ISSN: 2320-7817 | e-ISSN: 2320-964X
Special Issue A2, October 2014

INTERNATIONAL JOURNAL OF LIFE SCIENCES

AN INTERNATIONALPEER REVIEWED OPEN ACCESS JOURNAL

UGC Sponsored
National conference on

Biodivesity conservation and Role of Microbes in Environment Management

Managing Editor
Dr. Arvind Chavhan

ORGANISED BY
Department of Botany
VSPM Academy of Higher Education Nagpur's
JAWAHARLAL NEHRU ARTS, COMMERCE & SCIENCE COLLEGE,
Wadi, Nagpur , 440023, India.

| IJLSCI

VSPM ACADEMY OF HIGHER EDUCATION, NAGPUR

JAWAHARLAL NEHRU ARTS, COMMERCE & SCIENCE COLLEGE,

WADI, NAGPUR-440 023 (M.S.) ☎ (07104) 220963, E-mail: jnc.wadi@rediffmail.com

FROM THE DESK OF PRINCIPAL

It is matter of immense privilege that Department of Botany of the college have undertaken commendable task of organizing UGC–Sponsored National Conference on "*Biodiversity Conservation & Role of Microbes in Sustainable Environment Management (BCRMSEM-2014)"* on Saturday, 18th October 2014. Covering major themes, it mean to communicate, sensitize as well as introduce various challengeable aspects of biodiversity conservation of threatened flora and fauna, and also role of microbes in sustainable management of clean, pollution free, oxygen rich, healthy environment for better survival of diverse group of biotic components including plants and animals existing on the globe. Such conference at national level is undoubtedly the need of hour. The convener, other staff members of this college and some staff members of P.G Department of Botany, RTM Nagpur University has put in their best efforts, taking care of all minute details that go into the organization of a conference of this scale.

I take this opportunity to congratulate convener and his team members on their meticulous planning, and the zeal with which they went about the task of execution to ensure that the conference is a grand success.

I wish them all the success.

Dr. (Mrs) Vijaya Raghatate
Principal

VSPM ACADEMY OF HIGHER EDUCATION, NAGPUR

JAWAHARLAL NEHRU ARTS, COMMERCE & SCIENCE COLLEGE,

WADI, NAGPUR-440 023 (M.S.) ☎ (07104) 220963, E-mail: jnc.wadi@rediffmail.com

FROM THE DESK OF CONVENER

It brings immense joy and pleasure to organize UGC–Sponsored National Conference on "*Biodiversity Conservation & Role of Microbes in Sustainable Environment Management (BCRMSEM-2014)"* on Saturday, 18th October 2014 at Guru Nanak Bhavan, Nagpur and hoist by Jawaharlal Nehru Arts, Commerce & Science College, Wadi, Nagpur. It aims to narrow the bridge of traditional existing knowledge and recent update information on various aspects of biodiversity of flora & fauna; conservation strategies; role of microbes in management of sustainable environment and other related topics. I believe that conference will provide an excellent opportunity and platform for interactions, deliberations and scientific collaboration among academicians, scientists, research scholars, students, NGOs, authorities in the core areas of biodiversity conservation, microbial degradation of wastes and sustainable environment management.

To commemorate the Silver Jubilee of Jawaharlal Nehru Arts, Commerce and Science College, Wadi, Nagpur in 2014-15, an idea of holding this conference was conceptualized by Head, Department of Botany along with the blessing, undeterred support and guidance of my Guru, Principal, Management and Authorities.

The committee has proposed strategies for conference to:

- Encourages students, community and professionals to draw inspiration from environmentally sustainable technologies, climate sensible building design, resource conservation and biological waste treatment systems, all of which demonstrate aspects of sustainable urban living.
- Enhances community sustainability, and encourages community ownership of local environmental issues.
- Create awareness among community importance of natural environment, renewable technologies and self-sufficient operation by application of environmentally friendly technologies.
- Develop greater community awareness and understanding of renewable energy technologies, the efficient use of energy and the use of alternative technologies for building design and operation that is both cost effective and environmentally sound.

The galaxy of speakers will provide invaluable and holistic information, knowledge and supplement an insight to core the aspects on the above topics that remains their exclusive domain.

The Novel Thoughts, Faith and Ideas of Founder, Vidya Shikshan Prasarak Mandal, Nagpur as well as my Guru has helped us to achieve an overwhelming response from area of enriched academicians, scientists, research scholars, enthusiastic students and other associated bodies. I take this opportunity to thanks and express my deep sense of gratitude to each and every member including participants/delegates, speakers, invitees, guests who have made us feel privilege to undertake this ambitious and gigantic task of successfully conducting the conference of intense magnitude.

I again complement all members and wish them a pleasant and memorable experience during the conference.

Dr. M.N. Bhajbhuje
Convener,
UGC-Sponsored National
Conference,
BCRMSEM-2014

VSPM Academy of Higher Education, Nagpur

JAWAHARLAL NEHRU ARTS, COMM. & SCIENCE COLLEGE, WADI, NAGPUR
UGC-Sponsored National Conference BCRMSEM-2014
Saturday, 18th October, 2014

GENERAL ORGANIZING COMMITTEE

Organizing Committee

Dr. (Mrs) Vijaya Raghatate	Principal & Organizer
Dr. M.N. Bhajbhuje	Convener & Organizing Secretary
Dr. Mrs M.R. Mahore	Member
Dr. C.B. Bhoyar	Member
Dr. A.R. Nagpure	Member
Dr. G.D. Zade	Member
Prof. S.M. Borkar	Member
Dr. N.C. Kongre	Member
Dr. (Ms) Bhatkulkar	Member
Dr. D.P. Gogle	Member
Dr. Nitin Dongarwar	Member
Dr. Rupesh Badere	Member
Dr. Prashant Jakhi	Member
Dr. Ashwit Fulzele	Member
Dr. Vinod Dongre	Member

Registration committee:
Dr. G.D. Zade
Prof. Narendra Gharad
Dr. Prashant Jakhi
Dr. Mahesh Kawale
Dr. Walay Tagade

Reception Committee:
Dr. M.K. Chavhan
Dr. R.K. Wanare
Dr.(Ms) M.M. Bhatkulkar

News /Publicity Committee:
Dr. C.B. Bhoyar
Dr. (Mrs.) M.R. Mahore
Prof. R.S. Barve
Prof. N.R. Petkar
Prof. A. U Deore

Publication Committee:
Dr. S.S. Tekade
Dr. N.C. Kongre
Dr. S.S. Shembekar

Stage Decoration Committee:
Dr. (Mrs) K.S. Borkar
Dr. (Ms) M.M. Bhatkulkar
Prof. (Mrs) L.V. Phate
Dr. (Mrs) A.K. Deshmukh

Catering Committee:
Prof. S.M. Borkar
Dr. G.D. Zade
Dr. A.R. Nagpure
Dr. M.K. Chavhan
Prof. (Mrs) L.V. Phate
Dr. (Mrs). K.C. Mandlekar

Technical Committee:
Dr. Rupesh Badere
Dr. Prashant Jhaki
Dr. Rahul Kamble
Mr. Gaurav Shende
Mr. Shivkumar Madavi
Mr. Ankush Kayarkar
Mr. Harsh Kapse

Poster Session:
Prof. (Mrs) C.S. Laddha
Dr. (Ms) P.P. Kurhekar
Prof. (Mrs) N.H. Kamble

Discipline committee:
Dr.S.S. Khadse
Dr. S.D. Tade

VSPM Academy of Higher Education, Nagpur

JAWAHARLAL NEHRU ARTS, COMM. & SCIENCE COLLEGE, WADI, NAGPUR
UGC-Sponsored National Conference BCRMSEM-2014
Saturday, 18th October, 2014

STUDENTS COMMITTEE

Registration committee:
Dr (Mrs) Rupali Deshpande
Ms. Uma Thakur
Ms. Pradnya Anasane
Ms Madhuri Thakre
Ms. Reena Meshram
Ms. Swati Godghate
Ms. Supriya Waghmare
Ms. Omeshwary Chandekar
Ms. Kalyani Sawarkar
Ms. Nolifer Nisar Malik
Ms. Harshlata Patle

Reception Committee:
Mr. Ankush Kayarkar
Mr. Shivkumar Madavi
Ms. Uma Thakur
Ms. Vibha Choudhary
Ms. Sukanya Chandrikapure
Ms. Rohini Kanchanwar

Poster Session:
Mr. Piyushkumar Sharma
Mr. Vikas Bonde
Mr. Bhumeshwar Patle
Mr. Dewanand Mankar
Ms. Arti Rokde
Ms. Kalyani Raut
Ms. Pratiksha Vaidya

Stage Decoration Committee:
Pallavi Raut
Monali Khode
Puja Madankar
Sukeshni Mane
Ms. Jyoti Sharma
Ms. Monali Gotmare
Ms. Neha Dhobale
Ms. Ankita Bhobgade

Publication Committee:
Mr. Shivkumar Madavi
Ms. Sneha Dhongade
Ms Madhuri Thakre
Ms. Reena Meshram
Ms. Swati Godghate
Ms. Omeshwary Chandekar

Catering Committee:
Ms. Ashwini Upasani
Ms. Priyanka Rangari
Ms. Komal Thool
Ms. Keshri Atkari
Ms. Ekta Hajare
Ms. Anchal Tekade
Ms. Arti Roke

Technical Committee:
Dr. Rahul Kamble
Mr. Gaurav Shende
Mr. Shivkumar Madavi
Mr. Ankush Kayarkar
Mr. Harsh Kapse

News /Publicity Committee:
Ms. Dhanashri Taral Petkar
Ms. Monika Kakde
Ms. Pujadevi Patel
Ms. Neha Shamkuwar
Ms. P{ooja Ghagare

Discipline committee:
Mr. Amol Pimpalshende
Mr. Pankaj Ghakhare
Mr. Vikas Bonde
Mr. Piyushkumar Sharma
Mr. Mayur Meshram
Mr. Pankaj Sarile
Mr. Rajendra Jamunpane

INTERNATIONAL JOURNAL OF LIFE SCIENCES (IJLSCI)

(Peer Reviewed Open Access Journal)
ISSN: 2320-7817(Print) ISSN: 2320-964X (Online)

Editorial Board

Associate Editors

Members of Editorial Board

If one is interested to be member of editorial board of IJLSCI
Please send CV/ Biodata by Email- editorijlsci@gmail.com

ABOUT IJLSCI

International Journal of Life Sciences (IJLSCI) is a peer-reviewed, open access journal; it publishes original articles in all areas of Biology and Life Sciences. Authors are encouraged to submit complete unpublished and original works, which are not under review in any other journals. The scopes of the journal include, but limited to the following topic areas: Biology, Life Science, Anatomy, Botany, Cytology, Genetics, Microbiology, Physiology, Zoology, Ecology, Environmental Science, Hydrobiology, Neurobiology, Developmental Biology, Immunology, Molecular Biology, Biochemistry, Biophysics, and Biotechnology, Genomics and Proteomics. It is an open access journal, which publishes original research articles, reviews and short communication in all areas of life sciences and at the interface of related disciplines.

TYPES OF RESEARCH PAPER

Original Articles:
These should describe new and carefully confirmed findings, and experimental methods should be given in sufficient detail for others to verify the work. The length of an original article is the minimum required to describe and interpret the work clearly.

Short Communications:
Short communication also contain abstract. The list of references should not exceed 15. The presentation of Short Communications should contain headings such as Introduction, Materials and Methods, Results and Discussion, etc.

Reviews Articles:
Submissions of review articles and perspectives covering topics of current interest are welcome and encouraged.

Publication Frequency: Quarterly (published in March, June, September & December).

The journal is published in print as well as online version which is free access and downloads.

THIS JOURNAL IS CIRCULATED / DISTRIBUTED THROUGH SUBSCRIPTION ONLY

Submission of Paper: Submission of paper is encouraged by e-mail to editorijlsci@gmail.com
Subscription Plan: Rs. 2500 /- or 150 US$ (Individual Annual); Rs. 3500/- or 250 US$ (Institutional)
Life Membership: Rs. 10000/- or 550 US$ (Individual) Rs. 15000/- or 850 US$ (Institutional)
Fellow Membership: Rs. 15000/- or 850 US$ (Individual) Rs. 25000/- or 1700 US$ (Institutional)

Publisher and Owner: **Dr. Arvind Chavhan**, Published from **IJLSCI,** G-3, Dattamandir, Vinayak Nagar, Nagpur Road Amravati -444603

Printed at IJLSCI, G-3, Dattamandir, Vinayak Nagar, Nagpur Road Amravati -444603

Managing Editor: **Dr.Arvind Chavhan,** Department of Zoology, D.B. College, Bhokar, Nanded, India

Publisher, Editorial Board and Editor in Chief take no responsibilities for the inaccurate, misleading data, opinion and statement appeared in the articles published in this journal. All responsibilities of the contents rest upon the authors (especially upon the corresponding author).

INTERNATIONAL JORNAL OF LIFE SCIENCES

ISSN:2320-7817 (Print) 2320-964X (Online)

SPECIAL ISSUE A2; OCTOBER 2014

TABLE OF CONTENTS

KEY NOTE ADDRESSES

RESEARCH ARTICLES

ABSTRACTS

KEY NOTE

Soil and Rhizosphere Microbiome and Plant Productivity

Professor Johri BN

NASI Senior Scientist, Department of Biotechnology, Barkatullah University, Bhopal-462026

Soil is still a dogma in so far as its biological component is concerned. This dictum holds true and is particularly relevant for organisms that cannot be seen with the naked eye. Culturing techniques of the past decades have been best described as "plate count anomaly" since direct microscopic counts of especially bacteria do not match the values obtained on agar media. Last decades have seen a great deal by way of a debate on "culturables" vs "non-culturables" but with the advent of the science of "metagenomics", little if any doubts remain that the "classical" techniques did not permit recovery of more than 1 to 10% of the soil microbial population. Therefore, it is no surprise that soil has always been considered as a **"black box"** with respect to the resident microflora.

The sustainability of the soil system is dependent on both, biological and abiological components of this ecosystem. Several easy biological parameters such as microbial biomass C, dehydrogenase and FDA activity serve as indicators of quality of the soil; on the abiological front, level of organic 'C' 'N', 'P' are most important besides micronutrient status and pH profile.

For considerable period microbial population profile was used to assess productivity and quality of a soil for plant production systems, however, we now know that the relative balance and health of a soil is an outcome of microbial community ecology since this *inter-alia* is an outcome of fierce competition within the various populations that often exhibit inter and intra-level antagonistic interactions. This face of soil ecology is further compounded around the roots of a plant since root exudates provide relatively rich nutrient resource for competing populations in the so-called **"rhizosphere millieu".**

In view of its role in sustenance of human health through plant production system including food and cereal crops, Agro-forestry systems, horticulture, floriculture and others, stress has been laid on the efficiency of various soil types on the competitive interactions in soil and the resultant improvement in plant growth and disease. When one looks at the **"soil microbiome"** which represents total **"microbiota"** (culturable, non-culturables), the question is not not-only of diversity that is large and varied, but also inter- and intra-species interactions. This results in the so-called scenario of **"amensalilsm" "antagonism"** "**mutualism"** and others signifying the active beneficial and deletrious interactions that maintain balance of the soil ecosystem and determine the production scenario.

It has been surmised that on account of available nutrients as root secretion, **"rhizobiome"** is more diverse than its soil counterpart. However, it has now been observed that whereas microbial population in this milieu may be large, the species diversity in non-rhizosperic soil is large. This happens in a rhizobiome since species of genera such as *Bacillus* and *Pseudomas* dominate this ecosystem.

In view of the extensive literature that is now available through use of molecular tools, the soil and rhizomicrobiome are open to dissection and strategies for improvement of plant growth and health have new meaning.

The above shall be the basis of discussion in this discourse.

*****

KEY NOTE

Plant diversity of Western Ghats and its Conservation

Dr. Yadav SR

Professor, Department of Botany, Shivaji University, Kolhapur-416 004 (Maharashtra) India
sryadavdu@rediffmail.com

Plants are universally recognized as a vital part of the World's biological diversity and an essential resource for the planet. In addition to the small number of crop plants used for basic food and fiber, many thousands of wild plants have great economic and cultural importance and potential, providing food, medicine, fuel, clothing and shelter for vast numbers of people throughout the world. Plants play a key role in maintaining the planet's basic environmental balance and ecosystem stability and provide an important component of the habitat for the world's animal life. It is estimated that the total number of vascular plant species may be in the order of 3,00,000 of particular concern is the fact that many are in danger of extinction threatened by habitat transformation, over exploitation, alien invasive species, pollution and climate change. The disappearance of such vital and large amount of biodiversity set, one of the greatest challenges for the world community to half the destruction of the plants diversity that is so essential to meet the present and future needs of Human kind.
India is one of the 12 megacentres of Biodiversity and has unique biogeographical composition. Of the estimated 17000 species of flowering plants in India, some 5725 (33.5%) are found to be endemic to India (Nayar, 1996). The three megacentres of biodiversity of India are Eastern Himalayas, Western Himalayas and Western Ghats. Western Ghats is a major center of endemism which alone provides a niche for about 4500 species of flowering plants of which 1720 species 135 infraspecific taxa are endemic to this region (Ahamedullah and Nayar, 1986).

A global strategy for plant conservation was framed and adopted unanimously at the 6th meeting of the conference of the parties to the convention held in the Hange in April, 2002. The strategy provides an innovative frame work for actions at global, regional, national and local levels. The most innovative element of the strategy is the inclusion of 16 outcome oriented targets, aimed at achieving a series of measurable goals by 2010.

The Western Ghats is a chain of mountains of 1600 km in length running parallel to West coast of the peninsular India from Tapi to Kanyakumari. It covers over 1,60,000 sq. km of which about 1,00,000 sq. km form mountain terrain. It plays crucial role in hydrological cycle of peninsular India and is major factor to control the climate of the region. It occupies just 5% of total area of the country but supports 25-26% of total angiosperm diversity of the country. In other words, maximum biodiversity is packed in Western Ghats and it forms a store-house of genetic diversity and bioresources. Agasthiamalai, Nilgiri-Kodagu-Silent Valley, Anamalai high ranges, Shimoga-Kanara, Mahabaleshwar-Khandala, Konkan-Raigad, Marathwada, Pulni hills are the major hotspots of endemism in the Western Ghats. Western Ghats support over 12,000 species of plants. It is one of the most important phytogeographical regions of India harboring about 5000 species of flowering plants of which 60 genera and over 1500 species are endemic. It is a home for many endemic relict species. Poaceae, Leguminosae, Acanthaceae, Euphorbiaceae, Asteraceae, Lamiaceae, Rubiaceae and Asclepidaceae are the dominant families of flowering plants in Western Ghats.

Western Ghats support over 1200 species of trees. *Blepharistemma membranifolia* (Rhizophoraceae), *Erinocarpus nimmoni* (Tiliaceae), *Meteoromyrtus*

wynaadensis (Myrtaceae), *Otonephelium stipulaceum* (Sapindaceae) and *Pseudoglochidion anamalayanum* (Euphorbiaceae) are monotypic endemic tree genera of Western Ghats. Some of the critically endangered species of Northern Western Ghats include *Barleria gibsonioides, Barleria grandiflora, Ceropegia evansii, C. jainii, C. mahabalei, C. panchganiensis, C. rollae, Rungia linifolia, Beaumontia jerdoniana, C. odorata, Epiprinus mallotiformis, Litsea wightiana, Rotala ritchiei, Aspidopterys canarensis, Crinum brachynema, Cryptocoryne cognatoides, Cyanotis papilionacea var. vaginata, Habenaria sauveolens, Peristylis richardianus, Hubbardia heptaneuron* etc. Some genera with more number of endemic species are *Impatiens* (71), C*eropegia* (26), *Nilgirianthus* (19), *Oberonia* (14), *Dalbergia* (7), and *Plebophyllum (*7). There are about 116 species and 9 infraspecific taxa belonging to 67 genera and 20 families exclusively endemic to Maharashtra. There are 29 species belonging to 17 genera of Poaceae, 19 species belonging to 5 genera of Asclepiadaceae, 13 species belonging to 6 genera of Liliaceae, 11 species belonging to 9 genera of Acanthaceae, 7 species belonging to genus *Eriocaulon* and 7 species belonging 5 genera of Fabaceae are endemic to Maharashtra. Monotypic genera endemic to Maharashtra are *Frerea indica* (Asclepiadaceae), *Seshagirica sahyadrica* (Asclepiadaceae), *Danthonidium gammiei* (Poaceae), *Pogonachne racemosa* (Poaceae), *Pseudodichanthium serrafalcoides* (Poaceae), *Tribolachne cookei* (Poaceae), *Triplopogon ramosissimus* (Poaceae), *Bhidea burnsiana* (Poaceae). Western Ghats is a store house of several bioresources and it is precious bank of species and genes of great significance in welfare of human society. It is under great human pressure and numbers of species are threatened.

21st century has arrived with important words like global warming, climate change, biodiversity, biodiversity crisis, conservation, bio-prospecting, sustainable development, benefit sharing and has imposed several challenges to biologists of this century. Today we are passing through an age of biodiversity loss in masses, biodiversity crisis, food security, energy crisis and several environmental and health problems. We are destroying 300 acres of tropical forest per hour for all the 365 days of the year and if this rate of destruction continues, we will be losing 50% of our total tropical forests by mid of this century. Every hour we are losing 1-2 species of flowering plants alone. We are destructing our forests and burning fossil fuels at an alarming rate leading to the climate change. The Climate change and biodiversity are two key issues of both national and international importance.

Our knowledge of biodiversity is negligible. We have just documented, described and named 10% of our total biodiversity. Remaining 90% diversity is yet to be studied, documented, described and named. This is the formidable challenge to the biologists of this century. Second important task that biologists need to undertake is conservation of biodiversity and provide ways and means for sustainable utilization of biological diversity which needs hard work, serious research, co-ordination and co-operation. Third major challenge to biologists is to compile and provide data on biodiversity accessible to masses through data bases and computers.

There are several other local, regional, national and international services expected from biologists. Some of the important burning issues include secured supply of food, fodder, energy and medicines in which biologists have to play a key role through their studies and research inputs. Control of exotic weeds and various kinds of pollutions are other challenges to the biologists. Biologists need to make common masses aware of biodiversity, its importance and sustainable utilization. We all have understood quite well that biodiversity is the basis of human progress and provides most of the day today needs of human being and practical solutions to environmental problems such as control of pollution, energy requirements in future, health care and almost all the basic needs of mankind. Today we have number of popular terms commonly used by people like bio-prospecting, organic farming, bio-fuels, petro-crops, energy plantation, bio-insecticides, bio-pesticides, bio-control, biotechnology, bio-remediation carbon crediting and many others, highlighting the importance of biological diversity in solving several problems.

Indeed, biodiversity is the only crucial capital of mankind for his progress and survival. No other capital is as important as biological capital to human beings. Every species has some role to play in maintaining the health of ecosystem. Human beings are the single most reason for loss of biodiversity. Man is responsible for deforestation, destruction and modification of habitats, all kinds of pollutions, climate change and loss of biodiversity. Now he has to provide solutions to the problems created by himself for his own survival and he has understood that only biodiversity will

provide solutions to overcome majority of the problems. In this venture biologists have a key role to play through their studies, research and knowledge.

Biologists need to provide solutions for food and fodder security through improving existing food and fodder crops or developing new crops which will suit to changing climate. The biologists need to explore new bio-resources for various needs of human kind like shelter and energy. Biologists need to discover new drugs to treat the diseases. Biologists need to provide solutions to minimize various kinds of pollutions. He needs to provide answers to protect and conserve our biodiversity and its sustainable utilization. He needs to present way out to minimize climate change. In other words, he has to provide answers to majority of the problems that world are facing today. Furthermore, biologists need to document, describe and name huge unknown biodiversity of this planet, provide ways and means of its conservation and make this huge data accessible to the world. We, the teachers of biology in vicinity of one of the eight hottest hotspots of the world, the Western Ghats can significantly contribute to documenting the biodiversity, bio-prospecting our bio-resources and conservation of biodiversity. We have added advantage of youth with us through which we can train and prepare youth to undertake the challenges faced by the world in 21st century.

Western Ghats has rich biodiversity, however our knowledge on Western Ghats is scattered. We do not have complete documentation of biodiversity of Western Ghats which is very essential in policy framing, managing and protecting our biodiversity and resources. Western Ghats plays a key role in control of climate and hydrological cycle in peninsular India. Total agriculture in peninsular India depends on Western Ghats and it is the backbone of economy of the region. It is treasure house of biological diversity and new bio-resources. There are several issues like development verses biodiversity conservation and environment protection which needs serious considerations from a community of teachers, researchers, society and policy makers.

The present lecture is the synthesis of importance of plant diversity, its conservation, bio-prospecting plant sources and protection of Western Ghats.

*****

RESEARCH ARTICLE

Biosynthesis of silver nanoparticles using *Euphorbia hirta* leaves extract and evaluation of their antimicrobial activity

Basarkar UG*, Nikumbh PS and Thakur HA

P. G. Department of Botany, G. E. Society's, HPT Arts & RYK Science College, Nashik – 422 005

** Corresponding author -gdbasarkar@yahoo.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Basarkar UG, Nikumbh PS, Thakur HA (2014) Biosynthesis of silver nanoparticles using *Euphorbia hirta* leaves extract and evaluation of their antimicrobial activity, *Int. J. of Life Sciences,* Special Issue A2: 1-5.

Acknowledgement:
We thank Dr. Krishnau, Head, Department of Biology, TIFR, and Mumbai for analysis of samples. We also thank Mr. Nilesh Kulkarni, TIFR for XRD and Mrs. Shilpa TIFR for SEM analysis. We are grateful to Dr. Borahade, Professor, Department of Chemistry for UV and FTIR analysis of samples. We are thankful to Principal, G.E. Society's HPT Arts & RYK Science College for providing infrastructural facilities

ABSTRACT

Development of eco-friendly process through various biological means helps to explore various plants for their ability to synthesize silver nanoparticles. In the present study, biosynthesis of silver nanoparticles carried out using leaf extract of *Euphorbia hirta* at room temperature. Silver nanoparticles were characterized for UV-Vis Spectrophotometer, SEM, FTIR, XRD & EDX. The antimicrobial activity of silver nanoparticles was evaluated on gram positive (*Staphylococcus aureus*) gram negative (*Escheria coli, Salmonella paratyphi, Klebsiella pneumonia*) & fungi (*Candida albicans*). *S. aureus & C. albicans* were found to be more susceptible to silver nanoparticles. MIC study revealed that 2 and 5 % concentration of *C. albicans* found to be effective inhibitory concentration.

Keywords: Characterization, biosynthesis, leaf extract, silver nanoparticles, antimicrobial activity.

INTRODUCTION

Nanobiotechnology finds extensive application in nanomedicine, an emerging new field. It is a low cost, environment benign, non toxic and large scale up process. Silver has long been recognized as one of the nanoparticles having inhibitory effect on microbes present in medical and industrial process. Nanomaterials have a long list of applicability in improving human life and its environment. The synthesis and assembly of nanoparticles would define from the development of clean, nontoxic and environmentally acceptable "green chemistry" approaches for nanoparticles. Silver is an effective antimicrobial agent, exhibits low toxicity and has diverse *in vitro* and *in vivo* applications (Mani *et al.,* 2012). Nanoparticle can be used in combination therapy for decreasing antibiotic resistance. Antibiotics are sometimes associated with adverse effects on the host including hypersensitivity, immune- suppression and allergic reactions. There is a need to develop new antimicrobial drugs for treatment of infectious diseases. Because of their high reactivity due to large surface to volume ratio, nanoparticles play a crucial role in inhibiting bacterial growth in aqueous and solid media.

Green synthesis of silver nanoparticles has been reported using extracts of various plants such as *Lantana Camera* (Thirumurugan *et al.,* 2011), *Datura metel* (Ojha *et al.,* 2013), *E. hirta* (Elumalai *et al.,* 2012). *E. hirta* belongs to family Euphorbiaceae is distributed throughout the hotter parts of India and Australia, often found in waste places along the roadsides. *E. hirta* is widely used in traditional system of medicine to treat diabetes in India (Kumar *et al.,*

2010). Extracts of *E. hirta* have been found to show anticancer activity. In view of this following study was undertaken to synthesize the silver nanoparticles, reducing the silver ions present in the solution of silver nitrate by the cell free aqueous leaf extracts of *E. hirta.*

MATERIALS AND METHODS

For the synthesis of silver nanoparticles, plants were collected from the college campus and from nearby area of Nasik city. The extract was used for reducing and capping agent. Silver nitrate (Qualigens make), was purchased from Fisher Scientific India Pvt. LTD, Basiness Park, Powai, Mumbai, India. Culture of micro organism was procured from the Department of Microbiology and BAC Test Lab, Nasik. The nutrient media used here were supplied by Hi media.

Preparation of plant extracts:

The leaves of the plant *E. hirta were* collected from college campus and nearby areas of Nasik city. The leaves were allowed to dry at room temperature and powdered. The plant leaf broth solution was prepared by taking 20 gm of finely powdered leaves in 500 ml Erlenmeyer flask with 100 ml of sterile distilled water and then boiled the mixture for 10 min. It was then filtered to obtain the plant extract and stored at 4^0 C.

Synthesis & characterization of silver nanoparticle:

Silver nitrate was used as precursor in the synthesis of silver nanoparticles**.** 5 ml of plant extract was mixed with 25 ml of 3 mM silver nitrate and kept in dark for synthesis of silver nanoparticles. Then solution is stored at room temperature for 24 hrs for complete settlement of nanoparticles. Characterization is studied with p^H analysis which was determined by using digital p^H meter Systronic. (Ojha *et al.,* 2013), UV-Visible spectra analysis, FT-IR measurement, Scanning electron microscope analysis, X-ray diffraction study (Priya *et al.,* 2011*)*, Energy dispersive X-ray spectrometers (Saraniya *et al.,* 2012). *In vitro* antimicrobial assay by well diffusion method (T. Dhanalakshmi *et al.,* 2012). The determination of MIC of extracts was conducted according to standard procedures (Eloff, 1998).

RESULTS AND DISCUSSION

Synthesis & characterization of silver nanoparticles

Change into dark yellowish color is due to reduction of silver ions (Table-1) and reducing pH, of the solution which may be an indication of formation of silver nanoparticles. In this analysis, it was observed that p^H changed from high acidic to low acidic (Table 2). Fig. 1 represents the UV-Vis spectra of aqueous component as a function of time variation of leaf broth with 3 mM aqueous AgNO3 solution. Absorption spectra of Ag nanoparticles formed in reaction mixture at different time intervals at nm showed the particle has increasingly sharp between 1^{st} to 6^{th} hour i.e. particles are polydispersed to 380 nm throughout the reaction period indicates that the particles are dispersed in the aqueous solution.

Table 1: Change in color of solution during synthesis of silver nanoparticles

Sr. No.	Name of the plant samples	Color change		Color intensity *	Time (Hrs)
		Before reduction of Ag	After reduction of Ag		
1	E.hirta	Yellow	Dark yellowish	++	24
2	$AgNO_3$ Solution	Colorless	Colorless	-	-

**Color Intensity - (+) Light (++) Dark (+++) Very dark (-) Colorless*

Table 2: pH Analysis

Sr. No.	Plant Name	Plant part used	pH change in plant extract samples during synthesis of Ag nano particles		UV range	Results
			Before	After		
1	E.hirta		06	05	380	+ve

Table 3: In *vitro* antimicrobial activity of silver nanoparticles of *E.hirta* plant extract

Name of plant the extract	Zone of inhibition (mm)				
	Bacterial strains				Fungal strain
	E. coli	S. aureus	K. pneumonia	S. paratyphi	C. albicans
E.hirta		08	-	-	10
Distilled water	09	12	-	-	-

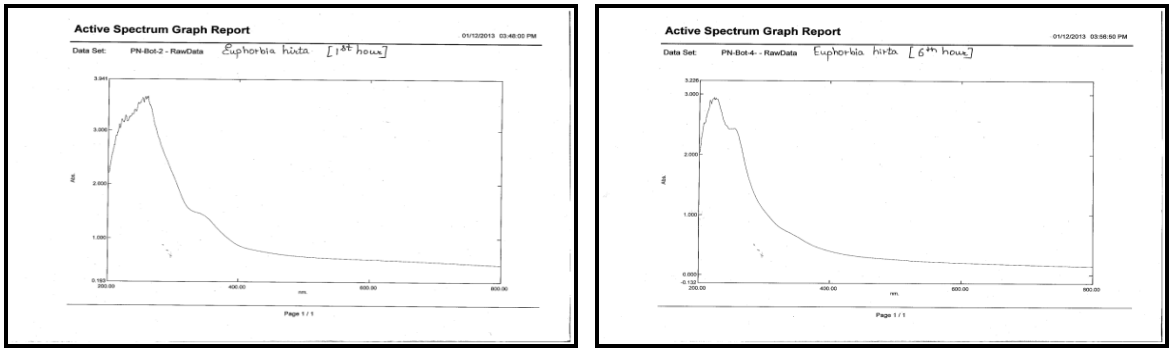
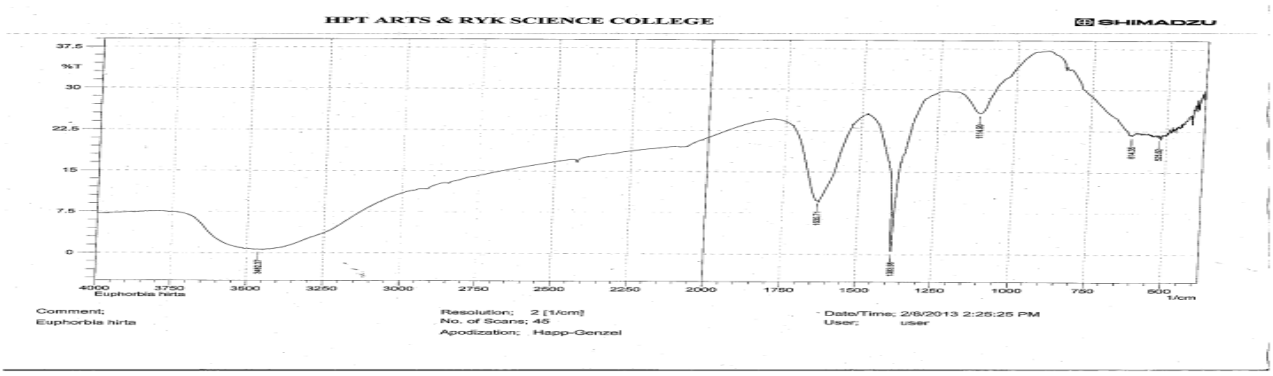


Fig.1:UV-Vis spectra of *E.hirta* with interval of 1st to 6th hour range 200-800 nm.



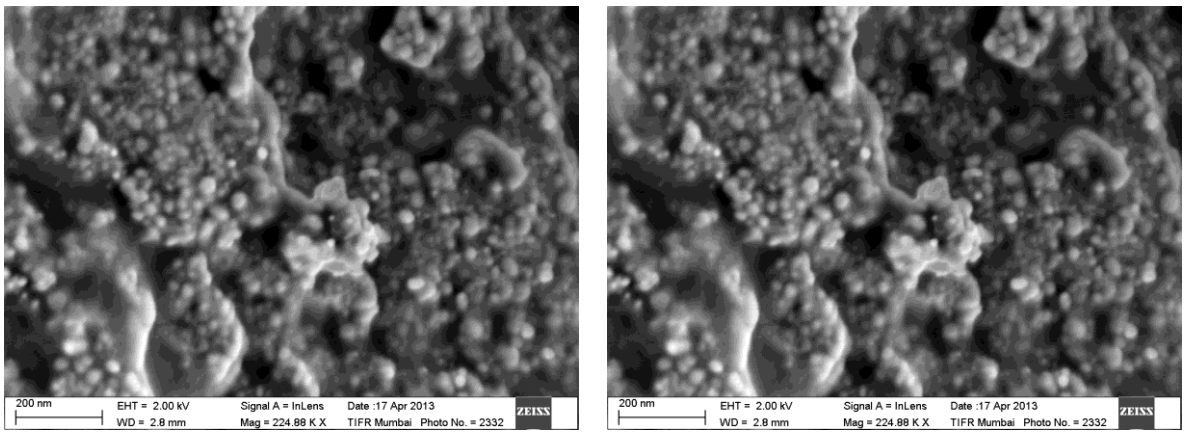


Fig. 3:SEM image of silver nanoparticles

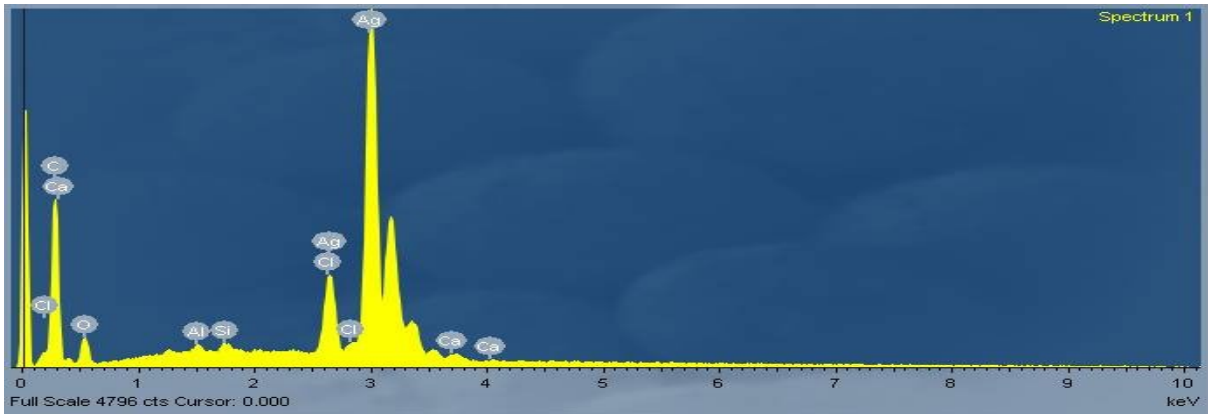


Fig. 4(a):EDX image of silver nanoparticles

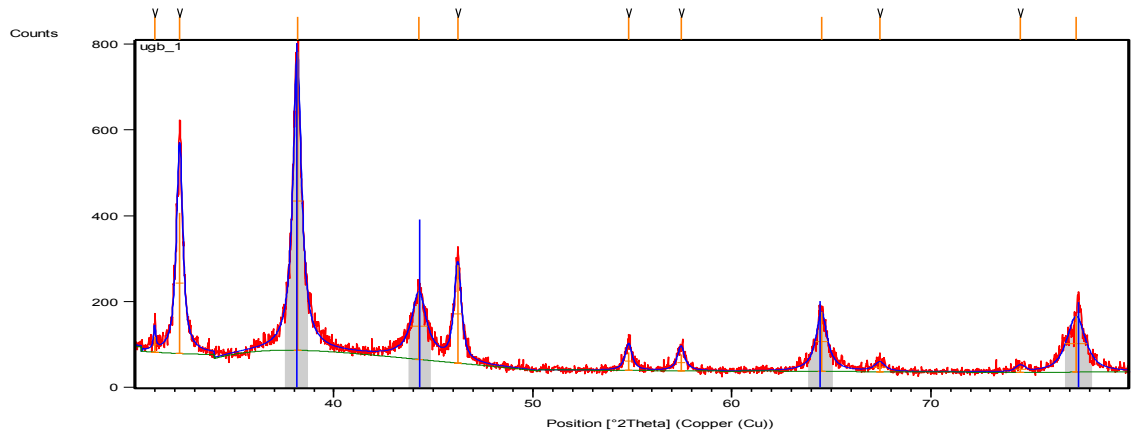


Fig. 4(b):XRD pattern from drop-coated films of synthesized silver nanoparticle

It was observed that the nanoparticles solution was stable for more than six months with little signs of aggregation.

Table - 4 Minimum inhibitory concentration of silver nanoparticles of *E.hirta* plant extracts

Name of the plant sample	Concentration (%)	Zone of inhibition (mm)	
		S. aureus	*C. albicans*
E.hirta	1	-	07
	2	-	11
	3	-	07
	4	-	08
	5	-	11
	control	-	08

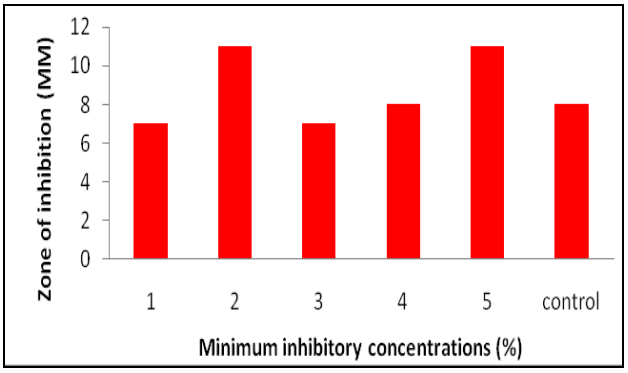


Fig. 5: Minimum inhibitory concentration of *E. hirta* for *C. albicans,*

FTIR measurements (Fig.2) were carried out to identify the possible biomolecules responsible for capping and efficient stabilization of the metal nanoparticles synthesized by leaf broth. In *E.hirta*, the Peaks near 3462.37cm-1 assigned to OH stretching respectively. The weaker band at 1635.71 cm-1 corresponds to amide I arising due to carbonyl stretch in proteins. The peak at 1114.90 cm-1 corresponds to C-N stretching vibration of the amine. The peak near 614.35cm-1 and525.62 cm-1 assigned to CH out of plane bending vibrations are substituted ethylene systems -CH=CH(cis). IR spectroscopic study confirmed that the carbonyl group form amino acid residues and proteins has the stronger ability to bind metal indicating that the proteins could possibly form a layer covering the metal nanoparticles (i.e. capping of silver nanoparticles) to prevent agglomeration and thereby stabilized the medium. This suggests that the biological molecules could possibly perform dual function of reduction and stabilization of silver nanoparticles in the aqueous medium.

The SEM image shown high density Ag nanoparticles synthesized by *E.hirta* plant extract further confirmed the presence of Ag nanoparticles (Fig.3). The nanoparticles were not in direct contact even within the aggregates, indicating stabilization of the nanoparticles by a capping agent. Under careful observation, it is evident that the silver nanoparticles surrounded by a faint thin layer of other materials, which we suppose are capping organic material from *E.hirta* leaf broth. The obtained nanoparticles are in the range of sizes 9–34 nm and few particles are agglomerate.

EDX micro analysis is performed by measuring the energy and intensity distribution of X-ray signals generated by a focused electron beam on a specimen which shows the EDS spectrum recorded in the spot-profile mode (Fig.4a). The optical absorption peak is observed at 3 KeV, which is typical for the absorption of metallic Ag nanoparticles. Strong signals from the

silver atoms are observed, while weaker signals from Cl, C, K, Ca, O, Mg, Si, P and S atoms are also recorded. Those weaker signals are likely to be due to X-ray emission from the plant leaves extract. From the EDX spectrum's it is cleared that Ag nanoparticles reduced by plant *E.hirta* have the weight percentage of silver which supports the XRD results.

XRD analysis of Ag nanoparticles using *E. hirta* plant extracts further confirmed the presence of Ag nanoparticles (Fig.4b).The XRD pattern showed intense peaks in the whole spectrum of 2θ values ranging for 9-34 nm. The typical XRD pattern revealed that the sample contains a mixed structure of silver nanoparticles. The average estimated particle sizes of the samples were calculated using the Debye- Scherer formula. A number of Bragg reflections corresponding to sthe sets of lattice planes are observed which may be indexed based on the face centered cubic structures of silver, peaks were also observed suggesting that the crystallization of bio- organic phase occurs on the surface of the silver Peaks marked with yellow background are from silver and average crystallite size is 9 nm.

In vitro antimicrobial assay

The biosynthesis of silver nanoparticles, *E.hirta* were studied for antimicrobial activity against pathogenic microorganism by using standard zone of inhibition microbiology assay. Ag nanoparticles of the plant extracts were found highly effective in their antimicrobial activity against *E. coli*, *S. aureus* and *C. albicans* than distilled water .Bacterial membrane, proteins and DNA make perennial sites for silver nanoparticles interactions as they possess sulphur and phosphorous compounds and silver has higher affinity to react with these compounds. Highest zone of inhibition was shown by extract of *E .hirta* (10 mm) against *C. albicans* & (8mm*)* against *S. aureus*. No any response observed with *K. pneumonia,* and *S. paratyphi* against plant extract. Remarkable result seen in control as distilled water for *S. aureus* (12 mm) and *E. coli* as (9 mm), (Table-3).

MIC study

MIC study revealed that no any aqueous concentration proved to be strongly susceptible likely (injury) for any of the pathogen. This might have resulted from minimum concentration used 2 & 5% from *E.hirta* found susceptible to *C. albicans.* The results shown that the plant extracts silver nanoparticles were found effective against bacterial and fungal strain. The *S. aureus* and *C. albicans* mostly related to skin infection, food poisoning, (Table-4, Fig. 5)

CONCLUSION

The bio-reduction of aqueous Ag+ ions by the leaf extract of the plants*, E. hirta* has been demonstrated. The reduction of the metal ions through leaf extracts leading to the formation of silver nanoparticles of fairly well defined dimensions. This green chemistry approach toward the synthesis of silver nanoparticles has many advantages such as, ease with which the process can be scaled up, economic viability etc. The use of medicinally important plants *E.hirta* has added advantage that these highly medicinally important plants can be used by nanotechnology processing industries for pharmaceutical formulations. Toxicity studies of silver nanoparticles on human pathogens open a door for a new range of antibacterial agents. Thus present study showed a simple, rapid and economical route to synthesize silver nanoparticles. Additionally it can minimize the dose of pharmaceutical formulations.

REFERENCES

Thirumurugan A, Tomy NA, Kumar HP, Prakash P (2011) Biological synthesis of silver nanoparticles by *Lantena Camera* Leaf extracts. *Int. J. of Nanomaterials and biostruc.*; 1(2) 22-24.

Ojha Akshaya Kumar, Rout J, Behera S and Nayak PL (2013) Green synthesis and characterization of zero valent silver nano-particles from leaf extract of *Datura Metel*; *IJPRAS,*.2:31-35.

Elumalai EK, Prasad TNVKV, Hemachandran J, Viviyan Therasa S, Thirumalai T, David E (2010) Extracellular synthesis of silver nanoparticles using leaves of *Euphorbia hirta* and their antibacterial activities. *Sci. & Res*., 2(9):549-554.

Eloff JN (1998) A sensitive and quick microplate method to determine the minimal inhibitory concentraton of plant extracts for bacteria. *Planta Medicas*, 64: 711-713.

Priya Mano M, Karunai Selvi B, John Paul JA (2011) Green Synthesis of silver nanoparticles from the leaf extracts of *Euphorbia hirta and Nerium indicm*. *Digest J. of Nanopaterials and Biostructures* 6(2): 869-877.

Mani Aparna, Lakshmi Seetha S, Gopal V (2012).Bio-mimetic synthesis of silver nanoparticles and evaluation of its free radical scavenging activity. *Int. J. of Biolog and Pharma. Res*., 3(4):631-633.

Saraniya Devi J, Valentine Bhimba B, Ratnam Krupa (2012) Invitro Anticancer activity of silver nanoparticles synthesized using extract of *Gelidella sps*. *Int. J. of Pharmacy and Pharmaceutical Sciences*, 4 (4).

Kumar Sunil, Rashmi and Kumar D (2010) Evaluation of antidiabatic activity of *Euphorbia hirta* in streptozotocin induced diabetic mice; *Indian J. of Nat.Prod. and Resou*. 1 (2):200-203.

Dhanalakshmi T and Rajendran S (2012) Synthesis of silver nanoparticles using *Tridax procumbens* and its antimicrobial activity . *Scholar Research Library, Archieves of Applied Science research,* 4 (3): 1289-1293.

RESEARCH ARTICLE

Role of fungal metabolites on seed viability and seedling emergence of *Triticum aestivum* L.

Bhajbhuje MN[1]*and Pathode Punam R[2]

[1] *Dept. of Botany, Jawaharlal Nehru Mahavidyalaya, Wadi, Nagpur-23 (M.S.) India*

[2]*P. G. Department of Botany, RTM Nagpur University, Nagpur 440 033 (M.S.) India.*

**Corresponding Author Email: dr_mnbhajbhuje@rediffmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Bhajbhuje MN and Pathode Punam R (2014)Role of fungal metabolites on seed viability and seedling emergence of *Triticum aestivum* L., *Int. J. of Life Sciences,* Special issue A2: 6-10.

Acknowledgement:
The authors gratefully acknowledges the facilitation of this work by Prof. & Head, Dr Mrs. Alka Chaturvedi and Dr .R.P. Thakre, Ex- Professor, P.G. Department of Botany, RTM, Nagpur University, Nagpur.

ABSTRACT

Fungal metabolites are well known low molecular weight, biconcave organic compounds created or secreted or excreted by diverse group of fungal organis- ms as results of diverse beneficial or detrimental activities or chemical reactions occurring in every functional cell during its growth and metabolism. The metabolites produced in growth nutrient medium by *Alternaria triticina*, a serious causal pathogen of leaf blight of *Triticum aestivum* L. were isolated from culture filtrate for a period between 5 to 25 days at an interval of five days in Czapek's broth medium and tested for their effects on seed viability and seed emergence of wheat. An increase in per cent seed germination and shoot length of seedling over control were recorded with five days old metabolites treated seeds. The rate of seed germination and seedling emergence declined while percent dead seeds and abnormal seedlings increased with metabolites of longer duration. The seed coat of treated hard seeds becomes soft, but seeds did not germinate. The metabolites from five day old culture filtrate served as growth promoter while metabolites of longer duration are toxic and acts as growth inhibitor.

Key words : *Alternaria triticina*, fungal metabolites, seed viability, seedling emergence, phytotoxic.

INTRODUCTION

Microbes are ubiquitous and constitute largest group of living creatures with varying potentials in biochemical, physiological and nutritional mode and play a key role in numerous fields including agriculture, biotechnology and biological engineering (Brakhage and Schroeckh, 2011). Majority of microbes release or excrete various active metabolites during their static growth and proliferation in favourable environment due to constantly occurring diverse metabolic reactions in every functional cell, which at low concentration enhance growth of plant seedlings and serve as growth promoter. Higher dosages of metabolites of fungal origin induce stunted growth, creating disturbances in normal karyokinesis of cell cycle, leads to chromosomal alteration and cause lethality (Bhajbhuje, 2013) and also may acts as

mutagens resulting to mutants that exhibit appearance of some phenotypic variations in resultant seedlings in subsequent generation (Venda *et al*., 2012).

Wheat (*Triticum aestivum* L.), one of the world's main widely planted staple nutritious food crop for more than one third of the world population is grown extensively in every continent around the globe except Antarctica for its amber-coloured non-dehiscent caryopsis, a single seeded fruit, as it is proved as an excellent health-building food and leading source of vegetable protein, minerals, Vit-B and dietary fibre in human diet, contributing 20% of all calories and proteins to the world diet than other major cereals (Wikipedia, 2014). Wheat seed is known for its potential longevity and has multiple applications as whole grain to improve nutrition, boost food security, foster rural development, support sustainable land care and for its value added products (Taylor and Koo, 2011). India is second leading producer of bread wheat on the globe, contributing 14.1% of the World's total annual output. Lion's share of India's production, accounting for over 32.77% of the nation's total output is contributed by Uttar Pradesh followed by Punjab. Whole grain provides nearly 55% of carbohydrate and 20% of the food calories and mostly used as animal feed as well as raw material for ethanol production, brewing of wheat beer, for cosmetics while white flour from seed endosperm is used for making of bread, preparing zero cholesterol confectionary products, biscuits, pasta, noodles, yeast breads; cakes, cookies, crackers and pastries Asides from being used as food, wheat has several medicinal virtues including anticancer property (Wikipedia, 2014).

Deuteromycetous ubiquitous notoriously destructive plant pathogen, *Alternaria* is remained associated with a wide variety of substrates including seeds and its several species remains as an increasing threat to majority crops around the globe causing several diseases in plants (Wagh *et al*., 2012). Among these, *Alternaria* leaf blight of *Triticum aestivum* L.is serious incited by *Alternaria triticina* causing damping off of seedlings, producing brown to black leaf spots lead to a reduction of leaf count, adversely affect annual productivity to the extent of 20-30% (Mamgain *et al*., 2013). *Alternaria triticina* has been first recorded from India and initially isolated from wheat leaves as parasite and later on from stored wheat seeds as saprophyte and has shown to be seed transmitted in wheat. Moreover, the pathogen can survive as conidia on the seed surface or as mycelium inside the seed coat and produced toxic metabolites during their growth in storage. The infected seeds are often shriveled, reduced in size with a brown discolouration of the seed surface and loss the weight to the extent of 46-75% (Prabhu and Prasada, 1966). The toxin from secondary metabolites rapidly penetrates into the host as well as non-host plant tissues, directly acts on living host protoplasm and damages cell components of actively growing cells to influence the course of symptom expression in host plant (Brakhage and Schroeckh, 2011). Tsuge *et al*. (2013) have studied role metabolites by *Alternaria* species in plant system. Presently specific role of fungal metabolites on seed germination and seedling emergence has so far not been reported from wheat. It seemed to be worthwhile to study parameters concerning to seed germination and seedling vigour using *Alternaria triticina* metabolites with wheat.

MATERIALS AND METHODS

A composite seed sample in storage of bread wheat (*Triticum aestivum* L) collected in cotton bags from different cultivators has been screened for apparent deformities or discoloration. *Alternaria triticina*, an incitant of early *Alternaria* leaf blight of wheat was isolated from infested wheat seeds as an internal seed borne pathogen following the technique of ISTA (2014). An inoculum of *Alternaria triticina* isolate obtained from 6 days old culture was transferred aseptically into 35ml Czapek's broth medium and incubated for a period between 5 to 25 days at laboratory temperature and shaken every day. Separate sterilized broth and sterile distilled water were kept as control. After an interval of 5 days, the culture filtrate containing metabolites was tested for seed germination and seedling growth of wheat.

Healthy seeds sterilized with aqueous solution of 0.1% mercuric chloride were soaked for one hour in sterile distilled water to soften the seed coat. Hundred water soaked seeds were placed for 3 hours in 5 to 25 days old culture filtrate containing metabolites of *Alternaria triticina* in triplicate. Washing of the seeds was carried out immediately after the metabolic treatment. The moistened treated and untreated control seeds were transferred to sterile blotting paper folds in slots for germination and seedling growth studies. The slots were covered with glass cabinet to avoid spoilage of seeds by any saprophyte contaminants. The moisture content of blotter paper containing seeds has been

maintained by addition of sterile distilled water when required. The seedling height was measured and per cent seed germination was recorded on eighth day. The seedlings raised from germinating seeds were graded as normal and abnormal seedlings defined by Ismail *et al*. (2012).

RESULTS AND DISCUSSION

Seed is critical input for substantial agriculture as it is a container of embryos of a new generation and vehicle for the spread of new life (Saskatchewan, 2013). Recently upgraded standard agar plating method of ISTA (2014) was used for detection of *Alternaria triticina* on stored wheat seeds. It is in agreement with the earlier findings of Mathur and Kongsdal (2003) who recommended agar plating method for detection of *Alternaria triticina* in wheat seeds. However, the agar plate method was proved superior in respect of isolation of deeply seated fungal pathogen and sporulation as this medium is a jelly and rich source of carbon as well as other essential micronutrient for fungal proliferation (Chung, 2012).

The results of present investigation reveals that seed germination rate and shoot length of seedlings was recorded to enhance by 11.8% and 13.1%; per cent normal seedling increased by 40.8% whereas a count of dead seeds was confined to reduce by 38.8% over control respectively in with five days old metabolites treatment (Table 1). These results are in conformity with the earlier finding to these parameters involving *Aijung rice* (Islam and Borthakur, 2012); and *Vigna mungo* (Bhajbhuje, 2014) with five to seven days metabolite treatment. Sung *et al*., (2011) reported higher seed germination and seedling growth rates in Canola over control in cucumber and tomato plants receiving metabolic treatment of culture filtrate of *Shimizuomyces paradoxus*. Moreover, a conidial suspension of $1.0x10^4$/ml induced the highest growth stimulating effects on the total plant length in cucumber. Metabolites of *Trichoderma harzianum* induced germination wheat seeds with hard seed coat (Mokhtar and Dehimat, 2013) while *Fusarium oxysporum f. sp. lycopersici* and *Alternaria solani* metabolites enhanced seed germination rate of tomato (Raithak and Gachande, 2013). Several researchers reported secretion primary metabolites and some growth regulating factors in filtrate by *Alternaria alternata* and *A. solani* at early stages of fungal growth that enhanced the seed germination rate, seedling emergence (Chung, 2012; Raithak and Gachande, 2013; Bhajbhuje, 2014).

These primary metabolites at low concentration served as growth promoter and induced vigorous growth by stimulating phosphorylation in the host tissues in association of Ca^{2+} and Mg^{2+}(EFSA, 2011).

Table 1: Record of per cent seed viability and shoot length of seedlings receiving metabolic treatment to wheat seeds (*Triticum aestivum* L.)

Duration of treatment (Days	Seed viability			Seedling emergence		
	Per cent seed germination[1]	Ungerminated seeds		Shoot length of seedlings (cms)	Nature of seedlings	
		Dead seeds (%)	Hard seeds (%)		Normal seedlings (%)	Abnormal seedlings (%)
5	85.3 (+11.8)	11.2 (-38.8)	3.5 (-32.7)	14.32 ± 0.02 (+13.06)	90.0 (+40.8)	10.0 (-72.2)
10	73.3 (-4.1)	20.0 (+11.1)	6.7 (+21.8)	10.3 ± 0.03 (-6.4)	84.8 (+32.7)	15.2 (-57.9)
15	72.0 (-5.8)	20.7 (+15.0)	7.3 (+32.7)	9.38 ± 0.03 (-14.6)	73.6 (+15.2)	26.4 (-26.8)
20	64.5 (-15.6)	29.0 (+61.1)	6.5 (+18.2)	8.87 ± 0.02 (-19.4)	66.2 (+3.6)	33.8 (-6.8)
25	58.0 (-24.2)	32.3 (+79.4)	9.7 (+76.4)	8.31 ±0.05 (-24.5)	58.5 (-8.4)	41.5 (+14.9)
Czepak's medium	83.0 (+8.5)	11.3 (-37.2)	5.7 (+3.6)	12.03 ± 0.02 (+4.6)	63.8	36.2
Control (D.W.)	76.5	18.0	5.5	11.01±0.02	63.9	36.1

1. Average of 300 germinated seeds; 2. Values in parenthesis indicate per cent reduction or increase over control 3. ± indicates standard error

Moreover, the low concentration of these metabolites did not express any phenotypic variation in seedling receiving treatment. A growth stimulating effect in response to seed germination rate and seedling emergence over control in present study may be attributed to secretion of primary metabolites by pathogen at early stages of its growth that may serve as growth promoters. Siderophores produced by microbes improve nutrient acquisition, hormonal stimulation, disease suppression and the induction of resistance (Sung *et al*., 2011).

The results of table 1 revealed that per cent seed germination declined by 4.1% to 24.2%; the shoot length of seedling reduced to the extent of 6.4% to 24.5%; per cent normal seedling declined by 8.4% to 40.8% whereas a count of dead seeds was found to increase by11.1% to 79.4% over the control when seeds treated with 10 to 25days old metabolites. Control seeds did not express any change. These results were confirmed with earlier findings of Madhavi *et al*., (2012) in *Allium cepa* L.; Bhajbhuje (2013) in *Solanum melongena* Mill.; and Venda kumari *et al*., (2014) in *Brassica carinata* & *B. braun*. Anand *et al*., (2008) investigated that *Alternaria alternata* and *Colletotrichum capsici* produced nonspecific toxic metabolites in culture filtrate which reduced seed germination, root length, shoot length and vigour index of the seedlings of chilli, rice, mungbean, maize, cotton, groundnut, okra, eggplant, cucumber and tomato. Wagh *et al* (2013) reported t *Alternaria* leaf spot *in vitro* and *in vivo* in *Alternaria alternata* inoculated plantlets and detached leaves of *Lepidium sativum*. The phenomenon indicates that metabolites are both phytotoxic and mutagenic as far as the present plant material is concerned.

Various factors are considered responsible for non-germination of seeds, among them, the hard seed, become barrier for seed imbibition. In present study, the ungerminated seeds have been categorized into hard and dead seeds. Percent hard seeds were reported declined with increase of dead seeds when treated with metabolites of longer duration (Table 1). The results are in agreement with earlier findings of Sung *et al*., (2011) who reported higher percent of ungerminated seeds of cucumber and tomato. Jyoti and Malik (2013) reported the secretion of cell wall, cellulose tannin and other chemicals degrading enzymes by the fungal microbes, which may be induce softening of seed testa. It may be attributed to the softening of seed coat by series of chemical reactions on seed testa followed by diffusion of aqueous solution of metabolites to embryonic cells leading to increase in percent dead seeds.

Mycotoxin secretion by several filamentous fungi has been reported in many crops (Vedna kumari, *et al*., 2014). *Alternaria* species can invade crops at the pre- and post-harvest stage and cause considerable losses due to leaf spot, early blight, rotting of fruits and seeds, may results to secretion of a range of mycotoxins as well as other non-toxic metabolites under favourable environment in plants (Wikipedia, 2014). *Alternaria alternata* produced several toxic metabolites of major toxicological importance including, HST-toxin, AAL-toxins, tenuazonic acid, alternariol monomethyl ether, alternariol, altenuene, and altertoxin I in artificial medium during its growth period (Holensein and Stoessi, 2008).

Phytotoxic and mutagenic and effect of mycotoxins has been highlighted by Chung (2012) and Venda Kumari *et al*. (2014). The mycotoxins are known to cause chromosomal breakage, create disturbances in normal karyokinesis in mitotic cell division, alter regular metabolism & cell membrane permeability and also induced physiological and biochemical changes in host cells leading to rapid increase of electrolyte loss and decline in the membrane potential of metabolically active meristematic cells of the plant system (Sung *et al*, 2011; Bhajbhuje, 2013). Mycotoxin responds to inducing micro-mutation, cause carcinogenic disorders in experimental animals and also pose variety of health hazards in domestic animals and human beings (ESFA, 2011) . Alternariol-induced cytotoxicity is mediated by activation of the mitochondrial path-way of apoptosis. Higher dosages of tenuazonic acid had inhibitory effect on protein synthesis that lost seed viability (Chung, 2012). The low concentration of Altertoxin III, caused negligible damage at early stages, its higher concentration in the nutrient medium, reported causing more damage to the leaf surface at a later stage (Sung *et al*., 2011). Per cent seed germination and seedling height were found to be decline in treated seeds with 10-25 days metabolites (Table 1). The toxicity of fungal metabolites was intensified on longer duration of the treatment may be attributed to the more accumulation of secreted metabolites on longer duration, may induced inhibition in seed germination and seedling emergence (Sung *et al*., 2011; Bhajbhuje, 2013). The growth of the

isolated pathogen results in changes associated with various cellular, metabolic and chemical alterations, including damage to the DNA, RNA and protein synthesis, enzyme degradation & inactivation, loss of membrane integrity, lowering of ATP, decline in sugar and protein content, inability of ribosomes to dissociate, starvation of meristematic cells, increase in seed leaches and fatty acid content, reduced respiration and accumulation of toxic substances which leads to spoilage of seeds(Jyoti and Malik, 2013). On the other hand, the prevalence of active fungal spores in seeds suggests an imminent public health danger since their mycotoxins produced in seeds may lead serious and devastating clinical conditions in the consumers (ESFA, 2011); Chung (2012); Tsuge *et al*., (2013). Sung *et al*., (2011) and Bhajbhuje (2014) have also reported close relationship between the duration of treatment and process of inhibition of seed germination and seedling emergence in crop plants.

CONCLUSION

Alternaria triticina a leaf spot insisting fungal pathogen of wheat produced metabolites in nutrient medium during its growth. Primary metabolites are secreted at early stages of growth may serve as growth promoter, and exhibited growth stimulating effect by enhancing seed germination rate and seedling vigour. The toxicity of metabolites was intensified on longer duration of treatment attributed to release of secondary metabolites, serves as growth inhibitor, reduced seed germination and seedling vigour with greater count of abnormal seedlings. Primary metabolites may be beneficial to crop plants as they enhance seedling growth in plants. The toxic secondary metabolites may be used as mutagens in evolving high yielding mutant varieties of economically important crop plants.

REFERENCES

Anand T, Bhaskaran R, Raghuchander T (2008) Production of cell wall degrading enzymes and tons by *Colletotrichum capsici* and *Alternaria alternata* causing fruit rot of chilies. *J. of Plant Protection Res.,* 48(4) : 437-451.

Bhajbhuje MN (2013) Karyotoxicity of fungal metabolites in *Trigonella foenum-graceum L. Int. Res. J. of Sci. & Engg*.,1(2): 47-54.

Bhajbhuje MN (2014) Response of fungal metabolites on meristematic cells from roots of *Vigna mungo* (L.) Hepper. *Asiatic Jour. Biotech Resources. Special issue*, 4(3) : 41-47.

Brakhage AA, Schroeckh V (2011) Fungal secondary metabolites in strategies of activate silent gene clusters. *Fun.Gene.Biol.,*8(1):15-22

Chung Kung-Ren (2012) Stress response & pathogenicity of Necrotrophic pathogen *Alternaria alternata. Scientific,* 20(12): 635-641.

EFSA (2011) Scientific Opinion on the risks for animal & public health related to presence of *Alternaria* toxins in feed and food. *EFSA Journal*, 9(10): 2407.

Holensein JE, and Stoessi A (2008) Metabolites of *Alternaria solani* Part IX: Phytotoxocity of Altersolarol- A. *Envi. Health Penlt.* 108(2):143-147.

Ismail M, Anwar SA, Ul-Haque MI, Iqbal A, Ahmad N, Arain MA (2012) Seed borne fungi associated with cauliflower seeds and their role in seed germination. *Pakistan J. Phytopath.*, 24(1):26-31.

ISTA (2014) International Rules for Seed Testing: *International ISTA News Bulletin* 2014. Zurich, Switzerland.

Jyoti, Malik CP(2013) Seed deterioration: A review. *International Journal of Life Sci. Biotech & Pharma Res.*, 2(3): 373-386.

Madhavi M, Kavita A, Vijayalaxmi M (2012) Studies of *Alternaria porri* (Ellis) Ciferri pathogenic to Onion (*Allium cepa* L.). *Archives of Applied Sci. Res*., 4(1) : 1-9.

Mamgain A, Roychoudhary, Jagatpati T (2013) *Alternaria* pathogenicity & its strategic controls. *Res. Jour. of Biology*, 1 : 1-9

Mokhtar H, Aid Dehimat (2013) Study of *Trichoderma harzianum* filtrate on viability of some hard wheat seeds and on their interior associated fungi. *Agric., Biol. Jour. North America*, 4(1) : 48-53.

Prabhu AS, Prasada R (1966) Pathological and epidemiological studies on leaf blight of wheat caused by *Alternaria triticina*. Indian Phytopathol., 19 : 95-111.

Saskatchewan (2013) Guideline for seed borne diseases of pulse crops. Agricultural Knowledge Centre at 1-866-457-2377 www.agriculture.gov.sk.ca/seed-testing labs.(Retrieved April 10, 2014).

Sung GH, Bhushan S, Park KB, Park SK, Han JM (2011) Enhancing effect of *Shimizuomyces paradoxus* on seed germination and seedling growth of Canola, Plant rowth of Cucumber and Harvest of tomato. *Mycobiology*, 39(1): 7-11.

Taylor RD, Koo WW (2011) Outbreak of the U.S. and World wheat industries 2010-2020. Centre of Agricultural policy and Trade studies, North State University, Fargo, North Dakota58108-6050.

Tsuge T, Harimoto Y, Akimitsu K, Ohtani K, Kodama M, Akaqi Y, Equsa M, Yamamoto M, Otani H (2013). Host-selective toxins produced by plant pathogenic fungus *Alternaria alternata*, *Microbiol. Rev*., 37(1): 44-66.

Vedna kumari, Kumar A, Choudhary HK, Prasad R, Jambhulkar, Sharma S. (2014) *In vitro* screening method: An efficient tool for screening Alternaria blight resistance/tolerance during early generations in Ethiopian mustards (*Brassica carinata , B. braun). African Jour. Agric. Res.*, 9(1): 137-143.

Wagh P, Sinha S, Singh HK, Khare UK (2013) Pathogenic behavior of *Alternaria alternata* and phytotoxicity of its culture filtrates on *Lepidium sativum*: A medicinal herb of immense pharmacological potential. *The Bioscan*, 8(2) : 643-647.

Wikipedia (2014) Fungal metabolites, Org. en.wikipedia,org/wiki. Inc . (Retrieved April. 7, 2014).

RESEARCH ARTICLE

LM and SEM Studies on the pollen morphology of family Anacardiaceae from Chandrapur and Gadchiroli districts of Maharashtra State

Athavale Pradeep S

Department of Botany, Bhalerao Science College, Saoner- 441107, India.

**Address for Correspondance Email: pathavale@yahoo.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Athavale Pradeep S (2014) LM and SEM Studies on the pollen morphology of family Anacardiaceae from Chandrapur and Gadchiroli districts of Maharashtra State., *Int. J. of Life Sciences,* Special Issue A2: 11-12.

Acknowledgement:
The author is grateful to the Principal, Dr. Nimishe PK, Bhalerao Science College, and Prof. Doifode VD, Head, Department of Botany for their constant help and encouragement during the entire work. I also sincerely thank Mr. Awade SA and his son Mr. Awade KS, of Saoner for electronic type setting.

ABSTRACT

The present paper deals with LM & SEM studies on the pollen of Anacardiaceae collected from Chandrapur & Gadchiroli districts of Vidarbha region of Maharashtra state. The pollen morphological characters of Anacardiaceae indicate that the family is significantly eurypalynous. Pollen morphology of four (4) sp. of the family Anacardiaceae belonging to 3 genera viz. *Anacardium*, *Buchanania*, *Lannea* has been investigated using Light and Scanning Electron Microscope. Pollen grains are radially symmetrical, isopolar, subprolate to prolate spheroidal. Ornamentation of the exine is striate, striate-reticulate.

Key words : Pollen grains, morphology, aperture, ornamentation, LH, SEM.

INTRODUCTION

The family Anacardiaceae is a tropical family, represented by 55 genera and approx. 500 sp. The members of this family are mostly trees and shrubs, with a resinous bark and a milky sap. Leaves alternate, simple or compound, exstipulate. Flowers hermaphrodite or unisexual, actinomorphic. Stamens usually 5-10. Fruit a drupe. The chief genera of the family are Rhus, *Pistacia*, *Mangifera, Anacardium*. Pollen morphology of family Anacardiaceae has been studied by many workers viz. Anjum and Quaiser (2010); Erdtman (1952; 1971), Faegri and Iverson (1964); Moore *et al*. (1991).

MATERIALS AND METHODS

Polliniferous material (mature anthers) was mostly collected in small vials and fixed in 70% alcohol during field trips. Pollen grains taken from dried herbarium material was kept in 70% alcohol for one hour before processing. The pollen slides were prepared following the method of acetolysis of Erdtman (1952-1960). For scanning electron microscopy, acetolysed pollen grains were transferred to absolute alcohol, mounted on specimen stubs first vacuum sputtered and then coated with Gold-palladium (100Å thick).

The pollen grains were scanned on Cambridge sterioscan 250 MK. Pollen grains are also studied under the light microscope. The SEM observations on the plants selected for the study is given after LM observations. The size and shape of pollen grains and the dimensions of various features are all useful in identification. The measurement & ratios stated has been averaged from observations on at least 6 and more upto 10 grains. While describing pollen morphology a definite sequence is followed viz. polarity, symmetry, aperture condition, shape & size of pollen grain, exine stratification and sculpturing.

The place of collection is mentioned in the parenthesis, just below the name of the genus. The different terminologies used in the description are according to Erdtman (1952; 1971) and Faegri and Iversen (1964).

RESULTS AND DISCUSSION

***Anacardium* occidentale L**. [Fig. 1]
(Bramhapuri, Laheri, Bedgaon, Bhamragarh)
Grains isopolar, radially symmetrical, 3-colporate, colpus length 19.9 µ [19.5 -21 µ], ora lalongate, 4.9 µ [4.5-6 µ], rather small, 31.5µ x 23.4µ, [30-33 µ x 22.5-25.5 µ], subprolate, exine thick, 3 µ, sexine is thicker than nexine, striate-reticulate, distinct LO pattern.

***Buchanania* axillaris (Desr.) Ramam**. [Fig. 1 and 2]
(Bamni {Sironcha})
Grains isopolar. radially symmetrical, 3-colporate, colpus length 24.4 µ (24-25.5 µ), ora lalongate, 3.9 µ [3-4.5 µ], rather small, 30 x 24µ [28.5-31.5 x 24 µ], subprolate, exine thick, 3 µ, sexine is thicker than nexine, rather finely reticulate, distinct LO pattern

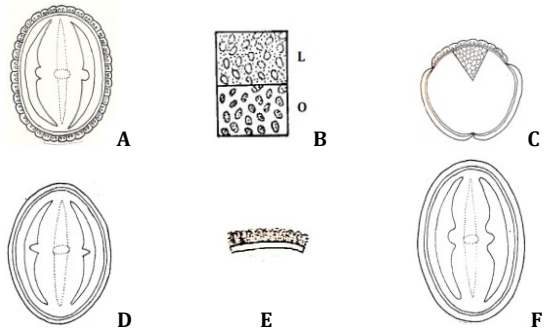


Fig. 1- A, B, C : Anacardium occidentale X 1000;
D, E,: Buchanania axillaris F: *Buchanania cochinchinensis*

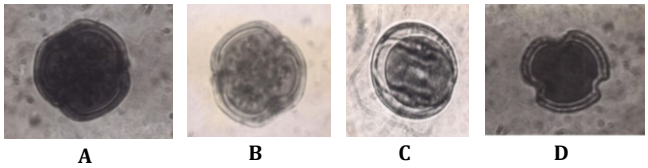


Fig. 2- A: Buchanania axillaris; **B:** *Buchanania cochinchinensis*; **C & D:** *Lannea coromandelica X 800*

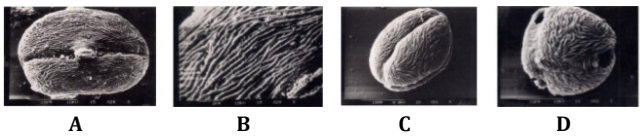


Fig. 3- A & B: *Buchanania cochinchinensis*;
C & D: *Lannea coromandelica X 800*

Buchanania cochinchinensis* (**Lour**.) *Almeida
(Bhamragarh).
Grains isopolar.radially symmetrical, 3-colporate, colpus length 24.9 µ (22.5-30 µ), ora lalongate, 4.5 µ, grains rather small,30 x 24.9 µ[27-33 x 24-27 µ],subprolate, exine thick,3 µ,sexine is thicker than nexine, finely reticulate, mesh size 1.5µ distinct LO pattern [Fig. 1, 2, 3]

***Lannea coromandelica* (Houtt.) Merr.**
(Pendhri, Jambhulkheda)
Grains isopolar.radially symmetrical, 3-colporate, colpus length 16.5µ (15-18 µ), ora slightly lalongate, 3.7 µ [3-4.5µ] grains small sized, 22.9 x 21.4µ [22.5-24 x 21-22.5 µ], prolate-spheroidal, exine thick, 4.5µ, sexine as thick as nexine, sexine 2.2µ, nexine 2.2µ, LO pattern not clear. (Fig. 3).

The pollen grain ornamentation for the pollen of *Buchanania cochinchinensis* & *Lannea coromandelica* were studied under Scanning Electron Microscope (SEM).

The pollen grains of *Buchanania cochinchinensis* under light microscope (LM) showed finely reticulate nature of the exine. However, under the SEM the pollen grains of *Buchanania cochinchinensis* (Lour.) *Almeida* and *Lannea coromandelica* (Houtt.) Merr. confirmed the striate-reticulate nature of the exine. The aperture condition is the same for all the taxa under present study. It is 3-colporate with a little variation in the length of the colpus. It ranged from 16.5 µ to 24.9 µ. Exine thickness also shows variation. In *Anacardium* occidentale L. and in *Buchanania sp*. the exine is thick. Sexine is thicker than nexine. In *Lannea coromandelica* (Houtt.) Merr. the exine is thick. In this taxon the sexine is as thick as nexine.

CONCLUSION

The pollen morphology of family Anacardiaceae shows that it is a eurypalynous family

REFERENCES

Anjum Parveen and Qaiser M (2010) Pollen flora of Pakistan-LXVI: Anacardiaceae. *Pak J .Bot.*, 42(3):1401-1406

Erdtman G (1952) Pollen morphology and Plant taxonomy-Angiosperms. Almquist & Wicksell, Stockholm.

Erdtman G (1971) Pollen morphology and Plant taxonomy.Hafner publishing company, New York, USA

Faegri K and Iverson J (1964) Textbook of Pollen Analysis, Munksgaard, Copenhagen.

Flora of Maharashtra State (2000), (2001) Dicotyledones Vol.I & II.B.S.I.Publication, Kolkata.

Moore PD, Webb JA and Collinson ME (1991) Pollen Analysis, Blackwell scientific Publication.

RESEARCH ARTICLE

Fungal Aeromicrobiota of Kamptee, Nagpur, India

Thaware Jayshree and Jawade Seema

Department of Botany, S. K. Porwal College, Kamptee Dist-Nagpur

E-mail: jsthaware@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Thaware Jayshree and Jawade Seema (2014) Fungal Aeromicrobiota of Kamptee, Nagpur, India. *Int. J. of Life Sciences,* Special Issue, A2: 13-16.

Acknowledgement
Authors are thankful to UGC for financial support and the Principal of S.K.Porwal College, authorities and staff for their kind cooperation and support.

ABSTRACT

Atmosphere is rich source of diverse groups of contaminants which may be biological or non biological in origin. Maximum contaminants have hazardous health effects such as allergic reactions, asthma, varied skin diseases, internal organ infection and toxicity as well. In the present study the mycological survey was carried out for one year from May 2013 to April 2014 by Volumetric Tilak Air Sampler which is known to capture approximate 75% of bio-particles. Aerobiological studies are of great importance as they provide with qualitative and quantitative information about airborne fungi in a given region. Total 24 Fungal spores were identified. *Alternaria, Artrinium, Ascospores, Beltrania, Bispora, Cladosporium, Curvularia, Didymosporium, Eppicoccum, Helminthosporium, Mold spores, Rust spores, Smut spores and Yeast* was observed throughout the year.

Key Words: *Fungal Spores, Tilak Air Sampler, Allergy, Seasonal, Spore/m³.*

INTRODUCTION

In the course of evolution, the fungi are adapted to transfer by means of air in greater extents comparatively to any other biological components which are transferred by wind such as pollen, insect, bacteria etc. Due to inhalation of fungal spores, toxicity is caused such as aspergillosis, allergic asthma, and some of saprophytic fungi are opportunistic pathogens which cause's skin diseases or any other internal organ diseases. Because of this they are termed as bio-contaminants, although they are indicator of pollution. (Ananthanarayan and Panikar, 2009)

Hazardous effects of fungi on human, animals and plants health can be minimized by monitoring the quality of air for knowing the diversity, abundance and variation according to seasonal changes. The day by day changing atmosphere affect the quality of air, reasoned due to change of its Biological and Non-biological components. For understanding of these variant phenomena, the continuous air sampling is needed. For this cause, the present study was carried out.

MATERIAL AND METHODS

The 'Volumetric Tilak air sampler'(Tilak and Kulkarni,1970) was fixed at the roof of Seth Kesarimal Porwal College, Kamptee at the height of 50 feet from

ground and runs continuously from May 2013 to April 2014. The glycerin jelly mounted 16 slides were prepared from Vaseline coated cello tape, removed from rotating drum of the sampler at the end of 8th day. The slides were scanned (Tilak, 1989) and fungal spores were observed, counted under Binocular microscope and identified by the standard literature. The Spores per cubic meter were calculated by the following formula:

Spores/m^3 = No. of same type of spore X 14

Where 14 is the conversion factor for Tilak Air Sampler)

RESULTS AND DISCUSSION

Total 24 Fungal spores were identified and others were separated from fungal spore which includes Pollen, Insect parts, hyphal fragments and some unidentified spores. Mold spores were represented by the spores of *Rhizophus, Mucor, Aspergillus, Penicillium species*. During a whole year total count of fungal spores was 60,662 spores/m^3 calculated. [Table –I] shows the monthly contribution of each fungal spore. February month showed highest 6510 CFU/M^3 followed by December, November and January. Throughout the year *Cladosporium* spore was most dominant after the *mold* spores [Fig.1].

A clear variation was seen among the fungal spores with respect to seasons. July, August, April and May shows the least count and diversity as well. Some spores were observed throughout the year like *Alternaria, Artrinium, Ascospores, Beltrania, Bispora, Cladosporium, Curvularia, Didymosporium, Eppicoccum, Helminthosporium, Mold spores, Rust spores, Smut spores and Yeast*. Some spores are seasonal, *Cercospora*

Table 1: Month wise count of Fungal spores of recorded species

Fungal Types	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Alternaria	308	280	252	224	182	168	196	210	238	252	266	336
Artrinium	224	168	126	112	112	210	252	196	252	266	280	322
Ascospores	196	224	308	336	364	392	406	252	224	252	196	182
Beltrania	252	182	168	154	168	196	210	224	252	266	280	308
Bispora	224	196	126	112	252	308	322	364	350	210	280	196
Cercospora	0	0	0	0	364	280	266	252	224	224	0	0
Chaetomium	0	28	42	70	84	126	140	168	182	112	70	0
Cladosporium	350	392	378	364	532	476	532	560	630	602	420	350
Curvularia	392	378	112	98	126	140	196	224	238	266	294	336
Didymosporium	168	196	84	56	140	168	196	224	238	252	196	294
Epicoccum	210	252	168	126	210	252	210	252	266	280	238	182
Fusariella	28	28	42	14	0	56	70	98	70	42	84	98
Helminthosporium	252	308	112	98	84	406	420	364	378	392	336	294
Hirudinaria	14	28	0	0	0	0	42	56	42	14	0	0
Leptospheria	42	70	0	0	0	56	98	112	70	84	0	0
Mold spores	1190	840	350	406	560	672	896	840	770	1050	1008	1260
Nigrospora	0	0	56	84	112	140	168	196	84	112	56	0
Pithomyces	336	280	0	0	42	28	14	56	42	98	140	252
Rust spores	28	126	42	28	84	126	168	196	224	308	364	140
Smut spores	364	392	140	98	182	210	238	238	280	336	378	406
Spegazzinia	56	42	0	0	0	112	210	252	280	322	182	126
Tetraploa	0	42	14	14	84	126	98	112	70	126	28	28
Torula	0	28	0	0	126	140	168	182	98	112	84	0
Yeast	14	42	140	98	224	252	196	224	266	280	42	70
Others	210	252	224	238	280	336	364	406	280	252	168	266
Total	**4858**	**4774**	**2884**	**2730**	**4312**	**5376**	**6076**	**6258**	**6048**	**6510**	**5390**	**5446**

and *Chaetomium* were observed in rainy season. *Hirudinaria* and *Leptosperia* were observed in winter. *Fusariella, Pithomyces, Spegazzinia, Tetraploa*, and *Torula* observed in winter and in the beginning of summer as well [Fig. 2: a, b and c]. A *mold spore shows* the highest peak in the month of April and May. Fig –III shows the yearly variation of fungal spores. Their curve represents the increase and decrease of their spore/m3 count.

Majority of Fungi are air borne and they vary greatly according to weather conditions and climatic factors. Many types of fungal spores are recorded from different environment (Hazarika et al., 2008; Cholke and Mahajan, 2008) Deforestations for settlement and Industrialization have huge impact for the diversity, variation and composition of air flora. The presence of yeast spores throughout the year is due to many small-scale bakery industries in Kamptee. The *yeast* and *yeast* like spores of *candida* are responsible for many diseases such as candiosis and asthma as well (Giri and Sawane, 2010). Lyon et al. (1984) and Grinn-Gofron et al. (2011) supported that the atmospheric factors and microclimate results in unique airomycoflora. The presence of *Alternaria, Artrinium*, *Beltrania*, *Curvularia*, *Fusariella*, *Helminthosporium*, *Pithomyces*, *Rust spores*, *Smut spores*, *Spegazzinia* spores in dry, warm air of summer was due their structural morphology, size and shape (Tilak, 2009) which were important for the buoyancy in air. The study of Skin Prick Test showed that varied range of fungal spores and its mycelium such as *Cladosporium, Aspergillus, Penicillium, Basidiospores* and *Uredospores* were proved to be allergic for different age group of peoples (Chakraborti et al., 2012). The above types of spores were high in concentration in present study.

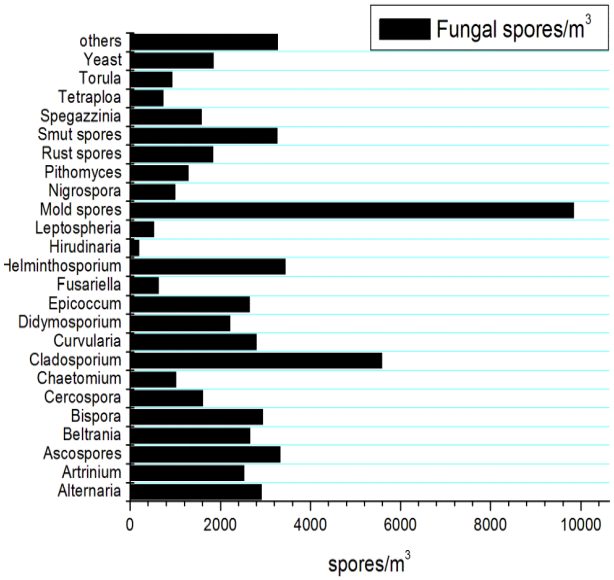


Fig. 1: Total fungal colonies count of recorded species

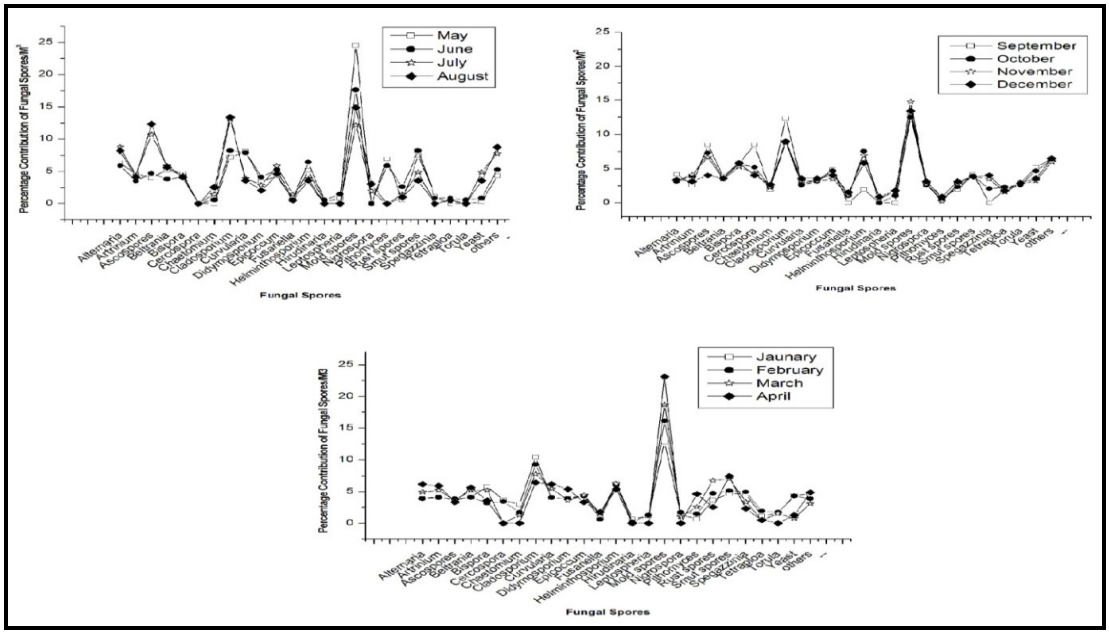


Fig. 2: a, b and c: Month wise fungal spore count variations

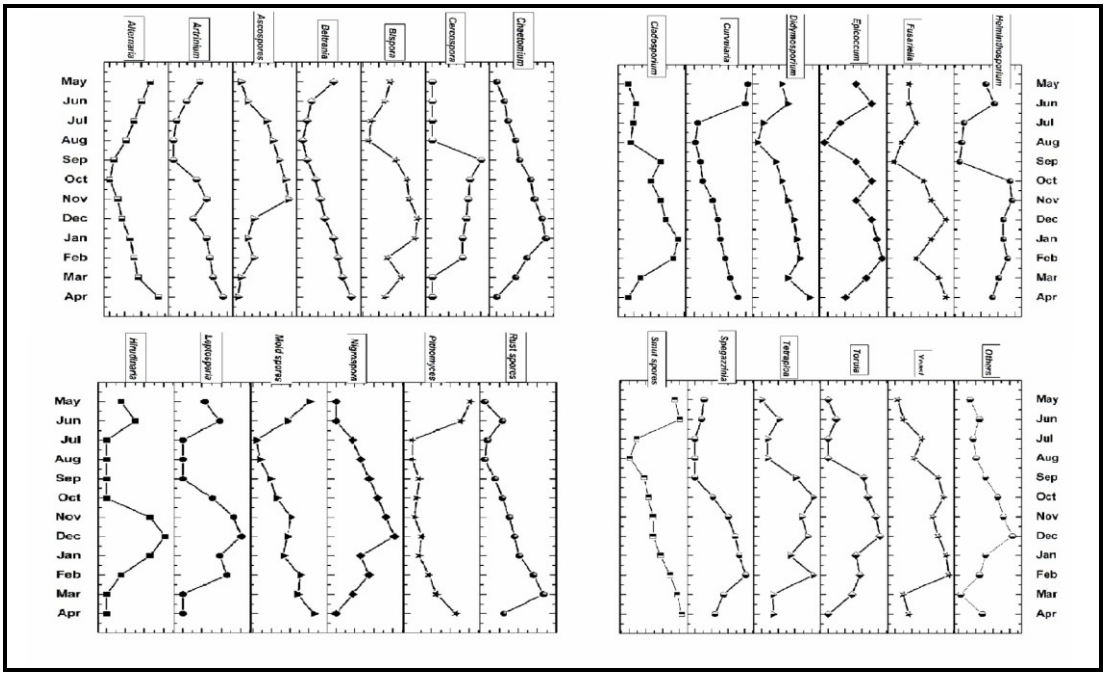


Fig. 3: Yearly variation of each fungal species recorded

CONCLUSION

Presences of yeast like spores were unique to the Kamptee environment. The high rainfall of July 2013 and August 2013 give minimum spore count and diversity which was result due to washout of spores, perhaps the mild rainfall was critical for the liberation of *ascospores*.

REFERENCES

Ananthanarayan R and Paniker C (2009) Textbook of Microbiology, University Press, 8th Ed. Pp.600-617.

Chakrabarti H, Das S and Bhattacharya S (2012) Outdoor airborne fungal spora load in a suburb of Kolkata, India: its variation, meterological determinants and health impact. *Int Jour Environ Health Res*., 22,No.1: 37-50.

Cholke PB and Mahajan MC (2008) Study of airomycoflora inside poultry shed, *Indian J. Aerobio*., 21, No.2:73-78.

Giri SK and Sawane AM.(2010) Airborne culturable fungi in Hospital Environment of Nagpur (Maharashtra) . *Indian J. Aerobio.,* 23 : 80-85.

Grinn-Gofron A, Strzelczak A and Wolski T (2011) The relationships between air pollutants, meteorological parameters and concentration of airborne fungal spores. *Environment pollution*, 159: 602-608.

Hazarika S, Bujarbaruah D and Sarma GC (2008) Air borne fungal spores in a paper mill complex at jagiroad, Assam. *Indian J. Aerobio*.,21,No.1:28-35.

Lyon FL, Kramer CL and Eversmeyer MG (1984) Variation of airspora in the atmosphere due to weather conditions. *Grana*. 23:177-181.

Tilak ST (2009) Aeromycology. U.S. Science publications, Pune.

Tilak ST (1989) Airborne Pollen and Fungal Spores, Vaijayanti Prakashan, Aurangabad. Pp. 125-283.

Tilak ST and Kulkarni RL (1970) A new air sampler. Experimentia,26:443.

Tilak ST and Srinivasulu BV (1967) Airospora of Aurangabad, *Ind. J. Microbiology*, 7:167-170.

RESEARCH ARTICLE

Influence of Biofertilizers on the Growth, Yield and Quality of Brinjal Crop

Doifode VD[1*] and Nandkar PB[2]

[1]*Department of Botany, Bhalerao Science College Saoner-441107, India.*

[2]*P. G. Department of Botany, RTM Nagpur University Nagpur, India*

**Corresponding Author E. mail: (vilasdd91@gmail.com)*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Doifode VD and Nandkar PB (2014) Influence of Biofertilizers on the Growth, Yield and Quality of Brinjal Crop, *Int. J. of Life Sciences,* Special Issue A2: 17-20.

ABSTRACT

The influence of biofertilizer inoculation, viz. *Azotobacter* and Phosphate Solubilising Bacteria (*PSB*) alone and in different combinations with recommended dose of chemical fertilizer (NPK) on Brinjal (*Solanum melongena* L.) crop was tested during the Kharif season of the year 2008 at agricultural field (21^{0}35'72.51 N; 78^{0}98'21.32E) to explore the possibility of reducing doses of chemical fertilizers and for better soil health. The results revealed significant improvement in growth characters such as height of plant (11.03% to 37.54%), stem diameter (6.38% to 23.79%), length of root (5.56% to 36.93%), number of functional leaves (5.67% to 51.51%), weight of fresh shoot (7.90% to 35.91%) and weight of dry shoot (7.14% to 46.94%) over the control. Similarly, number of fruits picked per plant (11.30% to 52.81%) and yield of fruits (11.89% to 54.61%) was more in inoculated crop. The attack of shoot-root borer, fruit borer and little leaf infestation was less (26.71% to 50.14%) as compare to un-inoculated condition.

Key words: Brinjal, Biofertilizers, NPK, Growth and Yield.

INTRODUCTION

The brinjal, also known as 'eggplant' or 'Guinea squash,' It is one of the most popular and commercial crop grown in India and other parts of the world and rightly called as vegetable of masses. The common large-fruited forms are believed to have originated in Indo-Burma region. Fruits are moderate sources of vitamins and medicinal properties including de-cholestrolizing action. China is the largest producer of Brinjal and contributes about 68.7% of the world's Brinjal production while India occupies second position in production with a share of 23.3%. However, the productivity of Brinjal is quite low (16-17 MT) in India. In India, Brinjal occupies fourth position in area and sixth in production among the vegetable crops. Brinjal cultivation is about 600 hectares with very fragmented attempts of biofertilizer applications in Saoner Tahsil of the Nagpur district (M.S.). Shoot-root borer, bacterial wilt, fusarian wilt, little leaf are the major threats to the brinjal.

The use of N-fertilizer not only spoils the ground water, soil but also have deleterious effects by the emission of harmful gases. The chemical fertilizers should be replaced with the natural and organic fertilizers which can play a key role of the conservation of the environment, (Jangral and Lakra, 2014).

Forum for Nuclear Co-operation in Asia Bio-fertilizer Project, National Project on Organic Farming and All India Network Project on Bio-fertilizers

aims to encourage use of bio fertilizers. Bio fertilizers improve the quantitative and qualitative features of many plants (Yosefi *et al*., 2011). Biofertilizers used in conjunction with chemical fertilizers improve crop productivity and nutrient use efficiency. Positive effect of azotobacterization on growth and yield of Brinjal also been reported by many workers. There is a positive influence of PSB on the growth and yield attributes of Brinjal-cv.Krishna (Gaikwad and Wani, 2001).

It is becoming difficult to meet the nutrient need of farming through chemical fertilizer alone and due to its higher costs, the concept of integrated plant nutrient supply system (IPNS) is gaining ground. Therefore, the investigation was planned and conducted to study the influence of liquid biofertilizers alone, dual and in different combinations with chemical fertilizers on the vegetative and reproductive growth, yield and quality attributes of *Solanum melongena* L.

MATERIALS AND METHODS

The experiments were laid down during Kharif season of 2008. The Randomized Block Design with four replications was adopted in field experiments. The sowing of experimental materials was done on 17th June and transplanting on 22nd July 2008 at agricultural field ($21^0$35'72.51 N; $78^0$98'21.32 E) in Saoner Tahsil of Nagpur district (M.S.). The brinjal variety Syngenta Green-Crown was given a spacing of 80-85 cm between two plants and 90-100 cm between two lines.

Overall the soils of experimental plots was medium, black, alkaline, with available N (158 kg/ha), P (7.38 kg/ha), K (443 kg/ha), organic C (0.42%), electrical conductivity (0.181 dSm^{-1}) and with 60.87% water holding capacity. This data was utilized to calculate the recommended dose of chemical fertilizer (RDF) in the form of granular urea, single super phosphate and muriate of potash. The RDF for present experiment was 75 N: 75 P_2O_5: 00 K_2O. The other agronomic practices were followed uniformly during cropping season and need based protection measures were taken. NPK fertilizers given in split doses by top dressing in ring placement as per the treatments. First application (07th Aug. 2008) constitute half dose of N and complete dose of P and K. Second application (05th Sept. 2008) constitutes remaining half dose of N.

The bioinoculant cultures (*Azotobacter chrochoccum* as AZT and *Bacillus polymyxa* as PSB) were confirmed from the RCOF, Nagpur, Ministry of Agriculture, Govt. of India. The seedlings were treated with liquid bioinoculant of viable cell count at transplanting time. Second inoculation of biofertilizers was made by broadcasting near the root zone of plants (19th Aug. 2008). The treatments were T-1: 100% RDF of NPK; T-2: 50% RDF of NPK + AZT + PSB; T-3: 50% RDF of NPK + AZT; T-4: AZT + PSB; T-5: AZT and T-6: Control (No treatment). Irrigation was provided as per the need and climate. The total rainfall of 869.4 mm was received during the season with 52 rainy days.

Observations were recorded on height of plant, stem diameter, length of root, number of functional leaves, weight of fresh plant, weight of dry plant, number of fruits picked per plant, yield of fruit and the gravity of pest infestations. Observations were recorded by selecting randomly two plants from each treatment for length of root, weight of fresh plant and weight of dry plant, all plants for pest infestation and five plants for rest of the parameters. The mean data for the yield was subjected to statistical analysis.

RESULTS AND DISCUSSION

Height of the plant studied from 15 to 150 Days After Planting (DAP). The max. plant height at 150 DAP (98.64 cm) was found in AZT + PSB + 50% RDF of NPK and 100% RDF of NPK (98.18 cm), whereas the min. was in control (71.44 cm). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 37.43%, 37.54%, 28.96%, 17.67% and 11.03% increased height per plant respectively over the control. Half dose of the chemical fertilizer is appeared to be compensated by the combined treatment of *Azotobacter* and PSB. The findings are in agreement with Dhumal (1992), Wange and Kale (2004). Mean stem diameter was under investigation from 15 to 150 DAP. The max. stem diameter at 150 DAP (3.33 cm) was found in 100% RDF of NPK and AZT + PSB + 50% RDF of NPK (3.08 cm), where as the min. was in control (2.69 cm). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 23.79%, 15.69%, 16.04%, 11.89% and 6.38% increased mean stem diameter per plant over the control. A secretion of growth hormones and availability of nutrients and moisture influenced positively the stem diameter. Findings are closely supported by Manjusha (1996).

Average length of root per plant was studied from 30 to 165 DAP. The max. length of root at 165 DAP (57.14 cm) was found in 100% RDF of NPK and AZT + PSB + 50% RDF of NPK (52.60 cm), where as the min. was in control (41.73 cm). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 36.93%, 26.05%, 13.04%, 10.38% and 5.56% increased length of root per plant respectively over the control. It is in conformity with Dhumal (1992) and Jakhar and Chauhan, (1997). Mean number of functional leaves per plant was observed from 30 to 150 DAP. The max. number of leaves at 120 DAP (552.38) was found in 100% RDF of NPK and AZT + PSB (463.25), where as the min. was found in control (364.58). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 51.51%, 27.06%, 19.55%, 13.10% and 05.67% more mean number of leaves respectively per plant over the control. The findings are in close agreement with Manjusha (1996) and Wange and Kale, (2004).

Average weight of a fresh shoot was observed from 30 to 150 DAP. The max. weight of a fresh shoot at 150 DAP (791 g) was found in 100% RDF of NPK and AZT + PSB + 50% RDF of NPK (787 g), whereas, the min. was recorded in the control (582 g). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 35.91%, 35.22%, 16.32%, 12.89% and 7.90% increase of average weight of a fresh shoot over the control. The chemical fertilizers and combined biofertilizer treatments recorded significantly more weight due to the proper nutritional supply. The max. weight of a dry shoot at 150 DAP (144 g) was found in 100% RDF of NPK and AZT + PSB + 50% RDF of NPK (139 g), whereas, the min. was obtained in the control (98 g). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 46.94%, 41.84%, 21.43%, 16.33% and 7.14% increase of average weight of a dry shoot respectively over the control, (Table 1). These finding are in close agreement with Singh and Bhargava (1994) and Gaikwad and Wani (2001).

The max. number of fruits picked per plant during the crop time was recorded in AZT + PSB + 50% RDF of NPK (40.31) and 100% RDF of NPK (38.23), where as the min. fruits picked per plant was in control (26.38). The treatments T-1, T-2, T-3, T-4 and T-5 have shown 44.92%, 52.81%, 33.09%, 24.64% and 11.30% more fruits picked per plant respectively over the control. The max. yield of brinjal fruit per plant during the crop time was recorded in 100% RDF of NPK (2554.7 g) and AZT + PSB + 50% RDF of NPK (2516.46 g), where as the min. yield per plant was in control (1651.96 g). All the treatments were significantly superior in fruit yield over the control. The treatments T-1, T-2, T-3, T-4 and T-5 have shown 54.61%, 52.33%, 36.09%, 23.48% and 11.89% more fruit yield per plant respectively over the control, (Table 2). The max. yield of brinjal fruit (marketable and infested) per hectare during the crop time was recorded in 100% RDF of NPK (306.56 qh^{-1}) and AZT + PSB + 50% RDF of NPK (301.97 qh^{-1}). It is followed by 50% RDF of NPK + AZT (269.77 qh^{-1}), AZT + PSB (244.79 qh^{-1}), AZT alone (221.81 qh^{-1}) and control (198.21 qh^{-1}). Pal (1996), reported 48.25 to 65.38% more brinjal fruit yield in treatment of *Azotobacter* alone and in combination with other biofertilizer and reduced N doses over the uninoculated. Gaikwad and Wani, (2001), Wange and Kale, (2004) also support the results.

Table 1: Brinjal growth parameters as influenced by different treatments

Parameter	Observation	T-1	T-2	T-3	T-4	T-5	T-6
Height, cm	90 DAT	86.26	86.12	80.45	73.88	69.24	59.23
	150 DAT	98.18	98.26	92.13	84.06	79.32	71.44
Stem diameter, cm	90 DAT	2.72	2.12	2.24	2.07	1.98	1.86
	150 DAT	3.33	3.08	3.06	2.98	2.78	2.69
Root length, cm	90 DAT	30.33	28.37	27.11	26.57	26.11	24.54
	165 DAT	57.14	52.60	47.17	46.06	44.05	41.73
Number of leaves	90 DAT	502.48	412.36	388.67	371.24	344.25	327.85
	120 DAT	552.38	463.25	435.86	412.35	385.24	364.58
Weight of fresh plant, g	90 DAT	639	598	548	521	493	441
	150 DAT	791	787	677	657	628	582
Weight of dry plant, g	90 DAT	114	112	97	91	86	73
	150 DAT	144	139	119	114	105	98

Table 2: Brinjal fruit yield as influenced by different treatments

Parameter	T-1	T-2	T-3	T-4	T-5	T-6
No. of fruits pick^{-1} plant^{-1}	4.25±0.07	4.47±0.03	3.90±0.01	3.65±0.02	3.26±0.01	2.93±0.03
No. of fruits plant^{-1}	38.23±0.66	40.31±0.28	35.11±0.12	32.88±0.26	29.36±0.12	26.38±0.29
Fruits yield pick^{-1} plant^{-1}, g	283.85±0.05	279.60±0.11	249.79±0.36	226.65±0.17	205.38±0.20	183.55±0.20
Fruit yield plant^{-1}, g	2554.7±0.49	2516.46±1.03	2248.12±3.32	2039.91±1.57	1848.44±1.83	1651.96±1.80

Table 3: Brinjal disease or pest infestation (%)

Infestation	T1	T2	T3	T4	T5	T6
Shoot/root b	16.67	8.33	16.67	16.67	13.33	25.00
Fruit borer	21.30	22.64	19.40	20.44	20.25	24.81
Little leaf	20.25	8.33	25.00	16.67	25.00	33.33
Average over control	-28.90	-50.14	-26.71	-33.64	-30.62	--

All the treatments appeared to be the significantly superior over the control as the average infestation was less by 26.71 to 50.14% as compared to the control population, (Table 3). It suggests that the biofertilizers secretes some antibiotic substances or growth hormones. Similarly the treatments of chemical fertilizers are more susceptible to infestation but due to availability of nutrients make them more resistant as compared to the control population. The treatments AZT + PSB + 50% RDF of NPK, AZT alone has shown 66.68% and 46.68% less shoot-root borer infestation respectively over the control. The treatments 50% RDF of NPK + AZT, and AZT alone has shown 21.81% and 18.38% less of fruit borer infestation respectively over the control. The treatments AZT + PSB + 50% RDF of NPK and AZT + PSB alone has shown 75.0%, and 49.98% less of little leaf infestation respectively over the control. These findings are supported by Verma and Shende (1993). So, the proper application of biorfertilizers can reduce RDF dose of NPK, the cost of production and minimize soil pollution but cannot replace the yield benefits due to chemical fertilizers. Integrated and judicious use of inorganic and organic sources of fertilizers is essential.

REFERENCES

Dhumal KN (1992) Effect of *Azotobacter* on germination, growth and yield of some vegetables. *J. Maharashtra Agric.* Univ. 17 (3): 500.

Gaikwad RM and Wani PV (2001) Response of Brinjal (cv.Krishna) to Phosphate Solubilizing Biofertilizers. *J. Maharashtra Agric. Univ.*, 26 (1): 029-032.

Jaakhar SS and Chauhan MS (1997) Role of seed treatment with *Azotobacter* in root rot of cotton caused by Rhizoctenia species under green house condition. *J. of cotton Res & dev*. 11 (2): 278-281.

Jangral J and Lakra H (2014) Impact of Fertilizers on the Environment Sustainability Development and Agriculture. *GE-Int. J. of Management Research* (ISSN: 2321-1709). Vol.2 (2): 160-166.

Manjusha S (1996) Response of culture with graded doses of nitrogen on growth, yield and quality of Brinjal and Tomato, *M.Sc. (Agri.) Thesis* (Unpub), Dr. P.D.K.V. Akola, (India).

Pal ML (1996) Efffect of *Azotobacter, Azospirillum* alone and in combination with reduced doses of N on growth and yield of Brinjal. *Thesis* submitted to Dr. Panjabrao Deshmukh Agriculture University, Akola (India).

Singh P and Bhargava SC (1994) Changes in growth and yield component of *Brassica napus* in response to *Azotobacter* inoculation at different rates of nitrogen application. *J. Agric. Sci*. 122 : 241-247.

Verma OP and Shende ST (1993) *Azotobacter* a biofertilizer for vegetable crops: *Biofert. Newsletter*. 1(2):6-10.

Wange SS and Kale RH (2004) Effect of biofertilizers under graded nitrogen levels on Brinjal crop; *J. Soils and Crops*. 14 (1): 9-11.

Yosefi K, Galavi M, Ramrodi M, and Mousavi SR (2011) Effect of bio-phosphate and chemical phosphorus fertilizer accompanied with micronutrient foliar application on growth, yield and yield components of maize (Single Cross 704.) *Australian Journal of Crop Science,* 5: 175 – 180.

RESEARCH ARTICLE

Biodiversity of Aeromycoflora from Indoor Environment of Library

Kayarkar Ankush[1] and Bhajbhuje MN[2]*

[1]*P. G. Department of Botany, RTM Nagpur University, Nagpur 440 033 (M.S.) India.*

[2]*Dept. of Botany, Jawaharlal Nehru Mahavidyalaya, Wadi, Nagpur-23 (M.S.) India*

**Corresponding author email: dr_mnbhajbhuje@rediffmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kayarkar Ankush and Bhajbhuje MN (2014) Biodiversity of Aeromycoflora from Indoor Environment of Library, *Int. j. of Life Sciences,* Special issue A2: 21-24.

Acknowledgment :
Authors are thankful to Dr. Mrs. Alka Chaturvedi, Prof.&Head, Post Graduate Department of Botany for providing Laboratory facilities and Dr. R. P. Thakre for identification of fungal isolates.

ABSTRACT

Library is a basic source of cellulosic substrate for proliferation of diverse group of fungal organisms provided ambient climate of temperature and humidity. India comprises one third diversity of globe. The study was undertaken for a month at an interval of a week to report the aeromycoflora from various corners of library. Altogether 980 colonies falls under 19 genera and 28 species have been recorded by culture plate exposer method. Ascomycota dominated with more than half of the total colonies recorded followed by Zygomycota and Deuteromycota while Oomycota had least colonies. Member of Basidiomycota did not persist. Significant count of colonies was reported prevalent in third week of January while moderate count was confined in first week of February. *Aspergillus* was dominated with higher colony count as well as greater species number. *Cladosporium cladosporoides, Mucor pusillus* and *Rhizopus stolonifer* were recorded sub-dominant. *Fusarium* was recorded with 3 species; *Penicillium, Curvularia*, *Alternaria* with 2 species and others had single species. Diversity of fungal organisms on cellulosic material in library concerns to changing indoor environment. The climate for third week of January was confined ideal for sporulation. The culture plate exposure technique has proved to be more appropriate over others.

Key words : Aeromycoflora, Indoor, *Aspergillus*, colonies.

INTRODUCTION

Library is the backbone of educational academy and an organized collection of information resources in the form of books, periodicals, newspapers, films, recorded music made accessible to defined community for reference or borrowing. Prevalence of the diverse group of fungal flora in indoor air of library causes biodeterioration of books and other materials in library, as these books provide nutrient source for the proliferation of fungal organisms. Biodeterioration by fungal organisms causes damage of books, discolouration of pictures and prints (Thakre and Bhajbhuje, 1989; Kalbende *et al*., 2012).

Mostly cellulosic material and other articles in libraries contribute to pollute indoor environment, may be hygienic affecting the health of researchers on the globe (Thakre and Bhajbhuje, 1989; Dalal *et al*., 2011).The moderate climate of temperature and relative humidity play an important role in proliferating fungal population in the indoor environment. The investigation of common airborne fungi and their distribution in a particular region can be helpful in identifying association between fungal sensitization and clinical diagnosis and clinical prevention of the seasonal allergic diseases (Chelak and Sharma, 2012). Since diverse fungal species constitute the major components of airborne flora are the major cause of respiratory ailment of humans, causing allergies, asthma and plant diseases and as well as important agents of degradation of cellulosic and non-cellulosic material in

indoor closed environment, thus there is a great need for understanding, aerobiological studies from indoor environment for library of P.G. Department of Botany, RTM Nagpur University, Nagpur. Presently, prevalence of aeromycoflora from indoor environment has so far not been reported earlier from these places, hence it seemed to be worthwhile to undertake a more comprehensive and systematic study of the biodiversity of aeromycoflora from indoor environment for library during winter season.

MATERIALS AND METHODS

The isolation of an indoor aeromycoflora from various corners of Library was made following culture-plate exposure method (Lanjewar and Sharma, 2014) using Potato Dextrose Agar (PDA) media at weekly intervals from 16thJanuary to 15th February 2014. Petri-plates containing sterilized media were exposed in triplicates for 10 minutes in library and brought into the laboratory and incubated at 25 ± 1^0C for 4-5 days. The colonies appeared on agar plates were counted and recorded as percentage for individual species employing standard formula (Kalbende *et al*., 2012). The species were identified on the basis of micro- & macro morphology; reverse and surface coloration of colonies grown on Czapek's medium and finally authenticated by authority.

RESULT AND DISCUSSION

Environmental microfungal population is seemed to act as an indicator of the level of environmental bio-pollution. The viable microfungal propagules in atmosphere, may remain in the same environment or carried to a long distance far away from existing condition by abiotic elicitors particularly wind, may get deposited on healthy flora, can cause many plant diseases, hence the knowledge of their periodicity is of great concern in terms of predicting the plant epidemics (Chelak and Sharma, 2012). Microbial components to indoor air are receiving the greater attention with the framework of potential health hazards to diverse group of biotic elicitors including human beings. Exposure to fungal airspora has been linked to a range of detrimental health effects in both infants and adults (Karvala *et al*., 2010). Conversely, the hygiene hypothesis, which posits that exposure to microbial material early in life can actually be preventative in developing disease later in life, continues to find empirical support (Adams *et al*., 2013).

The culture plate exposure technique has proved to be more appropriate over others, has been employed for detection of indoor aeromycoflora in present study to record fungal diversity (Lanjewar and Sharma, 2014). Altogether 980 fungal colonies were recorded which arefall under 19 genera and 28 species. Ascomycota dominated with 53% colonies exhibiting highest fungal count followed by Zygomycota (22.5%) and Deuteromycota (21.9%). Sterile mycelia contributed a count of 2% colonies while two colonies have been detected for Oomycota. The member of Basidiomycota did not appear on the agar plates for an area understudy (Table 1).This is in agreement with the findings of Ananna *et al*., (2013), Bhajbhuje (2013); Lanjewar and Sharma (2014) who reported the greatest count of fungal isolates as well as higher fungal colony count of indoor aeromycoflora by culture plate exposure test. This method was preferred for isolation of aeromycoflora in response to certain advantages such as (i) fungal spores with similar appearance can be identified to their generic level; (ii) fungal species of too small size with sufficient individual characteristics to be used as means of identification (iii) viable fungal hyphae can also be identified on the slides; and (iv) material on slides does not blow away with strong current of wind (Luka *et al*., 2014).

Deuteromycota contributed highest count of isolates followed by *Ascomycota*, while minimum fungal count was associated with Oomycota, Zygomycota and Sterile mycelia. The dominant microfungal genera of this group include *Alternaria, Cladosporium, Curvularia, Fusarium, Helminthosporium and Trichothecium*. These results are in confirmation with the earlier findings (Adams *et al*, 2013; Luka *et al*., 2014).The most common fungus *Aspergillus* contributed highest 49.7% of the total colony count followed by *Cladosporium* (14.5%), *Rhizopus* (11.2%), *Mucor* (11.2%) and *Fusarium* (4%). The genera*, Alternaria, Curvularia, and Penicillium* were recorded most significant or equally dominant. Among these, *Aspergillus flavus , A. niger and A. fumigatus* were observed most dominant followed by *Cladosporium* and two members of Mucorales viz.,*Rhizopus stolonifer* and *Mucor pusillus.* Other members, *Alternaria solani*, members of *Fusarium* and Sterile black mycelia contributed 0.5– 1.9% air spora(Table 1). It is in agreement with the earlier finding of Kalbende *et al*., (2012) who reported higher colony count and greater species number for *Aspergillus*. It was confirmed by Bhajbhuje (2013); Lanjewar and Sharma (2014).

Diverse group of fungal species of saprophytic nature inside library grew profusely on organic substrates such as cellulosic and non-cellulosic materials with different shades as compared to other group of microbes, producing allergens, enzymatic proteins, secondary metabolites and other toxins that caused many respiratory disorders (MBL, 2012). The occurrence of comparatively higher count of fungal isolates of *Deuteromycota* may be attributed to prevalence of diverse viable fungal spores with high indoor humidity of library area understudy. Members of *Deuteromycota* produce enormous resistant thick walled conidia asexually; remain dormant in unfavourable indoor environment for longer duration and able to germination on the onset of favorable condition of optimum temperature and high relative humidity (Adams *et al*., 2013). The conidia of *Cladosporium, Alternaria, Helminthosporium, Trichotheci - um, and Curvularia* remained in greatest abundance in indoor air even at low humidity, generally during warmer climate (Dalal *et al*, 2011). It was interesting to record that members of Basidiomycota did not persist in indoor environment of the area understudy, may be possibly attributed to mode of nutrition, as majority of fungal organisms of these groups are obligate parasites of crop plants. Major component included *Aspergilli, Cladosporium, Rhizopus, Mucor* while minor components included less frequent and sporadic types. Other stable components recorded were *Botryodiplodia*, *Chaetomium,* and Sterile mycelia.

Table 1: Report on fungal air spora from indoor environment of Library

S.No	Fungal organism	Number of fungal colonies				Total colonies	% Contribution	
		1-week	2-week	3-week	4-week		Species	Genera
A.	Oomycota	-	-	-	2 (2.02)	2 (0.2%)	0.20	0.20
1	*Phytophthora infestans*	-	-	-	1	1	0.10	0.10
2	*Pythium aphanidermatum*	-	-	-	1	1	0.10	0.10
	Genera /(species)	-	-	-	2 (2)	2 (2)		
B.	Zygomycota	100 10.2)	10 (1.02)	98 (10.0)	12 (12.2)	220(22.4%)	22.44	22.44
3	*Mucor pusillus*	49	6	50	5	110	11.22	11.22
4	*Rhizopus stolonifer*	51	4	48	7	110	11.22	11.22
	Genera /(species)	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)		
C.	Ascomycota	160(16.3)	122(12.4)	114(11.6)	124 (12.7)	520(53%)	53.06	53.06
5	*Aspergillus flavus*	68	56	60	43	227	23.16	49.69
6	*Aspergillus fumigatus*	32	23	13	24	92	9.39	
7	*Aspergillus niger*	41	32	34	42	149	15.20	
8	*Aspergillus sulphureus*	7	2	1	1	11	1.12	
9	*Aspergillus terreus*	1	2	-	5	8	0.82	
10	*Chaetomium glabosum*	6	2	3	3	14	1.43	1.43
11	*Penicillium citrinum*	3	4	1	3	11	1.12	1.73
12	*Penicillium oxalicum*	2	1	1	2	6	0.61	
13	*Phoma glomerata*	-	-	1	1	2	0.20	0.20
	Genera /(species)	3 (8)	3 (8)	3 (8)	4 (9)	4 (9)		
D.	Basidiomycota	-	-	-	-	-	-	
E.	Deuteromycota	51(5.20)	69 7.04)	44 4.49)	51(5.20)	215(21.9%)	21.94	21.94
14	*Alternaria alternata*	1	1	1	1	4	0.41	1.23
15	*Alternaria solani*	1	5	-	2	8	0.82	
16	*Botryodiplodia sp*	-	-	1	-	1	0.10	0.10
17	*Cladosporium cladosporoides*	34	45	34	29	142	14.49	14.49
18	*Curvularia lunata*	2	1	1	2	6	0.61	1.43
19	*Curvularia tetramera*	2	5	-	1	8	0.82	
20	*Fusarium moniliformae*	5	8	2	4	19	1.94	3.98
21	*Fusarium oxysporum*	3	1	3	3	10	1.02	
22	*Fusarium solani*	2	3	1	4	10	1.02	
23	*Helminthosporium tetramera*	-	-	-	2	2	0.20	0.20
24	*Nigrospora sp.*	-	-	1	-	1	0.10	0.10
25	*Pyricularia sp*	-	-	-	2	2	0.20	0.20
26	*Trichothecium roseum*	1	-	-	1	2	0.20	0.20
	Genera /(species)	5 (9)	4 (8)	6 (8)	7 (11)	9 (13)		
F.	Other types	7 (0.71)	5 (0.51)	7 (0.71)	4 (0.41)	23(2.3%)	2.35	2.35
27	*Sterile black mycelia*	5	3	4	2	14	1.43	1.43
28	*Sterile white mycelia*	2	2	3	2	9	0.92	0.92
	Genera /(species)	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)		
	Genera /(species)	12 (21)	11 (20)	13 (20)	17 (26)	19(28)		
	Total colonies	318	206	263	193	980	99.97	99.97
	Per cent contribution	32.45	21.02	26.84	19.69			

1. Values in parenthesis indicate per cent contribution of fungal flora over total colonies recorded.
2. Values in parenthesis indicate total number of isolates recorded.

found prevalent only 2-4 times during sampling. This is in agreement with the findings of Lanjewar & Sharma (2014) who reported frequent appearance of these fungi in indoor environment of rice mill.

The isolation of aeromycoflora from indoor environment of area understudy was made at an interval of a week from various locations for a month. Mycological analysis revealed an existence of a fungal population in higher concentration in third week of January, contributing 32.5%. In the fourth week of January, the concentration of fungal air spora declined to 21%and again increased to 26.8% in first week of February. It becomes least (19.7%) at the end the survey i.e., the second week of February. These results are in confirmation with earlier findings (Ghosh *et al*., 2011; Chelak and Sharma. 2012).

A fungal population of 28 diverse isolates representing 19 genera was seemed to be prevailing inside the library. Of these, a population of 11 isolates representing 7 genera, were encountered on agar plates throughout a month (Table 1). Among these *Aspergillus flavus* appeared predominant contributing 23.2% airspora, followed by *Aspergillus niger* (15.2%) and *Cladosporium cladosporoides* (14.5%), while others contributed less than 12% of total fungal air spora.*Fusarium*, a most prevalent toxin-producing deuteromycetous fungal organism contributed with 4% of total colony count (Table1), reported to degrade carpet, mattresses, damp walls, polyester, polyurethane foam, humifier pans and produce a diverse range of mycotoxins includes trichothecenes, zearalenon and fumonisins have significant impacts on human health (MBL, 2012).Inhalation of spore of *Mucor pusillus* caused mucocutaneous & rhinocerebral infections, septic arthritis, renal infections, gastritis and severe pulmonary infection, and difficulty in breathing;*Aspergillus niger* has potential to produce *ochratoxin-A* and degrade polysaccharide;*Aspergillus flavus* secretes aflatoxin B_1, B_2, G_1& G_2 and other toxic compounds including *strigmatocystin, cyclopiazonic acid, kojic acid, β-nitropropionic acid, aspertoxin, aflatrem, gliotoxin*and*aspergillic acid*.(Wikipedia, 2014).*Alternaria* conidia have implication to asthmatic and allergy patients. A sector of population inhaling conidia develops hay fever, woodworker's lung or apple store hypersensitivity; susceptible individuals can become sensitized to the protein on the spore surface and develops allergies (MBL, 2012).

CONCLUSIONS

Indoor aeromycoflora from Library is known to be significant in respect of allergic as well as air borne diseases and also involve in deterioration of cellulosic and non-cellulosic materials. Present investigation revealed that the third week of January had very pleasant weather with moderate temperature and high humidity is expected ideal for rapid proliferation and enhancement of the growth of diverse group of fungal organism. Impact of airborne fungal spores including their release, dissemination, deposition and effect is of great significant to identify the health hazards and physiological disorders in human beings. Exposure to indoor airborne inhalant mould allergens develops respiratory symptoms, airways disorders and allergies. Thus clean indoor environment is of prime importance for maintenance of good health.

REFERENCES

Adams RI, Miletto M, Taylor JW and Bruns TD (2013) Dispersal in micobes: fungi in Indoor air is dominated by outdoor air and show dispersal limitation at short distance, *Int. Soc. Jour. Micobiol. Ecology*, 7: 1262-1273.

Ananna AJ, Hossain KS, Bashar M A(2013).Aeromycoflora of the Dhaka University Campus. *Bangladesh Jour. Bot*., 42(2) : 273-278.

Bhajbhuje MN (2013) Biodiversity of Fungal Flora of Industrial Polluted Environment *International Journal of Environment Science*, 2 (2): 104-114.

Chelak EP, Sharma K (2012) Aeromycological study of Chandragiri hill top, Chhattisgarh. *International Multidisciplinary Res. Jour*., 2(11): 15-16.

Dalal L, Bhowal M, Kalbende S (2011) Incidence of deteriorating fungi in the air Inside the College libraries of Wardha city. *Archieve of Applied Sci. Res*., 3(5): 479-485.

Ghosh D, Dhar P, Das AK, Uddin N (2011) Identification and distribution of Aeromycoflora in the indoor environment of Shyambazar Metro-Railway Station, Kolkata, India. *African J.Microbiol., Res.*, 5(31) : 5569-5574.

Kalbende S, Dalal L,Bhowal M (2012) The monitoring of airborne mycoflora in indoor air quality of library. *Jour. Nat. Prod. Plant Resour*., 2(6) : 675-679.

Karvala K, ToskalaE, LuukkonenR, LappalainenS, UittiJ, NordmanH(2010)New-onset adult asthma in relation to damp and moldy workplaces. *Int. Arch. Occup. Environ. Health.*, 83 : 855-865.

Kotwal SG, Gosavi SV, Deore KD (2010) Aeromycoflora of outdoor and indoor air residential area area in Nasik. *Asian J. Exp. Biol. Sci. Spl.*: 24-30.

Lanjewar S, Sharma K (2014) Intramural aeromycoflora of rice mill of Chhattisgarh, *DAMA International*, 1 (1) : 39-45.

Luka RS, Sharma K, Tiwari P (2014) Aeromycoflora of Jackman Momorial Hospital, Bilaspur, *Scholar Academic Jour. of Pharmacy (SAJP)*, 3(1) : 6-8.

MBL (2012) *Fusarium, Alternaria, Curvularia*. Mississauga, Ontario Lab: 905-290-9101, Burnaby, British Columbia Lab: 604-435-6555. www.moldbacteria.com (Retrieved Aug. 10, 2014).

Thakre RP, Bhajbhuje MN (1989) Bio-deterioration of Books and Journals, In Proc: Int.*Conference on Bio-deterioration of Cultural property*, Lucknow 20-25th Feb. pp. 13-24.

Wikipedia (2014) www.wikipedia.com (Retrieved Agust 10, 2014)

RESEARCH ARTICLE

Fungal Diversity in Vegetables

Junghare Archana[1], Nasare PN[2] and Mousmi Bhowl[3]

[1]*Department of Botany, Hislop College, Civil Lines,Nagpur, Maharashtra, India.*

[2]*Department of Botany, Nilkanthrao Shinde Science and Arts College Bhadrawati, Dist-Chandrapur 442902 MS,India,*

[3]*Department of Botany, Hislop College, Civil Lines,Nagpur, Maharashtra, India.*

**Corresponding author Email:- pnnasare@rediffmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Junghare Archana, Nasare PN and Mousmi Bhowl (2014) fungal Diversity in Vegetables, *Int. j. of Life Sciences,* Special Issue A2: 25-26.

Acknowledgements:
The authors are thankful to the Principal, Hislop College, Civil Lines, Nagpur for providing laboratory facilities.The authors also thanks to Dr. A.A.Fulzele, Head, Department of Botany, Mohata Science College, Nagpur for his help to identify vegetables infecting fungi.

ABSTRACT

The present work was carried out on vegetable to study fungal diversity. The vegetable were purchased and collected from Bhadrawati and Warora vegetable market and allow to grow fungus on them. The Total of 25 vegetable were collected and categarised them in Earth vegetables, Undergound vegetables, Herbage vegetables and Fruit vegetable. Among these collected 25 vegetables those infected by fungus were identified as *Pythium* sp., *Alternaria* sp., *Phytophthora* sp., *Aspergillus* sp., *Aspergillus niger*, *Pythium* sp., *Helminthosporium* sp., *Rhizopus* sp., *Aspergillus* sp., *Aspergillus* sp., *Verticillium* sp., *Trichoderma* sp., *Rhizopus* sp., *Rhizopus* sp., *Fusarium* sp., *Alternaria* sp., *Trichoderma* sp., *Mucor* sp., *Fusarium* sp., *Mucor* sp., *Trichoderma* sp., *Colletotrichum* sp., *Cephalosporium* sp., *Erysiphe* sp., *Cladosporium* sp., respectively. This shows that there is a great fungal diversity in vegetables.

Keywords: Fungal diversity, Vegetables, Bhadrawati, Warora.

INTRODUCTION

Fungi is the plural of the word fungus which is derived from the Latin word FUNGOUR which means to flourish. The fungi may be defined as non-green, nucleated thallophytes. However, mycologists have defined fungi more scientifically. According to Alexopoulos (1962), the fungi include nucleated spore bearing achlorophyllous organisms that generally reproduce and whose filamentous branched somatic structures are typically surrounded by cell walls containing cellulose or chitin or both. A more technical definition of fungi was later given by Bessey (1968) which says that fungi are chlorophyll-less non-vascular plants whose reproductive or vegetative structures do not permit them to be assigned to positions among recognized groups of higher plants or algae.Fungi grow in diverse habitats.Majority of fungi prefer to grow in darkness and dimlight in most habitat (Vashishta and Sinha, 2002).

MATERIAL AND METHODS

The vegetable samples were purchased and collected from Bhadrawati and Warora vegetable market and the vegetables were allowed to grow fungi on them. For the identification of fungi, temporary slides were prepared by using cotton blue prepared in lactophenol is used as staining material for staining fungi. The temporary slides were prepared by scrapping small fragments of infected portion and sealed with paraffin wax and observed under light microscope. On the basis of morphological and reproductive

characters, fungi were identified. For this standard literature was used.

RESULTS AND DISCUSSION

The numerous earth vegetables, underground vegetables, herbage vegetables and fruit vegetables from Bhadrawati and Warora vegetable market were found to be infected by various fungi (Table 1). Large number of vegetables were infected by fungi. Earth vegetables were infected by *Pythium* and *Alternria* sp., Underground vegetables were infected by *Phytophthora*, *Aspergillus* and *Pythium* sp., Herbage vegetables were infected by *Helminthosporium* sp., *Rhizopus* sp., and *Aspergillus* sp., Fruit vegetables were infected by, *Aspergillus Verticillium, Trichoderma, Rhizopus, Fusarium, Alternaria, Mucor, Colletotrichum, Cephalosporium, Erysiphe, Cladosporium* sp. *Aspergillus* sp, and *Rhizopus* sp., was found to be dominant on vegetables (Table 1).

Table 1: Fungal diversity in vegetables

SN	Name of the vegetable	Fungus identified
EARTH VEGETABLES		
1	*Beta vulgaris* L.,	*Pythium* sp.
2	*Daucuscarota* L.,	*Alternaria* sp.
UNDERGROUND VEGETABLES		
3	*Solanum tuberosum* L.	*Phytophthora* sp.
4	*Allium cepa* L.	*Aspergillus* sp.
5	*Allium sativum* L.	*Aspergillus niger*
6	*Zingiberofficinalis* L.	*Pythium* sp.
HERBAGE VEGETABLES		
7	*Brassica oleracea var. botrytis* L.	*Helminthosporium* sp.
8	*Brassica oleracea var. capitata* L.	*Rhizopus* sp.
9	*Spinacea oleracea* L.	*Aspergillus* sp.
FRUIT VEGETABLES		
10	*Lycopersicon esculentum* Mill.	*Aspergillus* sp.
11	*Cucumis sativus* L.	*Verticillium* sp.
12	*Lagenaria vulgaris* (Mol) Stdl.	*Trichoderma* sp.
13	*Cucurbita moschata* (Duchex. Lam)	*Rhizopus* sp.
14	*Mimordicacharantia* L.	*Rhizopus* sp.
15	*Solanum melongena* L.	*Fusarium* sp.
16	*Capsicum annum* L.	*Alternaria* sp.
17	*Abelmoschusesculentus* (L.)(Moench.)	*Trichoderma* sp.
18	*Artocarpusheterophyllus*Lamk	*Mucor* sp.
19	*Citrullus vulgaris*var.*fistulosa* (stocks) Duthie and Fuller	*Fusarium* sp.
20	*Cocciniacordifolia* (L.) Cogn.	*Mucor* sp.
21	*Cyamopsistetragonoloba* (L.) Taub	*Trichoderma* sp.
22	*Dolicuslallab* L.	*Colletotrichum* sp.
23	*Cajanuscajan* L.	*Cephalosporium* sp.
24	*Coriandrum sativum* L	*Erysiphe*sp.
25	*Pistum sativum* L.	*Cladosporium* sp.

Earlier studies indicate that some of these pathogens have been reported from different parts of India, either on the same or other host. Study on pathogenic fungi of fruits and vegetables were carried out by Dandge (1998). ShikhaAgblor and Doug Waterer (2001) reported post harvest diseases in cabbage, caused by *Botrytis* and *Sclerotinia.* Chatage and Bhale (2010) reported Alternaria pluriseptata and Geotrichum candidus on ivy gourd (Coccinia indica). Ghurdeetal. (2011) reported *Alternaria alternata, Phoma nebulosa, Curvularia lunata, Colletotrichum capsic,Curvulareasenegalensis, Fusarium equiseti* etc. on *Brassica oleracea var. capitata* L., *Spinacea oleracea* L.,*Abelmoschusesculentus* L., *Capsicum annum* L.., *Dolicus lablab* L., and *Solanum tuberosum* L. respectively. Exposure and /or consumption of such infected vegetables may cause health hazards (Bauri, 2007). Hence, there is a need to explore possibilities of their control to prevent loss of product and injuries to human health.

CONCLUSION

It is concluded that ther is a great fungal diversity in vegetables.*Aspergillus*sp.,and*Rhizopus* sp., was found to be dominant on vegetables .Hence, there is a need to explore possibilities of their control to prevent loss of product and injuries to human health.

REFERENCES

Alexopoulos CJ (1962) Introductory Mycology, 2nd edition, John Wiley and Sons ,New York.

Bessy EA (1968) Morphology and Taxonomy of fungi. The Blankistan Co., Philadelphia.

Bauri NC (2007) Fungal spore, a potential source of occupational health hazard among the working of potato cold stores in West Bengal,India. World allergy congress (TM),Bangkok,Thailand.

Chatage VS and Bhale UN(2010) Fungi associated with fruit rot disease of ivy gourd (*Coccinia indica* Wight and Arn) from Maharashtra, India. *Bioinfolet*, 7: (3): 242-243.

Churde MU, Deshmukh VR, Pachkhede AU (2011) Vegetable infecting fungi from Amravati Market (M.S.) India. *Bioinfolet*, 8(4):384-386.

Dandge VS (1998) Taxonomical and physiological studies of some fungi causing diseases to fruits and vegetables.Ph.D.Thesis, SGB Amravati University,Amravati.,M.S.,India.

Shikha Agblor and Doug Waterer (2001) Cabbage post harvest handling and storage.Agri-food Innovation Fund,Post harvest specialist programme,Department of Plant Sciences,University of Saskatchewan,Canada.

Vashishta BR and Sinha AK (2002) Fungi S.Chand and Company Ltd. New Delhi, P:5.

RESEARCH ARTICLE

Mycoflora associated with seeds of chickpea

Sontakke NR and Hedawoo GB

P.G. Dept. of Botany, Shri Shivaji Science College, Amravati

Corresponding Author: namita.sontakke@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Sontakke NR and Hedawoo GB (2014) Mycoflora associated with seeds of chickpea, *Int. J. of Life Sciences,* Special Issue A2: 27-30.

ABSTRACT

In the present investigation, fungi associated with chickpea (*Cicer arietinum* L.) were detected by blotter paper and agar plate method. Thirteen different fungi like *Actinomucor repens, Alternaria alternata, Aspergillus flavus, A. fumigatus, A. niger, A. ochraceus, Cladosporium sp., Fusarium oxysporum, Fusarium sp., Mucor varians, Penicillium notatum, Phoma herbarum, Rhizopus stolonifer* were isolated in variable frequencies. Frequency of the individual species ranges between 1.11 – 8.19%. Of which, *Fusarium oxysporum* (8.19%), *Rhizopus stolonifer* (7.63%), *Phoma herbarum* (5.69%) and *Aspergillus flavus* (5.44%) were found to be predominant. Blotter paper method was found to be more effective than agar plate method. The percent germination of the Chickpea seeds was evaluated by the standard rolled paper towel method. Higher incidence of fungi on the seeds of chickpea adversely affected its germination.

Key words: Seed-borne mycoflora, % frequency, % germination, and Chickpea.

INTRODUCTION

Plants play an important role in the lives of human being. They are an essential resource for human well-being and also a source of energy. Pulse plants which are rich source of energy and are largely cultivated and consumed in India. *Cicer arietinum* L. which is also known as chickpea is the world's third most important grain legume globally grown in over 40 countries (Anwer *et. al*., 2009) and is one of the most important pulse crop grown in India. About 65 % of the global area with 68% of global production of chickpea is contributed by India (Reddy and Mishra, 2010). It is the most nutritive pulse crop extensively used as protein adjunct to starchy diet. Out of which digestibility of protein varies from 76-78 % and its carbohydrates from 57-60 %. The seeds contains essential amino acids, mineral, fibers, unsaturated fatty acids and β- carotene (Jukanti *et. al.,* 2012).

Seeds are the basic input for crop production. Pathogen free healthy seeds are required for healthy and high yield crop production. Although chickpea is known for its excellent source of nutritional and agronomical value. But there are lots of factors involved in the yield loss in which fungi play an important role. Many plant pathogens are seed-borne, which can cause enormous crop losses; reduction in plant growth and productivity of crops (Islam *et al.,* 2009). The seed borne pathogens associated with seeds externally or internally may cause various infection viz., seed rot, seed necrosis, reduction

or elimination of germination capacity, as well as seedling damage resulting in development of disease at later stages of plant growth by systemic infection (Khanzada *et al.,* 2002).

Chickpea is known to attack by about 67 fungi, 3 bacteria, 22 viruses and mycoplasma and 80 nematodes (Nene *et. al*., 1996). Many fungal species viz.., *Alternaria porri*, *A. alternata*, *Aspergillus amstelodami*, *A. flavus*, *A. fumigatus*, *A. nidulans*, *A. niger*, *A. sydowi*, *A. wentii*, *Botrytis cinerea*, *Cladosporium macrocarpum*, *Curvularia lunata*, *Fusarium equiseti*, *F. moniliforme*, *F. oxysporum*, *F. semitectum*, *Macrophomina phaseolina*, *Myrothecium roridum*, *Penicillium notatum*, *Rhizoctonia sp*., and *Rhizopus arrhizus* been reported from chickpea (Ahmad *et*. *al*., 1993). Many workers have detected different mold fungi and their toxin production ability in stored grains which deteriorate the stored products (Afzal *et*. *al*., 1979). Also, the seasonal climatic variation of Vidarbha and improper storage condition contribute to make the storage environment extremely supportive for fungal attack to the nutrient rich seeds (Bhajbhuje, 2013). Therefore the present study was conducted to isolate seed fungi and its effect on seed germination.

MATERIALS AND METHODS

The seed samples of chickpea (*Cicer arietinum* L.) collected from five different talukas of Amravati district during 2010-2011, were brought to laboratory in sterile cotton bags and kept at room temp. The untreated seeds were used for isolation of external mycoflora while surface sterilized seeds by aqueous 0.1% mercuric chloride solution were used for detection of internal seed mycoflora. The isolation of seed mycoflora was made by standard blotter paper and agar plate method technique of ISTA (2012). After incubation for seven days at 25±1^{0}C, seeds were observed under stereo-binocular microscope for prevalence of fungal growth on seed surface. A count of germinating seeds as well as fungal colonies on seeds was taken and expressed in percent frequency (Bhajbhuje, 2013). The fungal isolates were sub-cultured in slants, identified using keys and manuals (Neergaard, 1977).

RESULTS AND DISCUSSION

Mycological analysis of the seed samples of chickpea revealed the prevalence of total 9 genera belonging to 13 species with varying frequency.

Table 1 : Frequency of isolated fungi on chickpea.

S. N.	Fungi isolated	January-12		February-12		March-12		Mean±SD	±SE
		E	I	E	I	E	I		
1	*Actinomucor repens*	-	-	-	-	11.66	-	1.94±4.76	±1.95
2	*Alternaria alternata*	-	3.33	0.83	5.83	1.66	5	2.77±2.77	±0.95
3	*Aspergillus flavus*	7.5	11.66	10.83	3.33	8.33	-	5.44±4.49	±1.84
4	*Aspergillus fumigatus*	1.66	2.5	3.33	1.66	3.33	3.33	2.63±0.82	±0.33
5	*Aspergillus niger*	3.33	-	9.16	1.66	1.66	6.66	3.74±3.48	±1.42
6	*Aspergillus ochraceus*	4.16	-	3.33	-	5.83	-	2.22±2.56	±1.04
7	*Cladosporium* sp.	-	-	4.16	2.5	5.83	-	2.08±2.51	±1.02
8	*Fusarium oxysporum*	10	14.16	-	-	10.83	14.16	8.19±6.56	±2.68
9	*Fusarium sp.*	-	-	6.66	-	-	-	1.11±2.71	±1.11
10	*Mucor varians*	2.5	-	2.5	2.5	-	13.3	3.46±4.97	±2.03
11	*Penicillium notatum*	1.66	4.16	-	11.66	-	1.66	3.19±4.42	±1.81
12	*Phoma herbarum*	5.83	10	9.16	-	9.16	-	5.69±4.63	±1.89
13	*Rhizopus stolonifer*	14.16	2.5	10	15	4.16	-	7.63±6.31	±2.58
Total		50.8	48.31	59.13	44.14	62.45	44.11		
		99.11		103.27		106.56			

S.D. = ±Standard deviation; S.E. = ± Standard error

Table 2 : Germination % of Chickpea seeds.

Sr. No.	Month	Germinated seeds (%)	Non-germinated Seeds (%)
1.	January-2012	91.33%	8.67%
2.	February-2012	89.33%	10.67%
3.	March – 2012	86%	14%

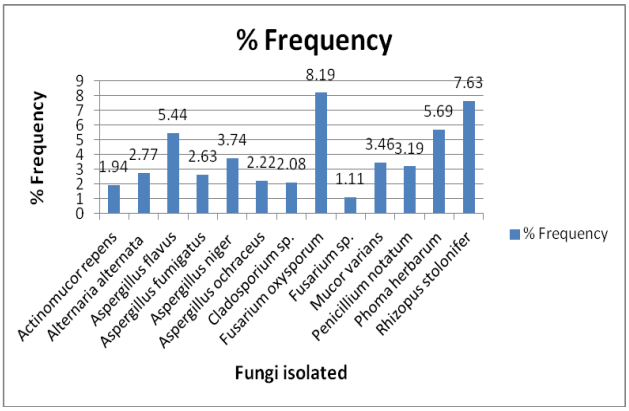


Fig.1: Frequency of individual fungal species on chickpea seeds

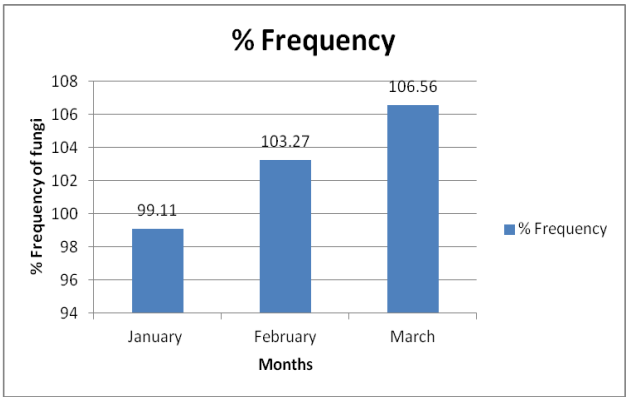


Fig 2:Frequency of fungi with respect to month.

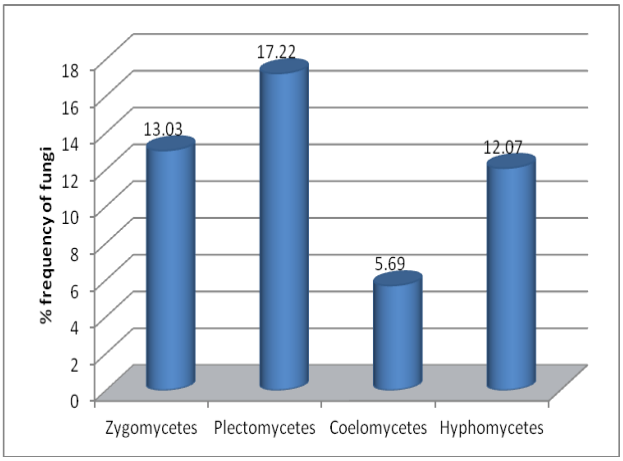


Fig. 3: Distribution of fungal flora with respect to classes

In the present investigation, *Alternaria alternata, Aspergillus flavus, A. fumigatus, A. niger, Cladosporium sp., Fusarium oxysporum, Penicillium notatum, Phoma herbarum, Rhizopus stolonifer* were commonly isolated by both the methods on chickpea seeds whereas, *Actinomucor repens, Aspergillus ochraceus* and *Fusarium sp.* were isolated only by standard blotter paper method. Singh (2014) also isolated seven fungal species such as *Alternaria alternata*, *Aspergillus flavus* , *A. niger*, *A. fumigatus*, *Curvularia lunata*, *Fusarium monoliforme* and *Rhizoctonia solani*. Ghangoaker and Kshirsagar (2013) also reported many fungal species *viz. Alternaria alternata*, *Aspergillus terrus*, *A. flavus*, *A. fumigatus*, *A. niger*, *Botrytis sp*., *Cladosporium*, *Curvularia lunata*, *Fusarium solani*, *F. moniliforme*, *F. oxysporum*, *Macrophomina phaseolina*, *Penicillium notatum*, *Rhizoctonia sp*. and *Rhizopus nigricans* from *Cicer arietinum* L.

The predominant fungi detected in the order of prevalence were found to be *Fusarium oxysporum* (8.19%), *Rhizopus stolonifer* (7.63%), *Phoma herbarum* (5.69%) and *Aspergillus flavus* (5.44%). Similar observation was recorded by Ghangoaker and Kshirsagar (2013). Amongst the 13 isolated fungi from chickpea, Plectomycetes contributed 2 genus and 5 species followed by Hyphomycetes with 3 genus and 4 species; Zygomycetes with 3 genus and 3 species. Coelomycetes had single genus and species. Hedawoo *et al*., (2014); Bhajbhuje (2013) reported higher count of fungal isolates in Ascomycota from spices seeds. Altogether a population of 13 fungal species was isolated by blotter paper method, exhibited greater fungal count over agar plate (Table 1). It is revealed that blotter paper method was found to be more effective over agar plate and also surface sterilization reduce fungal incidence. It is in agreement with earlier report of Bhajbhuje (2013) who recorded greatest count of fungal isolates by blotter paper method against agar plate. In each month, frequency of external mycoflora was greater than internal mycoflora.

The results presented in table 2, revealed 91.33% seed germination of chickpea in January, 89.33% in February and 86% in March. It was observed that, increase in the fungal frequency, decreases the per cent germination. Javaid (2005) also pointed out that heavy fungal infestation on the seeds of chickpea that adversely affected its germination.

CONCLUSION

Chickpea because of its high protein contain secure an important position amongst the pulse crops. But these seeds in the storage condition become more susceptible to fungal infection resulting in the lowering in seed germination and deterioration in storage. A damage seed will produce an abnormal seedling. Thus farmers are advice to use pathogen free healthy seeds to overcome the losses in productivity. But without seed health test it is not possible to detect healthy seeds for better productivity.

REFERENCES

Afzal MR, Cheema A, Chaudhary RA (1979) Incidence of aflatoxin producing fungi in animal feed stuff. *Mycopathologia*, 69(3): 149-51.

Ahmad I, Iftikhar S, Bhutta AR (1993) Seed borne microorganism in Pakistan. A chicklist 1991. Pakistan Agricultural Research Council, Islamabad, Pakistan, pp32.

Anwar F, Sharmila P, Saradhi PP(2009) No more hurdle: in vitro chickpea rooting and cent percent transplantation. *Australian J. basic and Applied Sciences*, 3 (3): 2491-2496.

Bhajbhuje MN (2013) Distribution of micro-fungal propagules in storage on seeds of *Lycopersicon esculentum* Mill. *Int. J. of Life Sciences*, 1(4): 248-263.

Ghangaokar NM, Kshirsagar AD (2013) Study of seed borne fungi of different legumes. *Trends in Life Sciences*, 2(1): 32-35.

Hedawoo GB, Mishra SA, Maggirwar RC (2014) Incidence of mycoflora associated with some spices. *Int. J. of Life Sciences*, 2(1): 44-48.

ISTA (2012) International rules for seed testing. ISTA News Bulletin No.143. Zurich, Switzerland.

Islam SMM, Masum MMI, Fakir MGA (2009) Prevalance of seed borne fungi in sorghum of different locations of Bangladesh. *Scientific Research and Essay*, 4(3): 175-179.

Javaid A, Bajwa R, Javaid A, Tehmina A (2005) Fungi associated with seeds of pulses collected from Lahor and their effect on seed germination. *Mycopath*., 3(1&2): 13-16.

Jukanti AK, Gaur PM, Gowda CL, Chibbar RN (2012) Nutritional quality and health benefits of chickpea (*Cicer arietinum* L.). *Br. J. Nutr*, 108: 512-526.

Khanzada KA, Rajput MA, Shah GS, Lodhi AM, Mehboob F (2002) Effect of seed dressing fungicides for the control of seed borne mycoflora of wheat. *Asian J. Plant Sci*., 1(4): 441-444.

Nene YL, Sheila VK, Sharma SB (1996) A world list of chickpea and pegionpea pathogens (5th ed.). ICRISAT, Patancheru, Andra Pradesh, India, pp 27.

Neergaard P (1977) Seed pathology, Vol I and II. *The Macmillan press, London, UK*. pp. 1-1187.

Reddy A, Mishara D (2010) Growth and instability in chickpea production in India. www. icrisat.org. (Accessed on 15th 2014.

Singh VK (2014) Detection of mycoflora associated with *Cicer arietinum* seeds by agar plate method with PDA. *Weekly Science Research Journal*, 1(30): 1-4.

RESEARCH ARTICLE

Preliminary phytochemical and antimicrobial screening of solvent extracts of roots of *Andrographis paniculata* and stem bark of *Bombax ceiba*

Gond Gopal S

Department of Biochemistry, Guru Nanak College of Science, Ballarpur-442701
Affiliated to Gondwana University, Gadchiroli
Email: gond.sg@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Gond Gopal S (2014) Preliminary phytochemical and antimicrobial screening of solvent extracts of roots of *Andrographis paniculata* and stem bark of *Bombax ceiba. Int. J. of Life Sciences,* Special Issue, A2 : 31-34.

Acknowledgement:
The author is extremely grateful to Principal of Guru Nanak College of Science, Ballarpur (MS) India for providing all research facilities to accomplish this study.

ABSTRACT

Medicinal plants are used to cure common ailments by the people of the tribal area. *Bombax ceiba and Andrographis paniculata* are selected for the antimicrobial and phytochemical analysis on the basis of medicinal folklore reports and literature data. The selection of plants for evaluation was based on traditional use for treatment of common ailments. *Bombax ceiba* is known Katesawari, semal, savari. It is used in diarrhoea, dysentery & menorrhagia. *Andrographis paniculata* belongs to the family of Acanthaceae and is popular worldwide with the name of "King of Bitters" in English. It is an annual herbaceous plant which is widely cultivated in Southern Asia, India, China and some parts of Europe. Qualitative phytochemical screening of stem bark Bombax ceiba and roots *Andrographis paniculata* was studied. The methanol solvent was used to obtain extracts from powdered plant parts. The extracts were subjected to qualitative phytochemical screening using standard procedures. Results show that six of seven phytochemicals screened for, were present in stem bark of Bombax ceiba. They are; carbohydrate, flavonoids, phenols, saponins, sterols and tannins. Five of seven phytochemicals screened for, were present in the roots *Andrographis paniculata.* They are; carbohydrates, phenols, saponins, alkaloids and tannins. The diversity of phytochemicals present suggests that Bombax ceiba stem bark and *Andrographis paniculata* roots could serve as a source of useful drugs.

Keywords: *Andrographis paniculata*, Bombax ceiba, Phytochemicals, Antibacterial, Roots, Stem bark.

INTRODUCTION

Phytochemicals are bioactive chemicals of plant origin. They are regarded as secondary metabolites and are naturally synthesized in all parts of the plant i.e. any part of the plant may contain active components (Tiwari *et al*., 2011. The quantity and quality of phytochemicals present in plant parts may differ from one part to another. In fact, there is lack of information on the distribution of the biological activity in different plant parts essentially related to the difference in distribution of active compounds (or active principles) which are more frequent in some plant parts than in others (Lahlou, 2004). Phytochemicals have been recognized as the basis for traditional herbal medicine .The presence of a phytochemical of interest may lead to its further isolation, purification and characterization. Then it can be used as the basis for a new pharmaceutical product.

Bombax ceiba (Bombacaceae) is large handsome deciduous tree, trunk with prickles. Lokal name of *Bombax ceiba* is Katesawari, semal, savari. The root has stimulant & tonic properties. The bark & the root are emetic. The roots of saplings up to about three years old are know as 'semarkanda' in the Central Provinces & are used as a nerve tonic & as an astringent . The gum is used as a tonic & astringent .It is also used in diarrhoea, dysentery & menorrhagia (Caius, 1939).

The genus *Andrographis* consists of 28 species, only a few species are medicinal. *Andrographis paniculata* is an annual herb extremely bitter in taste. The plant is known in India by various vernacular names. It is also known as Kalmegh or Kalamegha. Local name of this plant is Bhui-neem. It has a strong bitter taste similar to the Neem tree. *Andrographis paniculata* has an important place in the Indian Pharmacopoeia and is one of the most widely used plants in ayurvedic formulations (Hooker, 1885). The whole plant has variety of therapeutic values. It has immune-suppressive properties and is useful in treatment of wounds, ulcers, leprosy, sore throat, and hypertension, (Puri *et al*., 1996). Panchang (stem, leaves, flowers, root and seeds) of the plant is being used in various formulation of Indian system of medicine for the treatment of fever, malaria and sore throat (Chopra *et al*., 1956). It has been used in the treatment of some skin infections in India by folkloric medicine practitioners (Jain, 1991).

In the present study, extracts of stem bark of *Bombax ceiba* and root of *Andrographis paniculata* were qualitatively screened for phytochemicals and antimicrobial activities using standard tests.

MATERIALS AND METHODS

Collection of Plant Materials: Bark of *Bombax ceiba* and roots of *Andrographis paniculata* were collected from different parts of the Chandrapur district.The material for the present investigation was collected from villages inhabitating tribals in the Chandrapur & Gadchiroli districts of Maharashtra. The information was gathered by questioning local healers and knowledgeable villagers.

Preparation of sample: Collected samples are immediately chopped into small fragments. Stem, root, & bark are chopped into 3-5 cm pieces & splint longitudinally into several sections. Herbaceous samples & large leaves & fruits are also cut into small pieces.

Roots were washed thoroughly to remove soil before chopping. Chopping of fresh samples after collection hasten drying & its advantages are reduction in volume & increase in drying speed. Chopping permitted rapid drying of samples, otherwise they did not dry for weeks (Mehrotra, 1996)

The dried material pulvarized by a mechanical grinder. The material is coarsely ground by a mechanical grinder. The coarsely powder was stored in plastic container. The powdered material was kept in air tight plastic container & stored at low temperature till required for further study.

***Solvent extraction*:** The shade dried powder of the bark of *Bombax ceiba* and root of *Andrographis paniculata* (50 gm each) was packed well in Soxhlet apparatus and was subjected with water and methanol by continuous hot extraction for about 24 hrs. The extracts were filtered through Whatman filter paper and concentrated on a water bath. The final concentrated extracts were stored in refrigerator in bottles. The above prepared methanol extracts were used for phytochemical and anti-bacterial investigation. The dried extracts were tested for their phyto constituent's by standard methods.

Phytochemical Screening

Test for Alkaloids

***Mayers test*:** To a little of the test filtrate taken in watch glass a few drops of the Mayer's reagent reagent were added. Formation of cream colored precipitate showed the presence of alkaloids.

***Test for carbohydrates*: (Molisch's test)** Few drops of Molisch's reagent + 2ml of the extracts. Then add 2ml of conc. H_2SO_4 down the side of the test tube. The mixture was then allowed to stand for few minutes. Formation of a red or violet colour at the Junction of the two layers indicate positive test.

Tests for flavonoids: A small quantity of test residue was dissolved in 5 ml ethanol (95%) and treated with few drops of concentrated hydrochloric acid and 0.5 gm of magnesium. The pink or magenta colour is developed within three minutes, if flavonoids are present.

***Test for Phenols (Ferric chloride test)*:** A fraction of the extracts was treated with aqueous 5% ferric

chloride and observed for formation of deep blue or black colour.

***Test for Amino acids and Proteins (1% ninhydrin solution in acetone)*:** 2ml of filtrate was treated with 2-5 drops of ninhydrin solution placed in a boiling water bath for 1-2 minutes and observed for the formation of purple colour.

Test for Saponins (Foam test): To 2mls of extract was added 6ml of water in a test tube. The mixture was shaken vigorously and observed for the formation of persistent foam that confirms the presence of saponins.

***Test for Sterols (Liebermann-Burchard test)*:** 1ml of extract was treated with drops of chloroform, acetic anhydride and conc.H_2SO_4 and observed for the formation of dark pink or red colour.

***Test for Tannins (Braymer's test)*:** 2ml of extract was treated with 10% alcoholic ferric chloride solution and observed for formation of blue or greenish colour solution. The results obtained were recorded as --, +, ++, +++ signs, indicating their approximate concentrations. The results are given in Table 1.

***Anti-bacterial screening*:** Agar well-diffusion method (Okeke, 2001) was used for the anti-bacterial study. The overnight culture grown was used for inoculation. For working stock 1 mL of each bacterial strain was initially inoculated in100 mL of sterile nutrient broth and incubated for 37° ± 1°C for 24 hr respectively. Then 0.2 mL of the each test organisms from the working stock was seeded into 100 mL sterile nutrient agar medium and cooled to 48°C to 50°C in a sterile Petri dish respectively. When the nutrient agar medium solidifies, four holes of uniform diameter (6mm) were made using sterilized cork borer. Then, 0.2 mL of each methanol extracts and standard solution were placed in each hole separately. The plates were maintained at room temperature for 2 hr to allow the diffusion of the solution into the medium.

All the bacterial plates were incubated at 37° ± 1°C for 18 hr and the zone of inhibition was measured. Triplicates were maintained for each sample of the extracts respectively. For each bacterial strains control were maintained where pure solvents were used. All the diameters of inhibition zone were measured in mm. The results are shown in Table 2.

RESULTS AND DISCUSSION

Phytochemical Screening: Results obtained for qualitative screening of phytochemicals in stem bark of *Bombax ceiba* and roots of *Andrographis paniculata are* presented in table 1.

Of the seven phytochemicals screened for, five were found present in solvent extracts of *Andrographis paniculata*. They are alkaloid, phenols, carbohydrates, saponins and tannins. Phytochemical screening of stem bark of *Bombax ceiba* found to contain carbohydrate, flavonoids, phenols, saponins, sterols and tannins. In all, more phytochemicals were found present in the stem bark than in the roots. Remarkably, flavonoids were not present in roots but present in stem bark. This suggests that the stem bark offers a wider array of phytochemicals than the root. The diversity of phytochemicals present suggests that *Bombax ceiba* stem bark and *Andrographis paniculata* roots could serve as a source of useful drugs.

Table 1: Phytochemical Analysis of Plant Extracts

Plant Species	Part	Alkaloid	Saponins	Flavonoids	Tannins	Phenols	Sterols	Carbohydrates
Andrographis paniculata	Root	+++	++	-	+	++	-	+
Bombax ceiba	Bark	-	++	+	+++	+	+	++

Abbr: – = Absent, + = Presence, ++ = Moderate, +++ = Good

Table No 2: Results showing the antibacterial activity of plant extracts

Plant	Plant part	Extract	M.O.								
			S.a.	E.c.	B.s.	V.c.	S.d.	K.p	S.t.	P.a.	P.v.
Andrographis paniculata	Root	ME	12	10	12	11	17	11	14	15	13
Bombax ceiba	Bark	ME	14	--	11	--	--	--	--	9	--

ME=Methanol; M.O.= Microorganism; S.a.=Staphylococcus aureus; E.c.=Escherichia coli; B.s.=Bacillus subtilis; V.c.=Vibrio cholerae; S.d.=Shigella dystenteriae; K.p.=Klebsiella pneumoniae; S.t.= Salmonella typhi; P.a.=Pseudomonas aeruginosa; P.v.=Proteus vulgaris.

Anti-bacterial screening: Results of the antibacterial screening of methanol extracts of roots of *Andrographis paniculata* revealed significant antibacterial activity against all tested bacterial strains. The results are shown in table 2.

The methanol extract of roots of *Andrographis paniculata* showed more significant activity against all tested bacterial organisms than that of the stem bark extract of *Bombax ceiba*. The maximum antibacterial activity of methanol extracts of *Andrographis paniculata* was exhibited against Shigella dysenteriae and of *Bombax ceiba* was exhibited against *Staphylococcus aureus.* The inhibitory effects of *Andrographis paniculata* and of *Bombax ceiba* on the test micro-organisms may be due to the presence of the above phytochemical components. The various phytochemical compounds detected are known to have beneficial importance in medicinal science. The phenols along with antimicrobial activity also show astringent properties (Adelheid Brantner' 1994). Flavonoids and other polyphenols have been shown to exhibit significant antioxidant activity. Alkaloids have been used to treat diseases like malaria and glycosides serve as defense mechanisms against many micro-organisms. Alkaloids generally present in both parts play some metabolic role and control development in living system (Lalitha *et al*.,2012). They are also involved in protective function in animals and are used as medicine especially the steroidal alkaloids (Sharma *et al*.,2011). Saponin protects the plant against microbes and fungi.

CONCLUSION

Phytochemicals found present in root and stem bark extracts of *Andrographis paniculata and Bombax ceiba* indicates their potential as a source of principles that may supply novel medicines. Hence the crude methanol extract of *Andrographis paniculata* Root and bark extract of *Bombax ceiba* can be used for further purification and preparation of new anti-microbial for the more resistant type of micro-organism. The above findings recommend the further investigation of *Andrographis paniculata and Bombax ceiba* to evaluate their chemical potential.

REFERENCES

Adelheid Brantner and Edith Grein, (1994) Antibacterial activity of some plant extracts used externally in traditional medicine. "*Journal of Ethnopharcol*. 44:35-40.

Chopra RN, Nayar and Chopra IC (1956) Glossary of Indian Medicinal Plants. 1st Ed. Publication and Information, New Delhi.

Hooker JD (1885) Flora of British India, Vol. IV, L. Reeve & Co. Ltd. Ashford, Kent.

Jain SK (1991) Dictionary of Indian Folk Medicine and Ethnobotany-A Reference Manual of Man-Plant Relationships, Ethnic Groups and Ethno Botanists in India. Deep Publication, New Delhi, India .

Lahlou M (2004) *Phytother. Res.,* 18:435-445.

Caius (1939) Medicinal and Poisonous plants of India.

Lalitha TP, Jayanthi P (2012) *Asian J. Plant Sci. Res*, 2(2):115-122.

Mehrotra, BN (1996) Collection of biological materials in biodiversity prospecting in India: problems & solutions. *Ethnopharmacology*, 51:161.

Okeke MI, Iroegbu CU, Eze EN, Okoli AS and Esimone CO (2001) Evaluation of the Extracts of the Roots of Landolphia Owerrience for Anti-bacterial Activity, *J. Ethanopharmacol*, 78: 119-127

Puri A, Saxena R, Saxena R.P, Saxena, K.C Srivastava and Tandon, S, (1996) Imunostimulant Agents from *Andrographis Paniculata*, *J. Nat. Prod*., 56(7):995-999.

Sharma M, *et al*., (2011) Evaluation of Phytochemical and antibacterial activity of hot and cold methanolic extract of leaves and whole plant of *andrographis paniculata, Int. J. Chem. Sci.*: 9(3):960-968

Tiwari P, Kumar B, Kaur M Kaur G,Kaur H (2011) *Int. Pharm. Sciencia,* 1:98-106.

RESEARCH ARTICLE

Some Noteworthy Addition to the Flora of Nagpur District (M.S.), India

Gadpayale Jagannath V[1], Somkuwar Subhash R[1]* and Alka Chaturvedi[2]

[1]Department of Botany, S. N. Mor College of Arts, Comm. and Smt. G. D. Saraf Science College, Tumsar, India

*[1]*Dept. of Botany, Dr. Ambedkar College, Deekshabhoomi, Nagpur, India-440 010.*

[2]P.G.Department of Botany, RTM Nagpur University, Nagpur, India-440 033.

Corresponding author's E-mail: ssomkuvar@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as: Gadpayale Jagannath V, Somkuwar Subhash R and Alka Chaturvedi (2014) Some Noteworthy Addition to the Flora of Nagpur District (M.S.), India, *Int. J. of Life Science,* Special issue, A2 : 35-38.

Acknowledgements:
The authors are grateful to Dr. M R. Almeida (Taxonomist) Savantwadi, for their support, herbarium facility and scientific advices during the identification of plant. The authors acknowledge the essential help of Dr. Rahul Kamble for getting study access to the second author.

ABSTRACT

Nagpur is the most prominent district of Eastern Maharashtra. During the field survey of Nagpur District, the authors collected some uncommon taxa from the different locations and habitats which are not reported yet in the floristic documentation. The present paper deals with the study of findings of four new taxa, collected for the first time. Some taxa have very small population size in the study region. Specimens were collected, identified with the help of different floras and recent literature for their authentification.

Key Words: New Additions, Flora of Nagpur District, Maharashtra, India.

INTRODUCTION

Nagpur districtis a part of Eastern Maharashtra lies in between the latitudes 20^0 35' and 21^0 44'North and longitudes 78^0 15' and 79^0 40' east and has an area of 9930 square kilometers contributing the major forest cover and rich biodiversity in the Maharashtra Statehaving number of the protected area networks (national parks and sanctuaries). The earliest documentation of floristic exploration in this area was done by Ugemuge (1986). According to Flora of Nagpur District (Ugemuge, 1986) there are 1136 plant species which fall under 669 genera and 142 families.Many workers during botanical explorations of the district reported additions to the Flora of Nagpur District, viz. Bhuskute (1989; 1990), Thakre and Srinivasu (2012a; 2012b) and Kamble *et al.* (2013a; 2013b; 2013c; 2014).

MATERIAL AND METHODS

Several visits were made in the district for the floristic survey during the last two years in different seasons. The identification and authentification of collecting plant samples have been done with the relevant literature,Flora of Nagpur District (Ugemuge 1986), Flora of Maharashtra State Vol. I (Singh & Karthikeyan, 2000), Flora of Maharashtra State Vol. II (Singh *et al*., 2001), The Flora of Maharashtra (Almeida 1998), Flora of Marathwada (Naik, 1998) and research papers and reports. The voucher specimens of the collected plant species has been deposited at the Herbarium, Dept. of Botany, RTM Nagpur University, Nagpur. The identifications were further confirmed after a critical perusal of monographs and other allied material and matching with the

authenticated specimens housed in P.G. Dept. of Botany RTM Nagpur University herbarium and verified by comparing the specimens housed at the Magdelin Almeida Environmental Centre (ST. Teresa Socio, Eco and Educational Trust) Charatha, Savantwadi.

RESULTS AND DISCUSSION

The authors collected four different plant specimens belonging to families Orchidaceae, Sapindaceae, andMoraceae. After critical morphological and microscopic observations, the plant specimenswere identified with the help of various flora's which have been cited here.It was found that these plant species are a new addition to the Flora of Nagpur district and the Vidarbha region. The photographs of these plant species have been added below in the figure1 and 2 respectively. The flowering and fruiting seasons, habitats, status, localities,etc. have been mentioned in the description.

1. Family:-Sapindaceae

Cardiospermum microcarpakunth, Nov. Gen. Sp. 5: 104. 1821; Almeida, Fl. Mah.1: 276. 1996; Naik, Fl. Marathwada 1: 229. 1998. *C. canescens* Wall. Pl. As. Rar. 1: 14. 1830; Hiern in Hook. F. Fl. Brit. India 1: 670. 1875; Cook, Fl. Pres. Bombay 1: 281. 1958 (Repr.).

Climbing herbs or undershrubs; stems furrowed, pubescent.Leaflets 3.5-5.0 x 1-3 cm, ovate to obovate, apex in laterals obtuse, base cuneate to cordate, in terminal one apex mucronate, margins coarsely serrate.Flowers 0.6-1.5 cm long, white in umbellate cymes; peduncles 4-12 cm long. Capsules 2.5-4.0 cm long, globose, 3-angled. Seeds 0.3-0.5 cm across, globose, black, arillate.

Flowering & Fruiting: July - February

Ecology: Occasional on hill slopes.

Location: Veltur, Channa, Kuhi.

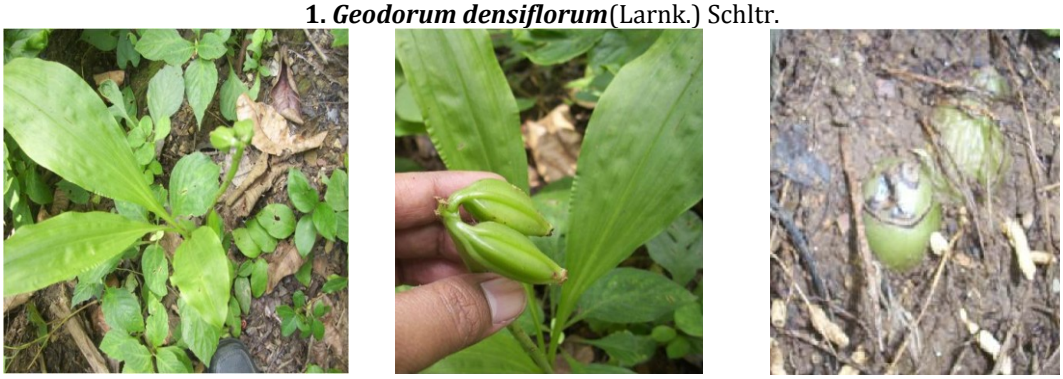
Distribution: Konkan (Cooke, op. cit) and Marathwada (Naik, op. cit)

Status: Rare

Note: It is the first record for Vidarbha

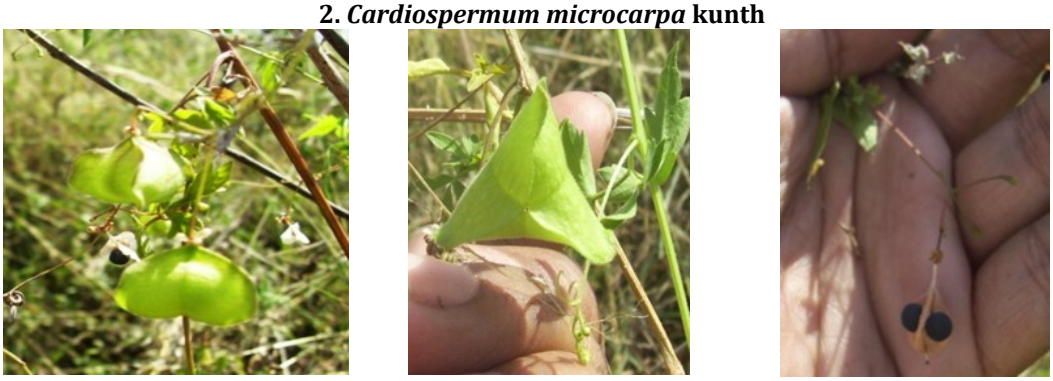
Key identification features : Tendrilar herbaceous climber, leaves biternate & pubescent, inflorescence with basal tendrils, capsules 3-angled.

1. *Geodorum densiflorum*(Larnk.) Schltr.



A. Habit **B. Capsules** **C. Tuberous root**

2. *Cardiospermum microcarpa* kunth



A. Habit **B. Fruiting twig** **C. Tuberous root**

Fig.1. Photographs of *Geodorum densiflorum*(Larnk.) Schltr. and *Cardiospermum microcarpa* kunth

A. Habit **B & C. Fruiting twig**

Fig.2. Photographs of *Ficus carica* L. and *Ficus amplissima*J.E. Sm.

2. Family:-Orchidaceae

Geodorum densiflorum (Larnk.) Schltr., Fedde. Report. 4: 259.191 9; Fischer in Gamble, FI.Pres. Madras 1437 (1004). 1928. *Limodorum densiflorum* Lamk., Eucyl. 3: 516, 1792.

Terrestrial herbs with tuberous root stock, stem arising laterally from the rootstock. Flowers purplish white, crowded in decurved racemes. Lip sessile, subpandurate, rounded at apex, emarginate or 2 - fid, streaked with purple, disc with a median yellow channelled ridge, ventricose at the base. Leaves 2 or 3, elliptic - lanceolate, plicate.

Flowering: March to May

Habit: Geophyte.

Ecology: Fairly common in the moist deciduous and semievergreen forest.

Taxonomic status: Still not stabilized (in someliterature, it is reported as an endangered terrestrial orchid, which has long been used traditionally for various medicinal purposes in the Indian subcontinent)

Location: Weltur and Marupar

Key identification features : Terrestrial, herbaceous plant, pollinia waxy, cells of anther usually confluent. Leaves on pseudobulbs, plaited and nerved, lip not spurred.

3. Family : Moraceae

1. *Ficus amplissima* J.E. Sm. in Rees, Cyclop. 14. n. 68. 1810; Corner in Dassan.& Fosb. Rev. Handb. Fl. Ceylon 3: 242, f. 9. 1981. F. tsiela Roxb. Ex Buch.-Ham.in Trns. Linn. Soc. 15: 149. 1826; King in Hook.f. Fl. Brit. India 5: 515. 1888; Cooke Fl.Pres. Bombay3: 150 1958 (Repr.); Talb.For.Fl. Bombay Pres. & Sind 2: 518, f. 526. 1911.

Well branched tree, c 15 m high; main trunk gregarious, often marked with vertical clefts, bark smooth, light colored, pale – green, whitish or grayish. Leaves ovate or ovate- lanceolate, bright green, shining above, 5-12 x 2-6 cm, base rounded, apex acute or cuspidate, entire along the margins, 3-nerved, membranous. Figs axillary, sessile, globose in pairs, c 1.5 cm across; basal bracts 3, ovate, glabrous or puberulous.Tepals 2-3, reddish, ovate-acute, free. Male flowers: few, pedicels 0.2mm long. Female flowers: sessile, tepals 3-4, ovary white.

Receptacles: - April - September

Ecology: Wet places (in forest areas)

Location: Nagpur, Satnavri, Thana, Kargaon, Wanadongri

Status: Not evaluated

Key identification features : A large spreading tree, sometimes with aerial roots. Leaves symmetrical at base, with a gland at the back of the petiole, Petiole 3 cm long, leaf blade ovate, slightly acuminate at the apex to 10cm long, 6 cm broad, leathery.Monoecious, figs often with interfloral bracts, sessile, bracts small and scaly.

2. Ficus *carica* L. Sp. Pl. 1059. 1753; Cooke Fl. Pres. Bombay 3: 155. 1958 (Repr.); Naik, Fl. Marathwada 2: 810. 1998.

Trees, 5-10 m tall, deciduous; branches pubescent. Leaves 8-13 x 8-17 cm, broadly ovate, cordate at base,

usually 3-5 lobed, hairy on both sides. Receptacles pyriform, 3-5 cm across, in axils of leaves, ripens greenish-purple, finely hairy outside. Achenes 1.5 – 2.0 cm long, ovoid, brown.

Receptacles: - March - May

Ecology: Dry places (grown on a small scale in orchards).

Location: Near Itwara Railway station and Ravinagar Nagpur

Status: Rare

Note: It is the first record for Vidarbha

Key identification features : Achenes are axillary, 1.5 – 2.0 cm long, ovoid, brown, usually pear shaped. The fig is sweet, and juicy when ripe and gummy with latex before ripening. Seeds vary greatly in size and number from 30 to 1600 per fruit.

Note: shows many similarities with *Ficus palmata* ssp. *Virgata* (Roxb.) Browicz.

CONCLUSION

In the recent years there is a great interest in plant diversity studies in general and floristic studies in particular while regional floristic studies got much importance. The major region of Nagpur district has many protected forests, because of which some taxa had not been documented earlier in the Flora of Nagpur District. This study added some noteworthy plants like *Cardiospermum microcarpa* Kunth, *Geodorum densiflorum* (Larnk.) Schltr., *Ficus amplissima* J.E. Sm.and *Ficus carica* L.to the flora and collected for the first time from this region with their status. The significance of this field research is the detection of narrative additions to a floristic region, which subsequently improve the basic understanding of phytogeography and species diversity in the study region.

REFERENCES

Almeida MR (1998) The Flora of Maharashtra, Orient Press, Mumbai.

Bhuskute SM (1989) New Plant Records for Nagpur District (M.S.). *Ind. Bot Rep* 8(1): 39-42.

Bhuskute SM (1990) New Plant Records for Nagpur District (M.S.)-II. *Ind. Bot Rep* 9(2): 61-65.

Forest Survey of India (2011) India State of Forest Report : 9.16. Maharashtra, pp. 170-175.

Kamble RB, Hate S. and Alka Chaturvedi (2013) New additions to the Flora of Nagpur District, Maharashtra. *J. New Biol Rep* 2(1): 09-13.

Kamble RB, Hate S, Mungole A. and Alka Chaturvedi (2013) New Record of Some Rare Plants to the Flora of Nagpur District, Maharashtra, *J. New Biol Rep* 2(2): 103-107

Naik VN (1998) The Flora of Marathwada, Amrut Publication, Aurangabad.

Singh NP, Karthikeyan S. (2000) Flora of Maharashtra State: Dicotyledones, Vol. I (Ranunculaceae to Rhizophoraceae) Botanical Survey of India.

Singh NP, Lakshminarasimhan P., Karthikeyan S. and Prasanna P. V. (2001) Flora of Maharashtra State: Dicotyledones, Vol. II: (Combretaceae to Ceratophyllaceae), Botanical Survey of India.

Sharma BD, Karthikeyan S and N. P. Singh (1996) Flora of Maharashtra State: Monocotyledones, Botanical Survey of India.

Thakre MT, Srinivasu T. (2012a) New (Fabaceae member) records to Nagpur district, *MFP News* XXII: (2): 4-5.

Thakre MT, Srinivasu T. (2012b) New plant records of Nagpur district, *MFP News* XXII: (3): 6- 10.

Ugemuge NR (1986) Flora of Nagpur District, Shree Publication, Nagpur.

RESEARCH ARTICLE

Mycodiversity Associated With Seeds of Soybean (*Glycine max* L.) Seeds

Patharkar SP and Hedawoo GB

P.G. Dept. of Botany, Shri Shivaji Science College, Amravati

Corresponding Author: sppatharkar@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Patharkar SP and Hedawoo GB (2014)Mycodiversity Associated With Seeds of Soybean (*Glycine max* L.) Seeds., *Int. J. of Life Sciences, Special issue,* A2: 39-42.

Acknowledgement:
The authors are thankful to Principal of college and Dr. P. W. Deotare, Head Department of Botany, Shri Shivaji Science College, Amravati for facilitation during the course of this work.

ABSTRACT

In Maharashtra state, oilseeds are cultivated in both kharif as well as rabbi seasons. Out of which soybean (*Glycine max* L.) is major oilseed crop. After harvesting, seeds are stored in various conditions. If these conditions are not provided properly that time different microbes like fungi are interacted with seeds and play a dominant role in decreasing quality and longevity of the seeds. Therefore the present work deals with the isolation, identification and percent germination of soybean seed mycoflora by using ISTA techniques. In seed health test, total 17 species of fungi were recorded from soybean seeds. Among them *Aspergillus flavus* (7.06 %), *Rhizopus stolonifer* (6.60 %), *Phoma oleraceae* (6.30 %) and *Aspergillus niger* (5.15 %) were found to be predominant. The highest (97.33 %) seed germination of soybean was recorded in the month of Nov. followed by Dec (95.21%) and lowest in Jan. (91.00 %).

Key words: - Seed-borne mycoflora, % frequency, % germination, soybean.

INTRODUCTION

Soybean [(*Glycine max* L.) Merril] a highly nutritive as well as commercial crop is grown both under irrigated and rain fed conditions and plays an important role in Indian economy (Kakade and Chauhan, 2011). It is widely accepted as an excellent source of nutrient to both man and poultry due to its high protein content. It contains 40-45% protein, 20-22% oil, 20-26% carbohydrates, and high amount of Ca, P and vitamins. Fat free soybean meal is cheap source of protein used as fodder and many prepackaged meals; soy vegetables oil is another product of soybean crop (Bansode *et al.,* 2014).

Seed quality is the cheapest input in advance agriculture. The viable as well as vigorous seed during planting time is very important for achieving the target of agricultural production because it acts as catalyst for realizing the potential of other input (Yadav *et al*., 2014). Various environmental factor like high relative humidity, moderate temperature etc. favours growth of seed borne micro-fungal flora on storage seeds, even some pathogens attack matured preharvested seeds in entire crop, as result of favourable storage environment (Bhajbhuje,2014). Several seed borne fungal pathogens have been reported by different researchers (Mishra *et al.,* 1969; Muthuraj *et al*., 2002).

During storage, variety of biochemical changes occurred due to fungal deterioration in oilseeds (Kakde and Chavan, 2011). Also, seasonal climatic variation of Vidarbha and improper storage condition contribute to make the

storage condition extremely supportive for fungal attack to the seeds (Bhajbhuje, 2014). In this context, the present work was carried out to explore seed mycoflora complex and their effect on seed germination.

MATERIALS AND METHODS

Soybean [(*Glycine max* L.) Merril]) seed samples collected from five different talukas of Amravati district during 2010-2011, were brought to laboratory in sterile cotton bags and kept at room temp. The untreated seeds were used for isolation of external mycoflora while surface sterilized seeds by aqueous 0.1% mercuric chloride solution were used for detection of internal seed mycoflora. The isolation of seed mycoflora was made by standard blotter paper and agar plate method technique of ISTA (2012). After incubation for seven days at 25±1^{0}C, seeds were observed under stereo-binocular microscope for prevalence of fungal growth on seed surface. A count of germinating seeds as well as fungal colonies on seeds was taken and expressed in percent frequency (Bhajbhuje, 2013).

RESULTS AND DISCUSSION

Mycological examinations of the soybean seeds were carried out for month of Nov.– 2011, Dec. – 2011and Jan. - 2012. The seeds were screened for prevalence of seed mycoflora (Table-1). Altogether a population of 17 fungal species representing13 genera has been confined to seeds of soybean (*Glycine max* L.). Of these, isolates of *Ascomycota* are most predominant, represented by 6 genera and 10 species followed by Deuteromycota, contributing 3 genera and 3 species. *Oomycota* and *Zygomycota* had 4 genera and 4 species. The result confirmed with report of Hedawoo *et al*., (2014) who reported higher count of fungal isolates of Ascomycota from spices.

Agar plate method and blotter methods were used to isolate large number of mycoflora from seed samples of soybean (Table-1). Results revealed that blotter paper method is more effective for isolation of mycoflora as compared to agar plate method. Bhajbhuje (2014) isolated greater count of isolates from brinjal seeds on blotter paper.

Table 1: Frequency of isolated fungi on soybean seeds.

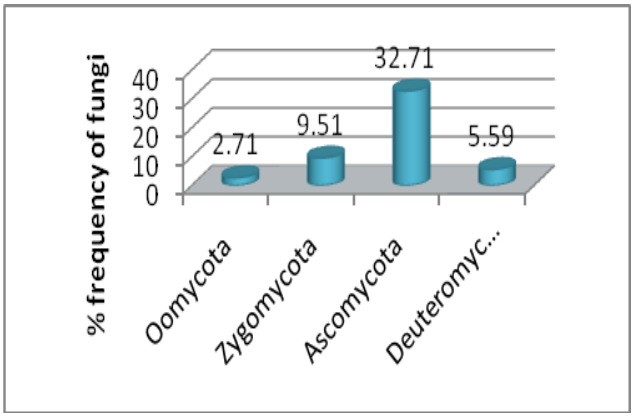
S. N.	Fungi isolated	November-11		December-11		January-12		Mean±SD	±SE
		E	I	E	I	E	I		
1	*Aspergillus flavus*	10.83	8.58	8.58	3.33	4.41	6.66	7.06±30.51	± 2.57
2	*Aspergillus niger*	4.58	2.5	1.08	4.16	10	8.58	5.15±38.67	±3.16
3	*Aspergillus fumigatus*	6.25	2.5	4.16	6.66	6.25	2.91	4.78±12.80	±1.68
4	*Aspergillus nidulance*	3.33	2.5	1.66	1.66	0.83	-	1.99±3.59	±0.85
5	*Aspergillus ochraceus*	2.5	1.66	2.5	1.66	2.83	2.08	2.20±8.75	±0.44
6	*Cladosporium cladosporioides*	0.83	-	0.83	-	0.83	-	0.83±0.83	00
7	*Curvularia lunata*	1.66	-	-	1.66	1.25	0.83	1.35±3.35	±0.34
8	*Cylindrocladium* sp.	-	-	-	-	1.66	-	1.66±6.71	00
9	*Fusarium oxysporum*	7.08	4.66	2.08	2.08	2.08	2.5	3.41±9.95	±1.87
10	*Mucor* sp.	1.66	-	1.66	2.5	7.5	1.25	2.91±4.92	±2.32
11	*Phoma oleraceae*	2.91	4.16	2.91	18.60	2.91	6.33	6.30±25.79	±5.63
12	*Pythium* sp.	1.66	-	0.83	-	-	-	1.24±3.37	±0.41
13	*Phytophthora* sp.	1.08	2.5	0.83	-	-	-	1.47±3.33	±0.73
14	*Penicillium digitatum*	6.66	0.83	0.83	-	2.5	2.91	2.74±11.60	±2.73
15	*Rhizopus stolonifer*	4.3	-	19.58	1.66	10.25	3.83	6.60±26.54	±6.25
16	*Trichothecium* sp.	-	-	-	0.83	-	0.83	0.83±3.57	00
17	*Torula* sp.	-	-	-	-	-	0.83	0.83±3.57	00
Total		55.33	29.89	47.53	44.8	55.8	39.54		
		85.22%		92.33%		95.34%			

±S.D. = Standard deviation **± S.E. = Standard error**

Table 2 : Germination % of soybean seeds.

Sr. No.	Month	Germinated seeds (%)	Non-germinated Seeds (%)
1.	November-2011	97.33%	2.67%
2.	December-2011	95.21%	4.79%
3.	January –2012	91.00%	9.00%

Fig.1: Distribution of fungal flora of soybean seeds (*Glycine max* L.)



Occurrence of fungi was recorded in terms of mean value with standard error and standard deviation (Table-1). The mean of highest percent frequency of *Aspergillus flavus* (7.06%) was appeared to be predominant followed by *Rhizopus stolonifer* (6.60%), *Phoma oleraceae*. (6.30%), and moderate percent frequency was of *A. niger* (5.15%), *A. fumigatus* (4.78%), *Fusarium oxysporum* (3.41%), *Mucor mucedo* (2.91%), *Penicillium digitatum* (2.74%) and lowest percent frequency was of *A. ochraceus* (2.20%), *A. nidulans* (1.99%), *Cylindrocladium* sp.(1.66%), *Phytophthora* sp.(1.47%). *Curvularia lunata* (1.35%), *Pythium* sp. (1.24%), *Cladosporium cladosporioides* (0.83%), *Trichothecium* sp. (0.83%) and *Torula* sp. (0.83%). The fungi, *Cylindrocladium* sp., *Cladosporium cladosporioides* and *Pythium* sp. were isolated by standard blotter paper method whereas, *Torula* sp. and *Trichothecium* sp. by only agar plate method. Popoola and Akueshi (1986) have reported *Aspergillus niger, Fusarium oxysporum, F.solani, Curvularia lunata, Penicillium* sp. on seeds during storage. Muthuraj *et al*., (2002) isolated seed mycoflora of soybean and dominant nature of *Aspergillus flavus, Aspergillus niger* and *Alternaria alternata*. Reddy *et al*.,(2014) also reported that *Aspergillus flavus* produces aflatoxins which is carcinogenic. Heavy infestation of *Aspergillus flavus* and *A.niger* was reported on tomato seeds (Bhajbhuje, 2013).

The germination percent of stored soybean seed was found to be decreasing every month. It was recorded as 97.33% in November –2011, 95.21% in December and 91.00% in January –2012 (Table.3). From the above results it appears that increase in fungal incidence on seeds seem to reduce the germination percentage. In north eastern Karnataka, Bhajbhuje (2013) reported decrease per seed viability in heavily infested seeds. Rao *et al*., (2014) reported biochemical changes biochemical changes in seeds during storage due to association of storage fungi. These microbes degraded seed constituents like amino acids, carbohydrates and bringing down the seed viability, plant growth and productivity. Thus there is a need

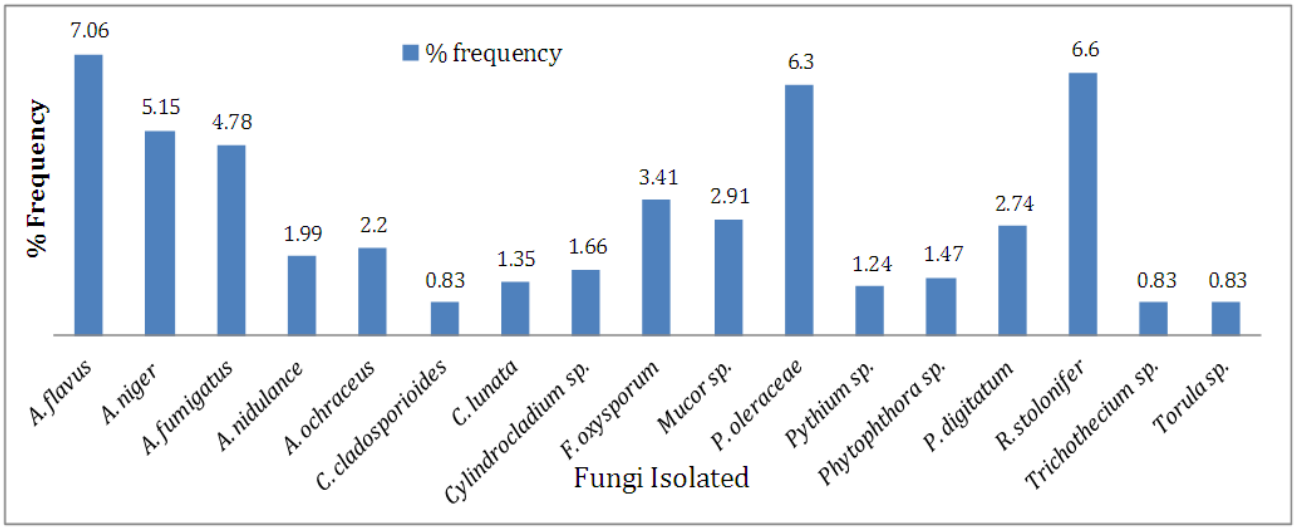


Fig. 2: Frequency of individual fungal species on soybean seeds

for the control of these pathogenic fungi by applying various techniques to ensure improvement of seed health which directly increases crop quality.

CONCLUSION

From the present the investigation it can be concluded that, the nature of fungi associated with the seeds of soybean samples and their effect on seed germination studies are needed to explore more safe and economic method to check seed borne fungi. Therefore, both these methods are easily applicable for isolation of seed mycoflora.

REFERENCES

Bansode SA, Sawant VS, Bhale UN (2014) Reclamation of degraded land through pond sedimentary soil and impact of biomass production and arbuscular mycorrhizal fungal (AMF) status of soybean field . *International Journal of Biotechnology and Allied Fields* ,2(1):33-41.

Bhajbhuje MN (2013) Biodiversity of mycoflora in storage on *Solanum melongena* L .seeds. *International Journal of Life Sciences*, 1(3):165-181

Bhajbhuje MN (2014) Seasonal diversity of seed borne micro-fungal flora in storage on *Solanum melongena* L. *International Journal of Life Sciences*, 2(1):31- 43.

Hedawoo GB, Mishra SA, Maggirwar RC (2014) Incidence of mycoflora associated with some spices. *Int. J. of Life Sciences*, 2(1): 44-48.

ISTA (2012). International rules for seed testing. ISTA News Bulletin No.143. Zurich, Switzerland.

Kakade RB and Chavan AM (2011) Deteriorative changes in oilseeds due to storage fungi and efficacy of botanicals. *Current Bot*, 2: 17-22.

Mishra AB *et al*. (1969) *Journal Applied sciences India,* 1:52-53.

Mukherjee PS, Nandi SK, Nandi B (1992) Deteriorative changes in groundnut seeds in storage. *Journal of Mycopathological Reasearch*, 30(2) :113-119.

Muthuraj R, Kant K, Kulshresthra DD (2002) Screening soybean cultivars for seed mycoflora and effect of thiram treatment thereon. *Seed Res*, 30(1):118-121.

Popoola TOS, Akueshi CO (1986) Seed borne fungi and bacteria of soybean (*Glycine max* L. Merril) in Nigeria. *Seed Res.* 14(2) :170-176.

Rahman MM, Hossain MM, Anwar MP, Juraimi AS (2011) Plant density influence on yield and nutritional quality of soybean seed. *Asian Journal of Plant Sciences*, 10(2):125-132.

Rao GS , Narayana SL ,Bhadraiah B, Manoharachary C. (2014) Biochemical changes due to fungal infestation in stored seeds of some vegetable crops. *Indian Phytopath,* 67 (2): 159 -163.

Reddy PLN , Reddy SC , Saritha P, Sreeramula A (2014) Antifungal activity of selected medicinal and aromatic plants extracts again soil born plant pathogenic fungi . Indo American Journal of Pharmaceutical Research,4(3):1520-1525.

Yadav VB , Bharud RW, Nagawade DR (2014) Biochemical changes associated with storage of summer groundnut (*Arachis hypogaea* L.) *Seeds Journal of Crop Science*, 5(1)112-115.

RESEARCH ARTICLE

Biodiversity of seed borne microfungal flora in storage on cauliflower (*Brassica oleracea* var. botrytis) from Nagpur region.

Madavi Shivkumar[1] and Bhajbhuje MN[2]*

[1]*P. G. Department of Botany, RTM Nagpur University, Nagpur 440 033 (M.S.) India.*

[2]*Assoc. Prof. & Head, Dept. of Botany, Jawaharlal Nehru Mahavidyalaya, Wadi, Nagpur-23 (M.S.) India*

**Corresponding Author Email: dr_mnbhajbhuje@rediffmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Madavi Shivkumar and Bhajbhuje MN (2014) Biodiversity of seed borne microfungal flora in storage on cauliflower (*Brassica oleracea* var. botrytis) from Nagpur region., *Int. J. of Life Sciences,* Special issue A2: 43-47.

Acknowledgement:
The authors gratefully acknowledges the facilitation of this work by Prof. & Head, Dr Mrs. Alka Chaturvedi and Dr .R.P. Thakre, Ex- Professor, P.G. Department of Botany, RTM, Nagpur University, Nagpur.

ABSTRACT

The mycological analysis of seed samples of Cauliflower (*Brassica oleracia* L. var. *botrytis*) from Nagpur region revealed prevalence of 38 fungal species belonging to 20 genera. Of these, 24 isolates encountered both as external and internal seed borne; 9 isolates were external and 5 isolates were internal seed borne. Deuteromycota dominated with nearly half of the total count of isolates followed by Ascomycota. *Aspergillus* dominated with highest count of species and contributed more than one quarter of the total incidence. *Fusarium* dominated with four; *Penicillium*, *Alternaria* and *Curvularia* each with three; *Chaetomium*, *Helminthosporium* with two species while remaining ones had single species. Ascomycota contributed greatest fungal incidence followed by Deuteromycota. *Rhizopus stolonifer*, *Fusarium*, *Alternaria* and *Penicillium* had significant level of infestation Moderate infestation has been recorded for *Cercospora, Chaetomium, Cladosporium, Mucor Curvularia, Helminthosporium, Nigrospora, Pyricularia, Trichothecium* and *Pythium* while others reported with little to mild infestation. Blotter paper method proved superior over agar plate.

Key words: *Brassica oleracia* var. *botrytis*, seed borne, pathogens, susceptible, infestation, isolates.

INTRODUCTION

Cauliflower (*Brassica oleracia* L. var. *botrytis*) is a major winter vegetable cash crop extensively grown worldwide including India for its white inflorescence as it is low caloric, low fat, zero cholesterol content, vitamin and mineral rich, nutritious vegetable, propagated by seeds. It is a store house of health-benefiting antioxidants and several phytochemicals hence consumed as vegetable in curries, soups and pickles. The florets are used raw in mixed salad as it can be consumed by low carbohydrate dieters as a reasonable substitute for potatoes or rice. A fresh white cauliflower heads are roasted, boiled, fried, steamed and consumed. India ranks second among leading producer contributing around 32.9% of the global annual harvest after China (42.4%). Aside from being used as food, cauliflower has great demand in pharmaceuticals. Its extract has been reported to be effective in the inhibition of carcinogenesis; support the livers ability to neutralize toxins,

maintains cardiovascular system, lowers cholesterol level; build a health immune system and also contribute to development of the fetus during pregnancy (Wikipedia, 2014).

Cauliflower is prone to attack by diverse group of fungal pathogens. Majority of them are reported to grow on stored seeds, causes physiological damage to seeds, resulting multi-fold loss to crop (Srivastava *et al*., 2011). Prevalence of seed borne mycoflora concern to this crop has been highlighted by Srivastava *et al*., (2011); Ismail *et al*., (2012); Thakur *et al*., (2013); Pscheidt and Ocamb (2014). A little is known from the Nagpur region concerning to biodiversity of seed mycoflora on *Brassica oleracea* L. var. *Botrytis*; it seems worthwhile to undertake systematic and comprehensive studies on biodiversity of seed mycoflora of this crop from Nagpur region.

MATERIALS AND METHODS

A composite seed sample of cauliflower from different retailers and stockiest of Nagpur region have been screened for isolation of fungal flora following standard blotter paper as well as agar plate technique (ISTA, 2014). The colonies developed on the untreated and pre-treated seeds were counted, isolated and identified after sub-culturing on tube slants containing Czapek's nutrient media. The species were identified on the basis of micro- & macro morphology; reverse and surface coloration of colonies grown on Czapek's medium and finally authenticated by authority. Fungal infestation level has been recorded as a percentage of infested seeds (Chukunda *et al*., 2013).

RESULTS AND DISCUSSION

The seed borne organisms include a very large and heterogeneous group of organisms that exhibit an enormous diversity in life-history strategies. Healthy seeds may act as catalyst for realizing the potential of all other inputs. Health of seeds can be affected by direct infection of pathogen or through contaminated seeds by pathogenic propagules as contamination in, on or with the seeds or as concomitant contamination (Saskatchewan, 2013). The prevalence of propagules of pathogen in seed lot is vitally important because infected seed(s) may fail to germinate, cause infection to seedlings and reduce health of growing plants (Chukunda *et al*., 2013).

The blotter and agar plate technique recommended for seed health testing and standardized time to time by ISTA (2013) for accuracy are applied for detection of seed borne fungal flora as these two tests are inevitable for getting a complete picture of the fungal infection/association with the seeds (Saskatchewan, 2013). Mycological analysis of a composite seed sample of cauliflower revealed the prevalence of population of total 38 fungal pathogens of diverse groups which fall under 20 genera in varying incidence (Table 1). A count of 24 isolates representing 13 genera has been isolated as both external and internal seed borne; 9 isolates of 7 genera confined only as external seed borne while 5 genera representing single species as internal seed-borne. Deuteromycota dominated with highest 47.4% fungal count followed by Ascomycota (39.5%), Zygomycota (7.9%). Oomycota had least count of isolates. Fungal spores from Basidiomycota did not persist on the seed surface. *Aspergillus* dominated with a higher count of 8 species; *Fusarium* with four species; three species each contributed by *Penicillium*, *Alternaria* and *Curvularia*; two species for *Chaetomium*, *Helminthosporium* while remainings had single species (Table 1).

The high level incidence was confined to cauliflower seeds. *Ascomycota* dominated with nearly half of the total fungal incidence (46.3%) followed by Deuteromycota (32.2%) and Zygomycota (19.1%) while Oomycota contributed least incidence. *Aspergilli* dominated with greater incidence; *Chaetomium* and *Penicillium* had moderate incidence while others representing Ascomycota had least level of incidence (Table 2). Amongst members of Deuteromycota, the *Fusarium moniliformae* had greater incidence while it was significant with *Alternaria alternata, A. brassicicola, Fusarium oxysporum, Curvularia ovoidea, C. lunata* and *Trichothecium roseum*. Moderate level was recorded for *Alternaria solani, Pyricularia* and *Rhizoctonia solani* while others had little incidence. In Oomycota, *Pythium* sp. had higher incidence over *Phytophthora infestans*. In Zygomycota, *Rhizopus stolonifer* had higher level of incidence. Out of the total, 62.8% incidence was recorded on blotter paper while it was 37.2% on agar plates. It is in confirmation with the findings of Saskatchewan (2013); Bhajbhuje (2013); Gayatri and Madhuri (2014) who reported higher fungal incidence from infested stored seeds of pulses, tomato and safflower respectively by blotter test.

Table 1: Percent incidence of fungal contaminants in storage on (*Brassica oleracea* L. var. *botrytis*) seeds.

Sr. No.	Name of fungal Species	Frequency (%) of fungal incidence		Total Frequency	% over total incidence[1]	
		Blotter	Agar		Species	Genus
A	**Oomycota**	6.5	2.5	9.0	2.37	2.37
1	*Phytophthora infestans* de Bary.	2.5	1.0	3.5	0.92	0.92
2	*Pythium sp*	4.0	1.5	5.5	1.45	1.45
B.	**Zygomycota**	50.0	22.5	72.5	19.13	19.13
3.	*Absidia corymbifera* (Cohn) Sacc. & Trotter	-	2.0	2.0	0.53	0.53
4	*Mucor pusillus* Lindt.	21.0	4.5	25.5	6.73	6.73
5	*Rhizopus stolonifer (Ehrarb.* Ex.Fr.) Lind.	29.0	16.0	45.0	11.87	11.87
C	**Ascomycota**	99	76.5	175.5	46.30	46.30
6	*Aspergillus flavus* Link	22.5	12.5	35.0	9.23	29.02
7	*Aspergillus fumigatus* Fres.	8.5	4.0	12.5	3.30	
8	*Aspergillus nidulans* (Eldam) Winter	3.5	-	3.5	0.92	
9	*Aspergillus niger* Van Tieghen	9.0	20.5	29.5	7.78	
10	*Aspergillus ochracious* Wihelm	1.5	-	1.5	0.40	
11	*Aspergillus sulphureus* (Fres.) Thom & Church	2.5	-	2.5	0.66	
12	*Aspergillus terreus* Thom	12.0	10.5	22.5	5.94	
13	*Aspergillus versicolor* (Vuill.) Tiraboschi	-	3.0	3.0	0.79	
14	*Chaetomium glabosum* Kunne & Schm	10.0	5.5	15.5	4.09	6.86
15	*Chaetomium sp.*	5.0	5.5	10.5	2.77	
16	*Cladosporium fulvum* Cooke	6.0	2.5	8.5	2.24	2.24
17	*Penicillium oxalicum* Currie & Thom	13.5	8.5	22.0	5.81	7.39
18	*Penicillium pallidum (*Cruick & Shank) Pitt.	2.0	1.0	3.0	0.79	
19	*Penicillium* sp	-	3.0	3.0	0.79	
20	*Phoma glomerata* (Corda) Wr. & Bochapfal	3.0	-	3.0	0.79	0.79
D.	**Basidiomycota**	-	-	-	-	
E.	**Deuteromycota**	82.5	39.5	122	32.19	32.19
21	*Alternaria alternata* (Fr.) Keissler	6.0	4.5	10.5	2.78	7.27
22	*Alternaria solani* (E & M) Jones & Grout	4.0	3.5	7.5	1.98	
23	*Alternaria brassicicola* (Schweinitz, Wiltshire)	5.5	4.0	9.5	2.51	
24	*Botryodiplodia sp*	-	3.0	3.0	0.79	0.79
25	*Cercospora sp*	-	5.0	5.0	1.32	1.32
26	*Curvularia ovoidea* (H & W) Munt.	6.0	2.0	8.0	2.11	5.67
27	*Curvularia lunata* (Wakker) Boedijn	6.5	2.0	8.5	2.24	
28	*Curvularia sp*	5.0	-	5.0	1.32	
29	*Fusarium miniliformae* Sheldom	7.0	4.5	11.5	3.03	8.18
30	*Fusarium oxysporum* Schlecht	6.0	4.0	10.0	2.64	
31	*Fusarium semitectum* Berk & Rav.	4.0	-	4.0	1.06	
32	*Fusarium solani* (Mert.) APP. & Wollenw	3.5	2.0	5.5	1.45	
33	*Helminthosporium tetramera* Mc Kinney	4.0	2.0	6.0	1.58	2.24
34	*Helminthosporium sp.*	2.5	-	2.5	0.66	
35	*Nigrospora sp.*	*2.5*	-	2.5	0.66	0.66
36	*Pyricularia sp.*	6.0	1.5	7.5	1.98	1.98
37	*Rhizoctonia solani* Kuhn.	7.5	-	7.5	1.98	1.98
38	*Trichothecium roseum* Link	6.5	1.5	8.0	2.11	2.11
	Total fungal incidence	238	141	379	99.99	99.99

1. Values of incidence of fungal flora calculated in terms of percent incidence over total incidence recorded.

Ascomycota contributed greatest fungal incidence. The dominant microfungal genera of this group include *Aspergillus, Penicillium* and *Chaetomium*, of this *Aspergillus* contributed more than one quarter of the total incidence. Higher incidence of *Aspergillus* was reported on seeds of maize (Chukunda *et al*., 2013); brinjal (Bhajbhuje, 2014). These results are in confirmation with earlier findings on oil seeds (Jain, 2008). *Alternaria, Curvularia, Fusarium, Helminthosporium, Rhizoctonia* and *Pyricularia* of Deuteromycota were reported predominant. It is in agreement to finding of Kakde *et al*. (2012) who reported predominant occurrence of Deuteromycetous members on oil seeds.

The efficacy of both standard blotter and agar plate tests varied with nature of fungal flora. The members of Oomycota and Zygomycota developed more

Table 2: Distribution of seed borne fungal flora on seeds of *Brassica oleracia* var *botrytis*

Sr. no.	Fungal Division	Number of fungal pathogen recorded								Frequency (%) of incidence		
		Both external & internal seed borne		External seed borne only		Internal seed borne only		Total genera	Total species	Blotter test	Agar plate test	Total fungal incidence[3]
		Species[1]	Genera[2]	Species	Genera	Species	Genera					
1.	Oomycota	2 (8.3)[1]	2 (14.3)[2]	-	-	-	-	2 (10.0)	2 (5.6)	6.5 (1..7)	2.5 (0.7)	9.0 (2.4)[3]
2.	Zygomycota	2 (8.3)	2 (14.3)	-	-	1 (20.0)	1 (20.0)	3 (15.0)	3 (7.9)	50.0 (13.2)	22.5 (5.9)	19.13 (19.1)
3.	Ascomycota	9 (37.5)	4 (28.6)	4 (44.4)	2 (28.6)	2 (40.0)	2 (40.0)	5 (25.0)	15 (39.5)	99.0 (26.1)	76.5 (20.2)	175.5 (46.3)
4.	Deuteromycota	11 (45.8)	6 (42.9)	5 (55.6)	5 (71.4)	2 (40.0)	2 (40.0)	10 (50.0)	18 (47.4)	82.2 (21.8)	39.5 (10.4)	122.0 (32.2)
	Total	24	14	9	7	5	5	20	38	238.0 (62.8)	141.0 (37.2)	379.0 (99.99)

1 & 2. Values in parenthesis indicate percent fungal isolates over total isolates recorded.
3. Values in parenthesis calculated in terms of percent incidence over total incidence.

profusely on agar plate possibly because they require softer medium rich in moisture for their establishment and growth. Among the seed health test techniques, standard blotter method was proved comparatively superior over agar plate method to the fungal pathogens isolation. Chukunda *et al*, (2013) pointed out the quick growing saprophytes adhering to the outer seed coat which may be troublesome to detect internal slow growing pathogen on agar plate. These variations may possibly attribute to the prolonged incubation that might lead to the development of deep seated infection (Hedawoo *et al*., 2014). The physiochemical nature of the seed as well as agricultural practices and storage environment provided for the different crop seeds are also possibly responsible to variation in two methods (Gayatri and Madhuri, 2014).

Mycological analysis of disinfected and non-disinfected seeds gave only general information about inner seed infection by assuming that fungal propagules exist in non-disinfected seeds and absent in disinfected seeds and that fungal organism contaminated their surface and they do not penetrate the inner tissue. This information can be a starting point to determine proper strategies of seed treatment.

Aspergilli and *Penicilli* of Ascomycota as well as *Alternaria, Curvularia, Fusarium, Helminthosporium, Rhizoctonia, Pyricularia* and *Trichothecium* of Deuteromycota contributed as major components on cauliflower seeds represented a group of taxa of cosmopolitan fungal organisms that can exploit virtually any organic substrate provided favourable storage environment of oxygen, temperature & relative humidity and accumulates toxic secondary metabolites (Gayatri and Madhuri, 2014). Deuteromycota had comparatively higher count of fungal isolates associated with stored seeds but Ascomycota had greater level of incidence followed by Deuteromycota. It may possibly due to prevalence of greater count of fungal propagules associated with seed coat with their higher incidence. Moreover, members of this group are known facultative parasites on crop plants as well as involved as saprophyte in biodegradation of seeds, and debris of plant and animal origin (Jyoti and Malik, 2013). Under storage, in moist environment the seeds form the ideal organic substrate to the development of storage fungi (Bhajbhuje, 2014). Members of Deuteromycota complete their life cycle asexually producing abundant, resistant, thick walled conidia which may remain viable for longer duration in adverse climate (Gayatri and Madhuri, 2014). The conidia of *Helminthosporium, Cladosporium, Alternaria, Trichothecium,* and *Curvularia* remained in greatest abundance under storage even at low humidity during warmer climate (Kakde *et al*., 2012). It was interesting to record that members of Basidiomycota did not persist on cauliflower seeds may be possibly attributed to mode of nutrition as majority of fungal organisms of these groups are obligate parasites of other crop plants.

The report revealed that Ascomycetous genera, *Aspergilli* and *Penicilli* which were the highly predominant on cauliflower seeds are among the most abundant and widely distributed organisms on the globe (Gayatri and Madhuri, 2014). *Aspergillus niger, A. flavus, A. fumigatus etc.* are known as obligate saprophyte and are commonly isolated from seeds, soil, plant litter, dried fruits and nuts (Kakde *et al*., 2012; Jyoti and Malik, 2013). *Aspergillus niger* has potential to produce *ochratoxin-A*; *Aspergillus flavus* secretes aflatoxin which proved to be nephrotoxic in pigs and broilers (EFSA, 2011). Penicillium produce Penicillic acid causing systemic penicilliosis in AIDS patients in Southern Asia and proved to nephrotoxic in

pigs and boilers (EFSA, 2011). Members of *Helminthosporium* have been reported to produce *Helminthisporin*; *Curvularia lunata* produces 2-methyl-(5-hydroxy methyl) furan-2 carboxylate; *Alternaria* secretes *Altersolarol-A* and *alternaric acid dibenzopyron, tetranic acid, altertoxin-I & II, alternariol, alternariol monomethyl ether, tentoxin, tenuazonic acid, altertoxins, stemphyltoxin III* (Brakhage and Schroeckh, 2011) that have been reported to cause a variety of toxic effects in both experimental animals and in human. *Fusarium solani* and *F. moniliformae* were reported to cause *keratitis* and also associated with wound and infections of the eyes and fingernails (EFSA, 2011). *Mucor pusillus* secretes Citrinin and Penetrem-A; *Cladosporium fulvum* produce glycosyl moiety; *Cercospora* secretes cercosporin. All these toxins are known to create physiological disorders to consumers (EFSA, 2011). Majority of fungal isolates involved in seed deterioration of cauliflower are xerophilic moulds such as *Aspergilli* and *Penicilli* of Ascomycota as well as *Alternaria, Curvularia, Fusarium, Helminthosporium* of Deuteromycota (Bhajbhuje, 2014). Planting of deteriorated seeds, increases chances of pathogen transmission to a new crop. The toxic metabolites secretion by these isolates may be one of the reasons to spoilage of stored seeds (Jyoti and Malik, 2013). Mutagenic and carcinogenic effect of mycotoxins has been highlighted by EFSA (2011). More than 300 fungal metabolites are reported to be toxic to man, animals and pose serious health hazard. Mycotoxins alter regular metabolism, induced physiological & biochemical changes in host cells resulting abnormal proliferation of plant cells (Jyoti and Malik, 2013).

CONCLUSION

Healthy seeds are important input for desired plant production and good economic harvest. The results revealed that cauliflower seeds harbor arrays of fungal contamination may be associated with the quality of seeds at the time of storage, environmental factors during pre- and post-harvest stages, moisture content, ambient relative humidity, temperature of storage environment and duration of seeds. The climate of winter season of Nagpur as well as improper storage condition contributes to make the storage environment extremely supportive for fungal attack on nutrient rich cauliflower seeds. In order to neutralize the potential of these fungal microbes surviving as agents of seed borne diseases, the steps must be initiated to develop a strategy to antagonize their growth and survival in this seed commodity. Low temperature results in delayed seed deterioration, and, thereby leads to prolonged viability period. Thus seed storage under ambient temperature and relative humidity without deterioration in quality for a longer period is of immense importance for farmers. The farmers are advised to use improved scientific methods of storage to discourage proliferation of these organisms on seeds.

REFERENCES

Bhajbhuje MN (2013) Distribution of micro-fungal propagules in storage on seeds of *Lycopersicon esculentum* Mill. *Int. J. of Life Sciences*, 1(4): 248-263.

Bhajbhuje MN (2014) Seasonal diversity of seed borne micro-fungal flora in storage on *Solanum melongena* L. *Int. J. of Life Sciences,* 2 (1) : 31-43.

Brakhage AA, Schroeckh V (2011) Fungal secondary metabolites in strategies of activate silent gene of clusters. *Fungal Gene. Biol.,* 48(1) : 15-22.

Chukunda FR, Osakwe JA, Boraka RE (2013) Control of seed borne fungi of stored maize from Nigerian Stored Products Research Institute Port Harcount. *Web Pub J. Agric. Res.,* 1920 : 98-21.

EFSA (2011) Scientific Opinion on the risks for animal and public health related to the presence of *Alternaria* toxins in feed and food. *EFSA Journal,* 9(10):2407.

Gayatri DA, Madhuri V (2014) Seed mycoflora of safflower and its control by using botanicals, bio-agent and fungicides - A review *Int. J. of Appl. Biol.* & *Pharm. Technol.,* 5(1) : 208-215.

Hedawoo GB, Mishra SA, Maggirwar RC (2014) Incidence of mycoflora associated with spices. *Int. Jour. Life Sciences*, 2(1): 44-48.

Ismail M, Anwar SA, Ul-Haque MI, Iqbal A, Ahmad N, Arain MA (2012) Seed-borne fungi associated with cauliflower seeds and their role in seed germination. *Pak. J. Phytopathl.,* 24(1): 26-31.

ISTA (2014) Seed Testing International ISTA News Bulletin No. 146. Zurich, Switzerland.

Jain PC (2008) Microbial degradation of grain, oil seeds, wood corrosion of metals and bioleaching of ores. Applied Microbiology nsdl.niscair,res.in/Microbial Dedradation pdf (Retrieved July 20, 2014)

Jyoti, Malik CP (2013) Seed Deterioration : A review. *Int. J. of Life Sci. Biotech & Pharma Res*., 2(3) :373-386

Kakde RB, Badar, Pawar SM, Chavan AM (2012) Storage mycoflora of oilseeds: a review. *Int. Multidisciplinary Res. Jour*. 2(3) : 39-42.

Pscheidt JW, Ocamb CM (2014) Cabbage and Cauliflower (*Brassica* sp.)-Damping-off {Wirestem}. *Pacific Northwest Plant Disease Management-Handbook. © Oregon State University.* PrintedpageURL: pnwhandbooks.org/plantdisease/node/2856

Saskatchewan (2013) Guideline for seed borne diseases of pulse crops. Agricultural Knowledge Centre at 1-866-457-2377 www.agriculture.gov.sk.ca/seed-testing labs(Retrieved July 20, 2014)

Srivastava M, Gupta SK, Saxena AP, Shittu LAJ, Gupta SK (2011) A review of occurrence of fungal pathogens on significant Brassicaceous crops and their control measures. *Asian J. Agric. Sci*., 3(2):70-79.

Thakur A, Kaur S, Kaur A, Singh V (2013) Enhanced resistance to *Spodoptera litura* in endophyte infected cauliflower plants. *Environ Entomol.* 42(2):240-246.

Wikipedia (2014) Cauliflower. Org. en.wikipedia,org/wiki. Inc. (Retrieved August, 10, 2014).

RESEARCH ARTICLE

Potential of Arbuscular Mycorrhizal (AM) Fungi in Reclamation of Wastelands

Naqvi Nikhat

Botany Department, SFS College, Seminary Hills, Nagpur
E. mail: naqvin@rediffmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Naqvi Nikhat (2014) Potential of Arbuscular Mycorrhizal (AM) Fungi in Reclamation of Wastelands., *Int. J. of Life Sciences,* Special Issue A2: 48-50.

Acknowledgement
The author is thankful to CSIR, New Delhi for financial assistance.

ABSTRACT

India has wide tracts of arid, semiarid and wastelands. There is a need to bring these arid, wastelands which are lying unutilized due to various constraints, under cultivation by adopting intensive reclamation measures. Forestry and wasteland development plays a vital role in socio-economic, rural development of a country besides maintaining ecological stability. Microbe-assisted phytoremediation is very effective and an innovative technology for restoration of biodiversity of degraded land. It provides number of benefits namely high survival rate of plants, increase in biomass. Mycorrhizal fungi are a critical component of healthy soil biology. Mycorrhiza is symbiotic association between fungus and roots of the higher plants. Out of the seven different types of mycorrhiza, arbuscular mycorrhiza (AM) is most important ecologically and economically. In view of importance of AM to improve water relations, growth and survival of trees especially in degraded wastelands, establishment of AM plants may be critical to vegetation efforts. There is growing awareness that Multipurpose Tree Species (MPTS) can play a prominent role not only in meeting the increasing demand for fodder, food and fuel wood but also in sustainable agricultural practices. The present paper explores the possibility of using Mycorrhizal technology as a good package to remove all constraints associated with reclamation of wastelands. In preliminary field trials conducted at a semi- arid site at Asola (40 Kms from Delhi) various multipurpose tree species like *Acacia catechu, A. nilotica, Prosopis juliflora, Albizzia lebbeck* showed improved and better growth, increased survival rate and establishment when they were inoculated with AM fungi as compared to control. Mycorrhizal technology seems to provide sustainable, economical and healthy answer to reclamation of wastelands.

Keywords: Wastelands, phytoremediation, reclamation, AM fungi, multipurpose tree species.

INTRODUCTION

The intense exploitation of natural forests in the sub-humid to arid tropics is leading to degradation of stable ecosystems. The resulting changes in abiotic and biotic soil properties make the re-establishment of vegetation difficult. In India, out of total geographical area of 328.05mha, about 37.4% of area of arid zone has been classified. NRSA (National Remote Sensing Agency) places wastelands in the country at 63.85mha. These large areas of land in country called wastelands are degraded and lying unutilized. There is potential for the development of vegetation cover in these areas. In view of increasing shortage of plant resources due to population explosion, it has become imperative that all wastelands are put to use by developing vegetation cover.

The main stress imposed on vegetation by arid environments is due to lack of water and mineral nutrients. The availability of relatively immobile nutrients, such as P, is lowered when soil water potential decrease. The effects of mycorrhizal fungi on growth and establishment of tree seedlings in such environments cannot be overlooked. Mycorrhiza is symbiotic association between fungus and roots of the higher plants. It is now well known that in a natural ecosystem, most plants will have a well-developed mycorrhizal association. Mycorrhizal fungi are a critical component of healthy soil biology. Out of 7 different types of mycorrhiza, *Arbuscular Mycorrhizal* Fungi (AMF) belonging to the phylum Glomeromycota are most important ecologically and economically. It can adapt to a wide range of conditions and can be found in extreme habitats. The hyphae of AM fungi serve as extensions of the root systems and are both physiologically and geometrically more effective organs of absorption than the root themselves (Naqvi and Mukerji 2000). In view of importance of AM fungi in improving water relations, growth and survival of tree species, establishment of mycorrhizal plants may be critical to vegetation efforts (Bainard *et al*., 2011).

Raising fast growing, nitrogen fixing Multipurpose Tree species on wastelands for firewood, fodder, timber and non-timber forest produce can play a vital role in socio-economic and rural development of a country apart from its role in maintaining ecological stability. The survival and growth of these tree seedlings on adverse sites are relatively low and can be improved with AM fungal inoculation (Wulandri *et al*., 2014). Mycorrhizal plants are less susceptible to wilting and transplant shock in low levels of soil moisture. These fungi are believed to improve the water relations of host plants by increasing hydraulic conductivity, increasing transpiration rate and lowering stomatal resistance or altering the balance of plant hormones. These changes could be secondary responses to better P nutrition or mediated via direct mycorrhizal effects. The literature strongly supports the fact that AM fungi are integral component of sustainable tropical forestry (Dodd 2000). The potential of AM fungi in increasing the growth, survival and biomass production of tree is well recognized, though not well exploited. Present study was carried out to test the efficacy of *Glomus macrocarpum* in improving the growth and survival of *Acacia nilotica* in nursery and subsequent transplantation in stressed site.

MATERIALS AND METHODS

Experimental Site:The investigation was carried out in experimental field located at Asola, Mehrauli, Delhi that represents typical semi- arid zone of India. The area is rocky with sparse xerophytic vegetation. Soil texture, sandy loam; pH 8.2; Electrical conductivity, 0.23 and nutrients (organic carbon, 0.56; phosphorus, 12.8 Kg/ha; and potassium, 499 Kg/ha)

***Pretreatment of seeds*:** To soften the seed coat, initially seeds were pretreated with sulphuric acid for 10 minutes and thereafter soaked in hot water followed by soaking in gradually cooling water. Then seeds were sown in polythene bags to raise seedlings. Each seedlings was treated with +*Glomus macro-carpum.* The untreated seedlings served as control. For mycorrhizal inoculation, 30g soil based inoculum and colonized roots were placed as a layer below seeds in each polythene bag. The plants of 90 days old were transplanted in field.

***Growth studies*:** The observations were made at an interval of 30 days at three different growth periods and growth parameters such as root length; shoot length; root dry weight; shoot dry weight were measured.

Mycorrhizal status (a) *Percent mycorrhizal colonization in roots*-Technique of Philips and Hayman (1970) was used for finding the percent colonization. *(b) AM fungal spore isolation*-Gerdemann and Nicolson (1963) technique of wet sieving and decanting technique was used for isolating AM fungal spore. After 90 days, the plants were transplanted at experimental site at Asola.

RESULTS AND DISCUSSION

AM fungal inoculation resulted in an appreciable increase in all the growth parameters *i.e*. root length, shoot length, root and shoot dry weight in *Acacia nilotica*. The importance of AM fungi in promoting growth of tree species has been demonstrated in nursery conditions (Fig. 1, 2, 3, 4). Mycorrhizal structures present in roots included mycelium, vesicles and arbuscules (Fig 5). The first step in any AM fungal inoculation program is identification of sites which are likely to respond to inoculation. The initial step involves identifying the limitations to plant growth in a particular soil and determine whether mycorrhizal fungi can help the plants to overcome the restrictions in growth.

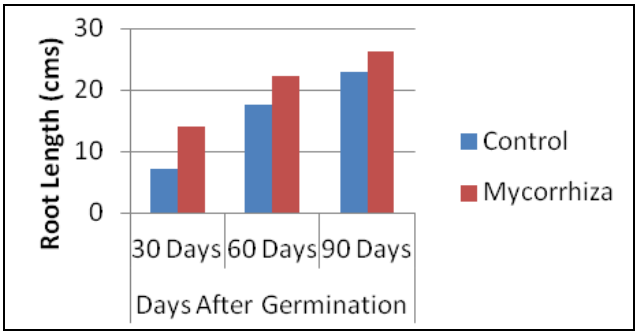


Fig. 1: Effect of Arbuscular Mycorrhizal inoculation on root length of *Acacia nilotica*

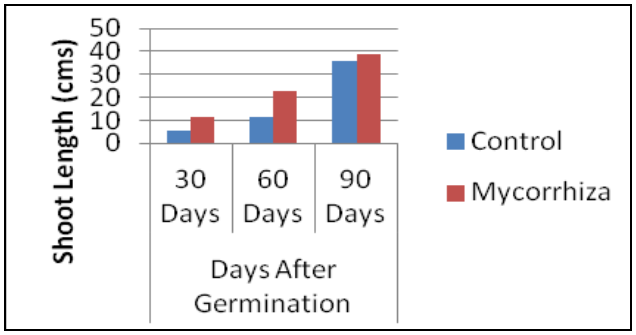


Fig 2: Effect of Arbuscular Mycorrhizal inoculation on shoot length of *Acacia nilotica*.

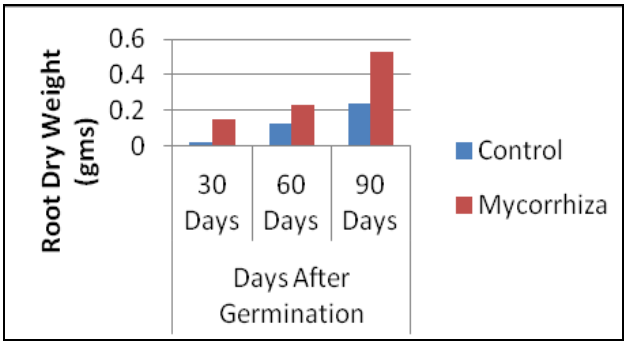


Fig. 3: Effect of Arbuscular Mycorrhizal inoculation on root dry weight of *Acacia nilotica*.

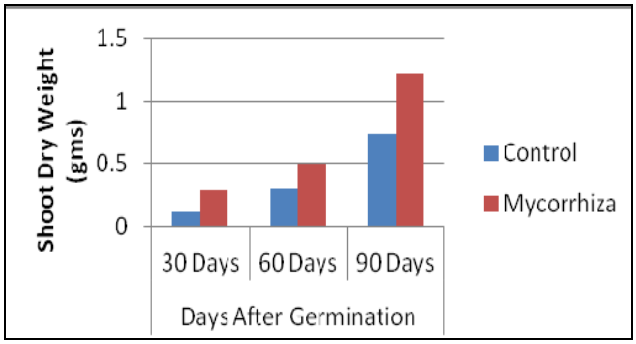


Fig. 4 : Effect of Arbuscular Mycorrhizal inoculation on shoot dry weight of *Acacia nilotica*

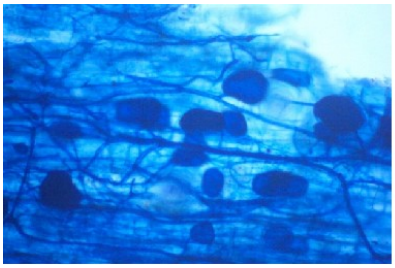


Fig. 5: Cleared roots of *Acacia nilotica* showing internal hyphae and oval vesicles

Fig. 6: Mycorrhizal plants transplanted at Experimental site at Asola.

Present study suggests the possibility of increasing productivity and growth rate of plants by mycorrhizal inoculation (Fig. 6). This may be due to its nutrient absorptive capacity and disease resistance (Olagunju *et al*., 2014). Soil type also affects mycorrhiza in arid and semiarid condition. Increased rooting length and depth associated with AM colonization may influence drought resistance of host plants. Nursery inoculation programs are beneficial because it results in early colonization of the plants by mycorrhiza. Reclamation and revegetation of degraded lands with MPTS such as *Leucaena leucocephala* and *Prosopis juliflora* have been successful in some arid and semi-arid regions of the world (Chaubey *et al*., 2014).

REFERENCES

Bainard LD, Klironomos JN, Gordon AM (2011) Arbuscular mycorrhizal fungi in tree- based intercroppimg systems: A review of their abundance and diversity. *Pedobiologia*, 54 (2) : 57-61.

Chaubey OP, Bohre P, Sharma A ,Jamaluddin (2014)Microbial restoration of degraded lands through plantation forests .Mycorrhiza News 26(1):9-14.

Dodd JC (2000) The role of arbuscular mycorrhizal fungi in agro and natural ecosystems. *Outlook on Agriculture*., 29(1):63-70.

Gerdemann JW, Nicolson TH (1963) Spores of mycorrhizal *Endogone* sp. extracted from soil by wet sieving and decanting. *Trans. Br. Mycol. Soc*., 46:235-244.

Naqvi NS, Mukerji KG (2000) Mycorrhizal technology in plant micropropagation system. In K.G. Mukerji, B.P. Chamola and Jagjit Singh (Eds). Mycorrhizal Biology, Kluwer Academic Publishers, New York. pp:217-234.

Olagunju EO. Owolabi KT, Alaje DO (2014) Effect of mycorrhiza on plant growth. IOSR *Journal of Environmental Science, Toxicology and Food Technology*. 8(1):83-85.

Philips JM , Hayman DS (1970) Improved procedures for clearing roots and staining parasitic and vesicular-arbuscular mycorrhizal fungi for rapid assessment of infection. *Trans. Br, Mycol. Soc*., 55 : 158-161.

Wulandri D, Saridi ,Cheng W ,Tawaraya K (2014) Arbuscular mycorrhizal colonization enhanced early growth of *Mallotus paniculatus* and *Albizia saman* under nursery conditions in East Kalimantan, Indonesia., *International Journal of Forestry Research,* Hindawi Publishing Corporation. 1-8.

RESEARCH ARTICLE

Effect of different herbicides on weed control and yield in Soybean (Glucine max L.)

Dapke Suresh[1], Lambat Ashish [2], Gadewar Rajesh[2], Charjan Sanjiv [1], Dongre Vinod [2]

[1]Sevadal Mahila Mahavidyalaya, Nagpur, India

[2]Dr. P. D. K. V's College of Agriculture, Nagpur, India.

Corresponding Email: rajeshgadewar29@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Dapke Suresh, Lambat Ashish, Gadewar Rajesh, Charjan Sanjiv, Dongre Vinod (2014) Effect of different herbicides on weed control and yield in Soybean (Glucine max L.), *Int. J. of Life Sciences,* Special Issue, A2 : 51-55.

ABSTRACT

A field survey was carried out in medium type of soil to evaluate the efficacy of herbicides for the control of weed. Dry matter accumulation of weed significantly reduced with application of Imezethapyr @ 75g ha^{-1} and Quizalofop ethyl @ 50g ha^{-1} with 1H and 1HW at 35 DAS followed by the treatment Imezethapyr 90 g ha^{-1} and Quizalofop ethyl 62.5 g ha^{-1} combined with 1 H and 1 HW at 35 DAS. Highest weed control efficiency and lowest weed index was recorded with treatment Imezethapyr @ 75g ha^{-1} +1H +1H +1HW. The treatment Imezethapyr @75 g ha^{-1}+1H+1HW found more effective on weed control and favours yield.

Keywords: Weed, Soybean, Yield attributes.

INTRODUCTION

Soybean in India at present has acquired a covered position by surpassing all the major oilseed crop. The unabated growth of soybean in area and production over short span of about 38 years has touched all time high covering more than 9.62 million hectares and produce more than 9.0 million ton of soybean since the average productivity round around 1 ton which is much more below than the world productivity viz., 2200 kg ha^{-1}. It needs to enhance production and productivity of soybean with continuous support of R & D.

Since the poor weed control is the major factor to reduce yield in soybean to the major extent up to 80%, further mechanical weed control is not feasible and enable in timely weed control so far. Hence it needs to evaluate efficient chemical herbicides favoring yield. Therefore, the present investigation was undertaken with objective to study the effect of different herbicides viz. imezethapyr, quizalofop ethyl on weed control and yield in soybean.

MATERIAL AND METHODS

The field experiment was conducted using randomized block design on medium soil type for 2011-2012. Fourteen treatments were given in three replicates.

T_1 -Unwedded control
T_2-2H + 2HW at 20 and 35 DAS
T_3-Imezethapyr 60 g ha^{-1} at 10 DAS

T_4-Imezethapyr 75 g ha^{-1} at 10 DAS
T_5-Imezethapyr 90 g ha^{-1} at 10 DAS
T_6-Quizalofop ethyl 37.5 g ha^{-1} at 10 DAS
T_7-Quizalofop ethyl 50 g ha^{-1} at 10 DAS
T_8-Quizalofop ethyl 62.5 g ha^{-1} at 10 DAS
T_9-Imezethapyr 60 g ha^{-1} 1H + 1HW at 10 and 35 DAS
T_{10}-Imezethapyr 75 g ha^{-1} 1H + 1HW at 10 and 35 DAS
T_{11}-Imezethapyr 90 g ha^{-1} 1H + 1HW at 10 and 35 DAS
T_{12}-Quizalofop ethyl 37.5g ha^{-1} 1H + 1HW at 10 and 35 DAS
T_{13}-Quizalofop ethyl 50 g ha^{-1} 1H + 1HW at 10 and 35 DAS
T_{14}-Quizalofop ethyl 62.5 g ha^{-1} 1H + 1HW at 10 and 35 DAS

Soybean variety JS-335 was sown on total 42 plots of size 4.8 x 3.6m^2 (gross) and 3.6 x 2.7m^2 (net) on dated 26.06.2011 with recommend seed rate i.e. 75 kg/ha and spacing i.e. 45 cm x 5 cm. All recommend package of practices were adapted appropriately in the experiment. Data was recorded for weed control efficiency, dry matter of weed, weed index, seed yield per hectare, straw yield per hectare. Weed dry matter was recorded by using a quadrate of one square meter from a random data recorded for the above five parameters was subjected to statistical analysis as suggested by Panse and Sukhatme (1954).

RESULTS AND DISCUSSION

The data of total weed count is presented in table 1. At 30 DAS, highest total weed count m^2 was observed with unweed control and all other treatments were significantly superior over unweeded control. Treatment comprising of two hoeing and two hand weedings was found significantly superior over other treatments except T_{10} – imezethapyr @ 75 g ha^{-1} + 1H and 1HW at 35 DAS, T_4 – imezethapyr @ 75 g ha^{-1} + 1H, T_{11} – imezethapyr @ 90 g ha^{-1} + 1H and 1HW at 35 DAS, T_7 – quizalofop ethyl @ 50 g ha^{-1}, T_{13} – quizalofop ethyl @ 50 g ha^{-1} + 1H and 1HW at 35 DAS and T_{14} – quizalofop ethyl @ 62.5 g ha^{-1} + 1H and 1HW at 35 DAS, which were at par with T_2 treatment comprising of two hoeing and two hand weedings at 20 and 35 DAS showed significantly lower total weed population m^{-2} over all treatments except for T_{10} – imezethapyr @ 75 g ha^{-1} + 1H and 1HW at 35 DAS, T_{13} – quizalofop ethyl @ 50 g ha^{-1} + 1H and 1HW at 35 DAS, T_{11} – imezethapyr @ 90 g ha^{-1} + 1H and 1HW at 35 DAS, T_{14} – quizalofop ethyl @ 62.5 g ha^{-1} + 1H and 1HW at 35 DAS, T_7 – quizalofop ethyl @ 50 g ha^{-1}, T_4 – imezethapyr @ 75 g ha^{-1} and T_5 - Imezethapyr 90 g ha^{-1} which were at par with T_2 treatment comprising of two hoeing and two hand weedings at 20 and 35 DAS. Similar trend was observed at 60 DAS and 75 DAS. At harvest, the total weed count m^{-2} was significantly lower with the treatment comprising of two hoeing and two hand weedings at 20 and 35 DAS. However, application of imezethapyr @ 75 & 90 g ha^{-1} along with 1H and 1HW at 35 DAS, Imezethapyr @ 75 g ha^{-1} and Quizalofop ethyl @ 50 g ha^{-1} were at par with treatment comprising of two hoeing and two hand weedings at 20 and 35 DAS. Similar results were reported by Kushwah and Vyas (2005) and Bhattacharya (2005).

Highest weed dry matter production was recorded with unweeded control and lowest weed dry matter production in weed free check (Table 2). Weed biomass showed progressive increase in unweeded control till 75 DAS. At 30 DAS highest weed dry matter was observed with unweeded control and all other treatments were significantly superior over unweeded control. Treatment comprising of two hoeing and two hand weedings at 20 DAS and 35 DAS was significantly superior over other treatments except for T_{10} – Imezethapyr @ 75 g ha^{-1} + 1H + 1HW at 35 DAS and T_{13} – quizalofop ethyl @ 50 g ha^{-1} + 1H and 1HW at 35 DAS which were at par with T2 treatment comprising of two hoeing and two hand weedings at 20 DAS and 35 DAS. At 45 DAS, significantly lower dry matter of weeds was observed with treatment comprising of two hoeings and two hand weedings at 20 DAS and 35 DAS except for treatments T_{10} – imezethapyr @ 75 g ha^{-1} + 1H and 1HW at 35 DAS, T_{13} – quizalofop ethyl @ 50 g ha^{-1} + 1H and 1HW at 35 DAS, T_{11} – imezethapyr @ 90 g ha^{-1} + 1H and 1HW at 35 DAS and T_{14} – quizalofop ethyl @ 62.5 g ha^{-1} + 1H and 1HW at 35 DAS which were at par with T_2 treatment comprising of two hoeing and two hand weedings at 20 and 35 DAS. Similar trend was observed at 60 DAS and 75 DAS. At harvest treatment comprising of two hoeing and two hand weedings exhibited significantly lower dry matter of weeds. However, application of imezethapyr @ 75 and 90 g ha-1 alogn with one hoeing and one hand weeding at 35 DAS and quizalofop ethyl @ 50 and 62.5 g ha-1 along with 1H and 1HW at 35 DAS were at par with treatment comprising of two hoeing and hand weedings at 20 and 35 DAS. These findings correlate with findings of Vyas and Jain (2005); Bhandiwaddar *et al* (2001). High weed dry matter production was recorded with unweeded control (T_1) and lowest was recorded with weed free check (T_2) however application of imezethapyr @ 75 and 62.5 g

ha^{-1} along with one hoeing and one hand weeding at 35 DAS was at par with the treatment of weed free check (T_2). Treatment consisting of two hoeings and two weedings recorded highest weed control efficiency over all other treatments at all periodical observations, followed by T_{10} -imezethapyr @ 75 g ha^{-1} +1H + 1HW at 30 DAS, T_{13} - quizalofop ethyl @ 50 g ha^{-1} +1H+1HW at 30 DAS, T_{11} - imezethapyr @ 90 g ha^{-1} + 1H & 1HW at 35 DAS and T_{14} - quizalofop ethyl @ 62.5 g ha^{-1} + 1H & 1HW at 35 DAS. This could be due to better control of weeds by hoeing combined with weeding. This result was in agreement to that of Vyas *et al.* (2000), Bhandiwaddar *et al* (2001), Singh (2002) and Bhattacharya *et at.* (2004)

Table 1: Total weed count m^{-2} as influenced by different weed control treatments.

Treatment details	Time of application	30 DAS	45 DAS	60 DAS	75 DAS	AH
T_1 - Un weeded control		53.33 (7.34)	54.99 (10.24)	55.99 (10.36)	54.00 (10.16)	55.66 (10.34)
T_2 - (2H + 2HW)	20 & 35 DAS	19.00 (4.41)	18.00 (6.03)	18.99 (6.17)	18.00 (6.02)	19.93 (6.32)
T_3 - Imezethapyr @ 60 g ha^{-1}	10 DAS	34.00 (5.87)	34.99 (8.23)	36.32 (8.43)	35.99 (8.35)	37.66 (8.54)
T_4 - Imezethapyr @ 75 g ha^{-1}	10 DAS	27.00 (5.24)	26.33 (7.11)	27.99 (7.33)	27.33 (7.24)	29.33 (7.51)
T_5 - Imezethapyr @ 90 g ha^{-3}	10 DAS	30.00 (5.52)	32.32 (7.93)	34.99 (8.26)	34.00 (8.16)	36.33 (8.42)
T_6 - Quizalofop ethyl @ 37.5 g ha^{-1}	10 DAS	35.33 (6.00)	35.32 (8.28)	37.66 (8.54)	37.99 (8.60)	39.66 (8.73)
T_7 - Quizalofop ethyl @50 g ha^{-1}	10 DAS	27.66 (5.31)	27.99 (7.32)	28.99 (7.44)	27.99 (7.32)	29.66 (7.54)
T_8 - Quizalofop ethyl @ 62.5 g ha^{-1}	10 DAS	31.33 (5.64)	32.66 (7.98)	35.33 (8.30)	34.66 (8.20)	36.66 (8.46)
T_9 - lmazethapyr @ 60g ha^{-1} + 1H+1HW	10 & 35 DAS	31.33 (5.64)	32.99 (8.00)	35.32 (8.31)	34.66 (8.23)	36.00 (8.39)
T_{10} - Imazethapyr @ 75g ha^{-1} + 1H+1HW	10 & 35 DAS	26.00 (5.15)	21.66 (6.61)	24.33 (6.94)	23.33 (6.81)	24.66 (7.01)
T_{11} - lmazethapyr @ 90g ha^{-1} + 1H+1HW	10 & 35 DAS	27.00 (5.24)	25.33 (7.10)	27.32 (7.38)	25.32 (7.13)	27.33 (7.38)
T_{12} - Quizalofop ethyl @ 37.5 g ha^{-1} + 1H+1HW	10 & 35 DAS	32.66 (5.76)	33.33 (8.07)	34.99 (8.30)	33.99 (8.17)	34.99 (8.28)
Ti_3 - Quizalofop ethyl @ 50 g ha^{-1} + 1H +1HW	10 & 35 DAS	28 (5.34)	23.66 (6.88)	25.66 (7.14)	24.66 (7.01)	26.33 (7.21)
T_{14} - Quizalofop ethyl @ 62.5 g ha^{-1} + 1H + 1HW	10 &35 DAS	29 (5.43)	25,66 (7.17)	27.32 (7.38)	25.66 (7.19)	27.33 (7.39)
SE (m) ±		**0.36**	**0.5**	**0.53**	**0.52**	**0.52**
CD at 5%		**1.10**	**1.53**	**1.61**	**1.58**	**1.61**
QM		**5.56**	**7.64**	**7.88**	**7.76**	**7.97**

Upper values are original values; Figures in parentheses are transformed values $\sqrt{x + 0.}$

Table 2: Weed dry matter accumulation (g) as influenced by different treatments.

Treatment details	Time of application	30 DAS	45 DAS	60 DAS	75 DAS	AH
T_1 - Un weeded control		217.33	226.33	235.33	244.66	239.00
T_2 - (2H + 2HW)	20 & 35 DAS	14.66	15.00	23.33	25.33	26.33
T_3 - Imezethapyr @ 60 g ha^{-1}	10 DAS	81.33	94.66	117.66	120.33	115.00
T_4 - Imezethapyr @ 75 g ha^{-1}	10 DAS	57.33	66.33	76.33	77.66	74.33
T_5 - Imezethapyr @ 90 g ha^{-3}	10 DAS	73.66	85.66	97.00	100.00	95.66
T_6 - Quizalofop ethyl @ 37.5 g ha^{-1}	10 DAS	90.33	M05.33	132.33	136.33	130.33
T_7 - Quizalofop ethyl @50 g ha^{-1}	10 DAS	70.32	81.66	96.22	98.33	94.00
T_8 - Quizalofop ethyl @ 62.5 g ha^{-1}	10 DAS	81.66	95.33	116.66	119.66	114.33
T_9 - lmazethapyr @ 60g ha^{-1} + 1H+1HW	10 & 35 DAS	79.66	38.66	52.33	53.66	51.00
T_{10} - Imazethapyr @ 75g ha^{-1} + 1H+1HW	10 &35 DAS	57.33	24.33	31.66	33.00	30.33
T_{11} - lmazethapyr @ 90g ha^{-1} + 1H+1HW	10 &35 DAS	73.66	28.66	38.00	38.66	35.33
T_{12} - Quizalofop ethyl @ 37.5 g ha^{-1} + 1H+1HW	10 & 35 DAS	88.67	40.33	54.33	55.66	53.00
Ti_3 - Quizalofop ethyl @ 50 g ha^{-1} + 1H +1HW	10 & 35 DAS	57.66	28.33	37.00	37.66	34.66
T_{14} - Quizalofop ethyl @ 62.5 g ha^{-1} + 1H + 1HW	10 & 35 DAS	79.66	32.66	43.33	44.33	40.66
SE (m) ±		**10.48**	**6.57**	**7.20**	**7.89**	**7.89**
CD at 5%		**32.02**	**20.09**	**22.01**	**24.10**	**24.10**
GM		**80.23**	**68.81**	**82.25**	**84.66**	**81.00**

Table 3: Weed control efficiency (%) and weed index (%) as influenced by different treatments

Treatment details	Time of application	Weed Index (%)	Weed control efficiency (%)				
			30 DAS	45 DAS	60 DAS	75 DAS	AH
T_1 - Un weeded control		41.58	-	-	-	-	-
T_2 - (2H + 2HW)	20 & 35 DAS	-	93.40	93.37	90.08	89.64	88.98
T_3 - Imezethapyr @ 60 g ha^{-1}	10 DAS	21.84	62.13	58.17	50.00	50.81	51.88
T_4 - Imezethapyr @ 75 g ha^{-1}	10 DAS	14.07	72.75	70.69	67.56	68.25	68.89
T_5 - Imezethapyr @ 90 g ha^{-3}	10 DAS	19.41	66.1	62.15	55.80	56.53	57.46
T_6 - Quizalofop ethyl @ 37.5 g ha^{-1}	10 DAS	23.62	57.49	53.46	43.76	44.27	45.46
T_7 - Quizalofop ethyl @50 g ha^{-1}	10 DAS	15.85	67.47	63.91	59.11	59.80	60.66
T_8 - Quizalofop ethyl @ 62.5 g ha^{-1}	10 DAS	20.87	62.91	57.88	50.42	51.09	52.16
T_9 - Imazethapyr @ 60g ha^{-1} + 1H+1HW	10 & 35 DAS	10.19	63.12	82.91	77.76	78.06	79.49
T_{10} - Imazethapyr @ 75g ha^{-1} + 1H+1HW	10 &35 DAS	1.45	73.61	89.25	86.54	86.51	87.30
T_{11} - Imazethapyr @ 90g ha^{-1} + 1H+1HW	10 & 35 DAS	4.36	65.15	87.33	83.85	84.19	85.21
T_{12} - Quizalofop ethyl @ 37.5 g ha^{-1} + 1H+1HW	10 & 35 DAS	13.91	58.25	82.18	76.91	77.25	78.66
Ti_3 - Quizalofop ethyl @ 50 g ha^{-1} + 1H +1HW	10 & 35 DAS	2.42	72.98	87.48	84.27	84.60	85.49
T_{14} - Quizalofop ethyl @ 62.5 g ha^{-1} + 1H + 1HW	10 &35 DAS	6.63	63.06	85.56	81.58	81.88	82.98

Table 4: Seed yield & straw yield as influenced by different treatments

Treatment details	Time of application	Seed yield kg ha^{-1}	Straw yield kg ha^{-1}
T_1 - Un weeded control		1213	2790
T_2 - (2H + 2HW)	20 and 35 DAS	2346	3800
T_3 - Imezethapyr @ 60 g ha^{-1}	10 DAS	1755	3213
T_4 - Imezethapyr @ 75 g ha^{-1}	10 DAS	1978	3779
T_5 - Imezethapyr @ 90 g ha^{-3}	10 DAS	1826	3347
T_6 - Quizalofop ethyl @ 37.5 g ha^{-1}	10 DAS	1714	2966
T_7 - Quizalofop ethyl @50 g ha^{-1}	10 DAS	1920	3499
T_8 - Quizalofop ethyl @ 62.5 g ha^{-1}	10 DAS	1779	3082
T_9 - Imazethapyr @ 60g ha^{-1} + 1H+1HW	10 and 35 DAS	2056	3333
T_{10} - Imazethapyr @ 75g ha^{-1} + 1H+1HW	10 and 35 DAS	2308	3764
T_{11} - Imazethapyr @ 90g ha^{-1} + 1H+1HW	10 and 35 DAS	2216	3618
T_{12} - Quizalofop ethyl @ 37.5 g ha^{-1} + 1H+1HW	10 and 35 DAS	1955	3150
Ti_3 - Quizalofop ethyl @ 50 g ha^{-1} + 1H +1HW	10 and 35 DAS	2282	3672
T_{14} - Quizalofop ethyl @ 62.5 g ha^{-1} + 1H + 1HW	10 and 35 DAS	2153	3500
SE (m) ±		**118.24**	**92.18**
CD at 5%		**361.2**	**281.6**
GM		**1964.51**	**3393.79**

Among the weed management practices lowest weed index was observed with T_{10}-imezethapyr @ 75 g ha^{-1} + 1H + 1HW at 30 DAS followed by T_{13} - quizalofop ethyl @ 50 g ha^{-1} +1H+1HW at 30 DAS, -T_{11} - imezethapyr @ 90 g ha^{-1} +1H & 1HW at 35 DAS and T_{14} quizalofop ethyl @ 62.5 g ha^{-1} +1H & 1HW at 35 DAS. Lower weed index in herbicidal treatments could be due to better weed control which provided favourable conditions for crop growth which ultimately increased the grain yield of soybean crop as compared to unweeded control treatment. Similar results were obtained by Chandel *et al* (2001). Treatment of two hoeing and two weeding (T_2) recorded highest weed control efficiency and lowest weed index percent followed by T_{10} - Imezethapyr @ 75 g ha^{-1} + 1H+1HW at 30 DAS.

Data pertaining to seed and straw yield of soybean as influenced by different weed control treatments was presented in Table 4. Highest seed yield ha^{-1} was recorded with treatment comprising of two hoeings and two hand weedings and significantly lowest seed yield was recorded with unweeded control. Seed yield ha^{-1} recorded with treatments T_{10} - imezethapyr @ 75 g ha^{-1}+ 1H & 1HW at 35 DAS, T_{13} - quizalofop ethyl @ 50 g ha^{-1} + 1H & 1HW at 35 DAS, T_{11} - imezethapyr @ 90 g ha^{-1} + 1H & 1HW at 35 DAS and T_{14} - quizalofop ethyl @ 62.5 g ha^{-1} + 1H & 1HW at 35 DAS were at par with T_2 treatment comprising of two hoeings and two hand weedings at 20 DAS and 35 DAS. These results

are also in agreement with the findings of Kushwah and Vyas (2001), Sharma (2001), Bhandiwaddar *et al.* (2001), Bhattacharya *et al.* (2004) and Singh (2002). Highest straw yield was recorded with treatment T_2 treatment comprising of two hoeings and two hand weedings at 20 DAS and 35 DAS and straw yield ha^{-1} recorded with treatments T_{10} - imezethapyr @ 75 g ha^{-1} + 1H & 1HW at 35 DAS, T_{13} - quizalofop ethyl @ 50 g ha^{-1} +1H & 1HW at 35 DAS, T_{11} - imezethapyr @ 90 g ha^{-1} + 1H & 1HW at 35 DAS and T_{14} - quizalofop ethyl @ 62.5 g ha^{-1} + 1H & 1HW at 35 DAS were at par with T_2. However, significantly lowest straw yield ha^{-1} was recorded in treatment unweeded control.

CONCLUSION

Study of effect of different weed control on yield revealed that treatments T_{10}, T_{11}, T_{13}, and T_{14}) were found promising in weed control which also showed superior effect on yield over unweeded control and found comparable to two hoeing and two hand weeding at 20 and 35 DAS. It shows that both Imezethapyr and Quizalofop ethyl are effective in weed control with the optimum doses of concentration i.e. 75g ha^{-1} and 50g ha^{-1} along with hoeing and weeding as they showed significant effect on yield.

REFERENCES

Adelheid Brantner and Edith Grein, (1994) Antibacterial activity of some plant extracts used externally in traditional medicine, *Journal of Ethnopharcol*. 44:35-40.

Caius (1939) Medicinal and Poisonous plants of India.

Chopra RN, Nayar and Chopra IC (1956) Glossary of Indian Medicinal Plants. 1st Ed. Publication and Information, New Delhi.

Hooker JD (1885) Flora of British India, Vol. IV, L. Reeve & Co. Ltd. Ashford, Kent.

Jain SK (1991) Dictionary of Indian Folk Medicine and Ethnobotany-A Reference Manual of Man-Plant Relationships, Ethnic Groups and Ethno Botanists in India. Deep Publication, New Delhi, India .

Lahlou M (2004) *Phytother. Res.,* 18:435-445.

Lalitha TP, Jayanthi P (2012) *Asian J. Plant Sci. Res*, 2(2):115-122.

Mehrotra BN (1996) Collection of biological materials in biodiversity prospecting in India: problems & solutions. *J. Ethno-pharmacology*, 51:161.

Okeke MI, Iroegbu CU, Eze EN, Okoli AS and Esimone CO (2001) Evaluation of the Extracts of the Roots of Landolphia Owerrience for Anti-bacterial Activity, *J. Ethanopharmacol*, 78: 119-127

Puri A, Saxena R, Saxena RP, Saxena KC, Srivastava and Tandon S (1996) Imuno stimulant Agents from *Andrographis Paniculata*, *J. Nat. Prod*., 56(7):995-999.

Sharma M *et al*. (2011) Evaluation of Phytochemical and antibacterial activity of hot and cold methanolic extract of leaves and whole plant of *andrographis paniculata, Int. J. Chem. Sci.*: 9(3):960-968

Tiwari P, Kumar B, Kaur M Kaur G, Kaur H (2011) *Int. Pharm. Sciencia,* 1:98-106.

RESEARCH ARTICLE

Post-harvest fungal diseases of fruits and vegetables in Nagpur

Rinkey Pallavi, Thakur Uma and Dongarwar Nitin*

Department of Botany, Rashtrasanta Tukdoji Maharaj Nagpur University, University Campus, Amravati Road, Nagpur-440033

**Corresponding author Email: dmnitin26@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Rinkey Pallavi, Thakur Uma, Dongarwar Nitin (2014) Post-harvest fungal diseases of fruits and vegetables in Nagpur, *Int. J. of Life Sciences,* Special Issue A2: 56-58.

Acknowledgements:
Authors are thankful to the Head, Department of Botany, RTM Nagpur University for providing necessary facility.

ABSTRACT

The survey of postharvest fungal diseases of some fruits and vegetables in the market of Nagpur was undertaken. Fruits and vegetables suffer every year due to number of pathogenic diseases. Postharvest diseases are caused by bacteria, yeast and fungi develops on fruits and vegetables between harvesting and consumption. Fungal diseases of 17 selectable fruits and vegetables were studied and their fungal pathogen were observed. Amongst these are *Aspergillus, Alternaria* sp., *Fusarium* sp., *Mucor* sp., *Penicillum* sp. and *Rhizopus sp* found to be major disease causing organism. The present investigation revealed that fungal infection is mainly due to injury during storage and handling.

Key words: Postharvest diseases, fungus, injury

INTRODUCTION

Food scarcity is one of the important major problems faced by several countries. It is reported that nearly 1 billion people are challenged by severe hunger in these nations of which 10% actually die from hunger-related complications. A substantial part of this hunger problem stems from inadequate agricultural storage and produce preservation from microbes-induced spoilages (Salami and Popoola, 2007; Kana *et al*., 2012). The most important losses in agricultural productions which involve the greatest costs on the farm economy occur by post harvest diseases. It is estimated that 10 to 40% losses nation of agricultural produce occur due to post harvest diseases worldwide. Losses are more severe in developing than developed nations of the world (Enyiukwu1, 2014).

Post harvest activities include harvesting, handling, storage, processing, packaging, transportation and marketing (Mrema and Rolle ,2002). These post harvest losses are caused by the disease which occurs on fruits and vegetables. Post-harvest diseases destroy 10-30 % of the total yield of crops and in some perishable crops especially in developing countries; they destroy more than 30% of the crop yield (Kader, 2002; Agrios, 2005).

MATERIALS AND METHODS

Samples were collected in the months of January –March from different vegetable and fruit markets of Nagpur City. The temperature during these

months ranges from 22-24 ±2°C. The sampling was done during morning (07 a.m. to 10 a.m.). Samples of fresh as well as previously infected or rotten fruits and vegetables were collected in pre-sterilized polythene bags from the market to examine post harvest fungi. They were kept in isolated conditions for the proper growth of the fungal hyphae. Conditions were maintained in moist chamber at room temperature for 7-10 days. Vegetable and fruit samples were taken to the laboratory and the causal organisms infecting the samples were identified from standard literature. Fungi from these samples were observed directly by preparing lacto-phenol cotton blue mounts. Fungal identification is based largely on the morphological characters of spores and spores bearing structure by using direct microscopy. Identification of fungi was also based on the color of mycelia and microscopic examinations of vegetative and reproductive structures. Different types of fungal pathogens were isolated from the collected vegetables and fruits.

RESULTS AND DISCUSSION

Fungal diseases of fruits and vegetables were studied and in all 19 fungal pathogens were observed. Among these *Alternaria solani, Aspergillus niger, Aspergillus fumigatus, Fusarium* sp., *Mucor* sp., *Penicillum* sp. and *Rhizopus sp.,* were found to be major disease causing organisms.

Table 1 : Infected Vegetables and Fruits with Their Collection Sites

Sr. No.	Name of Vegetables and Fruits	Common Name	Pathogen	Sample Collection Site
1.	*Alium cepa*	Onion	*Aspergillus niger*	Cotton Market, Kalamana, Sakkardara, Itwari, Gokulpeth
2.	*Brassica oleracea var botrytis*	Cauliflower	*Fusarium, Alternaria brassicola, Botrytis cinerea*	Gokulpeth, Cotton Market, Sakkardara
3.	*Capsicum frutescens*	Chilli	*Alternaria solani*	Sakkardara, Gokulpeth, Cotton Market
4.	*Dacus carota*	Carrot	*Mucor, Alternaria dauci, Rhizopus, Aspergillus,*	Cotton market, Kalmana, Sakkardara, Gokulpeth
5.	*Dolichos lablab var lignosus*	Field bean	*Aspergillus sp. ,Phythim sp.*	Sakkardara, Kalamana, Cotton market
6.	*Dolichos lablab* var *typicus*	Indian butter bean	*Phythium sp. Fusarium, Alternaria, Aspergillus*	Catton market, Kalamana, Gokulpeth
7.	*Lycopersicum esculantum*	Tomato	*Alternaria solani*	Sakkardara, Gokulpeth, Cotton market
8.	*Pisum sativum*	Pea	*Fusarium, Alternaria, Pernospora viciae, Ascochyta pinoides, Erysiphe sp.*	Gokulpeth, Cotton market, Sakkardara, Itwari
9.	*Solanum melongena*	Brinjal	*Alternaria, Botrytis cinerea, Phoma lycopersici*	Sakkardara, Cotton market, Kalamana
10.	*Solanum tuberosum*	Potato	*Fusarium*	Itwari, Sakkardara, Kalamana, Gokulpeth
11.	*Achras sapota L*	Sapota	*Rhizopus*	Fruit market, Sakkardara, Itwari
12.	*Citrus aurantifolia*	Lemon	*Penicillium digitatum*	Sakkardara, Cotton market, Gokulpeth
13.	*Citrus sinensis*	Sweet orange	*Penicillium digitatum*	Fruit market, Sakkardara
14.	*Citrus reticulata*	Orange	*Penicillium digitatum*	Cotton market, Fruit market
15.	*Zizipus mauritiana*	Indian jujube	*Aspergillus*	Sakkardara, Cotton market
16.	*Vitis vinifera*	Grapes	*Aspergillus niger, Penicillium sp. Rhizopus stolonifer, Botrytis cinerea*	Sakkardara, Fruit market, Itwari
17.	*Musa paradisiaca*	Banana	*Colletotrichum musae, Verticillium theobromae, Rhizopus stolonifer*	Cotton market, fruit market,

The present investigation revealed that fungal infection is mainly due to injury during storage and handling. Species of *Fusarium, Alternaria* and *Aspergillus* were found to be the disease causing organisms responsible for extensive damage to fruits and vegetables in the markets of Nagpur region. The fungi like *Aspergillus*, *Fusarium, Rhizopus, Mucor* and *Penicillium* species were found on edible fruits which may causes allergenic effects on human health. *Aspergillus, Penicillium, Rhizopus* and *Mucor* are found very dominant pathogens on fruits and vegetables. The optimum temperature and humidity are the main factor for the infection of fungus.

CONCLUSION

These fungi were most prevalent in the air of market environment and also found to be responsible for most of the decay of the vegetables and fruits during storage. Hence, there is probably a cyclic relationship existing between the prevalence of fungal bioaerosols and spoilage of diseases in environments.

The earlier results have emphasized that efforts should be made to adopt improved packaging techniques, cushioning material and cold storage facilities at the retail level. A number of physical and chemical treatments have been evaluated for controlling post-harvest diseases. The physical treatment includes heat therapy, low temperature storage and radiation, while chemical treatment includes the use of chemical agents like antibiotics, growth regulators, fungicides, oils, chemicals and vapors emitting compounds.

Maintaining hygienic condition in the market can help to minimize the post-harvest diseases. Burning of trash; proper disposal of fruits and vegetables would not only help to maintain hygienic conditions, but also will help to minimize bio-aerosol inoculums.

REFERENCES

Agrios GN (2005) Plant Pathology. Academic Press, New York. 922pp

Enyiukwu1 DN, Awurum1 AN, Nwaneri JA (2014) Efficacy of plant-derived pesticides in the control of myco-induced postharvest rots of tubers and agricultural products: *Net Journal of Agricultural Science* Vol. 2(1), pp. 30-46,

Kader AA (2002) Post-harvest Technology of Horticultural crops*. University of California, Agriculture and Natural Resources.*535pp

Kana HA, Aliyu IA, Chammang HB (2012) Review on neglected and underutilized root and tuber crops as food security in achieving the millennium development goals in Nigeria. *J Agric Vet Sci,* 4:27-33.

Mrema CG , Rolle SR (2002) Status of the postharvest sector and its contribution to agricultural development and economic growth. *9th JIRCAS International Symposium – Value Addition to Agricultural Product,* pp. 13-20.

Salami OA, Popoola OO (2007) Thermal control of some postharvest rot pathogens of Irish potato (*Solanum tuberosum* L.). *J Agric Sci,* 52(1):17-31.

RESEARCH ARTICLE

Comparative study of Mycoflora of Paddy field soil in Bhandara District

Yadav AM

P. G. Department of Botany, J. M. Patel College, Bhandara- 441 904, India.
Email- aparnayadav.10@rediffmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Yadav AM (2014) Comparative study of Mycoflora of Paddy field soil in Bhandara District, *Int. J. of Life Sciences,* Special Issue , A2: 59-61.

ABSTRACT

Soil contains many kinds of microorganisms. It is the loose mineral material on the surface of earth and very good culture medium for the growth of microorganisms. This study deals with the fungal diversity at various sites of traditional paddy field in Bhandara district. The soil of paddy field of Lakhani, Mohadi, Tumsar, Sakoli, Pauni and Bhandara was infected by the fungi *Tricoderma, Mucor, Fusarium, Arthrobotrys, Rhizopus, Rhizoctonia and Aspergillus*. After comparative study, it was concluded that mostly *Mucor* is dominated followed by *Tricoderma* and *Rhizopus*.

Key Words: Culture, Diversity, Fungal, Microorganism and Soil.

INTRODUCTION

Soil is a complex system. Many biological processes take place in soil and determine functions that provide various services within ecosystems: turn-over of organic matter, symbiotic and non-symbiotic atmospheric nitrogen fixation, denitrification, aggregation, etc. It regulates global biogeochemical cycles, filters and remediates anthropogenic pollutants, and enables food production (Kennedy and Smith, 1995; Richards, 1987). One particularly significant component of soil, are the microorganisms. Soil is a medium with solids, liquids and gases in which the mineral and organic particles form differently-sized aggregates that delimit pores . This organization creates micro-environments that are suited to microbial activity to varying extents. Recent studies have pointed out the importance of taking into consideration the distribution within the soil matrix of microbial activity hot spots (Gaillard *et al*., 2003). Micro organisms are beneficial in increasing the soil fertility and plant growth as they are involved in several biochemical transformation and mineralization activities in soil. Type of cultivation and crop management practices found to have greater influence on the activity of soil microflora (Mc Gill *et al*., 1980). Continuous use of chemical fertilizers over a long period may cause imbalance in soil microflora and thereby indirectly affect biological properties of soil leading to soil degradation (Manickam *et al*., 1972).

Fungi are fundamental for soil ecosystem functioning (Warcup, 1950). Especially in forest and agricultural soils; they play a key role in many essential processes such as organic matter decomposition and elemental release by mineralization (Christensen *et al*., 1989).

The rate of biodegradation depends on environmental factors, numbers and types of microorganisms present and the enzymatic processes leading to the disappearance of the parent molecular structure and the formation of smaller organic species. Some of which are directly usable for cell anabolism and are converted to CO_2 and H_2O ultimately. (Mishra *et al*., 1991)

MATERIALS AND METHODS

About six Soil samples were collected from the Bhandara district, i,e Bhandara, Lakhani, Sakoli, Tumsar, Mohadi and Pauni. The potato dextrose agar (PDA) media was selected to grow fungi of soils.

RESULTS AND DISCUSSION

Fungal cultures were isolated and prepared temporary slides and observed under microscope. Sketches were drawn and photography was done.

Following fungal organism from the culture sample:-
Bhandara:- *Rhizopus, Mucor*
Lakhani:- *Tricoderma, Mucor*
Sakoli:- *Fusarium, Arthrobotrys*
Mohadi:- *Mucor, Rhizopus*
Tumsar:- *Tricoderma, Rhizoctina*
Pauni:-*Mucor, Aspergillus*

In the present investigation seven genus of fungi were isolated from the soil of paddy field. In Lakhani soil *Tricoderma* and *Mucor* is observed. In Sakoli soil *Fusarium* and *Arthrobotrys* fungus are observed. In the soil of Mohadi *Rhizopus* and *Mucor* are observed. From Tumsar soil *Tricoderma, Rhizoctonia* and *Mucor* are observed and from Pauni soil *Mucor* and *Aspergillus* are observed. In the Bhandara soil *Rhizopus* and *Mucor* are observed.

Comparative study was carried out among paddy field soil of different talukas it was found that *Mucor* is dominated followed by *Tricoderma* and *Rhizopus.*
Selvaraj kalaiselvi and Annamalai Panneerselvam (2011) worked on ecology of soil fungi in paddy field of Tamilnadu, they isolated various fungal species in which the dominated species was *Aspergillus nigre* but in present study *Mucor* is dominent . On the other hand V. Manimegalai *et al* worked on paddy field of Thanjavur district, Tamilnadu, where dominant species are *Aspergillus niger* and *Aspergillus flavus.* Sethilkumar *et al*. (2009) worked on soil samples of three different places along the Muthupet mangroves in Tamilnadu out of 22 species *Aspergillus and Penicillium* were represented as dominated species. J.M Benila Smily *et al*. (2012) found the fungal species in rice field with paddy alone showed 13 species and *Aspergillus i*s dominated. Kadar *et al*. (1999) found *Aspergillus* genus is dominated in their work**.**

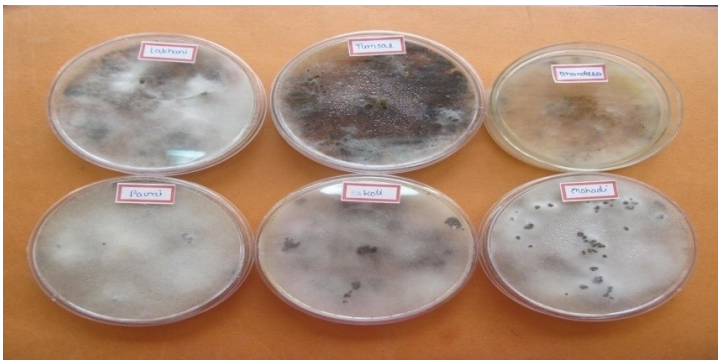


Fig.1 Fungal Colonies On PDA

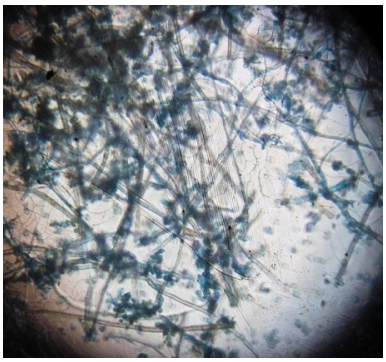


Fig. 2 *Tricoderma*

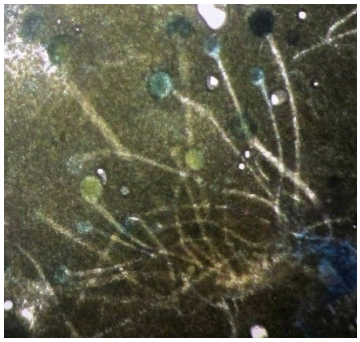


Fig. 3 Mucor

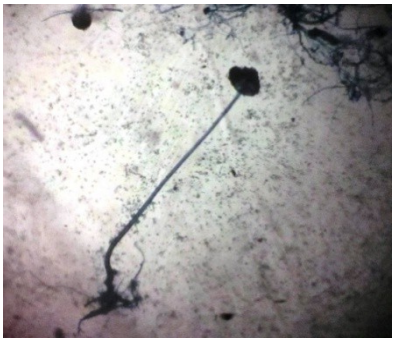


Fig. 4 *Rhizopus*

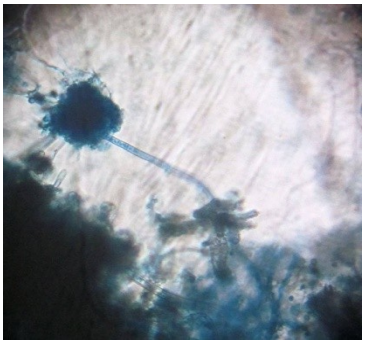


Fig. 5 *Aspergillus*

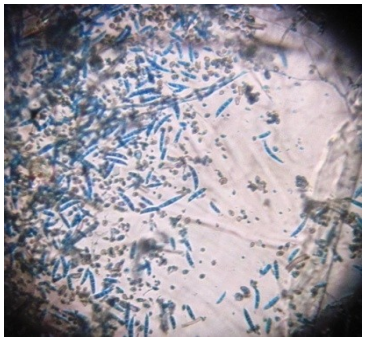


Fig. 6 *Fusarium*

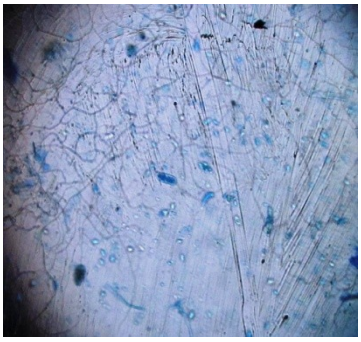


Fig. 7 *Arthrobotrys*

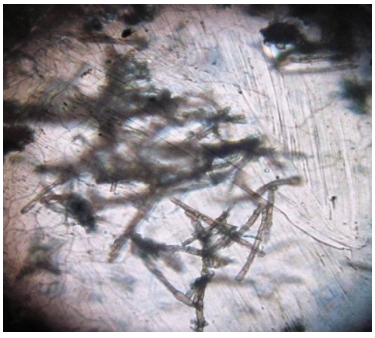


Fig. 8 *Rhizoctina*

CONCLUSION

Generally, top soil contains high organic matter, which in the presence of adequate moisture supply is acted upon by the microorganisms to decompose the complex organic residues into simpler forms; hence, microbial counts are generally higher in the surface soil layer as compared to the lower depths.

Soil of paddy field of lakhani, Mohadi, Tumsar, Sakoli, Pauni and Bhandara was infected by the *Tricoderma, Mucor, Fusarium, Arthrobotrys, Rhizopus, Rhizoctonia* and *Aspergillus.*

After comparative study, it was concluded that mostly *Mucor* is dominated followed by *Tricoderma* and *Rhizopus.*

The important factors influencing the variation in the population of fungi in the present study could possibly due to temperature, organic nitrogen and moisture content of the soil. The paddy field soil was subjected to disturbances such as irrigation, fertilizer and agricultural practices resulting in more homogeneity of soil which did not allow relatively wide fluctuation in the population of fungi. Agriculture would not be possible without microorganisms. Therefore, the soil depends upon the microorganisms for the fertility.

REFERENCES

Benila Smily JM, Vinoy Jacob and Ravi Kumar M (2012) Soil microflora of paddy fields among different rice forming system. *J. Acad. Indu. Res.,* 1 (1): 50-52.

Christensen M (1989) A view of fungal ecology, Mycologia, 81: 1-19.

Gaillard V, Chenu C and Recous S (2003) Carbon mineralisation in soil adjacent to plant residues of contrasting biochemical quality. *Soil biology and biochemistry,* 35: 93-99.

Kadar AJ, Omar O and Fing LS (1999) Isolation of cellulolytic fungi from the Balio Highlands, Sarawork. *ASEAN review of Biodiversity and Enviornmental conservation*, 1:1-3.

Kennedy AC and Smith KL (1995) Soil microbial diversity and the sustainability of agricultural soils, *Plant and soil*, 170:75-86.

Manickam TS and Venkataraman CR (1972) Influence of Fertilization and different tillage systems on soil microflora, *Madras Agriculrtural Journal*, 59: 508-512.

Manimegalai V, Ambikapathy V and Panneerselvam A (2011) Population dynamics of soil mycoflora in the paddy field of Thanjavur district, Tamilnadu. European *Journal of expermintal Biology*, 2011, 1 (3) : 14-19.

Mc. Gill WB, Cannon KR, Robertson JA and Coock GD (1980) Dynamics of soil microbial biomass and water stable organic carbon in Breton. L after fifty years of cropping to two rotations, *Canadian journal of soil science,* 66: 1-19.

Mishra PC, Manorama Patri and Madumita Panda (1991) Growth of water hyacinth and its efficiency in the removal of pollution load from industrial waste, *Journal of Ecotoxicology and Environmental Monitoring*, 1(13):218-224.

Richards BN (1987) Mineral cycling processes. In: The microbiology of terrestrial ecosystems. John Wiley and Sons, New York, pp 177-221.

Selvaraj Kalaiselvi and Annamalai Panneerselvam (2011) Ecology of soil fungi in paddy field of Tamilnadu-Thanjavur district. Peligia Research Library, *Der chemicasinica*, 2 (2) : 9-19.

Sethilkumar G. Madharaj P. Kanimoshi K and Panneerselvam A (2009) *J. Microb. World,* 11 (1): 31-36.

Warcup JH (1950) The Soil-plate method for isolation of fungi from Soil, Nature, Lond, 117-166.

RESEARCH ARTICLE

Survey on ethnobotanical plants used for wound healing: Nagpur region

Shrirame AM and Gogle DP

Department of Botany, RTM Nagpur University, Nagpur

Corresponding author: ajayshri968@gmail.cpom

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Shrirame AM and Gogle DP (2014) Survey on ethnobotanical plants used for wound healing: Nagpur region., *Int. J. of Life Sciences,* Special issue, A 2: 62-64.

ABSTRACT

The present study was carryout to enhance the knowledge of ethnobotanical plants used by local peoples, tribes of Nagpur region. The 44 plants were listed on the basis of ethno information and also based on literature used for wound healing. The information was compare with flora of Maharashtra, Nagpur, BSI.

Key words- Nagpur region, local people, Flora.

INTRODUCTION

Biodiversity is playing an important role in human life for survival and economically live well in future generation. Historically all medicinal preparations were derived from plants, whether in the simple form of plant parts or in the more complex form of crude extracts, mixtures, etc. Today a substantial number of drugs are developed from plants (Fabricant and Farnsworth, 2001) which are active against a number of diseases. Vidharbha is rich in medicinal plant biodiversity particularly in, Nagpur, Chandrapur, Gondia, Bhandara, Gadchiroli district. It is distributed in different environmental condition also it associated with traditional healer and folkfore people.

The majority of these involve the isolation of the active ingredient (chemical compound) found in a particular medicinal plant and its subsequent modification system. The value of medicinal plants to the mankind is very well proven. It is estimated that 70% to 80% of the people worldwide rely chiefly on traditional health care system and largely on herbal medicines (Shanley *et al.,* 2003).

India storage about 15 percent of medicinal plants, out of 20,000 medicinal plants of the world. About 90 percent of these are found growing wild in different climatic regions of the country. Scientific investigations of medicinal plants have been initiated in many parts of our country because of their contributions to health care. The tribal and rural people of various parts of India are highly depending on medicinal plant therapy for meeting their health care needs. This attracted the attention of several botanists and plant scientists who directing vigorous researches towards the discovery or rediscovery of several medicinal plants along with their medicinal remedies for various diseases. Many traditional practitioners across the world particularly in countries like India and China with age old practices have valuable information of many lesser – known neither to unknown wild plants

used by the traditional healers for treating wounds and burns. Besides the established system of Ayurvedic and Unani medicine, folk medicinal practitioners have dispensed for hundreds if not thousands of years medicinal plant preparations for treatment of a wounds (Bodeker *et al.,* 1998; Bharadwaj *et al.*, 2005). But rapid fragmentation of natural habitats is greatly narrowing the distribution of the plant and increasing the risk of losing genetic diversity (Das, 2012). As a result the medicinal qualities of these plants remain unknown.

MATERIALS AND METHODS

Study area

The area under investigation for ethnobotanical studies falls under Nagpur region of Maharashtra. It is situated range lying between 21°09'N 79°05'E 21.15°N 79.09°E / 21.15 , it covering forest area 28%. Humidity ranges from 20% to 70% and Rainfall averages 120cms annually. Nagpur is situated 274.5 mtrs to 652.70 mtrs above sea level .Nagpur generally has a dry tropical weather.

Data collection

Periodic field survey for ethanobotanical exploration was undertaken during 2011 of Nagpur region. During the surveys personal interviews were conducted with local peoples and other traditional healers, literature based, market ayurvedic medicine. Each plant materials were assigned with field book number and documented as to family, botanical name, local name (Marathi), parts used and medicinal uses. Plant parts that were identified as having use in ethanobotany were collected and preserved. Plant species collected were identified with the help of flora books (Mahahrashtra, Nagpur, B.S.I.).The identified plant specimens were then confirmed with the herbaria of Botanical survey of India. The specimens were deposited in the Herbarium of Botany Department, RTM Nagpur University, Nagpur.

RESULT AND DISCUSSION

Present investigation provides an ethnobotanical data of the medicinal plants used by the people for healing.

Table 1: Plants used for wound healing

Sr. No.	Botanical Name	Local Name	Family	Plant parts used	Habit
1.	*Acacia nilotica* Roxb.	Babul	Mimisaceae	Bark	Tree
2.	*Aegel marmelos* L.	Bel	Rutaceae	Fruit	Tree
3.	*Ageratum conyzoids* L.	Nag kuda	Asteraceae	Root	Herb
4.	*Alangium salvifolium* L.	Dirgakal	Alanginaceae	Stem, Lvs	Shrub
5.	*Aloe vera* L.	Alovera	Liliaceae	Leaves	Herb
6.	*Argemone Mexicana* L.	Kateringni	Papavaraceae	Root	Herb
7.	*Asparagus racemosus* Willed.	Shatavari	Liliaceae	Root	Shrub
8.	*Azadiracta indica* A.Juss.	Kadunimb	Meliaceae	Leaves	Tree
9.	*Butea monosperma* L.	Palas	Fabaceae	Fruit	Tree
10.	*Caesalpinia bonduc* L.	Sagargoti	Fabaceae	Fruit	Climber
11.	*Canthium dicoccum* Gaertn.	Arsul, Tupa	Rubiaceae	Leaves, Fruit	Tree
12.	*Cassia fistula* L.	Amaltas	Caesalpiniaceae	Fruit	Tree
13.	*Cassia occidentalis* L.	Cassia	Caesalpiniaceae	Fruit	Tree
14.	*Centella asiatica* L.	Mandukparni	Umbeliferae	Leaves	Herb
15.	*Cissus quadrangularis* L.	Harjor	Vitaceae	Stem	Climber
16.	*Clerodendron sp.* Spreng.	Haddijor	Verbanaceae	Leaves	Shrub
17.	*Clitorea ternetea* L.	Gokharna	Fabaceae	Fruit, Leaves	Climber
18.	*Croton bonpalandianum* L.	Wan tulsi	Euphorbiaceae	Leaves, Stem	Herb
19.	*Curcuma longa* L.	Halad	Zinjiberaceae	Root	Herb
20.	*Cymbopogan citratus* Stapf.	Gawtichyah	Poaceae	Leaves	Shrub
21.	*Dalbergia sissoo* L.	Sisam	Fabaceae	Leaves	Tree
22.	*Delanie pentagyna* Roxb.	-----	Dilleniaceae	Fruit	Tree
23.	*Eclipta alba* Hassk.	Maka	Asteraceae	Leaves	Herb
24.	*Eucalyptus sp.*	Nilgiri	Myrtaceae	Leaves	Tree
25.	*Euphorbia antiqurum* L.	Cactus	Euphorbiaceae	Leaves	Herb
26.	*Euphorbia tirucalli* L.	Pensil tree	Euphorbiaceae	Leaves	Shrub
27.	*Ficus sp.* L.	Wad	Moraceae	Aerial root,lvs	Tree
28.	*Jatropha curcus* L.	Ran erand	Euphorbiaceae	Leaves, Fruit	Shrub
29.	*Kaempferia rotunda* L.	--------	Zinjiberacae	Root	Herb
30.	*Lepidium sativum* L.	Lakholi	Fabaceae	Fruit	Herb

Table 1: Continued…

Sr. No.	Botanical Name	Local Name	Family	Plant parts used	Habit
31.	*Lannea coromandelica* Houtt.	----	Anacardiaceae	Fruit	Tree
32.	*Madhuca indica* J.F. Gmel	Mahu	Sapotaceae	Fruit	Tree
33.	*Phyllanthus emblica* L.	Awla	Euphorbiaceae	Fruit, Leaves	Tree
34.	*Ricinus communis* L.	Arandi	Euphorbiaceae	Fruit, Leaves	Tree
35.	*Rubia cordifolia* L.	Manjistha	Rubiaceae	Root, Leaves	Semi shrub
36.	*Sarcostemma acidum* Roxb.	Somlata	Asclepidiaceae	Stem	Climber
37.	*Tamarindus indica* L.	Chinch	Fabaceae	Leaves, Bark	Tree
38.	*Terminalia arjuna* Roxb.	Arjum	Cobmretaceae	Bark, Fruit	Tree
39.	*Terminalia bellerica* Roxb.	Behda	Cobmretaceae	Bark, Fruit	Tree
40.	*Terminalia chebula* Retz.	Hirda	Cobmretaceae	Bark, Fruit	Tree
41.	*Tridax procumbense* L.	Kambarmodi	Asteraceae	Whole plant	Herb
42.	*Vitex agnus* L.	Indrani	Lamiaceae	Whole plant	Smallshrub
43.	*Viscum album* L.	-----	Santalaceae	Bark	Tree
44.	*Zinjiber officinale* Rosc.	Adrak	Zinjiberaceae	Root	Herb

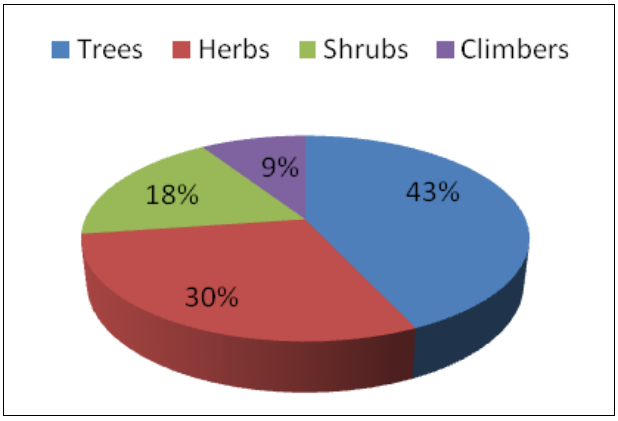


Fig. 1: Habit Pattern of species recorded in study for would healing

The most commonly represented families were Euphorbiaceae, Fabacaeae,, Combretacae. During study 44 species were listed as trees, herbs, shrubs, climbers. They were using these plants to cure wound healing and other therauptic used also. From this present study it is clear that the people of posses knowledge of medicinal plants and has to cure with their knowledge. List of plants and their family, local name parts used and their uses were tabulated (Table 1).

CONCLUSION

The results of this study will provide valuable information on medicinal plants for possible conservation. Since most of them are trees and herbs they provide a bulk supply of the medicinal products. Present report is a result of exhaustive survey on traditional uses of plants for various ailments and it revealed that there is a wide usage of plants by people of Vidharbha . This study will promote a practical use of botanicals and must be continued focusing on its pharmacological validation. Further detailed exploration and collection of ethnobotanical information, chemical studies and screening for medicinal properties will provide cost effective and reliable source of medicine for the welfare of humanity.

REFERENCES

Bhardwaj S and Gakhar SK (2005) Ethnomedicinal plants used by tribals of Mizorum to use cuts and wound. *Indian Journal of Traditional knowledge.* 4:75-80.

Bodeker G nnd Huges MA (1998) Wound healing, traditional treatment and research policy. In Prendergast, H.D.V., Etkin, N.L., Harris,D.R., Houghton, P.J. (Eds.). *Plants for Food and Medicine.* Royal Botanical Garden, Kew. 345-359.

Das Amar jyothi (2012) *Int Res J of Pharm.* 130-131.

Fabricant DS and Farnsworth NR (2001) The value of plants used in traditional medicine for drug discovery. *Environ Health Pers.* 109 (Suppl 1): 69-75.

Gupta R et al., (2010) Ethnomeidicinal uses of some medicinal plants used of Gond tribes of Bhandara district, Maharshtra. *Indian Journal of traditional knowledge.* 9(4):713-717.

Korpenwar AN (2012) Ethnomedicinal plants used by tribe in cure of wound healing in Buldhana district (M.S.) India. *International Journal of Recent Trends in Science and Technology.* 3(2): 49-53.

Shanley P and Luz L (2003) *BioScience.* 573 - 584.

RESEARCH ARTICLE

The Effect of Deproteinised Juice (DPJ) on Seed Germination and Seedling Growth of Different Plants (by Paper Towel Method)

Manwatkar VG[1] and Gogle DP[2]

1.Assistant professor, Vidya Vikas Arts, Commerce & Science College Samudrapur, Dist-Wardha-442305.

2. Associate professor, Dept. of Botany, R.T.M. Nagpur University Campus, Amaravati road, Nagpur- 440033.

Email: - m11.vijju@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Manwatkar VG and Gogle DP (2014) The Effect of Deproteinised Juice (DPJ) on Seed Germination and Seedling Growth of Different Plants (by Paper Towel Method). *Int. J. of Life Sciences,* Special Issue, A2: 65-68.

ABSTRACT

The deproteinised juice (DPJ) is also referred as 'Whey' or 'Liquor' which is left after the extraction of protein from juice. It contains proximate amount of non protein nitrogen, soluble carbohydrates, calcium and potassium as suggested by Reddy (1986). The DPJ can be used as a fertilizer for seed germination and growth of plants.During the present investigation some wild and cultivated plant species(*Brassica juncea, Goniocaulonindicum, Celosia argentea, Digeramuricata*and *Tridax procumbens*) have been used for the preparation of deproteinised juice (DPJ) and the effect of these DPJ has been studied on the seed germination and on growth of Pigeon pea seedling.

Key words:-Deproteinised Juice (DPJ), Seed Germination, Plant growth, Seedling Growth, fertilizer etc.

INTRODUCTION

The technique for extraction of protein from green leaves has been suggested by Pirie (1942) now becoming popular as "Green Crop Fractionation" (GCF). The process of GCF consists of pulping the green material, expressing the juice and precipitating the proteins by heat. Thus the process of GCF results into four fractions, namely Leaf juice (Leaf extract), Pressed crop residue (PC), Leafproteinconcentrate (LPC) and Deproteinised juice (DPJ).

The DPJ is the fourth and last product of green crop fractionation process. During preparation of LPC, the LPC can be separated from remaining part of the juice i.e. deprotenised juice (DPJ), by filtration through a simple cotton or canvas cloth. The DPJ is a by-product of GCF system, which is produced in large volume. This brown colored watery juice is "Whey" or "Liquor."

In order to avoid environmental bio-pollution due to the random disposal of DPJ and to make the process of GCF more economical and efficient, its proper use has to be made (Pirie, 1942). It is well known that, the DPJ contains biologically active substances like sugars, carbohydrates, free amino acids, amides, minerals, vitamins and other water soluble components. The dry matter of the DPJ contains 40% carbohydrates and 3% nitrogen as reported by Pirie (1971).

The glucose and fructose are the dominant monosaccharide present in the DPJ. Various workers suggested the use of DPJ as a fertilizer or manure for germination and growth of plants (Dakore, 1985; Ajaykumar and Mungikar, 1990a). In the present investigation attempts were made to study the effect of different DPJ (*Brassica juncea, Goniocaulonindicum, Celosia argentea, Digeramuricata*and *Tridax procumbens*) at various concentrations (0.5%, 1.0%, 1.5%, 2.0% and 2.5%) on seed germination and growth of Pigeon pea (*Pisum sativum*) seedling.

MATERIAL AND METHODS

Preparation of DPJ solution

The different concentrations of deproteinised juice solution (0.5%, 1.0%, 1.5%, 2.0% and 2.5%) were prepared by dissolving 0.5g to 2.5g of dry DPJ in 100ml distilled water. The DPJ solutions were filtered and used.

The seeds under investigation i.e. Pigeon pea seeds were soaked in distilled water and in various concentration of DPJ solution ranging from 0.5% to 2.5% for 24 hours. The seeds were removed, washed with distilled water and surface sterilized with 0.1% mercuric chloride solution for one min., washed several times with sterilized water. The germinating blotting papers were rinsed with 0.01N HCl and washed with distilled water. The seeds were kept for germination on germinating blotting paper. Ten seeds were replaced on the paper; the paper was then folded and replaced in a beaker containing water to provide adequate moisture for germination. Three replicates of each treatment were taken for the study. After 7 days, the resulting seedlings were taken for observation viz. shoot length, root length, fresh wt. and dry wt. per seedling.

RESULT AND DISCUSSION

The results obtained during the course of investigation were presented in different tables.The data obtained were statistically analyzed for standard deviation and analysis of variance (ANOVA) following Gomez & Gomez (1976) and Mungikar (2003).

The DPJ from *Brassica juncea* significantly enhanced the germination of Pigeon pea in 1.5% concentration, whereas *Goniocaulonindicum, Digeramuricata* and *Tridax procumbens* significantly enhanced the germination in 0.5% and 1.5% concentration.

Table 1. Effect of different DPJ on germination (%) of Pigeon pea seed.

Name of DPJ	Concentration of DPJ (%)						C.D.(5%)	C.V.(%)	S.E.
	Control	0.5	1.0	1.5	2.0	2.5			
Brassica juncea	76.7	63.3	40.0	86.7	36.7	63.3	8.36	7.11	2.51
Goniocaulonindicum	80.0	100.0	100.0	63.3	80.0	86.7	13.59	8.32	4.08
Celosia argentea	86.7	60.0	67.5	73.3	30.0	35.0	8.54	6.98	2.56
Digeramuricata	96.7	100.0	90.0	50.0	63.3	93.3	11.10	7.07	3.33
Tridax procumbens	80.0	83.3	96.7	90.0	80.0	86.7	10.33	6.24	3.10

Table 2.Effect of different DPJ on Shoot length (cm) of Pigeon pea.

Name of DPJ	Concentration of DPJ (%)						C.D.(5%)	C.V.(%)	S.E.
	Control	0.5	1.0	1.5	2.0	2.5			
Brassica juncea	5.25	8.59	5.43	5.79	6.44	4.57	0.47	4.10	0.14
Goniocaulonindicum	9.14	12.11	10.48	11.67	7.86	7.31	1.10	5.88	0.33
Celosia argentea	13.51	7.78	7.27	7.00	5.48	6.08	1.03	6.83	0.31
Digeramuricata	7.55	8.49	7.59	6.88	4.74	7.19	1.28	9.44	0.39
Tridax procumbens	8.14	9.32	9.97	7.53	8.37	6.85	1.54	9.59	0.46

Table 3.Effect of different DPJ on Root length (cm) of Pigeon pea.

Name of DPJ	Concentration of DPJ (%)						C.D.(5%)	C.V.(%)	S.E.
	Control	0.5	1.0	1.5	2.0	2.5			
Brassica juncea	4.02	6.05	4.99	5.94	6.60	7.43	0.11	1.02	0.03
Goniocaulonindicum	8.11	9.79	10.52	7.17	7.90	7.47	1.08	6.62	0.32
Celosia argentea	9.08	7.24	7.88	7.50	4.26	5.01	1.47	11.20	0.44
Digeramuricata	3.97	8.10	7.93	7.18	6.52	6.61	1.27	9.86	0.38
Tridax procumbens	4.87	8.60	8.63	7.22	6.22	7.46	0.49	3.55	0.15

Table 4. Effect of different DPJ on fresh wt. (gm) of Pigeon pea seedling

Name of DPJ	Concentration of DPJ (%)						C.D.(5%)	C.V.(%)	S.E.
	Control	0.5	1.0	1.5	2.0	2.5			
Brassica juncea	0.30	0.36	0.34	0.25	0.28	0.30	0.04	6.07	0.011
Goniocaulonindicum	0.28	0.27	0.27	0.19	0.22	0.28	0.03	5.91	0.009
Celosia argentea	0.34	0.37	0.38	0.39	0.22	0.29	0.01	2.18	0.004
Digeramuricata	0.30	0.32	0.34	0.33	0.25	0.28	0.01	1.16	0.002
Tridax procumbens	0.31	0.36	0.41	0.34	0.42	0.39	0.01	1.70	0.004

Table 5. Effect of different DPJ on dry wt. (gm) of Pigeon pea seedling

Name of DPJ	Concentration of DPJ (%)						C.D.(5%)	C.V.(%)	S.E.
	Control	0.5	1.0	1.5	2.0	2.5			
Brassica juncea	0.069	0.079	0.082	0.078	0.071	0.081	0.003	1.75	0.001
Goniocaulonindicum	0.097	0.107	0.121	0.082	0.095	0.078	0.024	12.94	0.007
Celosia argentea	0.091	0.091	0.094	0.093	0.059	0.062	0.007	4.69	0.002
Digeramuricata	0.082	0.10	0.10	0.10	0.08	0.08	0.004	2.37	0.001
Tridax procumbens	0.080	0.10	0.111	0.085	0.096	0.080	0.002	1.39	0.001

C.D. = Critical difference, C.V. = Coefficient of variation, S.E. = Standard error.

However, the DPJ from *Celosia argentea* completely inhibited the germination even at lower concentration (Table 1). The increase in shoot length was observed at 0.5% concentration in Pigeon pea with the DPJ of *Brassica juncea, Goniocaulonindicum* and *Digeramuricata* whereas *Tridax procumbens* DPJ showed stimulation in 1.5% concentration (Table no. 2). The increasing trend for root length was observed in Pigeon pea with the DPJ of *Brassica juncea* in concentrations ranging from 0.5% to 2.5%, whereas

DPJ of *Digeramuricata, Goniocaulonindicum* and *Tridax procumbens* showed increased in root length at 0.5% and 1.5% concentrations (Table no. 3).

The increase in weight of fresh seedling of Pigeon pea was found with *Brassica juncea* DPJ in the concentration of 0.5% and 1.0%. The DPJ of *Celosia argentea* and *Digeramuricata* showed increasing trend for fresh weight seedling with the concentration ranging from 0.5% to 1.5% whereas *Tridax procumbens* DPJ showed increasing trend from 0.5% to 2.5% concentration. However, *Goniocaulonindicum* DPJ had no effect on weight of fresh seedling (Table 4). The increasing trend for dry weight seedling of Pigeon pea was observed with *Brassica juncea* DPJ from 0.5% to 2.5% concentration whereas other DPJ showed the increase in 0.5% and 1.0% concentration (Table 5).

Maindarkar and Mungikar (1994) reported that lucerne DPJ inhibited the seed germination at higher concentration however; lower concentration did not affect the germination. Maindarkar (1990) studied the effect of DPJ on germination of maize,wheat, sorghum and mungseed and she reported that at higher concentration the DPJ inhibited the germination of seed by reducing the growth of root as well as shoot. It indicates that the inhibition of germination was depended on nature of the seeds, concentration of the DPJ used in the studies and on the species from which it was extracted.

CONCLUSION

In the present investigation lower concentration of DPJ always gave positive results on seed germination and seedling growth however, the higher concentrations have lethal for all the parameters which have been studied.

REFERENCES

Ajaykumar K, Mungikar AM (1990a) Fertilizer effect of deproteinised juice DPJ left after the extraction of leaf protein. *Sci. & Cult.* 56(8): 342-343.

Dakore HG (1985). "Studies on protein productivity and conservation of some forages of the region."Ph.D. thesis, Marathwada University.

Gomez KA, Gomez AA (1976) Statistical procedures for agricultural research with emphasis on rice.International Rice Research Institute, Los Banos, Laguna, Philippines Pp. 20-23.

Maindarkar KG (1990) *"Studies on the leaf extracts obtained during fractionation of green vegetation."* Ph.D. Thesis, Marathwada, University, Aurangabad.

Maindarkar KG and Mungikar AM (1994) Marathwada University. *J. Sci.*27: 34.

Mungikar AM (2003) Biostatistical analysis. First Ed., Saraswati Printing press, Aurangabad.

Pirie NW (1942) Direct use of leaf protein in human nutrition. *Chem.Ind.*61: 45.

Pirie NW (1942) Green leaves as a source of protein and other nutrients. *Nature.*194: 251.

Pirie NW (1942) Some practical aspects of leaf protein manufacture. *Food Manufacture.*17: 283-286.

Pirie NW (1971) In Leaf Protein: its agronomy, Preparation, Quality and Use. IBP Handbook 20. N.W.Pirie (Editor). Blackwell Scientific Publications, Oxford, England.

Reddy GS (1986)*"Physiological studies on leaf extracts of some forage crops"* Ph.D. Thesis, Marathwada, University, Aurangabad.

RESEARCH ARTICLE

Incidence of microorganisms in Mustard seeds during the storage and its toxic effect on seed germination and seedling diseases.

Ghugal SI[1] and Thakre RP[2]

[1.] *Department of Botany, S.S.E.S. Amt's Science College, Pauni, Dist.- Bhandara.*

[2.] *Ex-Prof. Post Graduate Teaching Department of Botany, R.T.M. Nagpur University Campus, Nagpur.*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Ghugal SI and Thakre RP (2014) Incidence of microorganisms in Mustard seeds during the storage and its toxic effect on seed germination and seedling diseases, *Int. J. of Life Sciences,* Special issue, A2: 69-72.

ABSTRACT

This work aims to isolate and to identify the fungal microorganisms associated with mustard (*Brassica juncea* cv. Pusabold) seed during storage. The seed mycoflora was isolated from mustard seeds at an interval of a month for a period of one year at laboratory condition by blotter and agar plate method. Altogether 28 storage fungi were confined to mustard seed samples throughout the year. Major predominant fungi included *Alternaria alternata*, *Aspergillus flavus, A. fumigatus, A. niger, Fusarium moniliforme, Penicillium multicolor, P. oxalicum* and *Curvularia lunata.* Mustard seeds were inoculated with the fungal culture filtrate of above test fungi and incubated for 7,14, and 21days. The pathological symptoms such as weak root, yellowing of leaf, stunted growth, blackening of radical, seedling rot, no primary root etc. were distinct symptoms of disease due to fungal filtrate of storage fungi. Culture filtrate of longer duration inhibited the seed germination and retarded the seedling growth.

Key words: Mustard, storage fungi, test fungi, fungal filtrate.

INTRODUCTION

In India and certain countries in Africa and South America the losses of food grains due to association of microorganisms is about 30 percent of the annual harvest. The fact that particularly some tropical developing countries suffer from these losses makes the problem of storage fungi, a major one in world agriculture. *Brassica juncea* (L.) Czern. & Coss. Cv. Pusabold also known as mustard is one of the important and widely distributed oilseed crop. It is cultivated in the cooler agricultural regions and at higher elevation as well as winter crop in India and other countries of the temperate zones. Large numbers of fungi are known to bring about several biochemical changes in mustard seeds and degrade seed constituents (Rai and Saxena, 1980). The microorganism associated with seed may be pathogenic, weak parasites or saprophytes and may be external or internal. The present investigation deals with the incidence of microorganisms in mustard seeds during the storage and also effect of fungal filtrates of predominant fungi (test fungi) on seed germination and Seedling diseases.

MATERIALS AND METHODS

Seed samples of Mustard was selected for experimental study and collected from different oilseed Brassica growers of north India and also from department of Botany, Nagpur. Seed samples were mixed together and selected randomly for further investigations. Isolation of fungi was done by

both blotter as well as agar plate method as recommended by ISTA (1966).

The seed sample was stored in small cotton bags under normal room temperature condition for one year i. e. from Jan 1999 to Dec 1999. After every month 400 seeds were taken out randomly and percentage incidence of fungi were recorded. Total percentage of fungal incidence was calculated by using the formula suggested by Sahai and Mehrotra (1982). To study the toxic effects, the metabolites from culture filtrate of test fungi were obtained for 7, 14 and 21 days incubation period. Surface sterilized one hundred seeds were soaked in culture filtrates for 24 hours. Seed soaked in sterilized czapek's broth served as control. The treated and control seeds were allowed to germinate on moist blotter paper in triplicate at laboratory condition. After six days of incubation at 28 ± 1^0 C, per cent seed germination as well as seedling pathogenic diseases symptoms were recorded.

RESULT AND DISCUSSION

The seed mycoflora obtained on Pusabold seeds from January 99 to December 99 is presented in Table 1. Altogether 28 fungi were isolated, out of which some were recorded throughout the year included *Alternaria alternata, Aspergillus flavus, A. fumigatus, A. niger, Fusarium oxysprorum, Penicillium chrysogenum* and *P. oxalicum.*

Table - 1 : Monthly incidence of fungi during storage on *Brassica Juncea* cv Pusabold using blotter and agar plate method.

S. No.	Name of Organism	Period of Incubation											
		Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99
1	*Alternaria alternata* a*	15.89	10.00	5.00	-	-	9.09	21.00	18.00	12.50	5.00	16.00	16.50
	b*	7.00	4.00	-	-	-	-	8.00	6.50	14.00	12.00	-	13.00
2	*Alternaria brassicae*	22.00	16.00	-	-	-	-	9.00	-	-	10.00	-	14.54
		8.00	-	-	-	-	-	-	5.50	-	14.54	2.00	5.05
3	*Aspergillus candidus*	7.62	-	-	5.72	-	3.00	-	-	-	-	-	10.00
		-	-	7.68	10.00	-	-	-	6.00	-	-	-	-
4	*Aspergillus flavus*	8.76	9.09	33.33	42.00	30.19	42.85	23.86	57.14	33.33	33.33	28.52	9.52
		5.05	-	-	40.00	-	-	-	10.00	14.28	61.90	38.09	-
5	*Aspergillus fumigatus*	-	37.50	47.00	20.20	47.61	9.52	19.04	19.04	12.08	-	42.85	13.27
		7.65	-	3.00	-	52.38	76.19	33.33	38.09	-	-	13.27	-
6	*Aspergillus glaucus*	-	-	-	-	-	-	8.76	10.00	19.52	14.28	-	16.70
		4.76	-	-	-	5.00	-	-	-	-	9.52	-	-
7	*Aspergillus nidulans*	16.00	8.33	5.00	10.00	9.00	-	-	-	-	-	-	15.50
		4.76	-	-	-	-	-	-	-	-	-	-	-
8	*Aspergillus niger*	4.54	-	-	47.61	52.38	33.33	57.14	66.66	61.90	19.52	-	13.60
		-	-	-	-	-	-	-	14.28	-	-	15.74	15.00
9	*Aspergillus versicolor*	-	-	9.09	5.54	-	8.00	-	-	-	-	-	-
		-	-	4.74	-	-	-	-	-	-	-	-	-
10	*Aureobasidium sp.*	-	8.96	-	10.62	12.00	-	-	-	-	-	-	-
		9.52	-	-	-	-	5.76	-	-	-	-	-	-
11	*Chaetomium bostrychodes*	-	-	10.00	-	-	-	-	15.16	15.60	9.05	-	-
		-	-	-	-	-	-	-	5.00	-	-	-	-
12	*Curvularia lunata*	22.72	30.17	15.42	-	-	-	4.76	15.16	-	-	-	9.52
		-	-	-	9.05	-	3.00	-	-	-	-	-	15.00
13	*Fusarium moniliforme*	4.54	25.00	31.00	-	4.76	-	-	-	15.00	27.00	19.05	-
		-	4.76	5.00	-	-	-	-	14.28	-	-	-	-
14.	*Fusarium oxysporum*	18.18	45.58	61.38	65.05	20.00	18.18	30.19	-	23.80	-	39.12	-
		5.00	-	9.05	12.00	-	-	-	-	25.00	11.00	21.05	22.23
15.	*Haplosporangium sp.*	-	-	-	-	-	4.76	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
16	*Memnoniella sp.*	-	-	-	-	-	-	-	-	-	5.00	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
17	*Penicillium chrysogenum*	-	28.57	12.00	-	-	-	38.50	-	-	28.57	19.05	9.52
		4.76	4.76	-	10.00	-	-	-	-	-	4.76	-	15.00
18	*Penicillium frequentans*	-	-	-	-	-	-	-	-	10.00	16.55	-	14.50
		-	-	-	-	-	-	-	-	-	-	5.00	-
19	*Penicillium multicolor*	-	30.00	-	-	30.54	-	19.05	11.76	-	13.49	28.09	-
		-	4.76	-	-	12.65	-	10.00	-	-	-	-	-

Table 1: Continued…

S. No.	Name of Organism	Period of Incubation											
		Jan-99	Feb-99	Mar-99	Apr-99	May-99	Jun-99	Jul-99	Aug-99	Sep-99	Oct-99	Nov-99	Dec-99
20	*Penicillium notatum*	18.18	20.00	21.51	19.09	-	4.76	26.32	33.33	9.00	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
21	*Penicillium oxalicum*	21.47	-	9.54	30.00	10.00	-	47.61	18.18	23.00	30.00	23.80	33.33
		-	-	-	-	-	-	-	-	4.76	5.00	4.76	-
22	*Phoma lingum*	-	-	-	4.76	-	5.00	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	5.54	-
23	*Phytophthora undulata*	-	-	-	4.54	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
24	*pythium sp.*	-	-	5.00	-	-	-	-	-	-	-	-	-
		-	-	-	-	10.00	-	-	-	-	-	-	-
25	*Rhizopus nigricans*	-	-	20.00	-	-	-	-	-	-	6.90	43.25	10.00
		-	-	-	-	-	-	-	-	-	-	-	-
26	*Stachybotrys sp.*	-	-	-	4.76	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
27	*Syncephalastrum sp.*	-	-	-	9.52	12.00	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-
28	*Trichoderma viridae*	-	-	-	-	7.71	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	25.50

Table 2: Effect of culture filtrate on seed germination and disease symptoms on B. juncea cv Pusabold.

Sr. No.	Name of Organism	Percent Germination	% Change over control	Symptoms
1	a*	95.00	0.00	-
	Control b*	95.00	0.00	-
	c*	95.00	0.00	-
2	*Alternaria alternata*	90.00	-5.26	-
		87.00	-8.42	-
		82.50	-13.16	Weak root
3	*Aspergillus flavus*	91.00	-4.21	-
		86.50	-8.95	Weak root
		76.00	-20.00	Yellowing of leaves
4	*A. fumigatus*	93.00	-2.11	-
		88.00	-7.37	-
		85.00	-10.53	Stunted growth
5	*A. niger*	90.00	-5.26	-
		87.00	-8.42	-
		82.50	-13.16	Dark brown spot near emergence of root
6	*Curvularia lunata*	93.50	-1.58	-
		90.00	-5.26	-
		86.00	-9.47	Growth checked
7	*Fusarium moniliforme*	93.00	-2.11	-
		89.50	-5.79	Growth checked
		87.00	-8.42	Seedling rot
8	*Penicillium oxalicum*	90.50	-4.74	-
		87.50	-7.89	-
		80.50	-15.26	No primary root

a* - 7 days of incubation , b* - 14 days of incubation
c* - 21 days of incubation

Fungal organisms recorded only in winter were *Alternaria brassicae, Aspergillus glaucus, Chaetomium bostrychodes, Curvularia lunata, Fusarium moniliforme, Penicillium frequentans,* and *Rhizopus nigricans*. The fungi, confined to summer season, were *Aspergillus candidus, A. nidulans, A. versicolor, Aureobasidium sp., Penicillium multicolor, Penicillium notatum, Phoma lingum, Pythium sp.,* and *Syncephalastrum racemosum*. The fungi occurring rarely during storage period were *Haplosporangium sp., Memnoniella sp., Phytophthora undulata, stachybotrys sp.* and *Trichoderma viridae.*

The fungi occurring throughout the year showed varying percentage of incidence. These fungi are obviously more versatile in their food requirement and capacity of tolerance for varying environmental conditions. Bilgrami *et al.* (1979) studied seasonal variation in mixed seed samples of mung, urad, masoor and gram. Sahay (1988) studied the incidence of fungi on mustard seeds with respect to winter, summer and monsoon season of the year.

Effect of fungal filtrates on germination of seeds and effect on seedling growth given in Table 2. As per methodology stated earlier, the seed samples were inoculated with fungal filtrates of test fungi, incubation for 7, 14 and 21 days. The results obtained from present study indicates that the test fungi under study exerted marked effect on percentage of seed germination and symptom appearance at seedling stage of Brassica crops. Control seeds showed 95.00% seed germination. The effects exhibited by test fungi are as follows.

Alternaria alternata - Seed infestation with these test fungi shows reduction in germination i.e. –5.26%, -

8.42%, -13.16% with 7, 14 and 21 days old culture filtrates. There was normal growth with 7 and 14 days old fungal filtrate treatment while with 21 days filtrate weak root of seedlings were noted.

Aspergillus flavus – It shows maximum reduction i.e. –4.21%, 8.95% and –20.00% over control with 7, 14 and 21 days old culture filtrate treatment. 14 and 21 days old filtrate exhibited with weak root and yellowing of cotyledonary leaves of seedlings.

Aspergillus fumigatus – It shows reduction in seed germination with increase in incubation period. The seedlings grows normally for 7 and 14 days, but 21 days old filtrate shows stunted growth of seedlings.

Aspergillus niger – It decreased the seed germination with increase in incubation of fungi. 21 days old fungal filtrate showed dark brown spot near the emergence of root.

Curvularia lunata – treated seeds shows reduction i.e. –1.58%, -5.26% and –9.47% with respect to 7, 14 and 21 days incubation of fungi followed by checking the growth of seedlings with 21 days old fungal filtrate treatment.

Fusarium moniliforme – It shows less effect on germination of seeds. However 21 days old fungal filtrate treatment shows –8.42% reduction exhibited with seedling root.

Penicillium oxalicum – As the incubation period increased, there was gradual reduction in seed germination. 21 days fungal filtrate treated seeding exhibited with absence of primary roots.

Loss of viability is sensitive indicator of deterioration. Under some circumstances, at least, fungi are primary causes of loss of viability in seeds (Christensen, 1973). He also reported that the embryo of cereal grains is often preferentially invaded by fungi, mostly species of *Aspergillus* and *Penicillium.* Loss in seed viability culture filtrates reported by Arya *et al*. (1989), Bhajbhuje and Thakre (1989) and Barve (1995).

REFERENCES

Agrawal PK, Dadlani M and Shrawa I (1992) Techniques in Seed Science and Technology.'Ed. S. Agrawal P. K. and M. Dadlani South Asian Publisher, New Delhi.P. 207.

Arya R and Saxena SK (1989) Effect of *Aspergillus niger, Pythium aphanidermatum*and their culture filtrates together with *Medoidogyne incognita* on seeds of tomato. 76th Annual Ind. Sci. Congr., pp 65.

Barve YY (1995) Studies on storage fungi associated with seeds of some leguminous crops. Ph. D. Thesis, Nagpur University Nagpur, India.

Bhajbhuje MN and Thakre RP (1989) Efficacy of culture filtrate of *Alternaria alternata* (Fr.) on somatic cells of *Trigonella foenum-graceum* (L). Proc.76th Ind. Sci. Congr. Part III (Abstract) Pp. 46.

Bilgrami KS and Verma RN (1978) Physiology of fungi.Vikas Publishing House Pvt. Ltd. Delhi.505 pp.

Bilgrami KS, Prasad T and Sinha RK (1979) 'International Biosciences Monograph – 9.Changes in nutritional components of stored seeds due to fungal association.' Today and Tomorrow's Printers and Pub. New Delhi. pp. 82.

Cochrane VW (1958) Physiology of fungi.*John Wiley and Sons. Inc., New York.*

Christensen CM (1973) Loss of viability in storage: Microflora. *Seed Sci. & Technol.,*1**:**547-562.

Davys MNG and Pirie NW (1969) International Biological Programme (IBP).*Biotech.Bioengr*.11: 528.

Dubois M, Gills KA, Hamilton JK, Robers PA and Smith E (1956) Methods in Microbiology' (eds). J. K. Norris and D.W. Ribbons.Acad. Press London, N. Y. pp. 272.

International Seed Testing Association, (1966). International rules for seed testing. *IntSeed Test. Assn.*31: 1-157.

International Seed Testing Association, (1988). International rules for seed testing. *Proc.Int. Seed Test. Asso.*63: 1-102.

Johnston A and Booth C (Ed.S) (1983)'Plant Pathologists Pocket Books.' The Combrain New Ltd. Aberystwyth, Wales. P.Musket, A. E., (1948). Technique for the examination of seed for the presence of seed borne fungi. *Trans. Br. Mycol. Soc*., 30: 74-83.

Prasad T and Pathak SS (1987) Impact of various storage systems on biodeterioration of cereals. *Indian Phytopath.*40 (1) : 39-46.

Sahai A and Mehrotra BS (1982) Mycoflora associated with the seed of forest trees and train effect on germination. *Proc. Ind. Nat. Sci. Acad. Part B*. 48(5): 706-713.

Sahay SS (1988) Occurrence of aflatoxin in mustard seeds, cakes and oils. *J. IndianBot. Soc*. 67: 188-190.

RESEARCH ARTICLE

Characteristic of Amylase produced by *Bacillus axarquiensis* Isolated from Basi Bhat

Bhute RM[1]* and Chandekar CJ[2]

[1]*Department of Botany, Sindhu Mahavidyalaya, Nagpur, India*

[2]*Department of botany, Shri Shivaji Sci.College, Nagpur, India.*

**Corresponding author Email: ramdasbhute.2011@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Bhute RM and Chandekar CJ (2014) Characteristic of Amylase produced by *Bacillus axarquiensis* Isolated from Basi Bhat. *Int. J. of Life Sciences,* Special Issue A2: 73-76.

Acknowledgements:
This research work was supported by grants from University Grant Commission, Western Regional Office, Pune under the Minor Research Project, thanks for that.

ABSTRACT

Bacillus *axarquiensis* is isolated from Basi Bhat. It had aggregation time (64 min) and produce biosurfactant. It showed protease, lipase, and amylase activity. It passes cell surface hydrophobicity 78.2%; resistance to acidic condition (pH 3 for 90 min) and growing in presence of bile salts (in culture medium containing more than 0.15% bile salt). The thermostable extracellular amylase was isolated and partially purified, the optimum temperature and pH for it was found to be 55^{0}C and 6.5 respectively. The maximum amylase production was seen with maltose as carbon source while among the nitrogen sources, complex nitrogen sources support for maximum amylase production.

Key words: Bacillus, biosurfactant, Basi Bhat, thermostable, amylase.

INTRODUCTION

Bacillus species, such as *Bacillus subtilis, Bacillus licheniformis, Bacillus axarquiensis* and *Bacillus pumilus,* produce biosurfactants (Arima *et al*., 1968; Naruse *et al*., 1990; Yakimov *et al*., 1995), compounds that reduce surface and interfacial tension and thus have excellent detergent, emulsifying, foaming and dispersing properties. They are used extensively in the textile, pharmaceutical and cosmetics industries and also in bioremediation (Banat *et al*., 2000). *Bacillus sp.* are Gram-positive long rods, and classified as Kingdom: *Bacteria*, Phylum: *Firmicutes,* Class: *Bacilli*, Order: *Bacillales,* Family: *Bacillaceae,* Genus: *Bacillus Bacillus axarquiensis* (B-5) is isolated from Basi Bhat, its 16S rRNA gene amplified by PCR using forward primer, Bac 8f (5'AGAGTTTGATCCTGGCTCAG3') and reverse primer, Univ592r (5'ACCGCGGCKGCTGGC3') following standard protocols. The sequences obtained was compared to reference 16S rRNA gene sequences available in the GenBank, and found 78% identical with *Bacillus axarquiensis.* Isolated *Bacillus axarquiensis* has been found to be amylase positive as hydrolyzing starch. The amylases are industrially important like microbial amylase, which has higher yield and thermo stability. They are used also in industries like food, fermentation, textile paper and detergent. The efficiency of microbial amylases has been proved to be better than chemical hydrolysis.

MATERIAL AND METHODS

Isolation of Bacillus: The *Bacillus axarquiensis* was isolated from Basi Bhat on medium; rice powder: 0.5%, peptone: 0.5%, K_2HPO_4: 0.2%, $MgSO_4$: 0.05%, $FeCl_3$: traces, and agar: 2%.

Cell surface hydrophobicity test: It was determined by the method of Rosenberg *et al*. (1980). The strain was harvested after 18h of growth, washed twice and suspended in saline solution to OD of 0.5 at 600 nm. To 3 ml of washed cells, 1 ml of toluene added and mixtures were blended for 90 seconds. The tube was left to stand for 15 min for separation; the OD of the aqueous phase was taken. Hydrophobicity was given by the percentage decrease in the OD of the bacterial suspension due to partitioning of cells into the hydrocarbon layer. Percentage of hydrophobicity = [(OD600 before mixing - OD600 after mixing) / OD600 before mixing] x100 (Handly *et al*).

Amylase Production: The following media were used to study the amylase production. Media I- Starch, 10.0 g; agar, 20 g; dist. water 1 liter and pH adjusted to 7.0.

Media II- Starch, 1.0 g; peptone, 0.5g; $K_2HPO_4.H_2O$, 0.05 g; $FeCl_3$ traces; agar 20g; dist. water 1 liter and pH adjusted to 7.0.

Media III- (composition is same as in media II where peptone replaced by NH_4NO_3).

The colonies identified by starch hydrolysis test using iodine solution.

RESULTS AND DISCUSSION

Effect of carbon and nitrogen sources on production of amylase: For optimization of cultural conditions, media IV was used, whose composition as, starch, 10.0 g; yeast extract, 3.0 g; peptone, 5.0 g; NaCl, 3.0 g; $MgSO_4.7H_2O$, 0.05 g; dist. water 1 liter and pH adjusted to 7.0. For study of effect of carbon source in media IV, starch was replaced by different 1.0% carbon sources as mentioned in Table 3. To study the effect of nitrogen source in media IV, peptone and yeast extract were replaced by different 1.0% nitrogen sources as mentioned in Table 4.

Amylase assay: For amylase assay 0.5 ml of 1 % starch in 0.1M phosphate buffer (pH 6.5) and adding 0.5 ml of enzyme were incubated for 30 min at room temperature i.e. 37^0C. While the reaction was stopped by adding 1.0 ml of dinitrosalicylic acid reagent, heated on boiling water bath 5 min and then to it 10 ml dist. water was added. Absorbance was checked at 540 nm against blank. The blank was the same as above without incubation. One unit of the amylase activity was defined as the amount of enzyme that liberated one µmole of reducing sugar under experimental condition.

Table1: Attributes of *B. axarquiensis*

Parameter	
Amylase activity	+
Protease activity	+
Lipase activity	+
Aggregation time (min)	64
Cell surface hydrophobicity	78.2%

Table2: B. *axarquiensis*-characteristics

Parameters	Characteristics
Morphology Colony on Agar	Straight rods, Gram +ve, Sporulating
Growth temp.	Opt growth at 32^0C range 15-45^0C
Gelatinase	Positive
Casein hydrolysis	Positive
Amylase	Positive
Catalase	Positive
Indole test	Negative
Urease	Negative
Nitrate reduction	Positive
Methyl red test	Positive
Citrate utilization	Positive

Table 3: Effect of carbon sources on amylase production

Carbon source	Activity (µmole/min/ml)
Arabinose	0.0523
Dextrin	0.1543
Fructose	0.4110
Galactose	0.2803
Glucose	0.1311
Glycerol	0.0215
Lactose	0.0101
Maltose	0.5120
Mannitol	0.1245
myo-Inositol	0.1542
Raffinose	0.3512
Ribose	0.2843
Sod. Acetate	0.0084
Sod. Citrate	0.1431
Starch	0.0661
Sucrose	0.2865
Xylose	0.2664

Partial purification of amylase:

From Basi Bhat total 32 *Bacillus* were screened based on aggregation time, antibacterial effects, enzymatic

activity, cell surface hydrophobicity, co-aggregation, tolerance to bile salts and acidic condition and finally selected *Bacillus* B-5 for study because of its peculiar characteristics in comparison to the other isolated strains from the Basi Bhat. The results showed that isolated *Bacillus axarquiensis* had amylase, lipase, and protease activity. This isolate was selected for partial purification of amylase. The inoculums was prepared from slant culture by transferring a loop-full of cells in inoculums media 50ml in 250ml fermentation flask and incubating at room temp in a rotary shaker at 120 rpm for 48 h. The fermentation medium was inoculated with 0.1% inoculums (medium 100ml in 250ml flask) and incubated for 72 hrs. On 48 hrs of fermentation, broth was centrifuged at 6000 rpm for 15 min at 4^0C. The partial purification of enzyme was carried out by ammonium sulphate precipitation (40%). Bradford method was used to estimate enzyme protein using bovine serum albumin as standard (Kotiranta *et al*., 2000).

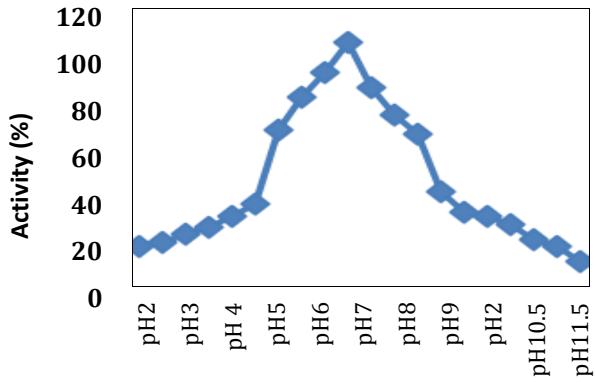


Fig. 5: Effect of pH on Amylase activity.

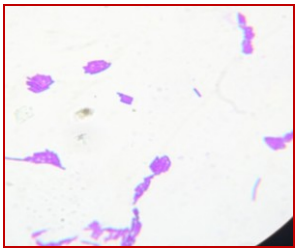


Fig.1: *B. axarquiensis* (autoaggregation)

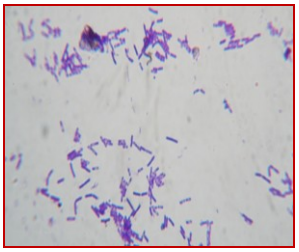


Fig. 2: *B. axarquiensis* (endospore)

Fig.3: Protease activity (+ve)

Fig. 4: Amylase activity (+ve)

Effect of pH and temperature on amylase: Effect of pH was from pH 2.0 to 12.0 (using HCl/KCl buffer for pH 2; glycine/HCl buffer for pH 2.5 to 3.5; acetate buffer for pH 4 to 5.5 phosphate buffer for 6 to 7.5; tris/HCl buffer for pH 8 to 9; glycine/ NaOH buffer for 11 to 12). Effect of temp was examined from 5^0 to 80^0C.

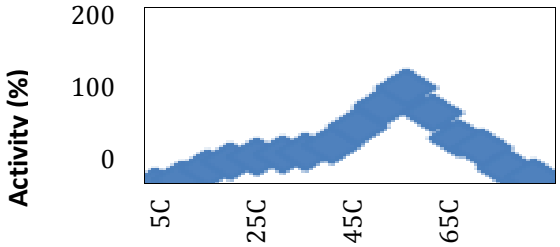


Table 4: Effect of various nitrogen sources on Amylase production

Nitrogen sources	Amylase Activity(µ mole/ min/ml)	Protein (µg/ml)	Specific activity (U/mg)
*$(NH_4)_2SO_4$	0	9	0
*$(NH_4)_2NO_3$	0	3	0
*NH_4Cl	0	8	0
*$(NH_4)H_2PO_4$	0	2	0
*CH_3COONH_4	0	3	0
*L-Glutamic acid	0	2	0
*KNO_3	0.06	0.001	60
*Urea	0.05	0.003	16.66
#Peptone	0.33	0.11	3
#Yeast extract	0.30	0.13	2.72
#Tryptone	0.25	0.35	0.72
#Soybean meal	0.25	0.46	0.543
#Beef extract	0.29	0.38	1.03
#Gelatine	0.09	0.22	0.4

**Simple Nitrogen Source; #Complex Nitrogen Source*

The morphological and physiological characteristics of the *Bacillus axarquiensis* are shown in Table 2. The optimum pH and temperature for its amylase activity was found to be 6.5 and 55^0C (Fig. 5 & 6), respectively. The maltose is found to induce amylase activity to 0.512 U, followed by fructose, ribose, raffinose, sucrose and xylose, but starch, and arabinose have very low inducing effect. In addition to soluble starch the lactose, glucose and dextrin were also found suitable for amylase production.

This selected *Bacillus axarquiensis* gives higher yield of amylase with complex nitrogen sources than with simple nitrogen sources as given in Table 4. Further enzyme purification is required for more characterization.

REFERENCES

Arima K, Kakinuma A and Tamura G (1968) Surfactin, a crystalline peptide lipid surfactant produced by *Bacillus subtilis*: isolation, characterization and its inhibition of fibrin clot formation. *Biochem. Biophys. Res. Commun.,* 31: 488–494.

Banat IM, Makkar RS and Cameotra SS (2000) Potential commercial applications of microbial surfactants, *Appl. Microbiol Biotechnol.,* 53: 495–508.

Hun L (2009) "*Bacillus coagulans* significantly improved abdominal pain and bloating in patients with IBS", *Postgraduate Medicine,* 121 (2): 119–124.

Kotiranta A, Lounatmaa K, Haapasalo M (2000) "Epidemiology and pathogenesis of *Bacillus cereus* infections". *Microbes Infect.,* 2 (2): 189–98.

Naruse N, Tenmyo O, Kobaru S, Kamei H, Miyaki T, Konishi M and Oki T (1990) Pumilacidin, a complex of new antiviral antibiotics. Production, isolation, chemical properties, structure and biological activity, *J Antibiot.,* 43: 267–280.

Rosenberg M, Gutnick D, Rosenberg E (1980) Adherence of bacteria to hydrocarbons: a simple method for measuring cell-surface hydrophobicity. *FEMS Microbiol. Lett..* 44: 929-937.

Taheri HR, Moravej H, Tabandeh F, Zaghari M, Shivazad M (2009) Screening of lactic acid bacteria toward their selection as a source of chicken probiotic. *Poult. Sci*., 88:1586-1593.

Yakimov MM, Timmis KN, Wray V and Fredrickson HL (1995) Characterization of a new lipopeptide surfactant produced by thermotolerant and halotolerant subsurface *Bacillus licheniformis* BAS50. *Appl Environ Microbiol.,* 61: 1706–1713.

RESEARCH ARTICLE

Establishment of Phylogenetic relationship on the basis of SDS-PAGE among the *Dioscorea* species under section Opsophyton, Enantiophyllum and Lasiophyton from Melghat Tiger Reserve Maharashtra, India.

Gawande PA[1*], Deshmukh VP[1] , Choudhary US[1] and Thakare PV[2]

[1]*Department of Botany, Sant Gadge Baba Amravati University, Amravati-444602, Maharashtra.*

[2]*Department of Biotechnology, Sant Gadge Baba Amravati University, Amravati-444602, Maharashtra.*

**Corresponding author email : prashantagawande@yahoo.co.in*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Gawande PA, Deshmukh VP, Choudhary US and Thakare PV (2014) Establishment of Phylogenetic relationship on the basis of SDS-PAGE among the *Dioscorea* species under section Opsophyton, Enantiophyllum and Lasiophyton from Melghat Tiger Reserve Maharashtra, India, *Int. J. of Life Sciences,* Special Issue A2: 77-80.

ABSTRACT

A crude protein extract when fractionated on a suitable gel medium produces a spectrum of bands which is diagnostic for the species. For each species at least 10 locations were selected. Protein samples were extracted in 50 mM Tri-HCl buffer (pH 8.3) to added 10 mM 2-Mercaptoehanol. Vertical polyacrylamide gel electrophoresis (SDS-PAGE) was carried out for separation of proteins, using crude extract. The 15% Gel caste was used for the separation of proteins. Genetic similarity (GS) between individuals was estimated and the matrix was subjected to Unweighted Pair Group Method for Arithmetic average analysis (UPGMA) to generate dendrogram using average linkage procedure. It was evident that these five species were in two clusters. *D. bulbifera*, *D. oppositifolia*, *D. hispida*, and *D. pentaphylla* formed a distinct cluster (cluster-I), while *D. belophylla* was completely out-grouped and formed cluster II. Although, *D. bulbifera* and *D. oppositifolia* were placed nearer to each other, they did not pair and hence, were placed in two different sub-clusters (sub-cluster I and II). In this cluster *D. hispida* and *D. oppositifolia* was grouped together and formed sub-cluster III. The *D. belophylla* was distantly related with remaining four species.

Keywords:*Dioscorea*, Dioscoreaceae, SDS-PAGE, Protein Profile, Phylogenetic analysis.

INTRODUCTION

The Melghat Tiger Reserve (MTR) is located on southern offset of the Satpura hill ranges in central India, called Gawilgarh hills in the Maharashtra. The family Dioscoreaceae is a natural group of tuber forming, tropical vines. The family is divided into two tribes: the Dioscoreae, including six genera all of which have unisexual flowers, and the Stenomeridae with three genera which produce hermaphroditic flowers (Smith, 1937).

The present investigator was very much impressed by the work carried out by Prain and Burkill in India as well as abroad. Burkill spent 58 years of his life on the study of world Dioscoreaceae (Burkill, 1960). Under the family Dioscoreaceae, the section Combilium includes *D. aculeata*, section Lasiophyton with *D. pentaphylla* and *D. triphylla*, Opsophyton with *D. bulbifera* and the last section Enantiophyllum represented by *D. wallichii*, *D. anguina*, *D. belophylla*, *D. glabra* and *D. alata* (Duthie, 1960). These sections were introduced earlier by Prain and Burkill (1936) who were the basic contributors on the taxonomy of Dioscoreaceae. The genus *Dioscorea* in the

forests of MTR is represented by five species namely, in the section Opsophyton includes species such as *D. bulbifera*; however section Enantiophyllum includes *D. oppositifolia* and *D. belophylla* and in the section Lasiophyton accomodate *D. hispida* and *D. pentaphylla* (Patel, 1968; Dhore and Joshi, 1988). Marked diversity was observed among the five species of the genus *Dioscorea* in MTR and also within individuals of the same species except *D. hispida*.

Protein electrophoresis has provided a new approach to the problems of species relationships (Johnson and Hall, 1965). SDS-PAGE technique was for the first introduced by Laemmli (1970). The proteins and enzymes are the important parameters in order to study molecular taxonomy (Anu and Peter, 2003). The proteins as primary gene products are good markers of genetic variations (Odeigah *et al*., 1999).

Dioscoreales have been the centre of attraction for plant systematists for many years. Salient features of *Dioscorea* viz. reticulate venation, nervation between primaries reticulate, ring vascular bundles, lateral position of the pistil, and second delayed cotyledon render the genus *Dioscorea* interesting for tracing possible phylogenetic relationship between Monocotyledons and Dicotyledons (Dhalgren *et al*., 1985; Brunnschweiler, 2004). By considering above character the present investigation intends to undertake in order to perform morphological character optimization, correlation of phenetic similarities with the genetic similarity and establishment of genetic relationship among genus *Dioscorea* from MTR. In relation to the above, the following parameters were undertaken to study genetic relationship between the five species of *Dioscorea* for to study inter-relationship based on morphology and protein profile.

MATERIALS AND METHODS

A total five individuals were randomly collected from each location on geographical and morphological basis as mentioned earlier. For each species at least 10 locations were selected. Tubers were cleaned with distilled water, pealed and cut into small strips. Small part measuring 1 gm from one location, thus samples from 10 locations were, dried at room temperature for 12 hours and transferred to oven at 55^{o}C for 24 hours, then grinded into fine powder in pestle and mortle. Tuber powder (200 mg) was taken from the above composite bulk and was homogenated at room temperature with 50 mM Tri-HCl buffer (pH 8.3) to added 10 mM 2-Mercaptoehanol, (Harvey and Boulter, 1983) and placed at 0^{o}C for 24 hours and then subjected to centrifugation at 13000 rpm for 15 min at 4^{o}C. The supernatant was transferred to 2 ml microcentrifuge tube containing 100 mg powder from bulk homogenate. The procedure was repeated twice. Protein electrophoresis was worked out according to the method of Laemmli (1970). Vertical polyacrylamide gel electrophoresis (SDS-PAGE) was carried out for separation of proteins, by using 15% Gel caste. Staining was performed by applying comassive brilliant blue stain R-250. Only the clear, unambiguous bands were considered for the preparation of unitary matrix by applying the method outlined by Nei and Li (1979). The phylogenetic analysis was carried out by using NTSYS-pc version 2.0 (Rohlf 1987) to generate similarity coefficient. The matrix was subjected to Unweighted Pair Group Method for Arithmetic average analysis (UPGMA) (Sokal and Micluner, 1958) to generate dendrogram using average linkage procedure.

RESULTS AND DISCUSSION

Two procedures were followed, one with 50 mM Tris-HCl buffer (pH 8.3) to which 10 mM β-mercaptoethnol and second with 50 mM Tris-Glycine buffer (pH 8.3) with 10 mM β-mercaptoethnol was added. Storage proteins were soluble maximally in Tris-HCl buffer because of its high ionic strength.

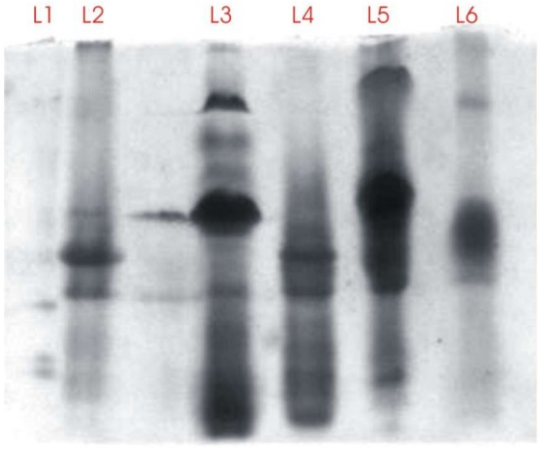


Fig. 1: SDS-PAGE Protein profile of *Dioscorea* species.

Table 1: Nei and Li similarity coefficient of SDS-PAGE

Species	*D. bulbifera*	*D. oppositifolia*	*D. hispida*	*D. pentaphylla*	*D. belophylla*
D. bulbifera	1				
D. oppositifolia	0.76	1			
D. hispida	0.66	0.75	1		
D. pentaphylla	0.75	0.82	0.84	1	
D. belophylla	0.60	0.54	0.46	0.42	1

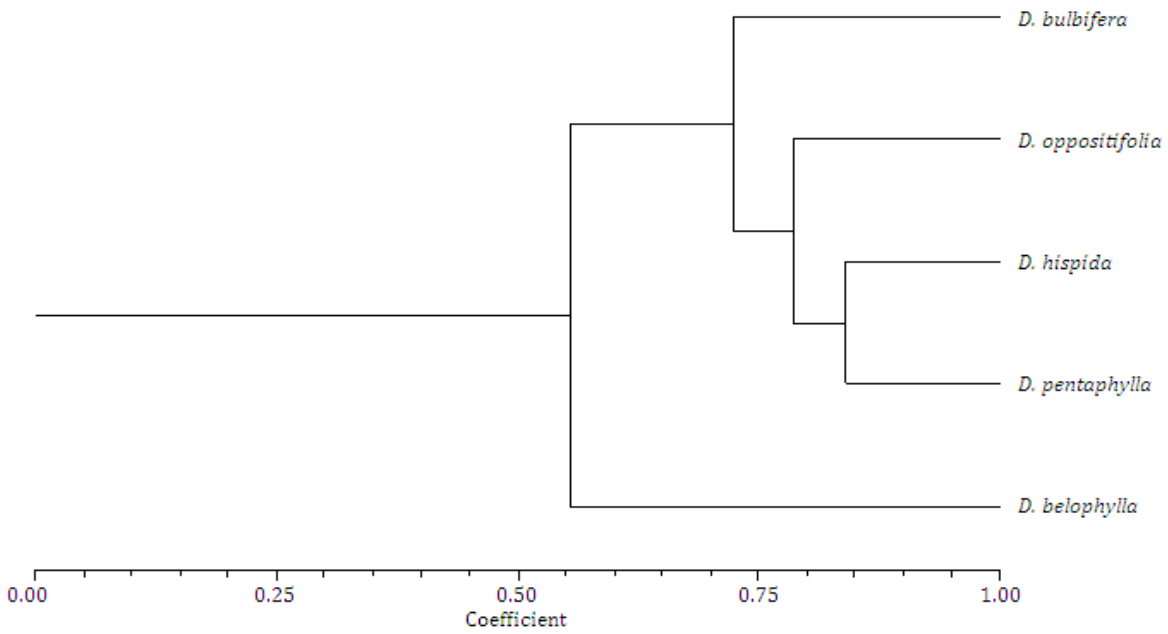


Fig. 2: Dendrogram showing genetic relationships between *Dioscorea* spp.

The five species of the genus *Dioscorea* were analyzed for proteins by 15% SDS-PAGE. Dormant tubers were taken for protein profile study. The tuber storage protein profile of five species of *Dioscorea* showed 11 stable bands, out of which 2 bands were monomorphic and 9 were polymorphic. The SDS-PAGE profile produced on an average 8 bands per species (fig. 1.). The highest similarity index was observed in *D. hispida-D. pentaphylla* (0.84) and the lowest in *D. pentaphylla-D. belophylla* (0.42). From similarity matrix (Table 1.) the dendrogram was constructed by using UPGMA method. It was evident that these five species were in two clusters. *D. bulbifera*, *D. oppositifolia*, *D. hispida*, and *D. pentaphylla* formed a distinct cluster (cluster-I), while *D. belophylla* was completely out-grouped and formed cluster II. Although, *D. bulbifera* and *D. oppositifolia* were placed nearer to each other, they did not pair and hence, were placed in two different sub-clusters (sub-cluster I and II). In this cluster *D. hispida* and *D. oppositifolia* was grouped together and formed sub-cluster III. The *D. belophylla* was distantly related with remaining four species (Fig.2).

The genus *Dioscorea* of MTR exhibited more diversity in morphology and protein profile as a biochemical marker used in present study was able to establish genetic relationship in the five species of MTR as well as for the taxonomic circumscription. Significant diversity was detected within the germplasm of *Dioscorea* spp. by isozyme pattern (Mignouna and Dansi, 2003). Cultivars of *Dioscorea cayenensis-rotundata* complex can be distinguished based on their morphological traits and/ or their isozyme pattern (Mignouna *et al*., 2002).

From dendrogram it was evident that these five species fell in to two clusters. The species *D. bulbifera*, *D. oppositifolia*, *D. hispida*, and *D. pentaphylla* formed a distinct cluster (cluster-I), while *D. belophylla* was

completely out-grouped and formed cluster II. The juvenile leaf of *D. oppositifolia* resembled with the mature leaf of *D. bulbifera*, moreover cormous head of *D. oppositifolia* apparently resembled with the tuber of *D. bulbifera*. In the dendrogram generated by SDS-PAGE these two species were placed nearer to each other but did not cluster, *D. bulbifera* of section Opsophyton was placed under sub-cluster I and *D. oppositifolia* of section Enantiophyllum under sub-cluster II. In the genus *Brachypodium*, *B. mexicanum* of section *Brachypodium* and *B. distachyon* of section Trachynia were clustered together in dendrogram generated on the basis of SDS-PAGE (Khan, 1992). In present investigation *D. belopylla* and *D. oppositifolia* of Enantiophyllum gets separated from each other. Similarly, cultivars of *D. rotundata* (white yam) and *D. cayenensis* (yellow yam) of section Enantiophyllum clearly separated from each other in dendrogram generated on the basis of isozymes (Mignouna *et al*., 2002). In the cluster I, *D. hispida* and *D. oppositifolia* of section Lasiophyton grouped together and formed sub-cluster III. The tripinnately compound leaf species *D. hispida* and *D. dumetorum* grouped together in the dendrogram generated on the basis of *rbc*L gene; *D. pentaphylla* and *D. hispida* placed nearer to each other on the dendrogram generated by *atp*B (Caddick *et al*., 2002). Morphological analysis brought *D. oppositifolia* and *D. hispida* under compound leaf clade (Wilkin *et al*., 2005). The *D. belophylla* of section Enantiophyllum was distantly related with remaining four species in the forest of MTR.

REFERENCES

Anu A, Peter KV (2003) Analysis of seed protein of 29 lines of *Capsicum annuum* L. by polyacrylamide gel electrophoresis. *Genet Resour Crop Evol* 50: 239-243.

Brunnschweiler J (2004) Structure and texture of yam (*Dioscorea* spp) and processed yam products. Ph.D thesis submitted for the degree of Doctor of natural sciences. University of Zurich

Burkill IH (1960) The organography and the evolution of Dioscoreaceae, the family of the yams. *J Linn Soc (Bot.*) 56 (367): 319-412 .

Caddick LR, Rudall PJ, Wilkin P, Hedderson TAJ, Chase MW (2002) Phylogenetics of Dioscoreales based on combined analyses of morphological and molecular data. *Bot J Linn Soc*.,138: 123-144.

Dahlgren RMT, Clifford HT, Yeo PF (1985) The families of the monocotyledons. Structure, evolution, and taxonomy. Berlin: Springer-Verlag pp 92-128 .

Dhore MA, Joshi PA (1988) Flora of Melghat Tiger Rreserve. Technical series no.1 Directorate, Project Tiger Melghat, Partwada, Dist. Amravati. Maharashtra. 173-174 .

Duthie JF (1960) Flora of the Upper Gangentic plain Vol III. Botanical Survey of India pp. 321- 326.

Harvey PJ, Boulter D (1983) Isolation and characterization of the storage protein of yam tubers (*Dioscorea rotundata*). *Phytochem*, 22: 1687-1693

Johnson BL, Hall O (1965) Analysis of phylogenetic affinities in the Triticinae by protein electrophoresis. *Amer J Bot*., 52 (5): 506-513.

Khan MA (1992) Seed-protein electrophoretic pattern in *Brachypodium* P. Beauv. Species. Ann Bot 70: 61-68Laemmli UK (1970) Cleavage of structural proteins during the assembly of the head of Bacteriophage T4. *Nature*, 227: 680-685.

Mignouna HD, Dansi A (2003) Yam (*Dioscorea* Ssp.) domestication by the Nago and Fon ethnic groups in Benin. *Genet Resour Crop Evol*., 50: 519-528 .

Nei M, Li WH (1979) Mathematical model for studying genetic variation in terms of restriction endonucleases. *Proc. Natl. Acad. Sci.* USA 76 (10): 5269-5273.

Mignouna HD, Dansi A, Zok S (2002) Morphological and isozymic diversity of the cultivated yams (*Dioscorea cayenensis / Dioscorea rotundata* complex) of Cameroon. *Genet Resour Crop Evol*., 49: 21-29.

Odeigah PGC, Oboh B, Aghalokpe IO (1999) The characterization of Nigerian varieties of pepper, *Capsicum annuum* and *Capsicum frutescens* by SDS-Polyacrylamide gel electrophoresis of seed proteins. *Genet Resour Crop Evol*., 46: 127-131.

Patel RI (1968) Forest flora of Melghat. International Book Distributors, Dehra Dun, India pp 317-320.

Prain D, Burkill IH (1936) An account of the genus *Dioscorea* in the East, Part 1: The species which twine to the left. Ann Royal Bot Gard, Calcutta 14: 1-210.

Rohlf FJ (1987) NTSYS-pc Micro-computer programme for numerical taxonomy and multivariate analysis. *Amer Statistician*, 41: 330.

Smith BW (1937) Notes on the cytology & distribution of the Dioscoreaceae. *Bull Torrey Bot Club* 64 (4): 189-197.

Sokal RR, Micluner CB (1958) A statistical method for evaluating systematic relationships. Univ Kans Sci Bull 38: 1409-1438.

Wilkin P, Schols P, Chase MW, Chayamarit K, Furness CA, Huysmans S, Rakotonasolo F, Smets E, Thapyai C (2005) A plastid gene phylogeny of yam genus, *Dioscorea*: Roots, Fruits & Madagascar. *Syst Bot* 30 (4): 736-749.

RESEARCH ARTICLE

Reproductive Strategies and Conservation Measures for Threatened Taxa, *Guaiacum officinale* L.

Kumbhare Shravan D*, Kamble Rahul B and Chaturvedi Alka

PGTD of Botany, RTM Nagpur University, Nagpur- 440033

**Corresponding author email: kumbhare.shravan@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kumbhare Shravan D, Kamble Rahul B and Chaturvedi Alka (2014) Reproductive Strategies and Conservation Measures for Threatened Taxa,*Guaiacum officinale* L. Int. J. of Life Sciences, 2014, Special Issue A2: 81-84.

Acknowledgement:
Authors are thankful to Authorities, Agricultural College, Nagpur for permitting study in MaharajbagZoo, Nagpur and Forest Department, Nagpur, Govt. of Maharashtra.

ABSTRACT

*Guaiacum officinale*belonging to family Zygophyllaceaeis native to the West Indies from the Greaten Antilles through to Bonaire, and Aruba; also in Panama, Colombia and Venezuela. This tree was naturalized in India from long years back. The species is listed in Appendix II of CITES (Convention on International Trade of Endangered Species). *G. officinale* is one of two species yielding the true lignum vitae, the other being *Guaiacum sanctum*. There was no any work documented earlier on this important taxa *Guaiacum officinale*. So keeping this view in mind, the work on reproductive biology conducted which expose the behavior of its pistil and concluded as the reason behind less percentage of fruit formation.Besides this, *in vitro* practices with the help of plant tissue culture techniques were performed on *Guaiacum officinale*and achieved callus induction as best response on anthers as an explants with hormonal concentration,Kinetin (0.3mg/L) and 2, 4-D (1.5mg/L).

Keywords: *Guaiacum officinale*, Conservation,threatened, reproductive biology, *in vitro* studies.

INTRODUCTION

*Guaiacum officinale*L. is a slow-growing broad leaf, evergreen tree or shrub reaching 9-12 m in height. Leaves are thick. Each leaf is composed of 2 or 3 pairs of smooth, stalk less leaflets arranged on a slender mid-rib. Beautiful bright blue flowers grow in great profusion and almost cover the tree and remain for a long time. The flowers grow in clusters at the ends of the branches. Fruits are capsule and become yellow when ripped. Seeds are black colored with red colored aril.

Guaiacum officinale is under the endangered category of IUCN (International Union for Conservation of Nature) and the major reason for this is the overexploitation of the plant for various purposes (IUCN). Besides this other reasons can also affect the plant, whose study was not conducted previously. Tissue culture is widely accepted technique as one of the best tool to perform conservation practices for those species which difficult to reproduce in natural way. This study concentrates on reasons other than concluded by IUCN which responsible for endangerment of the taxa as well as *in vitro* studies with the help of plant tissue culture were also conducted.

MATERIALS AND METHODS

Study area: The selected area for the survey; Nagpur (220.08 km^2), the second capital of Maharashtra State, situated at $21^0$13'N longitude and $79^0$6'E latitude. It is also one of the greenest cities of India (Figure No.1). Climate of the city is characterized by minimum temperature in December (5°C to 7°C). Maximum temperature is during May (around 45°C). In general the climate is semi-arid with unimodel monsoon. On an average 1205mm rainfall is received during rainy season (Chaturvedi et al., 2003). The Nagpur district is quite rich and varied in its plant composition. According to Flora of Nagpur District (Ugemuge, 1986) there are 1136 plant species which fall under 679 genera and 142 families.

Study Method: The study has three major objectives, first is the finding the distribution of *Guaiacum officinale* in the study area. Second most important is quantification of degree of threat to the plants and the third important objective is to find the reasons behind less productivity through the reproductive studies and to overcome these threats,*in vitro* practices with the help of plant tissue culture techniques. The basic methodology adopted for the study was field survey in which observations were recorded in different seasons.

Species threats have been analyzed at two levels, first at the habitat level and second at the species level. The habitat level analysis is holistic in approach whereas species level analysis is selective in nature (Srivastava, 2012). The methodology adopted for threat analysis included recording of field observations.

To understand the pollen viability as one of the tool for analysis of threat to selected trees, following method was applied.

(A) Reproductive Biology

To understand the reproductive biology of *Guaiacum officinale*, following studies were conducted.

(a) Maceration of anthers: In this method the thin transverse section of the anther of *Guaiacum officinale* was taken. The section was treated with mixture of acetic acid and ethyl alcohol (1:3 proportions) for 10 min. after withdrawing this mixture the sections placed in 1N HCl for 10 min at 60^0C in oven. Then HCl was replaced with 1% methyl green stain in a basic P_H by adding Sodium bicarbonate ($NaHCO_3$). Then section was placed in 50% Glycerol and mount on the slide and observations were made.

(b) Pollen viability test: Pollen viability test is conducted with Evans blue (or T-1824 Make- Himedia) stain. The Evans blue stain used for its accuracy in penetration into non-viable cells (Shivanna and Rangaswamy; 1993). The mature anther is taken and its pollen grains were dusted on the drop of Evans blue stain taken on the glass slide and after some time observations were made.

***(c) Pollen pistil interaction*:** This technique is used to find whether the stigma is receptive for pollen grains or not. The test is proceeded in the following manner.
The pistil was fixed in the modified Carnoy's mixture (6:4:1, Absolute alcohol+ Chloroform+ Glacial Acetic Acid) for one hour and transfer to the water through a descending series of ethanol and finally few amount of the staining mixture at 45^0C for 12 hours. Then the stained pistil was transferred to clearing and softening mixture and then hydrolyzed in the hot air oven at 58^0C for 30 minutes. Material is then washed twice in lactic acid and mount in the mounting medium and observed under the microscope.

(B) Tissue culture of *G. officinale*

For *G. officinale,* anthers were used as the explants for tissue culture supplemented with the MS (Murashige and Skoog, 1962) medium with the hormonal concentration of Kinetin (0.3mg/L) and 2, 4-D (1.5mg/L).

RESULTS AND DISCUSSION

Only 4 individuals of *Guaiacum officinale* were found, 3 of which present in Maharajbag and single found in the civil lines. All individuals are healthy and attract lots of pollinators with its beautiful attractive flowers. Loss of habitat and small fragments of habitat can only support small populations of plants and animals and small populations are more vulnerable to extinction. Minor fluctuations in climate, resources and other factors unremarkable and quickly corrected in large populations can be catastrophic in small, isolated populations. Thus fragmentation of habitat is an important cause of species extinction (Rosenzweig, 1995). The selected taxa threatened due to habitat loss and also in danger due to their overexploitation and are affected by their reproductive behavior. The work on reproductive biology conducted under the project expose the behavior of its pistil. The pistil is very less receptive to pollens and doesn't allow or make it very difficult for pollen grains to germinate on its stigmatic surface. Anthers do not possess any structural

problem and pollen development is not affected since, all the tissues of anther are well developed and functional. So, it is concluded as the reason was found for very less fruit formation in *G. officinale* is its stigma unreceptively.

Table No. 1: Threats and Causes for low population of *Guaiacum officinale.*

Plant Name	Location	NoI	MH	MG	MC	PO	Threats and Causes of Rarity
Guaiacum officinale	Maharajbag Civil Lines	3 1	9	164	85	Butterflies Honey bees(*Apismellifera*), Ants (*Crematogastor*species), Wasps	Habitat fragmentation Loss of habitat Very low percentage(20%) of fruit formation Unavailability of the seeds Very slow growing plant Overexploitation
***(Note: NoI**: Number of Individuals, **MH**: Mean Height (in meters), **MG**: Mean Girth (in centimeters), **MC**: Mean Canopy (in percentage), **PO** : Pollinators Observed)*							

Table 2: Reproductive biology of *Guaiacum officinale*

Sr. No.	Test	Observation
1.	Maceration of Anthers	Anther tissues are well developed and functional
2.	Pollen viability test	53.71%
3.	Pollen Pistil interaction	Stigma is unreceptive or very less receptive
4.	Fruit setting	20%

Table 3:Anther culture of *Guaiacum officinale*

Tube no.	Type of explant	Duration					
		5 days	10 Days	15 days	20 days	25 days	30 days
1.	Anther	Swelling	Callus initiation	Callus growth	Callus growth	Callus growth	Compact *Calli*
2.	Anther	NR	NR	NR	NR	NR	NR
3.	Anther	NR	NR	NR	NR	NR	NR
4.	Anther	NR	NR	NR	NR	NR	NR
5.	Anther	Swelling	Callus initiation	Callus growth	Callus growth	Callus growth	Compact *Calli*
6.	Anther	NR	NR	NR	NR	NR	NR
7.	Anther	Swelling	Callus initiation	Callus growth	Callus growth	Callus growth	Compact *Calli*
8.	Anther	Swelling	Callus initiation	Callus growth	Callus growth	Callus growth	Compact *Calli*
9.	Anther	Swelling	Callus initiation	Callus growth	Callus growth	Callus growth	Compact *Calli*
10.	Anther	NR	NR	NR	NR	NR	NR

(Note: NR: No Response)

Table 4: Callus induction on MS medium In Anther explant of *Guaiacum officinale*

Type of Explant	No. of Explants inoculated	No. of Explants responded	% Response	Time Duration for Response
Anther	10	5	50%	5-6 days

Fruits of *Guaiacum* species dehisced to reveal fleshy, bright-red. This bright color comes from an aril that covers the seed. The aril inhibits germination (Alexander 1966) and must be removed before germination will occur. No study was found regarding the reproductive biology of *G. officinale*. No any literature on *in vitro* practices were found on *Guaiacum officinale* so, because of its rarity *in vitro* of *G. officinale* was conducted with tissue culture under this study which responded with good result (50%) when anther was taken as explant with hormonal concentration of Kinetin (0.3mg/L) and 2,4-D (1.5mg/L).

CONCLUSION

The total of only 4 individuals of *Guaiacum officinale* present in Nagpur city and these healthy attractive individuals possesses an average of 85% canopy. The study concluded that the taxa facing greatest threat not only because of habitat loss but its own reproductive strategies are also generating barriers for its propagation. No any major problem observed in study of pollinator interactions and anther structure and its function but the taxa bears great difficulty in stigmatic receptivity to pollens which can be a probable cause for very less number of fruit formation.

In the point of conservations measures, this study may help to plan future conservation strategies for these valuable endangered taxa with the help of plant tissue culture techniques.Loss of these individuals by any reason will disrupt the entire gene pool in diversity of plants in Nagpur city. Proper conservative measures should be taken for the survival of these plants.

REFERENCES

Alexander TR (1966) Factors involved in germination of *Guaiacum sanctum*, L. Proc. Assoc. of Southern Agricultural Workers, Inc. for 1966 ; pp. 280-281

Chaturvedi A, Kamble RB, Patil NG & Chaturvedi A (2013) City - Forest Relationship In Nagpur, One Of The Greenest City Of India. Urban Forestry & Urban Greening Elsevier, 12(1): 79-87. ISSN: 1618-8667.

Murashige T, Skoog F (1962) A revised medium for the rapid growth and bioassays with tobacco tissue cultures.*Physiologia Pl*. 15: 473- 479

Rosenzweig, ML (1995) Species diversity in space and time.Cambridge Univ. Press.

Shivanna KR and Rangaswamy (1993) Pollen Biology- A laboratory manual, Narosa Publishing House ISBN 81-85198-97-7.

Srivastava P (2012) Threat analysis of the plants in the forest areas in the Indore and Dewas district of the Madhya Pradesh. PhD Thesis submitted to Devi Ahilya University, Indore.

Ugemuge NR (1986) Flora of Nagpur District, Shree Publication, Nagpur.

http://www.iucnredlist.org

RESEARCH ARTICLE

Anthropogenic impact on aquatic weed diversity of Balaji temple reservoir of Chimur city, Chandrapur district

Sitre Shashikant R[1], Thakare Mahendra G[2] and Kamble Rahul K[3]

[1]Dept. of Zoology, N. S. Science and Arts College, Bhadrawati, Chandrapur 442 902
[2]Dept. of Environmental Science, Arts, Commerce and Science College, Tukum, Chandrapur 442 401
[3]Dept of Environmental Science, Sardar Patel Mahavidyalaya, Chandrapur 442 402

** Corresponding author E-mail: shashikant_sitre2008@rediffmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Sitre Shashikant R, Thakare Mahendra G and Kamble Rahul K (2014) Anthropogenic impact on aquatic weed diversity of balaji temple reservoir of chimur city, chandrapur district, *Int. J. of Life Sciences,* Special issue A2: 85-87.

ABSTRACT

The Balaji Temple reservoir is a freshwater reservoir having an area of about 42 acres located in the heart of Chimur city of Chandrapur district in Maharashtra State. This study was carried out during summer 2013 at 4 different sites on this beautiful reservoir to know the status of prevailing aquatic weeds. The investigation revealed 19 macrophyte species in the catchment area of the reservoir. Out of the 19 macrophytes from the study area, 5 species each were belong to free floating, rooted floating and submerged type whereas 4 species belong to emergent type. The people residing nearby this reservoir use this reservoir for washing and bathing activities and for open defecation practices in the bank thus adding anthropogenic source of pollution leading to enriching its nutrient contents thereby subsequently degrading the water quality and copious growth of aquatic weeds. This reservoir was a closed type of ecosystem having concrete embankments on all the sides and the sediments of this lake are constantly getting polluted due to construction activities present near the basin and anthropogenic interference by dumping sewage and drainage from the nearby localities.

Keywords: *Aquatic weeds, Weeds, Balaji temple reservoir, Chimur, Chandrapur*

INTRODUCTION

Biodiversity is referred to as a combination of different species living together in a particular habitat, whether freshwater or marine. In Indian subcontinent a large number of aquatic weeds got adapted in water bodies thus posing a grave threat to water portability by their death and decay and subsequent organic enrichment and reducing the water holding capacity of lakes.

In water bodies large number of macrophytes of different nature thrives and succeeds throughout the year. Depending on the type of nutrients loading the macrophytes colonize freshwater bodies. The aquatic weeds are classified as free floating, rooted floating, submerged and emergent type. Based on nutrients loading into a lake from the catchment area and anthropogenic activities, the process of succession converts the pond ecosystem into a dry land and the pond ecosystem will be not be usable for benefit of human being. Taking into consideration this point, an assessment of aquatic weed biodiversity of Balaji temple reservoir of Chimur city was undertaken during summer 2013 by field visits and visual observations methods.

The aquatic weeds are of great importance today as far as food supply to fish species is concerned. Aquatic weeds are an integral component of an aquatic ecosystem and serve as source of food to the water birds and animals thus forming a base for aquatic wildlife conservation practices. Macrophytes of different water bodies in India are studied by researchers such as Wetzel (1975), Majid (1986), Sugunan (1989), Venkatraman *et al.* (2000), Yadav and Sardesai (2002), Abmasht (2005), Raut and Pejawar (2005), Sitre (2013) and many more. As there are no previous reported studies on aquatic weed biodiversity of Chimur's Balaji temple reservoir, an attempt has been made to study them.

MATERIALS AND METHODS

The Balaji temple reservoir is located in the heart of Chimur town having an area of approximately 42 acres with a firm embankment in the Chandrapur district of Maharashtra state. The studies were carried out during summer 2013 from 4 different sites of the reservoir catchment area. Aquatic weeds were collected by field visits and visual observations from the study area. The survey was conducted to collect information regarding floating, emergent, marginal and submerged type of vegetation. The macrophytes were collected by hand picking method and then brought to the laboratory and were preserved in 10% formalin solution and were identified using Cook (1996) and other standard literature.

RESULTS AND DISCUSSION

The observation on aquatic weeds of Lake Basin is presented in Table 1. Altogether 19 species of aquatic weed belonging to four groups viz. free floating, rooted floating, submerged and emergent types were recorded from study area. The tiny and delicate five species of free floating weeds including species of *Pistia*, *Azolla* , *Lemna, Salvinia* and *Wolffia* covered the major surface of lake water. Rooted floating species prevalent in mud region included species of *Trapa*, *Marselia*, *Nymphae* and *Hydrilla* had long creeping and lofting stems. Rooted floating species include species such as Submerged weeds such as *Vallisneria spiralis*, *Utricularia* spp, *Ceratophyllum* spp., *Potamogeton crispus*, and *Najas* spp. were confined to littoral zone of the lake and can be classified as fragile water weeds. They remain firmly fixed in the bottom sediments but their top regions were exposed in the environment. Emergent weeds like *Typha* spp., *Ipomoea indiaca*, *Cyperus* spp. and *Sagittaria* spp. were observed.

Table 1: The diversity of weeds in Balaji Temple Reservoir of Chimur city

Aquatic weed species	English name	Family
Free floating weeds (5)		
Azolla pinnata	Feathered mosquito fern, water velvet	Azollaceae
Lemna minor	Duckweed, Common duckweed	Araceae
Pistia stratiotes	Water lettuce	Araceae
Salvinia molesta	Giant salvinia, Kariba weed	Salviniaceae
Wolffia spp.	Water meal, Duckweed	Lemnaceae
Rooted floating weeds (5)		
Hydrilla verticillata	Hydrilla	Hydrocharitaceae
Marsilea spp.	Water clover and four-leaf clover	Marsileaceae
Nelumbo nucifera	Indian lotus	Nelumbonaceae
Nymphaea spp.	Water lily	Nymphaeaceae
Trapa natans	Water chestnut	Trapaceae
Submerged weeds (5)		
Ceratophyllum demersum	Hornwort	Ceratophyllaceae
Najas spp.	Water weed	Najadaceae
Potamogeton crispus	Curly leaf pondweed	Potamogetonaceae
Utricularia spp.	Bladderworts	Lentibulariaceae
Vallisneria spiralis	Tape grass, Eel grass	Hydrocharitaceae
Emergent weeds (4)		
Ipomoea aquatica	Water spinach	Convolvulaceae
Ipomoea indica	Morning glory	Convolvulaceae
Sagittaria spp.	Arrowhead, Duck potato	Alismataceae
Typha spp.	Bulrush, Reedmace	Typhaceae

Meshram (2003) recorded dominant macrophytes like *Hydrilla ceratophyllum* and *Chara* in Wadali lake of Amravati district and stated that the macrophytes stimulate the growth of phytoplankton and help in the recycling of the organic matter. Sitre (2013) recorded 17 macrophytes species in Ghotnimbala reservoir of Bhadrawati tehsil in Chandrapur district. Ambasht (2005) recorded 25 species of macrophytes from Gajner Tal, Jaunpur township of North India. Patil *et al* (2012) investigated Panchaganga river stretch in Ichalkaranji city of Kolhapur district and recorded 9 hydrophytes and 6 amphibious plants and recorded that the macrophytes were drained into river basin from the lakes in the vicinity of river during flood situation. Kiran *et al.* (2006) recorded 15 species of macrophytes belonging to 13 families and grouped them under submerged (2 species), rooted floating (2 species), free floating (2 species), emergent (7 species) and marshy amphibious (2 species) from fish culture ponds of Karnataka. Sugunan (1989) stated that aquatic macrophytes figure prominently in the community structure and trophic events of the reservoirs in India, and are the factors for the ageing of reservoirs due to pollution impact.

CONCLUSION

The open defecation practices prevalent on the banks of this reservoir coupled with enriched sediments and garbage disposal were daily increasing its organic loading thus providing a rich base for continuous growth of aquatic and emergent macrophytes in the basin. If this prolific growth of aquatic weeds is not curtailed and due attention is not given then this beautiful reservoir will become a dumping ground of pollutants which will be lost forever from the history thus subsequently losing a good recreation place for tourists. The results showed that the lake basin was rich with a diverse range of aquatic weeds which were posing a grave threat of silting and losing its aesthetic value due to prolific growth of aquatic weeds

REFERENCES

Ambasht RS (2005) Macrophyte limnology in the Indian subcontinent. Ukaaz Publications, Hyderabad: 58-174.

Cook CDK (1996) Aquatic and wetland plants in India. Oxford University Press, London.

Kiran BR, Patel AN, Kumar Vidaya, Puttaiah ET (2006) Aquatic macrophytes in fish culture ponds at Bhadra fish farm, Karnataka, J. Aqua. Biol. 21 (2): 27-30.

Majid, FZ (1986) Aquatic weeds- utility and development. Agro Botanical Publishers, India.

Meshram, CB (2003) Macro-invertebrate fauna of lake Wadali, Amravati, Maharashtra. J. Aqua. Biol. 18 (2): 47-50.

Patil, VG, Khabade SA, Khade SK (2012) Study of hydrophytes and amphibious plants occurred in Panchganga river in vicinity of Ichalkaranji city Dist. Kolhapur (M.S.). Ecology and Fisheries, 5 (2): 63-66.

Raut, NS and Pejaver Madhuri (2005) Survey of diversity of plankton attached to macrophytes from weed infested lakes. J. Aqua. Biol., 20 (1): 1-7.

Sugunan, VV (1989) Salient features of reservoir limnology and their significance to fisheries development in Jhingran A. G. and V. V. Sugunan (Eds.) Conservation and management of inland capture fisheries reservoirs of India. Inland Fisheries Society of India, Barrackpore, pp. 275.

Venkatraman K, SR Das and Nandi NC (2000) Zooplankton diversity in freshwater wetlands of Haora district, West Bengal. J. Aqua. Biol., 15 (1 & 2): 19-25.

Wetzel, FG (1975) Limnology. W. B. Saunders Company, Philadelphia, pp. 743.

Sitre SR (2013) Assessment of macrophyte biodiversity of a freshwater reservoir of Bhadrawati tehsil in Dist. Chandrapur. International Interdisciplinary Research Journal, 3(3): 78-81.

Yadav SR, Sardesai MM (2002) Flora of Kolhapur district. Shivaji University, Kolhapur.

RESEARCH ARTICLE

The impact of Herbicide Glyphosate on the biodiversity with special reference to Seed germination and early seedling growth of weed *Hyptis suaveolens* l.

Dudhe SS*, Khirade PD and Dudhe NS

Depatment of Botany, Guru Nanak College of Science, Ballarpur. Chandrapur-442701, India.

**Corresponding Author E-mail: sanjaydudhe.gnc@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Dudhe SS, Khirade PD and Dudhe NS (2014) The impact of Herbicide Glyphosate on the biodiversity with special reference to Seed germination and early seedling growth of weed *Hyptis suaveolens* l., *Int. J. of Life Sciences,* Special Issue A2: 88-90.

ABSTRACT

Weed is plant is a growing where it is not desired; it interferes with utilization of land and water resources and affects human and animal welfare. Unwanted vegetation flourish in the field crops, forestry, industrial sites, railway lines air fields, water ways and non cropped lands create several problems. The weed *Hyptis suaveolens* L. belonging to family Lamiaceae growing in Maharashtra especially in vidarbha region and found growing luxuriantly on boundary of crop fields, on sides of railway tracks and road sides. The seeds of plant were collected from plant already growing in fields, were allow to grow with aqueous concentration of glyphosate herbicide (weedicide) at various concentration like 1000-50000 ppm. No lethal dose could be determined upto 50000 ppm. Morphological changes like stunted growth and the inhibition in photosynthetic activity was observed.

Key words: *Herbicide (herbicide (weedicide)), Glyphosate, Hyptis suaveolens* L.

INTRODUCTION

Plants on the earth is a great asset to mankind, out of 2,50,000 plant species present in the world, nearly 200 species are found to be prominent weed causing severe losses in agricultural systems. Weeds are unwanted and undesirable plant. It grows where it is not desired, it interfere with utilization of land and water resources and affects human and animal welfare. Unwanted vegetation flourish in the field crops, forestry, industrial sites, railway lines air fields, water ways and non cropped lands create several problems. Great crop losses also occur due to weed about 20 to 100 percent. The natural growth aggressiveness and high adaptability of weed always makes them winners in the competition race.

Employing chemicals for weed control referred as chemically weed control method, the chemicals used commonly referred as herbicide (weedicide) or agrochemicals, it constitute the principal component of weed management. Herbicides are used to limit reduction in crop yield and quality due to weed competition, yield contamination and interference with harvesting. Herbicide use has undoubtedly contributed to crop yield increases and the efficiency of production.

Herbicide (weedicide) Glyphosate is a non-selective, systemic, broad spectrum herbicide produced by U.S. and contain the active ingrediants, glyphosate [N-(Phosphonomethyl) glycine]. Glyphosate kill the target organism by inhibiting the enzyme and that can control most annual and perennial plants. Glyphosate is strongly adsorbed to soil particles, which prevents it from excessive leaching or from being taken-up from the soil by non-target plants. It is degraded primarily by microbial metabolism, but strong adsorption to soil can inhibit microbial metabolism and slow degradation.

Glyphosate is extensively tested for health and safety, low-cost, effective weed control, economically and effectively controls broadleaf weeds growing in between rows of crop. By keeping these properties of glyphosate in mind this work has been undertaken.

MATERIALS AND METHODS

The seeds of *Hyptis suaveolens* L. were collected from plant already growing in fields. In this study healthy and proximate equal-sized seeds were selected. The seeds were washed in distilled water and allow soaking in distilled water for 24 hours and again washed with distilled water and kept the seeds for germination in petridishes lined with moistened double layer filter paper under laboratory condition. Germination of controlled seeds was observed for seven days along with seed treated with aqueous concentration of herbicide (herbicide (weedicide)) ranging from 50 to 1000 ppm were used, 1000 ppm does not found lethal, higher concentration were tried to determine lethal does up to 50000 ppm like 1000, 5000, 10000, 20000, 30000, 40000 and 50000 ppm. Morphological responses were recorded daily till the germination ceases in control and treated seeds. The emergence of radical considered as the criterion for germination.

RESULTS AND DISCUSSION

The results clearly demonstrate that glyphosate has a detrimental effect on the germination of seed. A negative correlation was observed between glyphosate doses and the germination percentage. The germination percentage of the seeds treated with glyphosate was rather different from the control group. The highest germination percentage was observed in the seeds of the control group (in proportion as 91%). The lowest germination rate was observed at 50000ppm dose of glyphosate. Glyphosate treatment caused a significant decrease in the germination percentage at all the doses of 1000, 5000, 10000, 20000, 30000, 40000 and 50000ppm doses of glyphosate caused 83.2 %, 82.8%, 82.6 %, 80.2 %, 77.2%, 76.6% and 72.3%, (Table 1 and Fig. 1) decreases of seed germination, respectively. These results showed that the effects of glyphosate on the germination percentage and shows morphological peculiarities in the seedling. Gradual decrease in the length of seedling of colour change of cotyledon to pinkish was noticed. No twisting of seedling nor any swelling on the seedling were observed at any concentration of glyphosate.

Table 1: Effect of various doses of glyphosate on the germination percentage of *Hyptis suaveolens* L. seeds.

Sr. No	Concentration in ppm	Germination Percentage
01	Control	91.0
02	1000	83.2
03	5000	82.8
04	10000	82.6
05	20000	80.2
06	30000	77.2
07	40000	76.6
08	50000	72.3

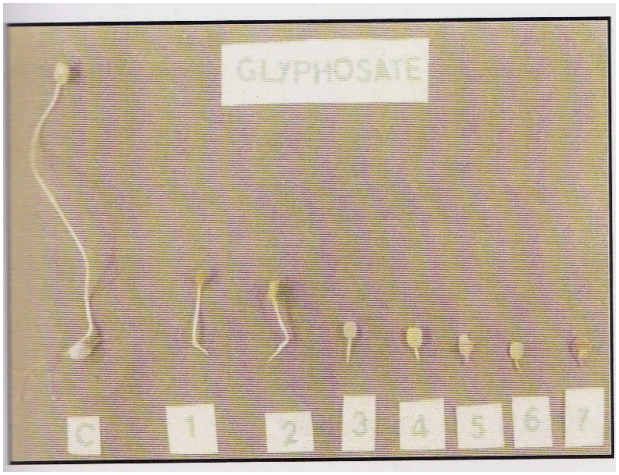


Fig. 1: Progressive inhibition of growth in seeds of *Hyptis suaveolens* L. treated with glyphosate

Glyphosate application fairly reduced the percent germination, compared to untreated seeds and also showed morphological changes in cotyledon colour and growth of seedling. Similar results were observed by Yenish and Young (2000), investigated the effects of glyphosate on seed germination and seedling quality in *Triticum aestivum.*

Klingman and Murray (1976) observed that glyphosate and paraquat affects germination of seeds of turfgrasses. This information is parallel with the other glyphosate activity. In a similar study, Mclaren and Don (2004) investigated the effect of glyphosate in barley crops.

Kültigin *et al.* (2011) reported toxic effects on seed germination of *Allium cepa* as investigated in the present study. Results of present investigation revealed that colour of cotyledon changes green to yellowish and later on pinkish. Similar pattern of colouration was also reported by Wong (2000). Baig *et al.* (2003) demonstrated that preharvest applications of glyphosate affect emergence and seedling growth of field Pea (*Pisum sativum*). In the present investigation growth of seedlings was reduced and stunted.

The results of the present study indicated that glyphosate caused to significant toxic effects in seed germination and early seedling growth of *Hyptis suaveolens* L.

REFERENCES

Baig MN, Lloyd Darwent A, Neil Harker K and Odonovan JT (2003) Preharvest applications of glyphosate affect emergence and seedling growth of field Pea (Pisum sativum). *Weed Technology* 17: 655-665

Klingman DL and Murray JJ (1976) Germination of seeds of turfgrasses as affected by glyphosate and paraquat. *Weed Sci*ence 24: 191-193

Kültigin Çavusoglu, Emine Yalçin, Zafer Türkmen, Kürsad Yaparand, Kürsat Çavusoglu and Figen Çiçek, (2011) Investigation of Toxic Effects of the Glyphosate on *Allium cepa*, *Journal of Agricultural Sciences,* 17:131-142

McLaren G and Don R (2004) The effect of glyphosate treatment on the germination potential of resultant crops, ISTA Seed Symposium, Budapest

Wong, PK (2000) Effect of 2,4-D,glyphosate and paraquat on growth, photosynthesis and chlorophyll-a synthesis on *Scenedesmes quadricallda* Berg, *614,Chemosphere,* 41(1-2):177-182

Yenish JP and Young FL (2000) Effect of preharvest glyphosate application on seed and seedling quality of spring wheat (Triticum aestivum). *Weed Technology,* 14: 212-217.

RESEARCH ARTICLE

Effect of Temperature, pH and Substrates on CMCase Enzyme Activity of Thermophilic Fungus *Humicola insolens*

Borkar KM[1] and Thakre RP[2]

[1]*Dept. of Botany, M. B. Patel College, Sakoli-441802 Dist- Bhandara, India.*

[2]*Dept. of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur, India.*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Borkar KM and Thakre RP (2014) Effect of Temperature, pH and Substrates on CMCase Enzyme Activity of Thermophilic Fungus *Humicola insolens*., *Int. J. of Life Sciences*, 2014, Special Issue A2 : 91-94.

ABSTRACT

Thermophilic fungi are known for their thermostable enzymes. In present work agricultureal wastes like corn cob, groundnut shell, wheat straw, jowar straw and carboxy methyl cellulose were utilized as substrates for cultivation of thermophilic fungus *Humicola insolens*. Culture filtrate was used for analysis of carboxy methyl cellulolase enzyme activity. Effect of different substrates and pH and temperature was studied. On wheat straw, corn cob and jowar straw activity was found to be higher than control on 4th day whereas, groundnut shell and CMC, as substrate inhibited the CMCase activity initially.Temperature 45^{0}Cand pH 5 found to be suitable for better enzyme activity.

Key words: Temperature, pH, substrates, CMCase, thermophilic, *Humicola insolens*.

INTRODUCTION

The thermophilic species are those with minima for growth at or above 20^{0}C and maxima for growth at 50^{0}C or above, whereas thermotolerant fungi are ones that have a thermal maximum near 50^{0}C and a minimum below 20^{0}C, (Cooney & Emerson, 1964). Nowadays, the term thermophilous is used to designate both thermophilic and thermotolerant fungi (Mouchacca 1997). The adaptive mechanisms of thermophilic fungi to withstand temperature/ heat stress may be due to specific and or physiological adaptations such as heavy pigmentation of spores produced by these fungi (Satyanarayana *et al*., 1992), that allow microorganisms to exist in many environments that experience extremes of temperature, pH, chemical content and or pressure. Elevated temperature survival of these fungi is attributed to thermostability and functional permeability of membranes(Redman *et al*., 1999). Plant biomass contains major proportion of cellulose produced continuously by natural photosynthesis. It is the most widespread naturally occurring carbohydrate readily available in every agriculturally developed region on the earth. Cellulose occurs in native fibers in close association with lignin and hemicelluloses, or in relatively pure state as in cotton.

Enzymatic abilities of thermophilic fungi are superior by way of their thermostability and better production under optimum nutritional conditions as compared to mesophiles, (Satyanarayana *et al*., 1988). They reported efficiency of degradation of plant residues by a particular fungus depends

upon its capacity to degrade cellulose, hemicellulose etc. Thermophilic fungi are also reported to secrete other enzymes including xylanase, protease, pectinase that able to degrade cellulose, hemicellulose, pectin and lignin content (Satyanarayana and Johri, 1983). Demirijan *et al*., (2001) stated the reason for number of commercial applications of thermophilic fungi due to their overall inherent stability.

MATERIALS AND METHODS

Cultivation of thermophilic fungi on different substrates:

For the cultivation of fungi on the different substrates 5gm fine powdered Corn cob, groundnut shell, wheat straw, jowar straw and CMC was taken in the conical flask of 150ml capacity. To these flask 5ml basal medium containing L-aspargine- medium and microelement solution 1ml/liter was poured. These flasks were sterilized. Mycelial disks of 5mm diameter were inoculated aseptically in flasks from 5 days old culture of *Humicola insolens,* these flasks were incubated at 45^{0}C. After the incubation period of 3, 6, 9, 12, 15 days these flasks were removed from the incubator and mycelium was harvested by adding 25 ml water and stirred well for half an hour on magnetic stirrer. Later-on the mycelium was filtered through the Whatman no. 1 filter paper. The filtrate was used as crude enzyme extract to assay the CMCase enzyme activity.

CMCase enzyme assay:

Temperature and pH plays an important role in enzyme activity. Thus, in the present study temperature and pH optimum of CMCase was determined. To determine the temperature optima, citrate buffer of pH 5.2 was used and the reaction mixture was incubated at 40, 45, 50, 55, 60^{0}C. Similarly to determine the pH optima of CMCase, the reaction mixture was incubated at 45^{0}C and the citrate buffer of pH 4, 5, 6, 7, 8, 9 was used. The reaction mixture was incubated for 30 min.After the incubation, Reducing sugar estimation was done using Nelson-Somogyi (1952) method.

S= Reducing sugar liberated in µg,
M= Mol. wt. of glucose,
T= Reaction time in minutes and
V= Volume of enzyme extract in ml.

Enzyme production / liter = Cellulase activity/ ml/ min. x 1000.

One unit of cellulolytic activity is defined as the amount of sugar liberates in one micromole of reducing sugar (as glucose) per min. per ml of enzyme samples under conditions defined (Joshi, 1992).

RESULTS & DISCUSSION

Effect of different substrates on CMCase activity

The Corboxy methyl cellulase enzyme activity of *Humicola insolens* was studied in present investigation. Various substrates from agricultural wastes were used as carbon sources. The observations taken during the course of study are as follows.

Overall 4 to 8 days incubation period had shown better enzyme production with all the substrates studied.Theenzyme activity was found to be highest with most of the substrates on 4th day of incubation. On wheat straw, corn cob and jowar straw activity was found to be higher than control on 4th day,however, lateron in case of corn cob was equal to control on 12th day, whereas, groundnut shell and CMC, as substrate inhibited the CMCase activity initially. On Groundnut shell the activity decreased between 8th and 12th day. on the other hand, the activity of CMCase remain almost same throughout incubation period for CMC (Fig. 1). *Humicola insolens* showed CMCase till 8 days on most of the substrates. Thereafter, the activity decreased to a low level (Fig. 1). *Humicola insolens* showed maximum CMCase activity with corn cob, wheat straw and jowar straw, da-Silva *et al*., (2005) reported maximum CMCase activity of *Thermoascusaurantiacus* from corn cob as substrate. Badhan *et al*., (2007) reported high CMCase activity of *Myceliophthora* sp. with rice and wheat straw as substrates. Charles *et al*., (1980) described in detail the cellulase enzyme complex and the process of cellulose degradation. They have illustrated that cellulose degradation process of different cellulosic substrates depends on various factors such as moisture content, degree of cellulose crystallinity and degree of polymerization of cellulose molecules as well as its association with hemicellulose and lignin. Overall weaker enzyme activity was reported after 12-16 days of incubation. Similar observations reported by Joshi (1992), attributed this either to the increasingly resistant cellulose residues left after degradation of

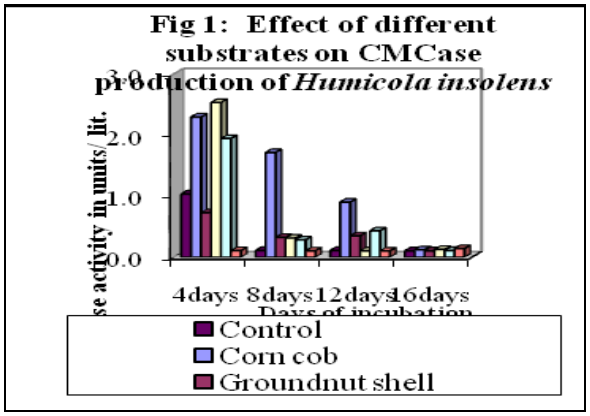
susceptible portion of cellulose or to the repression in soluble hydrolysis products.

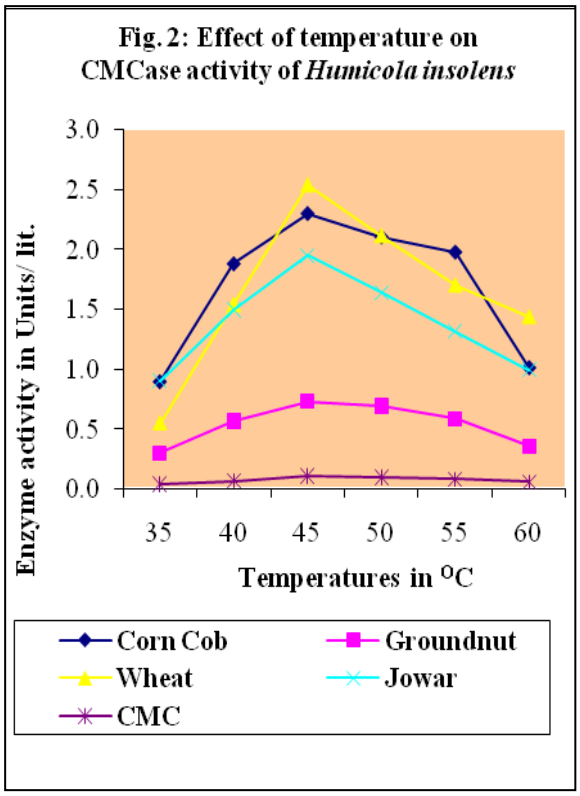
Effect of temperature on CMCase activity:

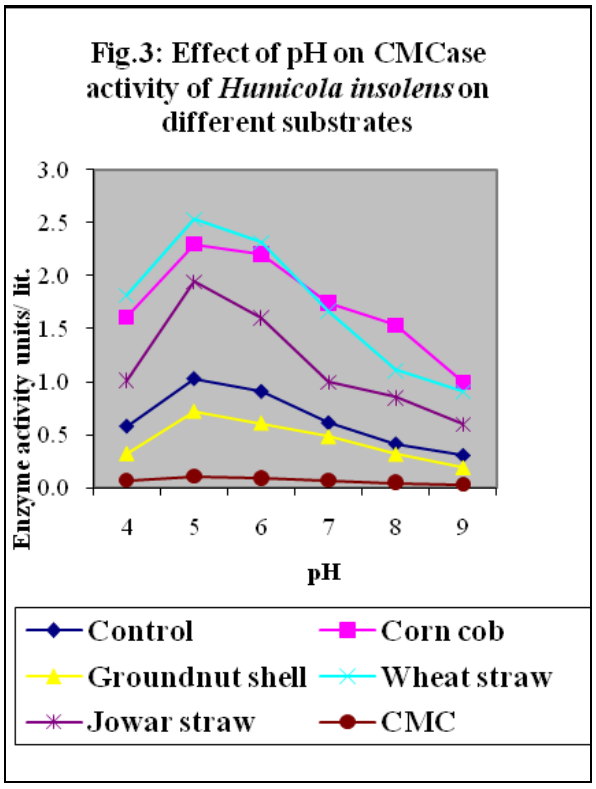
Crude enzyme extract of corn cob as a substrate has shown favourable temperature of 40-55^{0}C for the better enzyme activity. Although this extract has shown slight increase at 45^{0}C. The crude enzyme extract from Jowar straw as a substrate has shown better enzyme activity at 45^{0}C and further gradual decrease in enzyme activity at higher temperatures was observed. In case of crude enzyme extract from groundnut and CMC did not show significant difference in enzyme activity with respect to temperature (Fig. 2) Almost all the extracts tested under various temperature regimes showed better enzyme activity at 40-45^{0}C (Fig.2). Moreover, highest enzyme activity was recorded from almost all the extracts except jowar straw and CMC for *Humicola insolens*. For rest of the substrates broader range of temperature was observed. These findings are in agreement with the results Gomes *et al*., (2000) and da-Silva *et al*., (2005).

Effect of pH on CMCase activity:

The pH of the growth medium affect the enzyme activity at various levels. However, pH 5 had seen to be favourable for the production of maximum enzyme activity at all the substrates and pH studied. Highest enzyme activity (2.295 units/ liter) on wheat straw at pH 5 was recorded. Later on, gradual decrease till pH 8 was observed. This trend was followed by the enzyme extract from corn cob as a substrate. However, after pH 5 linear decrease in activity was observed in case of control. Whereas, no change in activity at various pH was observed in case of CMC as a substrate (Fig. 3). CMCase activity in crude enzyme extracts of both the isolates was found to be maximum at pH 5.0 (Fig. 3) Hayashida and Yashioka (1980) and Hayashida *et al*., (1988) found pH 5.0 to be optimum for CMCase activity of *Humicola insolens*. Similarly, da-Silva *et al*., (2005) reported pH 4.5-6 suitable for CMCase enzyme activity for *Thermoascusaurantiacus*.







CONCLUSIONS

Among the substrates studied, highest activity was recorded from corn cob, wheat straw and jowar straw from after 4 days of incubation. Availability of carbon source in these substrates for the rapid breakdown may be the reason for occurrence of highest CMCaseactivity.After 8 days of incubation still higher CMCase activity of jowar straw was seen from corn cob by *Humicola insolens*. The crude enzyme extract was subjected to the temperature and pH treatment for determination of temperature and pH stability and it was observed that, 40-55^{0}C temperature for both the fungi and pH 5.0-6.0 may be suitable for the production of CMCase activity.

REFERENCES

Badhan AK, Chadha BS, Kaur J, Saini HS, Bhat MK (2007) Production of multiple xylanolytic and cellulytic enzymes by thermophilic fungus *Myceliophthora* sp. IMI 387099.*Biores. Technol*. 98: 504-510.

Charles ED, Ling- Chang Chiang (1980) Cellulose degradation- A common link in: Utilization and recycle of agricultural waste and residues ed. M. L. Shuler, Pub. by CRC, CRC press Inc. Boca Raton Florida USA. 19-65.

Cooney DG and Emerson R (1964) Thermophilic fungi.An Account of Their Biology, Activities and Classification. W. H. Freeman & Co., San Francisco, Calif.

da- Silva R, Lago ES, Merbheb CW, Machione MM, Park YK, Gomes, E. (2005) Production of xylanase and CMCase on solid state fermentation in different residues by *Thermoascus aurantiacus* Miehe. *Brazilian J. Microbiol*. 36: 235-241.

Demirijan D, Morris- Veras F Cassidy (2001) Enzymes from extremophiles.*Curr.Opin. Chem. Biol.* 5: 144-151.

Gomes I, Gomes J, Gomes DJ, Steiner W (2000) Simulteneous production of high activities of thermostable endoglucanase and β- glucosidase by the wild thermophilic fungus *Thermoascus aurantiacus.Appl. Microbiol. Biotechnol*. 53: 461-468.

Hayashida S, Ohta K and Mohta K (1988) Cellulase of *Humicola insolens* and *Humicola grisea*.*Methods Enzymology*. 160: 323-338.

Joshi P (1992) Studies on Decomposition of organic materials with special reference to the role of thermophilic fungi. Ph. D. Thesis. Dept. of Botany, Nagpur University, Nagpur.

Kawamori MM, Takayama K, Takasawa S (1987) Production of cellulases by a thermophilic fungus *Thermoascus aurantiacus* A-131.*Agric. Biol. Chem*. 51: 647-654.

Margaritis A, Merchant R, Yaguchi M (1983) Xylanase, CM cellulose and avicelase production by the thermophilic fungus *Sporotrichum thermophile*. *Biotechnol.Lett*. 5: 265-270.

MouchaccaJ (1997) Thermophilous fungi: biodiversity and taxonomic status. *Cryptogamie, Mycologie*. 18: 19-69.

Redman SR, Litvintseva A, Kathy BS, Henson JM, Rodriguez JR (1999) Fungi from Geothermal Soils in Yellowstone National Park.*Appl. Environ. Microbiol.*65(12): 5193-5197.

Satyanarayana T, Jain S, Johri BN (1988) Cellulases and xylanases of thermophilic moulds, In: Perspectives in Mycology and plant pathology Eds. V. P. Agnihotri, A. K. Sarabhoy and Dineshkumar. Mehrotra Publishing House New Delhi. 24-60.

Satynarayana T, Johri BN, Klein J (1992) Biotechnological potential of thermophilic fungi in D.K. Arora, R. P. Elander and K. G. Mukerjee (eds) Handbook of applied mycology Vol. 4 Marcel Dekker, New York. Pp. 729-761.

RESEARCH ARTICLE

Report of *Rodeites* sporocarp from Deccan Intertrappean Beds of Bhutera (M.P.) India

Kapgate DK* and Ukey RW

Department of Botany, J. M. College, Bhandara (M. S.)-441904

**Corresponding author Email: dkapgate@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kapgate DK and Ukey RW (2014) Report of *Rodeites* sporocarp from Deccan Intertrappean Beds of Bhutera (M.P.) India. *Int. J. of Life Sciences,* Special Issue, A2 : 95-98.

Acknowledgement:
The authors are thankful to Principal V.P. Dhomne, J.M. Patel College-Bhandara for providing necessary research facilities.

ABSTRACT

The petrified pteridophytic sporocarp of *Rodeites* was collected from new fossiliferous locality- Bhutera (Lat. 22^{0}06.582'N; Long. 79^{0}08.402'E) of Chhindwara district, M.P. It is 30 km from Chhindwara on Seoni road and 10 km from north of Jhilmily Railway station. So far, only three species of *Rodeites* have been reported from these beds, such as *Rodeites dakshini* sporocarp present on a curved stalk, *Rodeites polycarpa* in a row attached to petiole, *Rodeites intertrappeana* on a branched pedicel. Present sporocarp shows some differences from above mentioned sporocarps of *Rodeites.* It is bilaterally symmetrical sporocarp of about 5 mm X 9 mm in size with very thick and multi-layered sporocarp wall approximately 454 µm. It contains 20-25 megaspores fully packed in the midst of microspores. Megaspores are spherical and 430µm to 500µm in diameter. Megaspore wall is about 43µm thick and complex in structure having intine or endospore, epispore, prismatic zone and outermost layer. Microspores are very numerous, spherical, 40-60µm in diameter. Microspore wall with two layers: a relatively smooth, dark inner layer and much thicker spongy looking layer outside it. A distinct triradiate mark observed from apical surface of microspore. As it show close similarities with *Rodeites dakshini* Sahni, (1943), it is kept under the genus *Rodeites bhuteri* sp. nov. The specific name after the locality Bhutera.

Keywords: *Fossil, Pteridophyte, Sporocarp, Deccan Intertrappean, Maastrichtian.*

INTRODUCTION

This paper describes petrified pteridophytic, a sporocarp of *Rodeites* collected from new Bhutera. The genus *Rodeites* was described by Sahni (1943). Further contributions to its knowledge were made by Mahabale (1956) and by Surange (1966). Later on a series of papers by Chitaley and Paradkar (1971, 1972) and Paradkar and Barlinge (1981) provided information for its reconstruction. So far, only three species of *Rodeites* have been reported from the Deccan Intertrappean beds of India such as *Rodeites dakshini* Sahni (1943) a single sporocarp on a curved stalk, *Rodeites polycarpa* Chitaley and Paradkar (1971) five sporocarps in a row attached to petiole, *Rodeites intertrappeana* Paradkar and Barlinge (1981) 3-4 sporocarps on a branched pedicel. Present specimen described here shows single sporocarps along with some differences from above mentioned reported *Rodeites.*

MATERIALS AND METHODS

A black silicified fossiliferous chert had been collected from Deccan Intertrappean beds of Bhutera, M.P., India. After breaking the chert and etching with hydrofluoric acid the specimen carefully observed by using hand lens, it appears elongated to elliptical body which cut in oblique longitudinal plane. Then serial peel sections were taken through its exposed plane with Cellulose Acetate peel technique.

RESULTS AND DISCUSSION

Present specimen from a piece of Deccan Inertrappean Chert of Bhutera, which is about 15 km away from well-known fossiliferous locality Mohgaonkalan, shows another Pteridophytic sporocarp cut in oblique longitudinal plane with mega, microsporangia and spores. Preservation of spores and the sporocarp is good. On closer study it has been found to be the sporocarp of *Rodeites*, which includes following parts:-

*Sporocarp***:** It is bilaterally symmetrical, elliptical to elongate in shape of about 5mmX 9 mm in size. (Plt., Fig. 1) having a well preserved wall and bisporangiate type i.e. two kinds of spores i.e. smaller microspores and larger megaspores.

*Sporocarp Wall***:** Sporocarp wall is very thick approximately 454 µm, multi-layered (Plt., Fig. 2); epidermis 94µm next is a layer 172 µm broad, the prismatic layer, of elongated palisade-like cells. After this there is middle, 2-3layers thick-walled cells of 111µm thick and parenchymatous inner layer 77µm thick.

*Spores***:** The sporocarp contains 20-25 megaspores fully packed in the midst of microspores in several sori/patches laterally extended towards center. Soral chembers are not distinctly seen and hence attachment of sori is unknown.

*Megaspores***:** Megaspores are spherical and 430µm to 500µm in diameter. (Plt., Fig.3 to 7) Megaspore wall is about 43µm thick (Plt., Fig. 8 and 9) and complex in structure showing following four layers-

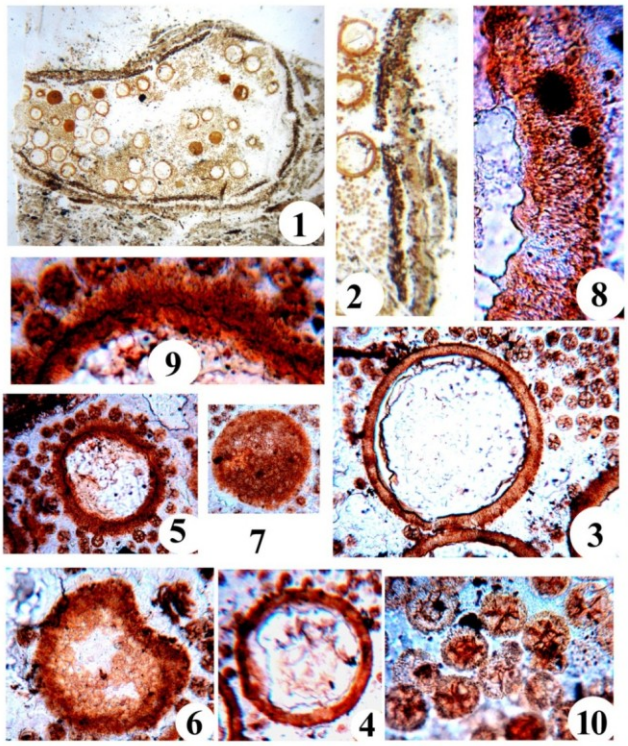
i. *Intine or Endospore*: Innermost thin dark layer which invests the cavity and only distinguishable in few place.

ii. *Epispore:* It is second thin membrane, darker and closely applied to intine.

iii. *Prismatic zone*: Epispore is covered by prismatic zone, at least 35-40µm thick. It is marked by radial striations which are seen to follow a sinus coarse.

iv. *The Outermost layer*: It is composed of the minute papillae 6-8µm tall, which terminate the prism and give the external surface a minutely tuberculate appearance.

*Microspore***s:** Microspores are very numerous, spherical, 40-60µm in diameter. Integument or microspore wall shows clearly preserved two layers: a relatively smooth, dark inner layer 1.5µm thick and much thicker 5µm spongy looking layer outside it, sometime forming loose covering and the 'prisms' end in minute tubercles or papillae give the very characteristic mosaic surface to the spore. Microspore shows a distinct tri-radiated mark from apical surface view (Plate, Fig.10).



Explanation of plate

Fig. (1): Complete sporocarp showing megaspores and microspores 45X
(2): Sporocarp wall 45X
(3 to 7): Megaspore at different stage of appearance 90X *
(8 and 9): Megaspore wall 90X
(10): Megaspore showing triradiate mark 90X.

From the above description following important features are conformed**:**

- Sporocarp is bilaterally symmetrical, elliptical to elongate in shape.
- Bisporangiate type i.e. two kinds of spores i.e. smaller microspores and larger megaspores.
- Sporocarp wall is very thick and multi-layered.
- The sporocarp contains 20-25 megaspores fully packed in the midst of microspores.
- Several patches of spore laterally extended towards center and attachment of sori is unknown.
- Megaspores are spherical with four layered wall.
- Microspores are very numerous, spherical.
- Microspore wall shows clearly preserved two layers, dark inner layer and much thicker spongy outer layer.
- Microspore shows a distinct triradiated mark.

From the above features the present described pteridophytic specimen conformed as Sporocarp of *Rodeites.*

IDENTIFICATION

For identification of above described sporocarp, it is compared with living sporocarps of Marsiliaceae family as well as reported *Rodeites* from the Deccan Intertrappean beds of India.

Comparison with Modern Species:

The living genera of Marsileaceae considered for the comparison of this fossil sporocarp are *Marsilea, Pilularia* and *Regnillidium.* It shows some common features with many variations.

*Resemblance to *Marsilea* are- attachment of sori inside the sporocarp, the bilateral nature of sporocarp.

*The sporocarp of *Pilularia,* with just four sori, is very different.

**Regnellidium diphyllum* also contains numerous megaspores packed in the midst of microspores, but sporocarp is round in shape.

*The spore size and ornamentation are more or less similar.

*The sporocarp wall and sporodermis less thick than above living genera.

*The mode of dehiscence seems to have been somewhat similar but intermediate between that in sporocarp of *Pilularia* and present day species of *Regnellidium.*

*There is a great deal of resemblance of present sporocarp and spores with those of the living *Regnellidium.*

***Comparison with Reported Species*:**

Table 1: This fossil sporocarp is compared with following reported fossil *Rodeites* sporocarps given table below:

Sr. No.	1	2	3	4
Genus	*Rodeites*			
Species	*R. dakshini*	*R. polycarpa*	*R. intertrappeana*	*Present species R. bhuteri*
Author	Sahni, 1943	Chitaley and Paradkar, 1971	Barlinge and Paradkar, 1980	
Imp. features and affinity	Single sporocarp on curved stalk. Size of sporocarp 10 mm dia. Megaspore- 600µm in dia. Microspore- 47 µm in dia.	5 sporocarp in a row attached to petiole. Size of sporocarp 8-12 x 12-16 mm dia. Megaspore- 450-600µm in dia. Microspore- 45-70 µm in dia.	3-4 sporocarps on a branched pedicel.	Single sporocarp, stalk is not seen, soral chambers are not distinctly seen, megaspores observed in different view. Size of sporocarp5mm X 9 mm dia. Megaspore- 430µm to 500µm in dia. Microspore- 40-60µm in dia.
Remarks	Rhizome, roots, leaves, petiole number of sporocarps and internal structure of both kinds of spores.		A reconstruction of plant has been done on the basis of observed facts.	

From this table it is clear that the present specimen does not exhibited any exact similarities with the reported fossil *Rodeites* except *Rodeites dakshini* Sahni, (1943) and with modern pteridophytes except *Regnellidium a* member of Marsileaceae. As it showed close similarities with *Rodeites dakshini* Sahni, (1943), it is kept under the genus *Rodeites* and named as *R. bhuteri* sp. nov. The specific name after the locality Bhutera.

DIAGNOSIS

Rodeites bhuteri sp. nov. : Bilaterally symmetrical, elliptical to elongate in shaped sporocarp of about 5mmX 9 mm in size with very thick and multi-layered sporocarp wall approximately 454 µm. It contains 20-25 megaspores fully packed in the midst of microspores. Megaspores are spherical and 430µm to 500µm in diameter. Megaspore wall is about 43µm thick and complex in structure having intine or endospore, Epispore, prismatic zone and outermost layer. Microspores numerous, spherical, 40-60µm in diameter. Microspore wall with two layers: a relatively smooth, dark inner layer 1.5µm thick 5µm spongy on outside. A distinct triradiated mark from apical surface view of microspore.

Holotype **:** RWU/Pte./Sp.N.5/Deposited at Dept. of Botany, J. M. Patel College, Bhandara.

Horizon : Deccan Intertrappean Series of Madhya Pradesh.

Locality **:** Bhutera of Chhindwara district.

Age **:** Late Cretaceous (Maastritchian).

REFERENCES

Sahni B (1943) *Rodeites dakshini* gen. et sp. nov.from the Deccan Intertrappean series. *J. Ind. Bot. Soc.* 22(1): 179-181.

Mahabale TS (1956) Trends of specialization in the sporocarp and spores in the living and fossil Marsiliaceae. *Palaeobotanist* 5(2): 66-72.

Surange KR (1966) Botanical Monograph, Indian Fossil Pteridaophytes. *Council of Scientific and Industrial Research, New Delhi.* : 143-149.

Chitaley SD Paradkar SA (1971) *Rodeites* Sahni–Reinvestigated I. *J. Linn. Soc. London.* 65: 109 –177.

Chitaley SD Paradkar SA (1972) *Rodeites* Sahni–Reinvestigated II. *Palaeobotanist* 20 (3): 293 – 296.

Paradkar SA and Barlinge SG (1981) *Rodeites* Sahni reinvestigated III. *Geophytology*, 11(1): 16-24.

RESEARCH ARTICLE

Diversity of *Arthrinium* from Melghat Forest, Amravati (MS) India

Hande DV, Suradkar KP and Kadu SR

Department of Botany, Shri Shivaji Science College, Amravati (MS), India.

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Hande DV, Suradkar KP, Kadu SR (2014) Diversity of *Arthrinium* from Melghat Forest, Amravati (M.S.) India, *Int. J. of Life Sciences,* Special Issue A2: 99-101.

ABSTRACT

The present paper deals with investigation on the fungi from forest area of Melghat of Amravati District (MS). During the survey in forest area, four fungal species representing single genus, *Arthrinium* has been collected from dead and decaying parts of different hosts including *Dendroclamus strictus* Nees., *Cajanus cajan* (L)Millsp., *Gossypium hirsutum* L. *Bambusa arundinacea* (Retz)Willd and their morphotaxonomy was studied. The species were identified on the basis of morphological characters and structure of fruiting bodies. Taxonomic details illustrated in the paper.

Keyword: *Arthrinium,* morphotaxonomy, Melghat Forest

INTRODUCTION

The fungal organisms of diverse groups are known to grow and proliferate in variable climatic environment (Bilgrami *et al*., 1991). The anamorphic fungi reproduced asexually whereas Hyphomycetes produce conidia directly from vegetative structures or on distinct conidiophores (Kirk *et al*., 2001). The genus *Arthrinium* is reported ecologically diverse and wide spread, commonly found as a saprobe on leaves, stems and roots of a range of different plant substrates (Agut and Calvo, 2004). It was found growing on dead and decaying plant parts from Melghat forest of Amravati District. (Subhedar *et al*, 2010, Dharkar *et al*, 2011; Hande, 2012 Hande and Hiwarale, 2013 and Hande *et al*, 2014) and reported new and rare to Maharashtra. In present survey, four species of *Arthinium* and its diversity has been reported from Melghat forest. The collected material has been studied in respect of morphology, taxonomy and identified with relevant literature (Subramaniam, 1971, Barnett & Hunter, 1972).

MATERIALS AND METHODS

Decaying leaves and stems of different plants were collected at Melghat forest. Samples were wrapped in butter paper and brought to the laboratory for examination. They were cut in small pieces and incubated in plastic containers lined with moist filter paper. Slides were prepared using lacto-phenol cotton-blue and observed. Morphological characteristics and relevant literature has been used for fungal identification (Subramaniam, 1971).

RESULTS AND DISCUSSION

Arthrinium caricicola *Kunze* ex Fries

Colonies dark brown, round, oval or irregular in shape, composed of closely packed conidiophores arising from superficial mat of mycelium. Mycelium composed of closely interwoven hyphae, hyaline when young, finally brown septate, conidiophores simple, slender, divided into several hyaline cells by dark brown septa. Conidia 1-celled, pale to dark brown.

Arthrinium hydei Crous (Fig 1.1-1.2)

Mycelium smooth, hyaline to pale brown, branched, septate, 2-3 µm diameter. Conidiophores pale brown smooth, cylindrical, septate, branched, 22-34 × 3-5 µm. Conidiogenous cell aggregated in clusters on hyphae, smooth, hyaline, doliiform. Conidia unicelled, brown, globose to lenticular with pale equatorial slit 10-22 µm diameter in side view.

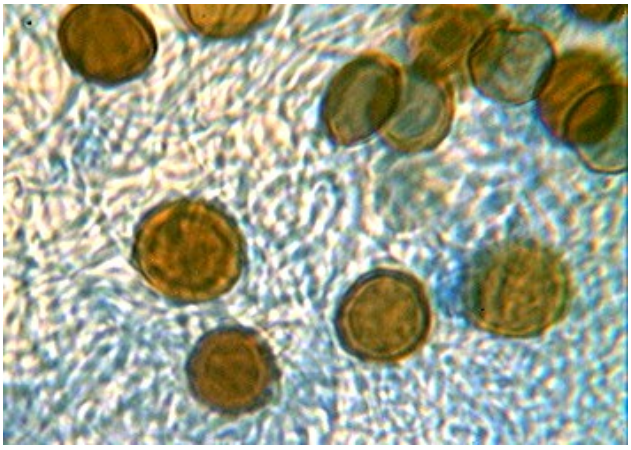


Fig 1.1: ***Arthrinium hydei*** **Mycelium with conidia**

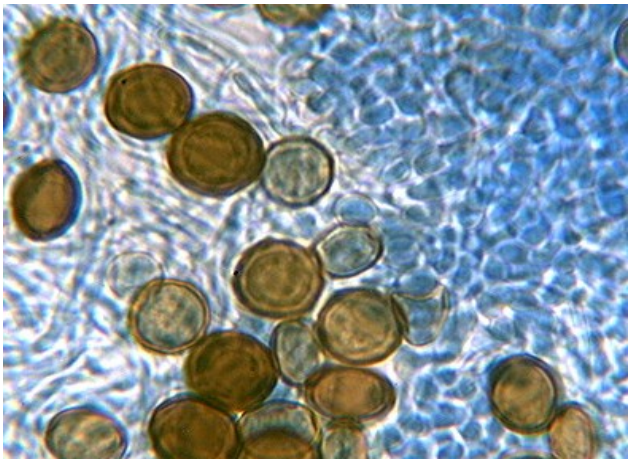


Fig 1.2: Conidiogenous cells and conidia

Arthrinium marii Larrondo & Calvo (Fig 1.3-1.4)

Mycelium smooth, hyaline, branched, septate upto 1.5 –3 µm in diameter, conidiophores reduced to conidiogenous cells. Conidiogenous cells aggregated on hyphae, basauxic, macronematous, mononematous, arising singly from ampulliform conidiophores, usually brown in color, 6-10× 2.5×4 µm. Conidia solitary, lateral or terminal, smooth, brown, globosed to elongate, ellipsoid in surface view 7-10 µm in diameter with pale equatorial slit,5-6 µm diameter in side view.

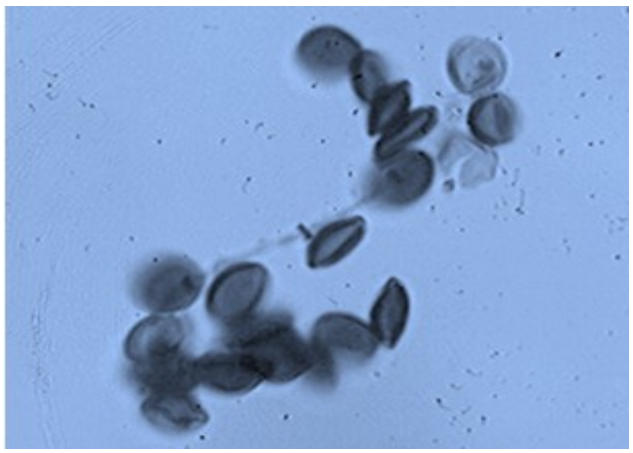


Fig1.3 : ***Arthrinium marii*** **Mycelium with conidia**

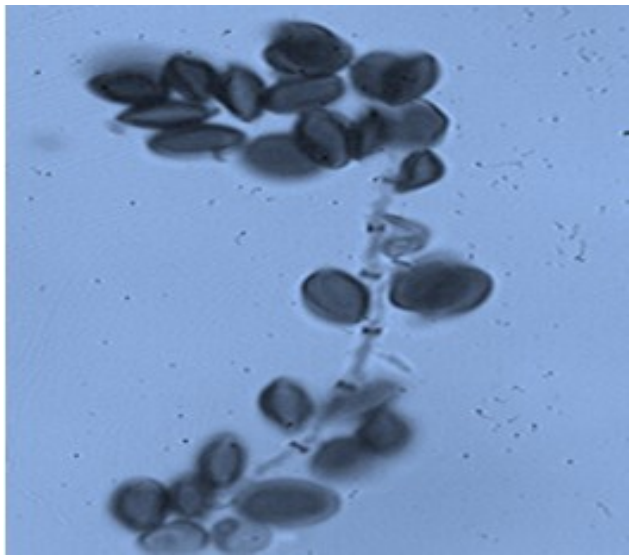


Fig 1.4: Broad septate mycelium with conidia

Arthrinium phaeospermum (Corda) Ellis

Colonies dark brown to greenish, round, oval or irregular in shape. Mycelium hyaline to pale brown, smooth hyphae,3-4µm in diameter. Conidiophores are cylindrical, narrow ,erect or flexuous, straight, simple, smooth, hyaline 5-12×3-5 µm thick, dark brown with transverse septa 48-120 µm long, 2-4.5 µm in diameter between septa, basal cell somewhat flattened and

Table 1 : Comparison between species of *Arthrnium*.

Species	Colony character(color)	Mycelium	Conidiophores	Conidia
A. caricicola Kunze ex Fries	Black,, pulvinate	2-3 µm diameter	150×4 µm	36- 54×9-12µm
A. hydei Crous	Olive white with patches of grey to black	2-3 µm diameter	22-34 × 3-5 µm	10-22 µm
A. marii Larrondo & Calvo	Whitish- black to olivaceous grey	1.5 – 3 µm in diameter	6-10× 2.5×4 µm	7-10 ×5-6 µm
A. phaeospermum (Corda) Ellis	Dark brown to greenish in color	3-4 µm in diameter	5-12×3-5 µm	10-16 × 4-7µm

round or irregular in shape. Conidia sessile or sometimes borne on short hyaline pegs along the sides of the conidiophores, which are somewhat flattened, lemon shape in surface view, triangular in side view but outer edge is curve and the corners round, brown pale at tips, smooth 10-16 µm long, 4-7 µm wide in surface view.

CONCLUSION

The survey aims to establish the diversity and distribution of *Arthrinium* sp. associated with plant debris from Melghat Forest of Amravati district of Maharashtra and this is the first report on diversity of *Arthrinium* species from this region.

REFERENCES

Agut M, Calvo MA (2004) *In vitro* conidial germination in *Arthrinium aureum* and *Arthrinium phaeospermum*. *Mycopathologia,* 157:363–367.

Barnett H, Hanter BB (1972) : Illustrated Genera of Imperfect fungi. III. Ed., Burgoss Publishing Co., Minnesota.

Bilgrami KS, Jamaluddin, Rizwi MA (1991) Fungi of India, Part – III, List and References. Today and Tomorrow Publications, New Delhi, pp. 798.

Dharkar N, Hande D, Shahezad MA (2011) *Ajrekarella asetosa*– A new Coelomycete From Vidarbha, India. KAVAK, 37&38 : 3-5.

Hande DV (2012) Dematiatious Hyphomycetes Fungi From Amravati MS. *Journal of Ecobiotechnology*,4(2) : 172-174.

Hande DV, Hiwarale SV (2013) Diversity of *Xylaria* Species from Amravati Region, Amravati, MS, India. *International Research Journal of Biological Sciences*, 2(1), 1-6.

Hande DV, Kadu SR, Suradkar KP (2014) A Rare Myxomycetes *Macbrideola* from Amravati, Maharashtra. *Int. J. of life Sciences*, 2 (1):93-95.

Krik SD, Cannon PF, David J, Stalpars JA(2001) Ainsworth & Bisby's Dictionary of the Fungi. CAB International, Wallingford, UK.

Subramaniam CV (1971) yphomycetes. I. C. A. R. Sci. Monogr., New Delhi.

Subhedar AW, Hande DV, Dharkar N.(2006) Effect of some rhizosphere fungal flora on productivity of some crop plants Asian journal of Agronomy.5 (2):239-247.

RESEARCH ARTICLE

Evaluation and Role of Lycopene from the various Vegetables

Wankhade MR

Post Graduate Department of Botany. Govt. Vidarbha Institute of Science and Humanities, Amravati.

E-mail :- mayurideshmukh3190@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Wankhade MR (2014)Evaluation and role of Lycopene from the various Vegetables. Int. J. of Life Sciences, 2014, Special Issue A2: 102-104.

Acknowledgment:
I am very much thankful to Dr. K. V. Kothale Asst. Prof. & Dr. K. D. Jadhav Asst. Prof. for valuable guidance and also thankful to Head of the department Dr. S. N. Malode & Director Govt. Vidarbha Institute of Science & Humanitis, Amravati for providing necessary facilities for research work.

ABSTRACT

Lycopene is one of the most important and very much useful carotenoid traced in many fruits and vegetables. Lycopene is a potent antioxidant substance which plays critical role in cancer prevention, sun protection, asthma, atherosclerosis, high cholesterol and in maintenance of the immune system of the body. This study made for to assess the concentration and presence of lycopene in various vegetables which are included in our day to day diet. For this spectrophotometric analytical techniques were used and nutritionally important data is traced out from the experimentation.

Keywords: Lycopene, spectrophotometer, carotenoid, antioxidant.

INTRODUCTION

Lycopene is a bright red carotenoid pigment found in fruits and vegetables. It is an important intermediate in the biosynthesis of many carotenoids, including beta-carotene responsible for yellow, orange or red pigmentation lycopene belonges to the family of carotenoids and structure that consists of a long chain of conjugated double bonds, with two open end rings. The structure of lycopene is the longest of all carotenoid. Lycopene (C40H56)is an unsaturated hydrocarbon. Carotenoid contains 13 carbon-carbon double bonds, 11 of which are conjugated and arranged in a linear array. These conjugated double bonds are responsible for the vibrant red color of lycopene. It is a lipophilic compound that is insoluble in water, but soluble in organic solvents, and it has a quenching constant double that of beta-carotene and 10 times alpha tocopherol. It is an abundant carotenoid in human blood that is associated with antioxidant and most powerful antioxidant has received attention for potential role in preventing cardiovascular disease such as cancer in humans also plays role in the prevention of heart disease and to reduce the risk of developing cholesterol. The antioxidant properties of lycopene primarily responsible for beneficial effect to suggest other mechanism (Agarwal *et al*., 2000). Lycopene to be great interest to the food and related industries or well to public health organization. An increase in serum lycopene after supplemention can reduce oxidative stress may play a role in endothelial function (Kim *et al*., 2010). In present work analysis and evaluation of lycopene from various vegetables is done.

MATERIAL AND METHOD

Vegetables are the great source of antioxidants because almost vegetables contain one or more vitamins, carotene and having high antioxidant properties. Experimental vegetables were collected from various agricultural fields from different areas of Amravati district and analysed for Lycopene extraction.

Lycopene extraction:

1gm of each sample in 15ml acetone were crushed then acetone extracts transferred in to separating funnel containing 20ml petroleum ether mixed gently. Then added 10ml of 5% sodium sulphate solution, shaken well gently and reduced the volume of petroleum ether because of evaporation. Two phases formed upper petroleum ether phase and lower aqueous phase. Petroleum ether extract contains carotenoid. In it added 10gm of anhydrous sodium sulphate. Kept aside for 30 min. Decanted the extract, volume were makeup 50ml. UV-Vis spectral analysis has been done by using a spectrophotometer with micro processor and double beam. The wavelength range used were 503nm.

RESULT AND DISCUSSION

Lycopene is a carotenoid, which is a coloring pigment dominantly found in fruits and vegetables. Many studies confirm that lycopene is a carotenoid, phytonutrient and is the most potent antioxidant. Antioxidant provide an effective means to combat the deleterious effects of highly reactive oxidant molecules generated endogenously through normal metabolic processes, lifestyle activity and the diets. Antioxidants have disease fighting properties that protect cells from damage by substances known as free radicals. Antioxidants like lycopene vitamin E, vitamin C worked by neutralizing free radicals that are formed when body cell burn oxygen for energy. Antioxidant also may help to keep immune system healthy and reduce the risk of cancers and other diseases. Also some studies shows correlation between skin roughness and lycopene concentration. The high levels of lycopene exhibits lower levels of skin roughness, so lycopene as well as other antioxidant substances may be able to reduce the formation of furrows and wrinkles also it assume that skin roughness depend not only an age but also on other factors. Lycopene possesses strong antioxidant capabilities. Lycopene is not produced into body so you can only obtain its benefits by eating fruits rich in lycopene or supplementing vitamins containing lycopene serum concentration of lycopene may decrease and increase proportionately to amount of lycopene in diet. There are various dietary sources of lycopene such as fruits and vegetables. Studies made in order to trace out the concentration of lycopene and it is observed that to fulfill daily need. According to national research council daily intake of lycopene should be 15mg. In order to fulfill above prescribed dose various fruits and vegetables can be consumed singly or in combinations. And one can have varietal and changed nutritive food supplement considering lycopene concentration. Various concentrations are shown in table and in graph.

Table 1: Various concentrations of Lycopene in different vegetables.

Sr. No.	Name of vegetables (sample)	Vernacular name	Weight of sample	Total Volume of extract	Volume taken for analysis	Absorbance (503nm)	Lycopene in 1gm of sample(mg)
1.	*Beta vulgaris L.*	Beet root	1gm	10ml	1ml	0.003	0.093
2.	*Brassica oleracea var.botrytis*	Cauliflower	1gm	10ml	1ml	0.004	0.124
3.	*Brassica oleracea L. var. capitata L.*	Cabbage	1gm	10ml	1ml	0.001	0.031
4.	*Capsicum annum L.*	Chilly	1gm	10ml	1ml	0.068	2.122
5.	*Cucumis sativum L.*	Cucumber	1gm	10ml	1ml	0.001	0.031
6.	*Cucurbita maxima Duch.ex. poir.*	Cucurbita	1gm	10ml	1ml	0.006	0.187
7.	*Daucus carota L.*	Carrot	1gm	10ml	1ml	0.033	1.029
8.	*Pisum sativum L.*	Pea	1gm	10ml	1ml	0.045	1.404
9.	*Lycopersicon esculentum Mill.*	Tomato	1gm	10ml	1ml	0.068	2.402
10.	*Solanum melongena L.*	Brinjal	1gm	10ml	1ml	0.003	0.093
11.	*Solanum tuberosum L.*	Potato	1gm	10ml	1ml	0.001	0.031
12.	*Spinacia oleracea L.*	Spinach	1gm	10ml	1ml	0.019	0.592

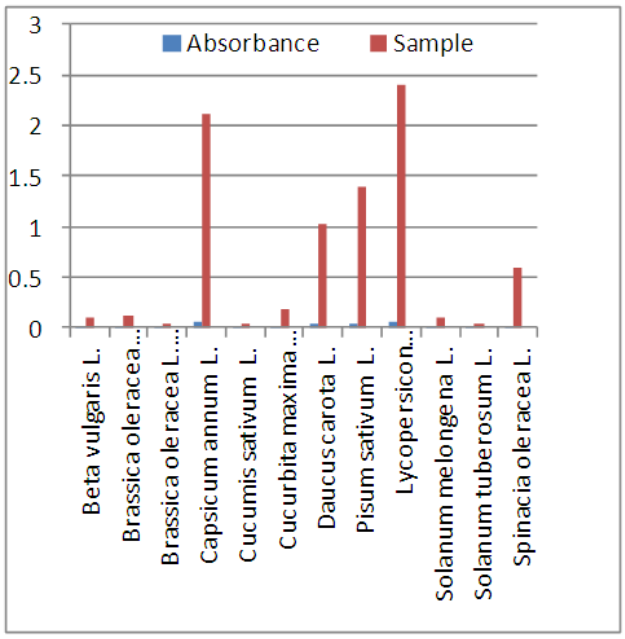


Fig 1: Showing various concentrations of Lycopene in different vegetables.

CONCLUSION

So it is confirmed that lycopene is very useful carotenoid found from food supplement and plays major role in human health and disease prevention.

REFERENCES

Agarwal S and Rao AV (2000) Tomato lycopene and its role in human health and chronic diseases can, *Med Assoc J*., 163:739-44

Darvin ME *et al*. (2005) Determine of the carotenoids and lycopene concentration in the human skin using the Raman Spectroscopic Method, *J.Phys.D-Appl.Phys*.,38: 2696-2700.

Food Sources of Lycopene (http://nutrient.javalime.com/nutrient.php/337)-Based on USDA (US Department of Agriculture)National Nutrient Database Release 21.

Halliwell B (1994) Free radicals, antioxidants and human disease: Curiosity, Cause, *Lancet*, 344 : 721-4.

Kim OY, Yoe HY, *et al*. (2010) Independent inverce relationship between serum lycopene concentration and arterial stiffness Atherosclerosis. 2010; 208: 581-6.

Lycopene Nutrition Food and Supplement Source .2012; (mhtml:file://H:\Lycopene%20nutrition%20Heart%Health%20supplements.mht).

Rao AV and Agarwal S (1999) Role of lycopene as antioxidant carotenoid in the prevention of chronic diseases: a review, *Nutr Res.,* 1999; 19:305-23.

Sandmann G (1994) *Euro J Biochem*., 223,7-24.

Thimnaiah SR (1999) Standard method of Biochemical analysis 1999; Kalyani Publication new delhi. 304-306.

Thamburaj S and Singh N (2003) Textbook of Vegetables, Tubercrops and spices, Indian Council of Agricultural Research (ICAR) Krishi Anusandhan Bhavan Pusa New Delhi.

RESEARCH ARTICLE

Preliminary Aerospora survey at outdoor and indoor environment in western part of Nagpur region

Bhiwagade SD and Kalkar SA

Department of Botany, Institute of Science, Nagpur-440001(M.S.), India.

E mail: surekhakalkar@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Bhiwagade SD and Kalkar SA (2014) Preliminary aerospora survey at outdoor and indoor environment in western part of Nagpur region *Int. J. of Life Sciences*, 2014, Special Issue A2: 105-107.

ABSTRACT

Preliminary aerospora survey at outdoor and indoor environment in western part of Nagpur region was carried out for the period of three months viz, August 2013 to October 2013. The survey was conducted using rotorod air sampler. Data was analysed and identified qualitatively by using standard literature. Fungal spores viz. *Alternaria, Aspergillus ,Curvularia, Helminthosporium*, *Nigrospora, Cladosporium* uredospores, smut spores and pollen grains belonging to families like Poaceae, Asteraceae, Amaranthaceae, Mimosaceae were prominently observed along with other types. Further identification and quantitative analysis is in progress.

Key words: aerospora, outdoor environment, indoor environment, qualitative analysis.

INTRODUCTION

Aerobiology is a branch of biology that studies organic particles, such as bacteria, fungal spores, very small insects, pollen grains and viruses, which are passively transported by the air (Spieksma, 1995). Aerobiologists have traditionally been involved in the measurement and reporting of airborne pollen and fungal spores as a service to allergy sufferers (Larsson, 1993). The importance of biopollutants as a major cause of outdoor and indoor air has been recognised. Much work is being done on the study of airborne fungal spores and pollen grains and its impact. The airborne fungal spores are important in the etiology of respiratory disorders (Bajaj, 1998; Durham, 1998; Verma and George, 1997). They have been recognized to cause asthma, allergic rhinitis, skin disorders, and other allergic diseases. The airborne fungal spore shows great variation in composition and concentration from place to place and from time to time. Hence aeromycological study with different views is being continued (Khilare and Chitnavis , 2002; Agashe.*et.al* 2002, Tilak , 2009).The present outdoor and indoor investigation was undertaken to study the extramural and intramural aerobiopartical of western part of Nagpur city. This will render valuable information regarding the concentration and composition of the bioparticales in the air.

MATERIAL AND METHODS

The air monitoring was carried out for a period of three months viz. August 2013 to October 2013 in western part of Nagpur city by using "Rotorod Air

Sampler" outdoor and indoor samples were collected daily for the said period from morning 7 a.m. to evening 6 p.m. for 30 minutes each. Slides were prepared and scanned and spores were identified qualitatively. Daily temperature, humidity and rainfall were recorded during the survey.

RESULT AND DISCUSSION

The present outdoor and indoor aeromycological survey carried out for three month by using rotorod air sampler. Data was analysed qualitatively by using standard literature (Barnett, 1960; Tilak, 1989). Fungal spores viz. *Alternaria*, *Aspergillus, Curvularia, Helminthosporium*, *Nigrospora,* uredospores, smut spores and pollen grains belonging to families like Poaceae, Asteraceae, Amarantaceae, Mimosaceae were prominently observed along with other types. Preliminary aerospora survey in which the most common fungi identified in indoor and outdoor environments include *Aspergillus, Penicillium, Cladosporium, Aureobasidium* and Basidiomycete species and these have seasonal spore releasing patterns (Bush and Portnoy, 2001). Most of the studies have shown that the most common spores belong to *Cladosporium, Botrytis, Ustilago, Alternaria, Epicoccum, Erysiphe, Entomophthora, Torula, Stemphylium* and *Polythrincium* species and peak spore counts range anywhere between 1 000 – 10 000 000 spores per m-3 (Nikkels *et al.,* 1996). The most dominant fungus identified with the highest airborne concentrations in the majority of other studies include *Cladosporium* species during the spring and summer months (Comtois and Mandrioli, 1996; Nikkels *et al.,* 1996; Pelizzari, 1996), however during the winter months *Penicillium* and *Aspergillus* species were often predominant indoors (Cosentino and Palmas, 1996; Meriggi *et al.,* 1996; Pasanen *et al.,* 1997; Katz *et al*., 1999). Furthermore, a number of these genera, in particular *Cladosporium*, *Penicillium* and *Alternaria* have also been shown by a number of investigators to settle in high concentrations in mattresses, carpet, the bedroom, and living areas of indoor environments (Benguin, 1995; Benguin and Nolard, 1996; Cosentino and Palmas, 1996; Pasanen *et al.,* 1997). The most abundant fungi that are reflected in spore counts include *Cladosporium, Penicillium, Aspergillus, Paecilomyces, Alternaria, Trichoderma, Ulocladium, Stachybotrys, Fusarium, Aureobasidium,* Phialophora, Wallemia, Acremonium and Rhodotorula species (Levetin *et al*., 1995; Cole *et al*., 1999; Wedner *et al*., 1999; Ren *et al*., 2001).

However, numerous other fungal spore types, such as those belonging to Basidiomycetes are also abundant (Kramer *et al*., 1959). In a survey of airborne fungal spores at Dehra Dun, India, Singh and co-workers (1987) demonstrated that the most prevalent fungi belong to *Cladosporium, Alternaria, Curvularia,*

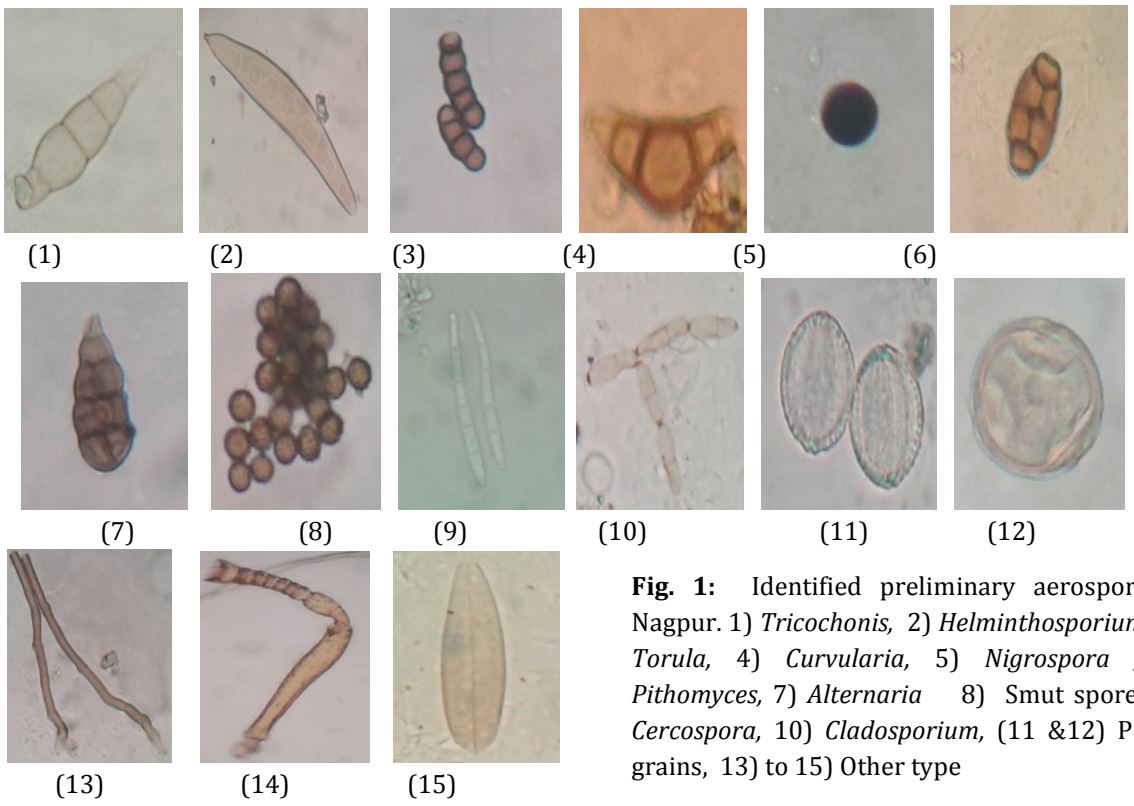


Fig. 1: Identified preliminary aerospora of Nagpur. 1) *Tricochonis,* 2) *Helminthosporium,* 3) *Torula,* 4) *Curvularia,* 5) *Nigrospora* , 6) *Pithomyces,* 7) *Alternaria* 8) Smut spores, 9) *Cercospora,* 10) *Cladosporium,* (11 &12) Pollen grains, 13) to 15) Other type

Aspergillus, Penicillium, Dreschera, Chaetomium and *Epicoccum* species with July through to October identified as the period of greatest spore concentrations. However, in Taiwan and Japan, the predominant fungal genera are restricted to only a handful of fungal spore types including *Cladosporium, Aspergillus, Penicillium* and *Alternaria* species (Su *et al*., 2001; Ara *et al*., 2004). Other common outdoor genera that have been identified include *Alternaria, Ustilago*, *Epicoccum,* and Botrytis species (Hasnain *et al*., 1985; Bass and Morgan, 1997; Mitakakis *et al.,* 1997; Rutherford *et al*., 1997; Mitakakis and Guest, 2001).

CONCLUSION

Aerobiological survey for the period of Aug 2013 to Oct 2013 month recorded fungal spores viz. *Alternaria, Aspergillus, Curvularia, Helminthosporium, Nigrospora, cercospora, cladosporium,* uredospores, smut spores and pollen grains belonging to families like Poaceae, Asteraceae, Amaranthaceae, Mimosaceae were predominantly found in the air with other forms. Such studies where carried out continuously and will also be helpful for allergy patients, allergologist, agriculturist, plant pathologist and related worker in the field. Further continuous air sampling and studies are in progress.

REFERENCES

Spieksma FT (1995) Aerobiology of inhalatory allergen carriers. *Allergol Immunopathol (Madr) 23*, 20-23.

Bajaj A (1998) Studies of viable spores in air at two different sites of Nagpur. *J.Palynol. 14 (2)*:136-149.

Durham S (1998) Summer Hay fever. *Br. MedJ,* 316:843-845.

Verma KS and George AM (1997) Fungi of allergenic significance in the air of Jabalpur. *Ind. J. Allergy Appl. Immunol. 11 (1)*: 13-15. Biology Newsletter, 34, 1-5.

Khilare CJ, Chitnavis SS (2002) An Aeromycological survey of slum and decent areas of Kolhapur (M.S.) *India. India J. Allegery Asthma Immunol. 16*(1):56.

Agshe et al. (2002) Aerobiological approach in Monitoring Intramural and Extramural environments and its implication in Health. *Indian J.AllergyAsthma Immunol, 16*(1):32.

Tilak ST (2009). Aeromycology.U.S. Science Publication, Pune, pp-.58-60.

Tilak ST (1989) Airborne pollen and fungal spores, Vaijayanti Prakashan, Pune.

HL Barnett 1955-1960. Illustrated genera of imperfect fungi.

Ara K, Aihara M, Ojima M, Toshima Y, Yabune C, Tokuda H, Kawai S, Ueda N, Tanaka T, Akiyama K and Takatori K (2004) Survey of fungal contamination in ordinary houses in Japan. *Allergology International 53,* 369-377.

Benguin H (1995) Mould biodiversity in homes II. Analysis of mattress dust. *Aerobiologia 11,* 3-10.

Benguin H and Nolard N (1996) Prevalence of fungi in carpeted floor environment: analysis of dust samples from living-rooms, bedrooms, offices and school classrooms. *Aerobiologia 12*, 113-120.

Bass D and Morgan G (1997) A three year (1993-1995) calendar of pollen and Alternaria mould in the atmosphere of south western Sydney. *Grana 36*, 293-300.

Burge HA, Chatigny M, Feeley J, Kreiss K, Morey P, Otten J and Peterson K (1987) Guidelines for assessment and sampling of saprphytic bioaerosols in the indoor environment. *Applied Industrial Hygiene 2*, R10-R16.

Burge HP, Solomon WR and Boise JR (1977) Comparative merits of eight popular media in aerometric studies of fungi. *Journal Allergy Clinical Immunology 60*, 199-203.

Bush RK and Portnoy JM (2001) The role and abatement of fungal allergens in allergic diseases. *Journal of Allergy & Clinical Immunology 107*, 430-440.

Cole EC, Cook CE, Dulaney PD and Leese KE (1999) Mold and mildew in the home environment: characterization and control of hard surface allergen reservoirs. *Annals of Allergy, Asthma, & Immunology 82*, 68.

Comtois P and Mandrioli P (1996) The aerobiological results from the 1994 cruise of the Urania (cnr) on the Adriatic. I. Pollen and spore counts on the Mediterranean sea as compared to mainland Italia. *Aerobiologia 12,* 167-172.

Cosentino S and Palmas F (1996) Occurence of fungal spores in the respiratory tract and homes of patients with positive skin tests to fungi. *Aerobiologia 12*, 155-160.

Hasnain SM, Wilson JD and Newhook FJ (1985) Fungi and disease: fungal allergy and respiratory disease. *New Zealand Medical Journal 98.*

Katz Y, Verleger H, Barr J, Rachmiel M, Kiviti S and Kuttin ES (1999) Indoor survey of moulds and prevalence of mould atopy in Isreal. *Clinical and Experimental Allergy 29*, 186-192.

Kramer CL, Pady CM and Rogerson CT (1959) Kansas aeromycology. II. Materials, methods, and general results. *Transactions of the Kansas Academy of Science 62*, 184.

Levetin E, Shaughnessy R, Fisher, E, Ligman B, Harrison J and Brennan T (1995) Indoor air quality in schools: exposure to fungal allergens. *Aerobiologia 11*, 27-34.

Meriggi A, Ricci S, Bruni M and Corsico R (1996) Aerobiological monitoring for fungal spores in a rehabilitation hospital in Northern Italy. *Aerobiologia 12*, 233-237.

Mitakakis TZ, Ong EK, Stevens A, Guest D and Knox RB (1997) Incidence of Cladosporium, Alternaria and total fungal spores in the atmosphere of Melbourne (Australia) over three years. *Aerobiologia 13*, 83-90.

Mitakakis TZ and Guest DI (2001) A fungal spore calendar for the atmosphere of Melbourne, Australia, for the year 1993. *Aerobiologia 17*, 171-176.

Nikkels AH, Terstegge P and Spieksma, F.T.M. (1996) Ten types of microscopically identifiable airborne fungal spores at Leiden, The Netherlands. *Aerobiologia 12*, 107-112.

Pasanen AL, Kujanpaa L, Pasanen P, Kalliokoski P and Blomquist G (1997) Culturable and total fungi in dust accumulated in air ducts in single-family houses. *Indoor Air 7*, 121-127.

Pelizzari F (1996) Gravimetric survey of airborne fungal spores in Milan. *Aerobiologia 12*, 205-207.

Ren P, Jankun TM, Belanger MB and Leaderer BP (2001) the relation between fungal propagules in indoor air and home characteristics. *Allergy 56*, 419-424.

Rutherford S, Owen JAK and Simpson RW (1997) Survey of airspora in Brisbane, Queensland, Australia. *Grana 36*, 114-121.

Singh BP, Singh AB, Nair PKK and Gangal SV (1987) Survey of airborne pollen and fungal spores at Dehra Dun*, India. Annals of Allergy 59*, 229-234.

Su H, Wu P, Chen H, Lee F and Lin L (2001) Exposure assessment of indoor allergens, endotoxin, and airborne fungi for homes in southern Taiwan. *Environmental Research Section A 85*, 135-144.

Wedner HJ, Peabody R and Dixit A (1999) A survery of mold contamination in inner-city homes. *The Journal of Allergy and Clinical Immunology 103*, S187.

RESEARCH ARTICLE

Mycofloral biodiversity of Tubercolariaceae in rice field soil of Gondia District, India

Rane VI and Suryawanshi BG

Department of Botany, Jagat Arts, Commerce & Indiraben Hariharbhai Patel Science College, Goregaon, Dist: Gondia (M.S.),India. 441801.

Email- vijay_rne@rediffmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Rane VI and Suryawanshi BG (2014) Mycofloral biodiversity of Tubercolariaceae in rice field soil of Gondia District. *Int. J. of Life Sciences*, 2014, Special Issue A2: 108-111.

ABSTRACT

Soil is one of the most diverse habitats on earth and contains the most diverse assemblages of living organisms. Biodiversity refers to all organisms living in the soil. Soil fungi are microscopic plant-like cells that grow in long threadlike structures called hyphae. The mycelium (a mass of hyphae) absorbs nutrients from the roots; it has colonized on surface organic matter or on the soil. Fungal population is maximum close to the soil surface and decreased with soil depth. The factors inorganic matter and aeration believed to limit the fungal growth. Cultivated soils of the same type contain many organisms in common, but cultivation may change the proportion of different species of soil fungi also. Fungi occur in soil either in mycelia stage or reproductive stage. Soil of Gondia district, is fertile; it is suitable for rice crop. The climate of Gondia district is tropical hot and favorable for growth of fungi. Altogether 11 species of Tubercolariaceae belonging to 02 genera were recorded throughout the study from rice field soil during 2005-06.

Key words: Biodiversity, Tubercolariaceae, soil.

INTRODUCTION

Biological activity in soils is largely concentrated in the top soil. Depending on the size and class organisms may be divided into macro, meso and micro fauna. Beyond that, bacteria, fungi, protozoa and algae are grouped as microorganisms in soil biodiversity. Soil fungi are microscopic plant-like cells that growing long threadlike structures or hyphae that make a mass called mycelium. The mycelium absorbs nutrients from the roots; it has colonized on surface organic matter or on the soil. It produces special hyphae that create the reproductive spores. The soil fungi colonize on the dead or the decaying plant residues in soil by their mycelia growth. The bacteria come on them as secondary decomposers. Some soil fungi are true soil inhabitants, while others are merely exotic or temporary soil invaders, (Waksman, 1944). The effect of a particular crop on a soil clearly exposes the changes in micro flora, especially on those microbes, which causes disease. The fungal population is constantly changing not only in numbers but also in respect to the dominant species. The fungal population is also affect by climate change (Suryawanshi & Rane, 2012). In their ability to decompose organic residues, fungus are the most versatile and the persistent group to decompose cellulose, starch, gums, lignin as well as the more easily affected proteins, and sugars. The population of Tuberculaceae group is significant in this study.

Gondia is situated at $20^0.45^1$to $21^0.30^1$north latitude and $80^0$to $80^0.30^1$ east longitudes. It is the eastern part of Maharaashtra known as Vidarbha. Gondia is "Rice city" and famous for global export quality rice grain marketing. Total 169 rice industries have been established for the quality production of polished rice, boiled rice, murmura, poha and for the extraction of rice bran oil in Gondia district. Many bricks companies are totally depend on rice bran fuel in this area. One project is also carrying the power production by using rice husk.

MATERIAL AND METHODS

Collection of samples: Soil samples were randomly taken after scraping away one inch of surface soil, from depth of 10-15 cm with a surface sterilized trowel per month during timing of the crop season from different area in polythene bags. The collected soil samples were mixed and transported to the laboratory for assessment of soil mycoflora. Under aseptic conditions the stones and organic debris were removed and spread on the sterile tray for air-drying and after drying it was gently crushed. The soil obtained after sieving by 2 mm sieve was ready for the plating.

Isolation: Soil fungi were isolated by serial dilution plate method Sieved dry soil (10 gm) was suspended for 20-30 minutes in 250 ml Erlenmeyer flask with 90 ml sterile water to make a suspension. Serial dilutions 10^{-2} to 10^{-6} was made by withdrawing 1ml into additional dilution blanks having 9 ml sterile water in flasks respectively. Finally, 1 ml aliquot of the desired dilution was aseptically pipette out into sterile petri dished and 12-15 ml of on appropriate cooled, melted agar medium was added to each petri dish just above the solidifying temperature. The dishes were gently swirled in clockwise and anticlockwise direction to disperse the diluted soil suspension on the agar medium. After solidification of the medium the petri dished were incubated in an inverted position for 3-7 day's at room temperature (25 ± 2°C) till the colonies appear. To get uniform results three replicate plates were prepared for each sample.

RESULT AND DISCUSSION

The study of soil was undertaken on account of the importance of rice as an important staple food crop of the world. Food webs are ultimately based on microorganisms, including fungi, reflecting the course of evolution. Species diversity tends to be great amongst smaller organism (May, 1988). In fungi it might be thought reasonable to assume that all wood decay or litter-rotting species in site are not necessary for that ecological function to occur effectively. Such 'bootstrapping' involving fungi may be especially important in the maintenance of soils biodiversity (Perry *et al*., 1989).

However, the information is still insufficient to understand the complete biology of these organisms along soil of rice field for this region (Rane & Suryawanshi, 2012). Rice crops were cultivated in the field condition twice during a year (Kharif and rabbi) and mycofloral biodiversity in soil was studied.

Fungal species were assigned to their respective groups like Phycomycetes, Ascomycetes and Deuteromycetes and population of these groups at various period of one-month interval as samples were taken for study is given (Tables-1,2 & 3 and fig-1, & 2).

Table 1: Seasonal variation in taxonomic groups (species/sample) of soil mycoflora.

Cropping seasons	Date of Sampling	Phycomycetes	Ascomycetes	Deuteromycetes
Cropping (Kharif)	15th June 2005	02	01	02
	15th July 2005	01	02	03
	15th Aug 2005	01	02	04
	15th Sept 2005	01	02	03
	15th Oct 2005	03	01	05
	15th Nov 2005	02	01	01
Cropping (Rabbi)	15th Dec 2005	02	01	01
	15th Jan 2006	03	01	02
	15th Feb 2006	01	01	05
	15th Mar 2006	02	00	04
	15th April 2006	01	01	03
	15th May 2006	01	00	01

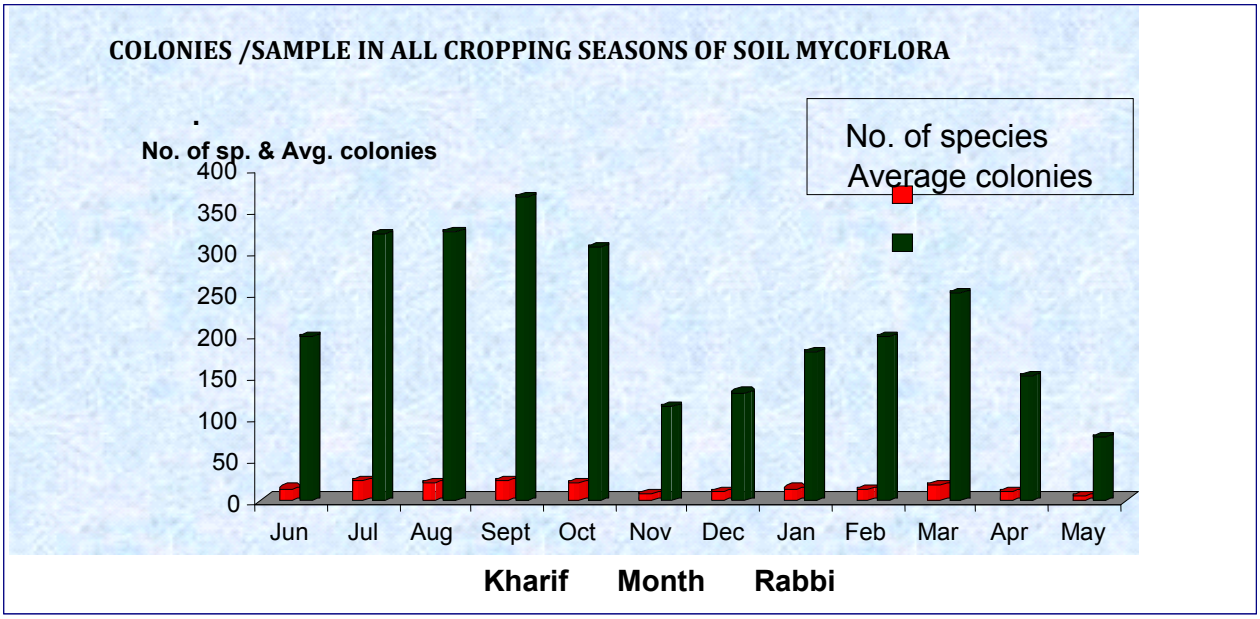


Fig. 1: seasonal variation in species and average

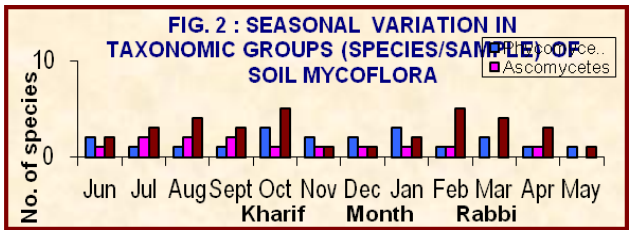
Table 2: Taxonomic account of Dueteromycetes isolated from soil of rice field.

Classes, order and family	Genera	Species
DEUTEROMYCETES:		
Sphaeropsidales : Sphaeropidaceae	01	02
Melanconiales : Melanconiaceae	02	02
Monilales		
1. Moniliaceae	05	20
2. Dematiaceae	09	17
3. **Tuberculariaceae**	**02**	**11**
Mycelia sterilia	03	03

Table 3: Biodiversity of family Tuberculariaceae species isolated from soil of rice field.

Sr.No.	Name of Organisms	Kharif	Rabbi
1	*Fusarium chlamydosporum* Wollenw. & Reinking	–	+
2	*Fusarium oxysporum* Schlecht	+	–
3	*Fusarium semitectum* Berk & Ravenel.	+	+
4	*Fusarium poae* (Peck) Wollenw.	+	+
5	*Fusarium moniliforme* J. Sheldon.	+	+
6	*Fusarium sambucinum* Fuckel.	+	–
7	*Fusarium dimerum* Penzig.	+	–
8	*Fusarium avenacea* (Fr,) Sacc.	+	–
9	*Fasurium udum* Butler.	+	–
10	*Fusarium* sp.	+	+
11	*Myrothecium roridum* Tode.	–	+

Population of Tuberculariaceae group of Deuteromycetes was also fonnd along with Phycomycetes and Ascomycetes during both cropping seasons. They showed highest peak in kharif cropping season as compared to rabbi cropping season (fig-1). Deuteromycetes were dominated in soil before the harvest time when crop shows full growth as compared to early stage of growth in all the years. Altogether 47 species of fungi belonging to 22 genera were recorded from the soil of rice field. Out of 47



species 08 were Phycomycetes, 03 were Ascomycetes and 33 were Deuteromycetes and 03 of mycelia sterilia. Total 11 numbers of species from Tuberculariaceae were recorded as mycofloral biodiversity. *Fasurium udum* Butler causes wilt of pigeonpea (Vinodkumar, *et al.,* 2007). *Fusarium moniliforme* J. Sheldon causes stalk rot of maize (Thory*, et al.,* 2012). *Myrothecium roridum* Tode causes leaf spot of soyabean (Talukdar and Dantre, 2013). *Fusarium moniliforme* J. Sheldon was recorded as disease casual organism of foot rot of rice and *Fusarium oxysporum* Schlecht, *Fusarium poae* (Peck) Wollenw shows the toxic effect on seedling of rice during this study. These above species were isolated along with others in two cropping seasons of a year.

CONCLUSION

The present study revealed that fungal population varied according to the cropping seasons exhibiting relation with rainfall, humidity and temperature. Fungal population was increased considerably in response to rainfall and higher humidity. Higher temperature and dry atmosphere did not favours fungal proliferation. Maximum count of fungi remain prevalent in kharif cropping season while it was reported minimum at the seedling and harvesting stage of rice. Higher peak of population was confined in middle age of the cropping. Altogether 11 species of Tuberculariaceae fall under 02 genera were recorded throughout a survey from rice field soil. Population of Deuteromycetous fungi was reported higher over others.

REFERENCES

Das AC (1963) Ecology of soil fungi of rice field. *Trans. Brit. Mycological Soc*. 46 (3): 431-433.

May RM (1988) How many species are there on earth? *Science.* New York. 241: 1441-1449.

Perry DA, Amaranthus M.P, Brocher J.G, Brocher S.L, Brainerd, RE (1989) Bootstrapping in ecosystems. *Bio Science*. 39: 230-237.

Rane VI, Suryawanshi BG (2012) Mycofloral biodiversity of Dematiaceae in rice field soil of Gondia district. *Journal of Bio. & Phy.Science*. 2(4):332-335.

Sharma RD, Singh RS (1973) A technique for selective isolation of *Fusarium monili forme* from soil and plant tissues. *Indian Journal of Mycology and Plant Pathology.* 3: 6770.

Suryawanshi BG, Rane VI (2012) Environment and rice (*O.sativa*) phylloplane mycofloral biodiversity in east Vidarbha(India). *Jon. of Bio. & Phy.Science*. 1(4):35-37.

Talukdar T and Dantre RK (2013) Physiological studies on Myrothicium roridum casuing leaf spot of soyabean. *Indian Phytopath.* 66(2):224-225.

Thory HR, Bunker RN, Mathur K., Sharma SS (2012). Integrated management of post flowering stalk rot of maize caused by Fusarium moniliforme. *Indian Phytopath.* 65(2):151-154.

Vinod Kumar, Chauhan VB, Shrivastav JP (2007) Pathogenicity & biochemical variability in Fusarium udum, causing pigeonpea wilt. *Indian Phytopath.* 60(3):281-288.

Waksman SA. (1944). Three decades with soil fungi. *Soil Sci.* 58: 89-115.

RESEARCH ARTICLE

Cyanophycian Algal Diversity of Bhadrawati Tahasil Paddy Soil of Chandrapur District (MS) India

Wadhave NS

Department of Botany N.S College Bhadrawati Maharashtra State(INDIA)

Email Id :nswadhave@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Wadhave NS (2014) Cyanophycian Algal Diversity Of Bhadrawati Tahisil Paddy Soil Of Chandrapur District (Ms) India. *Int. J. of Life Sciences*, 2014, Special Issue A2: 112-115.

ABSTRACT

Rice fields harbour a very luxuriant growth of different kinds of algae owing to their standing water,prevalent high temperature and high humitidy during the rice growing season. Cyanobacteria are widespread photosynthesis microorganisms among which some are able to fix atmospheric nitrogen. Cyanobacteria also have a unique potential to contribute to productivity in a variety of agricultural and ecological situations.Cyanobacteria have been reported from a wide range of soils. Bhadrawati Taluka has an area of 1121sqkm,the area under cultivation is around 51900hectors.Soil samples were collected from Bhadrawati, Chora, Chandankheda,Ghodpeth and Ghotnimbala studies and 74 algal taxa have been identified..

INTRODUCTION

Rice is the world's most important food crop. More than 40% of the world's population depends on rice as the major source of calories. Most of the rice in tropical countries is produced in lowland areas. To feed thedemand of global population, the world's annual rice production would have to increase from the present 528 million to 760 million by the year 2020. Nitrogen is a key input limiting rice production worldwide. To produce a ton of grain, the rice crop takes up an averge of 20 kg N ha-1 from the soil over 3-5 months to sustain rice productivity at present levels,the N removed in harvested produce or lost from the system must be replaced by N fertilizers or through biological N2 fixation (BNF).

Most of the world's rice production is in Asia where, for centuries, farmers have practiced a cultural system that ensured modest but stable yields, yet maintained a degree of N fertility in the soil. Additions of N through BNF balanced the losses of N through crop harvest and other mechanisms, creating a dynamic equilibrium (Ladha, 1997). This equilibrium was disturbed by the need to increase rice production and high-yielding rice varieties (HYVs) which can use additional N.in comparion with traditional varieties , the HYVs needs larger amounts of N from soil.. With irrigation, cultivation was Fritsch and John(1942) found a correlation between the composition of the algal flora and the soil characteristics. Lund (1947), observed that the number of alage in these soils vaied with the weather conditions. The development of soil alage in sodium padzolic soils and their

relation to the cultivated plants were studied by shtina(1957). Granhall (1970), reported that Nostoc and Anabaena were the commonest nitrogen fixing algae in Swedish soils and had the greatest PH tolerance intensified to two and even three crops per year. Another trend detrimental to soil N fertility is the increase in area being cropped only to cereals.

Yield trends from long–term continuous cropping experiments conducted in the Phillipines, India, Indonesia, Thailand and Bangladesh Indicate that, even with the best available cultivars and scientific management, rice yield, has declined over time since the early 1980s (Flinn and De Datta , 1984; Cassman and Pingali, 1995; Nambiar and Ghosh , 1984[as cited in Pingali et al., 1997]). Farm monitoring data from the Phillippines showed that average wet season rice yields were 4.2t ha-1 in central Luzon and 4.7 t ha-1 in Laguna in the early 1980s. Since then, yields have gradually declined to such an extent that they were 0.5 t ha-1 lower in 1990 in both domains. In Ludhiana, Punjab, India, where an intensive rice– wheat double-cropped system is being practiced, average rice yield attained by 1980 was 4.0t ha-1 and has remained relatively constat, thereafter (Cassman and Pingali, 1995). Such declining or stagnant yields have raised concerns about the long- term substainability of intensive rice production systems.

MATERIAL AND METHODS

Experiments were conducted on five places of Bhadrawatitaluka.The soil samples were collected from a paddy field from depth of 15 to 20 cm by means of stainless steels augers from 15 to 20 well distributed spots,moving in zigzag manner from each individual sampling site after scrapping off the surface litter, if any,without removing soil.

Collected soil was mixed thoroughly by hands on a clean piece of cloth.From the soil samples,1 gm.ofsoil was used for each culturing and remaining soil samples were used for soil analysis B.G-11 culture medium was used. for the culturing different algae.

In rainy season natural algae were picked up with the help of forcep and collected in clean plastic bottle in the laboratory.The algal slide were made and identified the natural algae,with the help of standard literature.The culturing vessels with culture media were sterilized and autoclaved at 2lbs.pressure for 20 minutes prior to inoculation.. The sub-cultureswere prepared and a few cells were transfered to media for unialgal cultures for the identification of algae.

RESULT AND DISCUSSION

Result of algal studies showed that,from the 5 places of Bhadrawati, 74 algal taxa could be identified from

Table 1: Showing cyanophycian algal diversity

S.N.	Name of Algae	Places of Occurance				
	CYANOPHYTA	**Bhadrawati**	**Chora**	**Chandankheda**	**Ghodpeth**	**Ghotnimbala**
1	*Microcystiselabens*	+	-	-	+	+
2	*Microcystisholsatica*	-	+	-	+	+
3	*Microcystisprotocystis*	+	-	+	-	+
4	*Microcystispulvarea Var. incerta*	+	+	+	-	-
5	*Microcystisrobosta*	-	+	+	+	-
6	*Chroococcuslimneticus*	-	+	-	+	+
7	*Chroococcus micrococcus*	+	+	-	-	+
8	*Chroococcus minor*	+	-	+	+	-
9	*Chroococcusspelaeus*	+	+	-	+	-
10	*Chroococcusturgidus*	-	+	+	+	-
11	*Gloeocapsarupestris*	+	-	-	+	+
12	*Aphanoapsabiformis*	-	+	-	+	+
13	*Aphanoapsaconferata*	+	-	+	-	+
14	*Aphanoapsafonticola*	+	+	+	-	-
15	*Aphanoapsamusicola*	-	+	+	+	-
16	*Spirulinagigantia*	-	+	-	+	+
17	*Spirulinasubtilissima*	+	+	-	-	+
18	*Oscillatoriaabscura*	+	-	+	+	-
19	*Oscillatoriaamoena*	+	+	-	+	-
20	*Oscillatoriaamphigranulata*	-	+	+	+	-

21	*Oscillatoriaannae*	+	-	-	+	+
22	*Oscillatoriachlorina*	-	+	-	+	+
23	*Oscillatoriacurviceps*	+	-	+	-	+
24	*Oscillatoriacurviceps Var. anqusta*	+	+	+	-	-
25	*Oscillatoriadecolorata*	-	+	+	+	-
26	*Oscillatoriaprinceps*	-	+	-	+	+
27	*Oscillatoriasalina*	+	+	-	-	+
28	*Oscillatoriatenuis*	+	-	+	+	-
29	*Phormidiumfaveolarum*	+	+	-	+	-
30	*Phormidiumjankelianum*	-	+	+	+	-
31	*Phormidiummucosum*	+	-	-	+	+
32	*Phormidiumuncinatum*	-	+	-	+	+
33	*Lyngbyaaerugineocorrulea*	+	-	+	-	+
34	*Lyngbyacorticicola*	+	+	+	-	-
35	*Lyngbyadendrobia Var. skujaii*	-	+	+	+	-
36	*Lyngbyarivunarianum*	-	+	-	+	+
37	*Lyngbyasemiplena*	+	+	-	-	+
38	*Schizothrixtenuis*	+	-	+	+	-
39	*Symplocaelegans*	+	+	-	+	-
40	*Hydrocoleussubincrustaceus*	-	+	+	+	-
41	*Cylindrospermumindicum*	+	-	-	+	+
42	*Cylindrospermummusicola*	-	+	-	+	+
43	*Nostoccalcicola*	+	-	+	-	+
44	*Nostoc commune*	+	+	+	-	-
45	*Nostocmicroscopium*	-	+	+	+	-
46	*Nostocpaludasum*	-	+	-	+	+
47	*Nostocspongiaeforme*	+	+	-	-	+
48	*Anabaena anemala*	+	-	+	+	-
49	*Anabaena fertilísima*	+	+	-	+	-
50	*Anabaena laxa*	-	+	+	+	-
51	*Anabaena naviculoides*	+	-	-	+	+
52	*Anabaena sphaerica*	-	+	-	+	+
53	*Anabaena variabilis*	+	-	+	-	+
54	*Camptylonamopsisiyengarii*	+	+	+	-	-
55	*Scytonematopsisworonichinii*	-	+	+	+	-
56	*Scytonemafremyii*	-	+	-	+	+
57	*Scytonemamillei*	+	+	-	-	+
58	*Tolypothrixbouteillei*	+	-	+	+	-
59	*Tolypothrixhyssoidea*	+	+	-	+	-
60	*Microchaetecalothrichoides*	-	+	+	+	-
61	*Calothrixbrevissima Var. moniliforme*	+	-	-	+	+
62	*Calothrixclavata*	-	+	-	+	+
63	*Calothrixepiphytica*	+	-	+	-	+
64	*Calothrixmarchika Var. intermedia*	+	+	+	-	-
65	*Calothrixmembranacea*	+	-	-	+	+
66	*Calothrixspiphytica*	-	+	-	+	+
67	*Gloetrichiaindica*	+	-	-	+	+
68	*Gloetrichianatans*	-	+	-	+	+
69	*Haplosiphonintricatus*	+	-	+	-	+
70	*Haplosiphonwelwitschii*	+	+	+	-	-
71	*Stigonemahormoides*	-	+	+	+	-
72	*Aphanothecenaegelii*	-	+	-	+	+
73	*Arthospirakhannae*	+	+	-	-	+
74	*Synechocystisaquatilis*	+	-	+	+	-

There are well marked seasonal and ecological changes in the paddy fields and the algal flora. Therefore, shows considerable variation during the year. The cultural conditions moreover are markedly different from those in nature. The qualitative and quantitative growth of the algae in nature, therefore, differs from what we find in culture.

A comparison of the algal flora in nature and in culture of the soils of BharawatiTalukashows that a number of forms like *Anabaena bharadwajae*, *Calothrix membranacea, Nostocsp., Cylindrospermummucicola* and species of *pharmodium, Lyngbya* and *oscillatoria* occur abundantly both in culture as well as in nature. *Scytonemafremyii* also grows abundantly both in nature and in soil culture but another species of *Scytonema*, *S. pseudohofmnni* is found to grow only in nature. Similarly *Tolypothrixbouteillei* is common in both culture and in nature. Some of the forms which occurred exclusively in nature are *Aulosira fertilissima*, *Gloeotrichianatans, Scytonemafremyii, Aphanocaps agrevilli, Aphanothae cenaegelli* and a few others. Out of these *A. fristchii, G natans,* and *S. coactile* grew very profusely in nature and their complete absence in soil cultures is, therefore , noteworthy. The algal flora of a particular region or crop fields depends on the climate,of the region,environment of the field and nature of cultivation.The interaction between the algal flora and the crop plant in a crop field.paddy have much important effects by the algal flora of the paddy field.

Paddy shows a variable environment for the growth of different types of algae at different seasons.Hence collection of algae and cultures of algae of different seasons were made to finalise the list of algae present in the paddy fields of Bhadrawatitaluka five different culture medians were used to avoid elimination of an alga from the list to culture condition. Soil analysis of the respective fields was made to correlate the presence of an alga in a particular type of soil, TableII. The soil analysis showed a pH range from 6.9 to 7.9 to state a alkaline condition.In all 74 taxa from paddy fields of Bhadrawati were isolated and identified.In the paddy field of Bhadrawati Anabaena and Nostoc were found frequently.

CONCLUSION

The present study revealed that fungal population varied according to the cropping seasons exhibiting relation with rainfall, humidity and temperature. Fungal population was increased considerably in response to rainfall and higher humidity. Higher temperature and dry atmosphere did not favours fungal proliferation. Maximum count of fungi remain prevalent in kharif cropping season while it was reported minimum at the seedling and harvesting stage of rice. Higher peak of population was confined in middle age of the cropping. Altogether 11 species of Tubercullariaceae fall under 02 genera were recorded throughout a survey from rice field soil. Population of Deuteromycetous fungi was reported higher over others.

REFERENCES

Cassman KG and Pingali PL (1995) extrapolating trends from long term experiments to farmer field: the case of irrigated rice systems in asia. In; Barnett v, payne r &stenier r (eds) agriculture substancebility: economic, envermonental and stablishlity considered pp 63-84. Jhonwiley & sone Ltd.

Flinn JC & de data SK (1984) Treinds in irrigated rice yields under intensive cropping at Philippine research stations. *Field crops res*., 9:1-15

Ladha JK (1997) role of biological nitrogen fixation in replenishing oil nitrogen pool in cropping systems. In; elmerich C etal. (eds) proceedings of the international congress on nitrogen fixation. Kiuwer academic press, the Netherlands (in press).

Pingali PL, Hossain M and Gerpacio RV (1997) Asian rice bowls: the returning crisis/ p 341. CAB international, Wallingford, oxon, UK.

Fritsch and John (1942) found a correlation between the composition of the algal flora and the soil.

Lund (1947) The number of algae in these soils varied with the weather conditions.

Shtina (1957) The development of soil algae in sodium padzolic soils and their relation to the cultivated plants.

Geanhall (1970) Nostoc and anabaena were the commonest nitrogen fixing algae in swedish soils and had the greatest $_{p}$H tolerance.

Singh PK, Dhar DW, Pabbi S, Prasanna R and Arora A (Editors), Biofertilizers:Blue Green Algae and Azolla, IARI, New Delhi. Venus Printers and Publishers, New Delhi,2000.

Singh NI, Dorycanta H, Devi GA, Singh NS and Singh SM (1997) Blue–Green algae from rice field soils of Nagaland. Phykos, 36:115-120.

Thajuddin N and Subramanian G (2005) Cyanobacterial biodiversity and potential applications in biotechnology. *Curr.Sci*., 89(1):47-57

Tirkey J and Adhikary SP (2005)Cyanobacteria in biological soil crusts of India. *Curr.Sci*, 89(3):515-521

Iris Pereira et al. (2009) Development of a biofertilizer based on filamentous nitrogen-fixing cyanobacteria for rice crops in chile. *J. Appl Phycol*.,21:135-144 DOI 10,1007/s10811-008-9342-4.

RESEARCH ARTICLE

Studies on certain physico-chemical parameters of some freshwater bodies in & around Pauni Town of Dist. Bhandara (M.S.) India.

Deshmukh RN

Department of Botany, Shivaji Science College, Congress Nagar, Nagpur

E-mail: *rn.deshmukh@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Deshmukh RN (2014) Studies on certain physico- chemical parameters of some freshwater bodies in & around Pauni Town of Dist. Bhandara (M.S.)India., *Int. J. of Life Sciences,* Special Issue A2: 116-118.

ABSTRACT

Fresh water is one of the abundantly available abiotic components in nature that exploited more than any other resources by man for the sustenance of life. Moreover, the uncontrolled use of natural resources has put enormous strain on the quality of freshwater. In the backdrop of above information, the present study was undertaken to determine the trophic status of the five freshwater resources/lakes in and around Pauni town of Bhandara District of the central India. The trophic status assessment of the five collected water samples from lakes was assessed phosphorous, nitrogen, chlorophyll-*a* content and transparency. The results revealed variation in concentration of phosphorous from 1.3±0.5 to 3.1±1.1 mg/L and nitrogen from 3.4±1.3 to 8.1±2.2 mg/L. The transparency in majority of lakes was less than 1.9 meters, whereas the chlorophyll-a varied from 3.9 to 8.3 mg/L. Majority ($P<0.05$) of freshwater resources in & around Pauni town are reported mesotrophic. It may be concluded that freshwater resources of the region are severely under nutrient pollution threat and demand that better practices be followed to restore the water quality.

Keywords: *Freshwater, phosphorous, nitrogen, chlorophyll a, trophic status*.

INTRODUCTION

Water is one of the abundantly available substances in nature, which man has exploited more than any other resources for the sustenance of life. Safe water is need of hours for survival of living organisms. However, most water bodies have become contaminated due to incorporation of untreated solid and liquid waste. Moreover, smaller as well as larger towns in India are situated near the lakes, and dams, their run off and those from agricultural lands find their way to these water bodies and makes them unfit for human use. Presently due to increased human population and man-made conditions, the water quality is deteriorating everywhere (Jayabhaye *et al*., 2008). The contents of growth – the composition of inputs (including ecological resources) and outputs (including waste products)—determined by, among other things, the economic institutions within which human activities are conducted, is critical for human development. These institutions need to be understood to appreciate the correct incentives for providing and protecting the resilience of aquatic ecological systems. Protecting the precious aquatic ecological systems to sustain welfare is of as much importance to poor countries as it is to the rich (Khanna *et al*., 1999).

The importance of aquatic ecosystem health lies in the fact that where an ecosystem is out of balance, humans suffer as well. Human health and many of the activities are dependent on the health of aquatic ecosystems. Most of the drinking water is taken from lakes or rivers.

If the lake or river system is unhealthy, the water may be unsafe to drink or unsuitable for industry, agriculture, or recreation. Uses of aquatic ecosystems are thus impaired when these systems are unhealthy. Healthy aquatic ecosystems are those where anthropogenic disturbances have not impaired the natural functioning (e.g., nutrient cycling) nor appreciably altered the structure (e.g., species composition) of the system. These disturbances can be *physical* (e.g., injection of abnormally hot water into a stream), *chemical* (e.g., introduction of toxic wastes at concentrations harmful to the organisms), or *biological* (e.g., introduction and propagation of non-native or exotic animal or plant species). Symptoms of poor ecosystem health include loss of species (loss of biodiversity), accelerated proliferation of organisms (algae blooms caused by an excess of phosphorous and nitrogen compounds in the water i.e. eutrophication), change in chemical properties (like pH) and presence of certain unwanted organisms (like coliform bacteria). Environmental pollution may change the composition, function, and trophic status of ecosystems in reversible or irreversible ways by affecting their biotic or abiotic components. Aquatic pollution comprises all allochthonous inputs and stresses that are in contrast to natural allochthonous input directly or indirectly caused by anthropogenic activities. Possible pathways for aquatic contamination are treated or untreated domestic/ municipal wastewater, surface runoff and industrial wastes (Heininger *et al*., 1998; Tariq *et al*., 1996; Moll and Mansfield, 1991). Pollution of water, soil, sediment or atmosphere proceeds essentially unabated, and the ecosystems serve as repositories for numerous pollutants.

Eutrophication refers to the continuous enrichment of waters by the addition of substances that provide for the increasing growth of aquatic life. Natural eutrophication tends to occur regularly but very slowly, often over a period of hundreds of years. Human activity is generally responsible for rapid eutrophication as household wastes, agricultural land drainage, and organic industrial wastes or their decomposition products reach the lakes and reservoirs. When gross eutrophication is reached, large, visible aggregations of floating algae bloom extensively, particularly blue-green forms which develop during the late summer. *Anacystis (Microcystis)*, and *Anabaena* are the most common algae to bloom but others such as *Aphanizomenon, Gomphosphaeria, Rivularia*, and *Oscillatoria* may also produce blooms. Less often *Spirulina* or *Arthrospira* may be responsible. The blooms may cause unusually severe problems of tastes and odors, filter and screen clogging, and slime accumulation in pipes; some may be toxic, and all may cause fish kills when large numbers of the algae die at about the same time. In the backdrop of above information, this study was carried out to determine the trophic status of the freshwater resources in & around Pauni town of Bhandara District of the central India. This district was selected as it is known as the district of lakes and there is abundant water availability.

MATERIALS AND METHODS

Study Area – Pauni Town:

A Pauni town in the District of Bhandara situated in 20 48' North and 79 39' East, on the Wainganga river. A town is surrounded by many water bodies of which Khurada & Balsamudra are the larger one. Geographically, the district lies entirely within the Wainganga basin. Three major tributaries of the Wainganga—the Bagh, the Bawanthari and the Chulband drain the district. The district covers an area of 9280.0 km^2 and often called the 'Lake District' of Maharashtra as it is well justified by existence of 580 large, 13758 medium and few small sized tanks.

To the collection of data for some parameters, water samples were obtained from five different lakes and processed by standard methods.

(a) Analytical Methods Used: *Conc. of Phosphorous* was determined by Stannous Chloride method and Nitrogen conc. by UV Spectrophotometric method.

(b) Trophic Status of the Water bodies in & arround Pauni Town: Three trophic state categories were used to describe lakes as they grow progressively greener: *oligotrophic, mesotrophic*, and *eutrophic*. Trophic state was assessed by: (1) measuring nutrients level and chlorophyll-a content in the lake and (2) measuring lake water clarity using a Secchi disk. By using these measurements, classification of lake based on typical ranges for phosphorus, nitrogen, chlorophyll a and Secchi depth values reported in the lake's lifecycle. Chlorophyll *a* was determined by using a handheld fluorometer manuf.

(c) *Statistical Analysis of Data and Significance Level*: Data was analyzed by applying statistical tests and with the aid of PASW 18.0 software.

RESULTS AND DISCUSSION

Table 1: Trophic Status of the different water bodies in & around Pauni Town

	Total Phosphorus		Total Nitrogen		Chlorophyll *a*		Secchi Depth (m)		Trophic Status
Gosekhurd	2.77	±0.72	3.00	±0.46	8.20	±1.20	3.20	±0.28	Mesotrophic
Wahi Lake	1.50	±0.38	5.33	±0.25	11.82	±3.38	2.87	±0.44	Mesotrophic
Pauni-Near Bridge	1.57	±0.25	1.20	±0.56	7.45	±2.48	4.86	±0.27	Mesotrophic
Khurada Lake	1.77	±0.45	5.20	±0.17	9.47	±2.62	4.27	±0.54	Mesotrophic
Balsamudra Lake	1.43	±0.06	4.37	±1.16	12.56	±3.31	2.18	±0.19	Eutrophic

Trophic Status of the Water bodies in & around Pauni Town:

The determination of lake trophic state is usually made by measuring several diverse criteria, none of which are direct measures of trophic state per se, but rather are indicators of it. Erroneous conclusions may be drawn if only single or few indicators are used, and it is therefore useful to consider an array of different methods. Hence, it is important that the trophic status assessment be carried out with utmost care. Besides, the trophic status knowledge for a particular lake or group of lakes in a geographical area indicates the possible risk of good quality water availability or unavailability. Hence, in this investigation the trophic status of five different water bodies in & around Pauni Town of Bhandara District of central India was carried out. The results of the study are presented in Table 1.

On the basis of results obtained for total phosphorous, total nitrogen, Chlorophyll *a* and Secchi depth, the trophic status of Gosekhurd, Wahi Lake, Pauni-Near Bridge and Khurada Lake is mesotrophic whereas Balsamudra Lake was eutrophic. Thus, it may be concluded from the study results that majority ($P<0.05$) of water bodies in & around Pauni Town are mesotrophic.

CONCLUSION

The impact of human activity on water resources and the need for the rehabilitation of watersheds, watershed ecosystems needs an in depth understanding of the limnology. Water is necessary for the survival of all biotic components. Moreover, clean freshwater is needed by humans for personal hygiene, irrigation, industry and recreation. With all of the demands humans place on the hydrosphere, as well as climate changes which have led to droughts, the quantity of available freshwater is decreasing at an alarming rate. The human civilization has been blessed with the abundance of freshwater; however, the demographic growth of civilization has put a lot of pressure on the aquatic resources, which collectively experience deteriorating quality since last many years. In view of this, present study focused on the assessment of trophic status of the selected water bodies in & around Pauni Town of Bhandara District of Maharashtra. On the basis of results obtained in the present study, it may be concluded that majority ($P<0.05$) of water bodies in study area are of mesotrophic trophic status. Since good quality freshwater is important for health, economic prosperity, and personal enjoyment, it needs to be preserved, however, the mesotrophic status of majority of lakes indicated that the risk of these lakes becoming eutrophic is very high.

REFERENCES

Heininger P, Pelzer J, Claus E, Tippmann P (1998) Contamination and toxicity trends for sediments- case of the Elbe river, *Wat. Sci. Tech.,* 37: 95-102.

Jayabhaye UM, Pentewar MS, Hiware CJ (2008) A study on physico-chemical parameters of a minor reservoir, Sawana, Hingoli District, Maharashtra. *J. Aqua. Biol.*, 2008, 23(2): 56-60.

Khanna P, Ram Babu P, Suju George M (1999) Carrying-capacity as a basis for sustainable development: A case study of National Capital Region in India, *Progress in Planning*, 52: 101 – 163.

Moll RA & Mansfield PJ Response of bacteria and phytoplankton to contaminated sediments from Tenton Channel, Detroit River, *Hydrobiologa*, 1991, 219: 281-299.

Tariq J, Ashraf M, Jaffar M, Afzal M (1996) Pollution status of the Indus river, Pakistan, through heavy metal and macronutrient contents of fish, sediment and water. *Water Res.,* 30 : 1337-1344

RESEARCH ARTICLE

Physico-Chemical Analysis of Ground Water Sample from Kamal Colony, Amravati.

DeshmukhVaishali D[1,2], Wharekar SR[2], Ingole SP[2], Khedkar DD[3]

[1]P.G. Department of Env. Science Shri Shivaji Science College, Amravati.

[2]P.G. Department of Environmental Science, Art, Commerce and Science College, KiranNager, Amravati

[3]P.G. Department of Botany, Shri Shivaji Science College, Amravati.

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Deshmukh Vaishali D, Wharekar SR, Ingole SP & Khedkar DD (2014) Physico-Chemical Analysis of Ground Water Sample from Kamal Colony, Amravati., *Int. J. of Life Sciences,* Special Issue A2: 119-122.

ABSTRACT

The quality of ground water depends on various constituents and their concentration. Ground water is the only source of potable water for majority of people in the urban & rural area.Dug well water samples were collected from five sampling of the Kamal colony, Amravati. which is analyzed by standard analytical methods. Water sample is collected by grab sampling method and stored in clean polyethylene five-liter cans. Physico-chemical analysis is carried out in the laboratory. The physical parameter like Colour, Temperature, Turbidity, Total suspended solids, Total dissolved solids and Conductivity. Chemical parameter like Alkalinity, Hardness, Acidity, p^H, Dissolved oxygen, Chloride, Total hardness, Phosphate, etc. were analyzed. Each parameter was compared with the standard desirable limit of that parameter in drinking water as prescribed by different agencies such as WHO standard, ISI standard and USPH Standard.

Key Words-Ground Water Quality, Physico-chemical analysis, Awareness.

INTRODUCTION

Water is nature's most wonderful, abundant & one of the most essential need for the human and other living organisms, but is also important for the sustenance of biodiversity, ecology and overall health of the planet Earth. Water is extremely essential for survival of lives–ecological resources for the flora and fauna of our earth. The quality of water is vital concern for mankind since it is directly linked with human welfare. The quality of ground water depends on various chemical constituents and their concentration, which is derived from the geological data of the particular region. Ground water occurs in weathered portion, joints and fractures of the rocks (Gupta *et al*., 2009). Most groundwater is clean, but groundwater can become polluted or contaminated due to various anthropogenic activities.

It can become polluted from leaky underground tanks that store gasoline, leaky landfill, or when people apply too much fertilizer, herbicides or pesticides on their fields or lawns. When pollutants leak, spread or are carelessly dumped on the ground they can move through the soil. Some sources are contaminated to groundwater as well, such as industries would dump toxic wastes into ponds, river or swampy area, which is not realizing that the waste could get into someone's drinking water. Some agricultural areas have trouble with fertilizer, pesticides and herbicides from farm runoff that contaminated seeps into the drinking water. Even sewage from houses,

toilets or livestock can contaminate water with dangerous bacteria. According to WHO survey has studied that 1.2 billion people all over the world do not use pure and safe drinking water and biological contamination of water is responsible for 80% of all human illness in the developing world (Wright *et al*., 2004).

Quality of ground water is an important factor in development and use of ground water as drinking resource. The potable water should be free from pathogenic agents and chemical constituents, pleasant to taste and usable for domestic purposes and healthy to human. The ground water is characterized by various quality problems (Gupta *et al*., 2004).

A various pathogenic microorganisms can be transmitted to humans via contaminated water with fecal material. Bacteriological quality of drinking water is primarily determined by using "indicator organisms" whose presence indicates fecal contamination (Duling, 2008). The physical, chemical and bacterial characteristics of ground water determine its use fullness for municipal, commercial, industrial, agricultural, and domestic water supplies (Walton, (1970). Various workers in our country have carried out an extensive work on water quality for various purposes. Subramani had studied groundwater quality and its suitability for drinking and agricultural use in Chithar River Basin (Subramani, 2005). Charu had studied the drinking water quality status in Bhopal and concluded that the water quality is good and within permissible range of drinking water standard values given by various agencies

MATERIALS AND METHODS

Study area: Kamal colony comes within the jurisdiction of Amravati municipal corporation (AMC). Kamal colony situated towards western part of the city. It is about two kilometers away from the main city. This colony was brought into existence in 1983. At the distance of 5 km. MIDC area is situated. Area covered by this colony is 19,6020sqft. and there are 58 plots of 2000sqft. There are 12 wells in the colony from those one wells are dumped by garbage or other waste.

***Sampling sites and sampling*:** The ground water is carried out from five (5) well at various locations within study area. Water sample is collected by grab sampling method and stored in clean polyethylene five-liter cans. Sampling has been carried out without adding any preservatives in well-rinsed bottles.

***Methodology*:** The collected samples were analyzed for different physico-chemical parameters. Some physical parameters like temperature & pH were determined at the site with the help of digital water analyzer kit. Electrical conductivity determined by conductivity meter. Total dissolved Solids (TDS) was estimated by evaporation method. Dissolved Oxygen (DO) mg/L Winkler method, Alkalinity as analyzed by titration method, Calcium (Ca) & Magnesium (Mg) Hardness as CaCO3 mg/L was measured by using standard EDTA solution. Chloride was determined by argentometric titration method using standard AgNO3 solution. Phosphate mg/L determined by Colorimetric Method. All the results are compared with standard limits recommended by WHO, WHO standard, ISI standard and USPH Standard & all parameters were analyzed by standard procedure mentioned in APHA.

RESULTS AND DISCUSSION

The results for dug well water quality of Kamal colony Amravati are tabulated in above Table 1. The temperature of five well water samples was found between the ranges 25^0C to 25.3^0C which is below the desirable limit. Higher ground water temperature decrease dissolved oxygen and also due to increased microbial activity (Kataria, 1996). The colour of the five well water samples was found to be clear during investigation period.

The turbidity of well water samples was found between the ranges 0.9 to1.7 NTU. In most water, turbidity is due to colloidal and extremely fine dispersions. The turbidity of five well water samples was found to be within permissible limits.

Total dissolved solids (TDS) value of five well water sample ranged from 19 to 81mg/lit. The total suspended solids and total solids, in five well water samples were found within the range of permissible limit. According to WHO the desirable limit of TDS is 500 and all samples were below the standard permissible limit. A high value of TDS reduces water quality for drinking, irrigation and agriculture purposes (WHO, 1996). Increase in TDS is mainly due to sea water intrusion and increase in salts (carbonates, bicarbonates, sulphate, calcium, sodium, potassium and other ions) Mittal *et al*. (1994). Dissolved solids tend to increase with increasing pollution of water. Water containing more than 500

mg/L of TDS is not considered desirable for drinking water.

Electrical conductivity of five well water samples was found between the range 0.738 m mho/cm to 1.110 m mho/cm value indicating that conducting materials are not present in large amount. It is a very important parameter for determining the water quality for drinking and agricultural purposes.

pH of five well water samples was found between the range 7.4 to 7.7. This value shows that the groundwater of the study area is slightly alkaline in nature and all the samples were within the permissible limit prescribed by WHO. pH is an important parameter in water body since most of the aquatic organisms are adapted to an average pH and do not withstand abrupt changes. pH is most important in determining the corrosive nature of water. Lower the pH value higher is the corrosive nature of water (Gupta *et al*., 2009).

Dissolved oxygen values of well water sample are varied between 4 mg/lit to 4.8 mg/lit. Dissolved Oxygen is one of the important parameters that measure the extent of organic as well as biological pollution load to a water body. All the samples were within the permissible limit. The low DO values indicating contamination by organic matter, which indicates some pollution load in the water.

Table 1: Physico-Chemical Parameters of well water

Sr. No.	Parameters	Sampling Station-1	Sampling Station-2	Sampling Station-3	Sampling Station-4	Sampling Station-5
1	Temperature	25^{0}C	25.2^{0}C	25.2^{0}C	25.3^{0}C	25.1^{0}C
2	Colour	Transparent	Transparent	Transparent	Transparent	Transparent
3	Turbidity	1.7 NTU	0.9 NTU	1.7 NTU	0.9 NTU	1.7 NTU
4	Total Solids	340 mg/lit	362 mg/lit	329 mg/lit	441 mg/lit	287 mg/lit
5	TSS	320 mg/lit	343 mg/lit	289 mg/lit	360 mg/lit	248 mg/lit
6	TDS	20 mg/lit	19 mg/lit	40 mg/lit	81 mg/lit	39mg/lit
7	Electrical Conductivity	0.751m mho/cm	0.753mmho/cm	0.738m mho/cm	1.110m mho/cm	0.776m mho/cm
8	pH	7.6	7.6	7.4	7.5	7.7
9	DO	4.4 mg/lit	5.1mg/lit	4.4 mg/lit	5.1mg/lit	4.4 mg/lit
10	Total Alkalinity	328 mg/lit	319 mg/lit	314 mg/lit	331 mg/lit	308 mg/lit
11	Total Hardness	320 mg/lit	316 mg/lit	300 mg/lit	324 mg/lit	292 mg/lit
12	Calcium Hardness	196mg/lit	244 mg/lit	172 mg/lit	188 mg/lit	180 mg/lit
13	Magnesium Hardness	124 mg/lit	72 mg/lit	128 mg/lit	136 mg/lit	112 mg/lit
14	Chloride	53.88 mg/lit	58.21 mg/lit	65.22 mg/lit	70.90 mg/lit	51.48mg/lit
15	Phosphate	0.10 mg/lit	0.7 mg/lit	0.8mg/lit	0.11 mg/lit	0.6 mg/lit

Table -2: Drinking Water Standards

Sr. No.	Parameter	WHO Standard	ISI Standard (Permissible limit)	USPHS Standard
1	Temperature	--	--	--
2	pH	6.5-9.0	6.0 – 8.5	6.0 – 8.5
3	Conductivity	--	--	300 μ mho cm^{-1}
4	Turbidity	5 NTU	5NTU	5NTU
5	Total Solids	500-1500 mg/lit	500-2000 mg/lit	--
6	Total dissolved solid	500mg/lit	500 mg/lit	500 mg/lit
7	Total suspended solid	-	100 mg/lit	120-
8	Alkalinity		200-600 mg/lit	120
9	D.O.	--	4 to 6.0 mg/lit	4.0 – 6.0 mg/lit
10	Total Hardness	150-500 mg/lit	300mg/lit	--
11	Calcium Hardness	100-200 mg/lit	75-200 mg/lit	--
12	Magnesium Hardness	150mg/lit		
13	Chloride	250mg/lit	250 mg/lit	250 mg/lit
14	Phosphate	--	--	0.1 mg/lit

The total Alkalinity in five well water samples was found between the range 308 mg/lit to 328 mg/lit. The main sources of natural alkalinity are rocks containing carbonate, bicarbonate and hydroxide compounds that are present in region (Agarwala *et al*., 2012). The value of alkalinity in water provides an idea of natural salts present in water.

The total hardness of five well water samples was found between the range 292 mg/lit to 324 mg/lit. The calcium hardness of five well water samples was found between the range 172 mg/lit to 244 mg/lit. The magnesium hardness of five well water samples was found between the range 72 mg/lit to 136 mg/lit. Hardness is the property of water which prevents the lather formation with soap and increases the boiling points of water. Hardness of water mainly depends upon the amount of calcium or magnesium salts or both. The total hardness in five well water samples was found to be within permissible limit. Excess of calcium and magnesium shows the hardness in water and is not good for potable.

The chlorides of five well water samples was found between the ranges 51.48 to 70.9 mg/lit. Chlorides are important in detecting the contamination of ground water by waste water. The permissible limit of chloride in drinking water is 250 mg/L. The values of chloride observed in five well water samples were very low i.e. within the permissible limit. The concentration of chloride caused a salty taste to water. These people who are not accustomed to high chloride content, it may cause a laxative effect (Agarwala *et al*., 2012).

The phosphate of five well water samples was found between the ranges 0.6mg/lit to 0.11 mg/lit. The higher phosphate was found to be 0.11mg/lit. Phosphate may occur in groundwater as a result of seepage of domestic sewage, detergents, agricultural effluents with fertilizers and industrial waste water. The phosphate content in the study area was found to be above the permissible limit. The excess amount of phosphate may cause serious health hazard (Rao *et al*., 2012).

CONCLUSION

The study area is analyzed for 15 parameters which are essential for deciding the water Portability. The quality of ground water with respect to name as per to various collection stations is within permissible limit. The par parameter phosphate is showing high level which cause adverse health effect. The purpose of project is to create awareness in people so that they can accept and implement the precaution while handling and using the ground water for drinking purpose

REFERENCES

Agarwala BR, Vijay MundhebV, Hussainc S and Pradhand V (2012) Assessment of bore well water quality in and around Badnapur Dist. Jalna. *Journal of Chemical and Pharmaceutical Research,* 4(8):4025-4027.

APHA (1998) Standard Methods for the Examination of Water and Waste Water. 20th edition, *American Public Health Association Washington D.C.*: APHA-AWWA-WEF.

Duling W,Wanda F(2008) Evaluation of media for simultaneous enumeration of total coliform and Escherichia Coli in drinking water supplies by membrane filtration techniques. *J Environ Sci*., 20:273-77.

Gupta DP, Sunita and Saharana JP (2009) Physiochemical analysis of ground water of selected area of Kaithal City (Haryana) India., *Researcher*, 1(2): 1-5.

Gupta S, Kumar A and Seth G (2004) Study of some Physico-chemical characteristics of various type of water in VKI area in Jaipur (Rajasthan) chemistry. *An Indian Journal*, 2: 612.

Gupta S, Kumar, Ojha CK, and Singh G (2004) Assessment of Water Quality Index for the Groundwater in Tumkur Taluk, Karnataka State, India. *J Environmental Science and Engineering,* 46(1): 74-78.

ISI (1983) Indian standard specification for drinking water, IS10500, ISI, New Delhi.

Indian standard drinking water Specification (1991) (First Revision), ISSN-10500: BIS, New Delhi, India.

Kasturi H, Kakaraddi, Kugali NM and Yadawe M (2014) Bacteriological and Physico-Chemical analysis of drinking water samples S2. *International Journal of Pharmaceutical and Medical Research*, Vol – 2 (1):13-15.

Kataria HC, Quershi HA, Iqbal SA and Shandilya AK (1996) Assessment of water quality of Kolar reservoir in Bhopal (M.P.). *Pollution Research*, 15(2): 191-193.

Mittal SK, Rao AL, Singh and Kumar R (1994) Ground water quality of some areas in Patiala city. *Indian J Environ Health,* 36:51-53.

NEERI (1981) A Course Manual Water and Waste Analysis. *National Environmental Engineering Research Institute, Nagpur*.

Rao VS, Prasanthi S, Jagarlapudi VSK and Kottapalli RSP (2012) Physico-chemical analysis of water samples of Nujendla area in Guntur District, Andhra Pradesh, India. *Int. J. ChemTech Res,* 4(2): 691-699.

Subramani T, Elango L and Damodarasamy SR (2005) Groundwater quality and its suitability for drinking and agricultural use in Chithar River Basin, Tamil Nadu, India. *Environ. Geol.* 47: 1099–1110.

Walton WC (1970) Ground water resources evolution, *New York, Mc Graw Hill Book.*

World Health Organization (1993) Guidelines for drinking water qua lity, vol 1 2nd ed. Recommendations, Geneva 830.

WHO (1996) Guidelines for Drinking water Quality 2(WHO, Geneva),231.

Wright J, Gundry S and Conry R (2004) House hold drinking water in developing countries; A systemic review of microbiological contamination between source and point of use. *Trop Med Int Health,* 9(1): 106-117.

RESEARCH ARTICLE

Water conservation by automatic water level controller

Ingole SP

Department of Environmental science, Shri Shivaji Science College, Amravati. India.

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Ingole SP (2014) Water conservation by automatic water level controller. *Int. J. of Life Sciences*, 2014, Special Issue A2: 123-124.

ABSTRACT

The drinking water crises in India is reaching alarming portion. It might very soon attain the nature of global crises. Hence it is important to preserve water. In many houses there is unnecessary wastage of water due to overflow in overhead tanks. Automatic water level controller can provide a solution to this problem. The operation of water level controller works upon the fact that water conducts electricity so water can be used to open or close the circuit. As the water level rises or falls different circuits in the controller send different signals. These signals are use to switch on or switch off the motor pump as per requirement.

Keyword: drinking water crises, need of conservation, use of automatic water level controller.

INTRODUCTION

Water is required for innumerable purpose. For household sanitary purpose water required for man is about 50 to 60 lit/day. The fact is human being and other required water which is fresh and not salty and polluted. But from where this water comes is the source limited or unlimited?

Our earth seems to be unique among the other known celestial bodies. It has water which covers three forth of its surface and constitutes 60 to 70% weight of the living world. Water regenerated and is redistributed through evaporation making it seems endlessly renewable (Abu-Tleb and Muurad, 1999). Dehydration will kill us faster than starvation. Since the plant and animals we eat also depend on water. Lack of water could cause both dehydration and starvation. The scenario get worse. Water that looks drinkable can contain harmful elements, which could cause illness and death if ingested (Aitken, 1994).

In day to day household and industrial activity we are using large quantity of water. A small negligence is putting us in danger for future water need and its consequences, etc (Berk et al., 1980; Calder, 2004). 'To save the water ' for future motivated me to do the research study on "the automatic water level controller" which is not the complete solution but a attempt of saving few litres of water which will definitely contribute in fulfilling the future need of water on the earth and so to conserve this precious water we have decide to give our contribution by putting forward the idea of the automatic water level controller.

The overall description of this controller is as fallows;

An automatic water level controller is designed to switch on the pump when the water level inside the overhead tank is low and to switch off when the tank is full. The switch is mounted over the tank and the electricity is switch on/off outside the tank (Arpke and Hutzler, 2006). and we can design a device to do this job automatically by measuring the level of the tank and taking appropriate action depending on the measurement (CCWS, 2006). The controller adjusts system inputs to produce desire system output. The rate of water flowing in and out is adjusted to produce the desire output, a half full tank. Measuring the tank level and using the measurement information to change the inflow and out flow rates is called feedback. We use feedback unconsciously all the time for instance when walking we use our eyes to measure the ground of and then place our feet appropriately.

To design controller, control engineers and mathematical models of the system to be designed.

If we let A is the rate of inflow, B is the rate of out flow, and C is the tank level, we might have a model which says-

If A is greater than B, then C increases.

If A is equal to B, then C remains constant.

If A is less than B, then C decreases.

Once we have such a model mathematical tools may be used to design a controller, the development of such mathematical tools is one of the principle area of this research.

Here the main principle is "the conversion of physical quantity into easily accessible signals".

CONCLUSION

It is very useful and easy to operate and save litres of water in day. In this survey the study of domestic water conservation using automatic water level controller. I had observed the efficiency of instrument during one month we find that the instrument useful and effective in domestic water purpose. It is also useful to know the property or status of water i.e. corrosive. Which occurs due to hardness Iron or Bronze material used in sensor, it found quickly corrosive. Water level controller helpful in motor power cut off during running dry condition due to motor power cut off the pump motor. Water level controller also useful for water, electricity conservation; as well as the cost saving.

RECOMMENDATION:

The study identify that the domestic water wastage is very high in jameel colony area due to improper governor which result in waste of water. We recommended to installed automatic water level controller which is helpful in the following ways.

- Save human efforts of governors.
- Reduce the cost of electricity.
- No cost for water for maintenance.
- Increase life of water pump.
- Hassel free life in busy and hectic schedule.
- Indirectly contributing to the environment for the conservation of water and energy for future.
- Availability of water in tank 24 x 7 and 365 during power load shading in area.
- No worries or forget to fill the tank

REFERENCES

Abu-Tleb MF, Muurad MM (1999), 'use of focus groups and survey to evaluate water conservation campaign'. Journal of water water resources planning and management, 25(2):94-99.

Aitken CK, McMahon TA, Weearing AJ, and Finlayson BL (1994) Residential Water Use: Predicting and Reducing Consumption. *Journal of Applied Social Psychology*, 24(2):136-158.

Aronson E (1990) Applying Social Psychology to Desegregation and Energy Conservation. Special Essue: Illustrating the Value of Basic Research. *Personality and Social Psychology Bulletin,* 16(3):118-132.

Arpke A and Hutzler N (2006) Domastic Water Use In The India: A Life Cycle Approach. *Journal of Industrial Ecology*, 10(1&2).

Berk RA et. al. 1980. Reducing Consumption in Periods of Acute Scarcity: The Case of Water. Social Science Research, 9:99-120.

Calder IR (2004) "Forests and water—Closing the gap between public and science perceptions." *Water Sci. Technol.*, 497, 39–53.

Conway G (1997) The doubly green revolution: Food for all in the twenty-first century, Penguin Books

CCWS (City f Calgary Water Services) (2006) Year End 2006: Water Conservation Report. City of Calgary Waterworks. 2005. Water Efficiency Plan

RESEARCH ARTICLE

Diversity of Wild Macrofungi in forests of Bhandara District, (MS), India

Tagade WY[1]* and Kawale MV[2]

[1]*Department of Botany, C. J. Patel College Tirora*

[2]*Department of Botany, D. B. Science College Gondia*

Corresponding author email : kawalemahesh@rediffmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Tagade WY and Kawale MV (2014) Diversity of Wild Macrofungi in forests of Bhandara District, (MS), India, *Int. J. of Life Sciences,* Special Issue A2: 125-127.

ABSTRACT

Bhandara district is well-known for the forest resources. 1343.77 Sq. Km. land is under forest which constituted 36.15% of total geographical area of the district. Forest resources contribute significantly to the economy of the district. Mushroom is a general term used mainly for the fruiting body of the macrofungi. In a present study, a survey of the biodiversity of wild macrofungi, including edible species, was carried out in two major forest area of Bhandara district. The Koka forest is one of the recently declared sanctuaries by Government of Maharashtra. While Chandpur forest is well known tourist place covered with dense forest. In these forests, numbers of macrofungi are available, which play an important role in forest ecosystem. Macrofungi like *Coprinus comatus*, *Daldinia concentrica*, *Xylaria polymorpha*, *Polyporus lucidus*, *Marasmius delectans*, *Schizophyllum commune*, *Mycena* sp., *Dictyophora duplicata, Claveria stricta*, *Geaster fimbriatus*, *Cantharellus infundibuliformis*, *Mutinus ravenelii*, *Lepiota americana*, *Clathrus cancellatus* are occur commonly in Koka and Chandpur forest.

Key words: Macrofungi, Koka forest, Chandpur forest, *Geaster fimbriatus*, *Lepiota Americana*.

INTRODUCTION

The study of fungal biodiversity has been carried out in all over the world (Crous, 2006) and about 1.5 million species has been reported so far (Hawksworth, 2004). About approximately 50% of them have been characterized (Monoharachary *et al*., 2005). The total numbers of fungal species in India is 27,000. Wild mushrooms have a profound biological and economical impact. From ancient times, they have been consumed by man with delicacy probably, for their texture and pleasing flavour. Mushrooms proteins contain all nine essential amino acids for man (Chang and Miles, 2004) as well as most commonly occurring non-essential amino acids and amides. They have rich nutritional value with high content of proteins, vitamins, minerals, fibres, trace elements and low/no calories and cholesterol. Many of them have been used in folk medicine for thousands of years. Some of them are neutralceuticals (natural food having potential value in maintaining good health and boosting immune system of the human body) while some can produce potent nutriceuticals (compounds that have medicinal and nutritional attributes and are consumed as medicines in the form of capsules or tablets but not as food). They are the sources of various bioactive substances like, antibacterial, antifungal, antiviral, antiparasitic, antioxidant,

antiinflammatory, antiproli- ferative, anticancer, antitumour, cytotoxic, DNA damaging, anti-HIV, hypocholesterolemic, antidiabetic, anticoagulant, hepatoprotective, etc.

Bhandara district (21.09 N latitude and 79.42 E longitude) situated in the Nagpur division of Vidarbha region and is surrounded by Balaghat district of Madhya Pradesh in the north, Gondia in the east, Chandrapur in the south and Nagpur in the west. Out of total geographical area of the district, 1343.77 Sq.Km is under forest which constituted 36.15% of the total area. District is famous for its lakes and forest area which comes under dry deciduous sub-trophical type. Forest resources contribute significantly to the economy of the district. From the month of June upto December and January different types mushrooms grows in these forests. Yet no work has been done on the diversity of macrofungi of the district. The current deforestration trends, which threatened the existence of plants as well as mushrooms, make it inevitable that this information be made available in the area.

During the investigation, the checklist of wild mushrooms was prepared. The formation of checklists for future comparison is vital to our understanding of changing fungal diversity.

MATERIALS AND METHODS

***Study Area* :** Two forests areas of Bhandara district of Maharashtra in India were selected for the study. One was Koka forest which is a Reserve forest area since 1879. It was a shooting block during the Raj era. Recently, Government of Maharashtra has declared as Sanctuary. Koka is located at 21°20 N 79°81E / 22.67°N 81.75°E. The total sanctuary area comes to 92.35 sq km.

The second forest area was Chandpur forest which is also well known tourist place due to famous Hanuman temple and its lake. This site is situated at N 21.51 latitude, E 79.81 longitude and altitude is around 357m. The Chandpur village is also surrounded with the Hills and dense forest.

Collection of mushrooms :The fungal surveys depend on timing and location of observations. The survey methods were adopted according to techniques adopted by Metzler Susan and Metzler Van (1992), Lodge *et al*. (2004) and Natrajan *et al*., (2005). Systematic and periodical survey of different parts of forest and other habitats rich with organic matters of Koka forest and Chandpur forest was undertaken during the period of July 2012 to October 2013.

Standard methods of collection, preservation, and identification were followed. Specimens were dried at 45°C - 50°C overnight and kept in plastic boxes with silica gel to keep out humidity. Each specimen was collected and labelled, indicating number, date of collection, locality and uses. Macrocharacters of the fungi were studied in the laboratory for identification and fruiting bodies were photographed by digital camera (Sony HD). Fungi were identified to genera and morphotypes and herbarium specimens are deposited in the College Museum (Christensen, 1970).

RESULTS AND DISCUSSION

It was observed that the climatic conditions prevailing in the areas of Koka and Chandpur regions of the Bhandara district favored the occurrence of diverse mushrooms. During the different visits to these forests total 30 Macrofungi were identified and collected (Table 1). Macrofungi like *Collybia butyracea*, *Conocybe tenera*, *Coprinus comatus*, *Daldinia concentrica*, *Xylaria polymorpha*, *Peziza badia*, *Polyporus versicolor*, *Polyporus lucidus*, *Polyporus elegans*, *Polyporus arcularius*, *Marasmius delectans*, *Scutellinia scutellata*, *Schizophyllum commune*, *Clitocybe ectypoides*, *Mycena* sp., *Marasmius rotula*, Inocybe sp., polyporus albellus, Dictyophora duplicata, Claveria stricta, lactarius affinis, *Geaster fimbriatus*, *Panaeolus sphincitrinus*, *Xylaria polymorpha*, *Cantharellus infundibuliformis*, *polyporus lucidus*, *Mutinus ravenelii*, *Lepiota Americana* & *Clathrus cancellatus* are the common fungi occurred in both the sites of Bhandara district.

Of the collected and identified species of mushrooms, *Polyporus* was most dominating, as near about 7 species of it were observed in both the study sites. Geaster which is well known for its structure and famous as 'Earth Star' was found in both the study sites. *Clavaria stricta* well known with the name 'Coral Fungi' was also reported in both forests. Similarly, *Xylaria polymorpha* common name of which is 'Dead Ladies Finger' was shown its presence in both the sites. Three mushrooms with very interesting structures viz. *Clatharus, Mutinus* and *Dictyophora* were observed only in Koka forest, however, they were absent in Chandpur forest. Similarly some mushrooms were present in Chandpur forest absent in Koka forest which are *Clitocybe, Coltricia, Coprinus* and *Peziza* etc. After observing both these sites it can be concluded

that diversity of mushrooms is more in Koka forest as compared to Chandpur forest.

Table 1: List of identified wild mushrooms available at Koka and Chandpur Forest

Sr. No.	Name of Macrofungi	Koka forest	Chandpur forest
1.	*Cantharellus infundibulliformis*	+	+
2.	*Clathrus cancellatus*	+	-
3.	*Clavaria stricta*	+	+
4.	*Clavulina cristata*	+	+
5.	*Clitocybe ectypoides*	-	+
6.	*Collybia butyracea*	+	+
7.	*Coltricia perennis*	-	+
8.	*Conocybe tenera*	+	+
9.	*Coprinus comatus*	-	+
10.	*Daldinia concentric*	+	+
11.	*Dictyophora duplicata*	+	-
12.	*Geaster fimbriatus*	+	+
13.	*Inocybe fraudans*	+	+
14.	*Lacterius offinis*	+	-
15.	*Lepiota Americana*	+	-
16.	*Marasmius delectans*	+	+
17.	*Marasmius rotula*	+	+
18.	*Mutinus ravenelii*	+	-
19.	*Mycena sp.*	+	+
20.	*Panaeolus ephincitrinus*	+	+
21.	*Peziza badia*	-	-
22.	*Polyporus albellus*	+	+
23.	*Polyporus arcularius*	+	+
24.	*Polyporus elegans*	+	+
25.	*Polyporus lucidus*	+	+
26.	*Polyporus offinis*	+	+
27.	*Polyporus versicolor*	+	+
28.	*Schizophyllum commune*	+	+
29.	*Scutellinia scutellata*	+	-
30.	*Xylaria polymorpha*	+	+

During the study, total 26 non-edible, 04 edible and 01 medicinally important fungi were collected. Four edible mushrooms are *Cantharellus infundibulliformis, Coprinus comatus*, *Lepiota Americana* and *Panaeolus ephincitrinus.* Though the quantity of edible fungi likes *Agaricus* and *Pleurotus* was quite more but these were not found in the field as they were collected by the local peoples before our reach. Hence, these are not mentioned in a list. The local people called them as a 'Bhombhdi' or 'Satya'. One mushroom *Polyporus lucidus* was found to have medicinal value particularly in dermatological problems (Fig. 2 and 3). Singer (1989) had reported 1320 species belonging to 129 genera under Agaricalse. Mushrooms alone are represented by about 41,000 species, of which approximately 850 species are recorded from India (Deshmukh, 2004). Besides extensive surveys of the Himalayan region are compiled by Lakhanpal (1997). Atri *et al*. (2000) had done taxonomic studies of *Agaricus* from Punjab plains. Pradeep *et al*. (1998) worked on the diversity of mushrooms from Western Ghats.

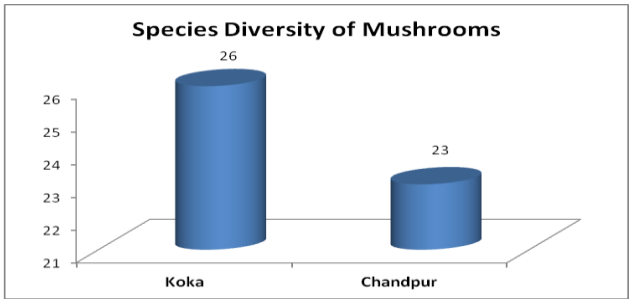


Fig. 2: Graph showing diversity of mushrooms in forest areas.

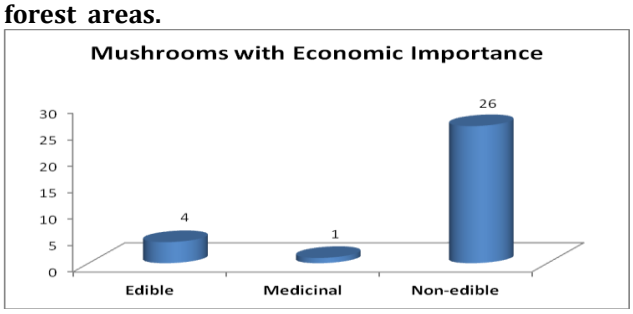


Fig. 3 Graph showing number of Economically important mushrooms species in forest areas

REFERENCES

Christensen CM (1970) Common Fleshy Fungi. Burgess Publishing Company, Minneapolis (USA).

Chang S, Miles GP (2004) Mushrooms: Cultivation, nutritional value, medicinal effects and environmental impact. CRC Press, USA, pp: 436.

Crous PW (2006) How many species of Fungi are there in tip of Africa. *Studies in Mycology*, 55: 13.

Deshmukh SK (2004) Mushroom Cultivation Nutritional value, Medicinal effect and Environmental impact. IInd Ed. CRC Press, pp: 2–4.

Hawksworth DL (2004) Fungal diversity and its Implifications for Genetic Resource collections. *Studies in Mycology*, 50: 19

Lakhanpal TN (1997) Diversity of Mushroom Microflora in the North Western Himalaya. In: Recent Research in Ecology, Environment and Pollution. Eds. Sati SC, Saxena J and Dubey RC. Today and Tommrow's Printers and Publishers, New Delhi, pp: 35-68.

Manoharachary C, Sridhar K, Singh RA, Suryanarayanan TS, Rawat S, Johri BN (2005) Fungal Biodiversity: Distribution, Conservation and Prospecting of Fungi from India. *Current Science* 89(1): 58-71.

Pradeep CK, Virinda KB, Mathews S, Abrahm TK (1998) The genus *Volvariella* in Kerala state, India. *Mushroom Res.,* 53-62.

Singer R (1986) The Agaricales in Morden Taxonomy. J. Cramer, Weinheim, 4th ed, pp: 912.

RESEARCH ARTICLE

Weed Diversity in Rabi Wheat Crop of Bhandara District (MS), India

Khobragade DP and Sathawane KN

Dept. of Botany S. N. Mor College of Arts, Commerce & Smt. G. D. Saraf Science College, Tumsar, Dist.- Bhandara

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Khobragade DP and Sathawane KN (2014) Weed Diversity in Rabi Wheat Crop of Bhandara District (MS), India, *Int. J. of Life Sciences,* Special Issue A2: 128-131.

ABSTRACT

The present communication deals with the diversity of common weeds in wheat crop cultivation during Rabi season of Bhandara district (M.S.), India. In this study 76 weed species belonging to 24 dicotyledons and 03 monocotyledons families are reported.Among dicotyledons families the maximum dominance shown by Asterceae, Fabaceae, Amaranthaceae, and Euphorbiaceae while monocotyledons families with 15 weed species, having dominance of Cyperaceae and Poaceae.The common dominant weeds of Rabi wheat crop are *Anagalis arvensi, Chenopodium album, Portulaca oleracea, Melilotus indica, Phaselous aconitifolius, Parthenium heterosphorus, Tridax procumbence, Rumex dentatus, Alternanthera spinosus, Euphorbia thymifolia, Cyprus rotundus* and more

Key words: - Wheat crop, Weed, Rabi season, Bhandara district.

INTRODUCTION

Jethro (1731) for the first time defined 'a weed as a plant can grow where it is not desired' in his much esteemed 'Horse Hoeing Husbandry'. Weeds are unwanted plants that grow in association with agricultural crops and bring about significant decline in yield through their competition with crop plants for sunlight, space, nutrients etc. (Dangwal *et al.*, 2010). However, some weeds are also allelopathic in nature (Oudhia and Tripathi, 1997; 1998). While Holm *et al.,* (1977; 1979) estimated that about 8000 weed species growing in world, of which only 250 are of particular importance to agricultural crops.

In view of significant yield decline by weeds in different crops, numerous studies have been carried out on various aspects of weed biology and control in India. Wheat (*Triticum aesativum* L.) is the second important staple food crop, next to rice in India. Rice – Wheat cropping system is predominant in our country of which 40% wheat is grown. The grasses and broad leaf weeds flourish luxuriantly because of availability of moisture and nutrient in abundance and lesser competitive ability of wheat cultivars. In general, seasonal long competition for major weeds culminates in yield reduction to an extent of 15- 40 % in this context Kaul (1986) studied the weed flora in Kashmir valley and reported 401 weed species belonging to 251 genera and 56 angiosperm families. Shailey and Gaur (1993) studied the phyto-sociological association of crops and weeds of Pauri district of Uttrakhand, India and recorded 180 weed species belonging to 50 angiosperm families. The dominant dicot families were Amaranthaceae, Apiaceae, Asteraceae and Brassicaceae and Commelinaceae and Poaceae from monocot familes. Singh *et*

al., (2007) studied the phytosociological association of weeds in winter crops of Kashmir valley.Gupta *et al.,* (2008) studied the dynamics of cereal crop weeds of Doon valley with special reference to rice, maize and wheat fields. They reported 151 weed species belonging to 118 genera. 31 families; 57 weeds were reported from rice, 77 from maize and 71 from wheat fields. As the Bhandara district separated then there is only the taxonomical and Ethnobotanical exploration is don by some workers as Gadpayale *et al*.(2011a,2011b, 2013,a 2013b), Tiwari *et al* (2013) , but the studies on weed plants is still unscreened. Hence in the present study attempts were made to screen the weed plants associated with rabi wheat crop of Bhandara district (M.S.).

The Bhandara district is situated on the bank of Waingangā River. It lies between the latitudes $20^0$39' and $21^0$38' North and longitudes $79^0$27' and $80^0$42' East and has an area of 3716.65 sq. kilometer. The district is surrounded on the north by Balaghat district of Madhya Pradesh, on the east by Gondia district, on the south by Chandrapur district while on the west by Nagpur district and along a small strip on the south and east by Gadchiroli district.

Administratively, Bhandara district has seven sub divisions or Talukas (Tahsils) as-Bhandara, Tumsar, Mohadi, Sakoli, Lakhani, Lakhandur and Pauni. The district has an average elevation between 271.42 meters and 300 meters above sea level and its relief features are characterized by the small or residual hill ranges of Satpuda and Bhimsen.

MATERIALS AND METHODS

The present study was undertaken to find out common weeds of Rabi wheat crop in Bhandara District. (M. S.) India. Extensive field surveys were conducted during different months of Rabi crop season of 2011-12in Bhandara district. Randomly three sites were selected in each tehsil of seven subdivisions. Weeds were collected from all the sites of the study area at seedling, premature & mature stages of crop. During this period survey of wheat field, interviews with farmers and agriculturists were conducted to collect information about the seasonal weed plants and their vernacular names if known. The collected weed plants were Photograph and properly identified with the help of available literature, monographs and confirmed from the authentic regional floras (flora of Maharashtra Vol. I, II & III by Singh N. P. and S. Karthikeyan, 2000).

RESULTS AND DISCUSSION

During wheat cropping season in all 76 weed species belonging to three monocot and twenty four dicot families were found under the survey of the cropping session from five tehsil of Bhandara district (M.S.) India. The predominance was shown by Asteraceae, Acanthaceae, poaceae, Papilionaceae, Caesalpiniaceae Euphorbiaceae, which included major weed species, while Amaranthaceae, Polygonaceae. Brassicaceae, Caryophyllaceae, Chenopodiaceae, Malvaceae and Solanaceae Asclepiadaceous, Convolvulaceae, Oxalidaceae, Primulaceae, were represented as minor weeds.

The yield losses due to weeds are generally more than the combined losses caused by insects and pathogens together (Hassan and Marwat, 2001). The impact of weeds is always obscure and it becomes visible when the critical time has gone; whereas that of insects and pathogens is visible at all times. This is the reason the why the weeds are mostly ignored and on contrary the insects and pathogens attacks are given proper heed.

It is astonishing to note that grasses existed only to the extent of 9.5% among the weed flora of the target site. Out of weed species reported from the study area, weeds like *Anagallis arvensis, Cypreusr otundes, Fumaria parviflora, Lathyrus aphaca, Melilotus indica, Parthenium hysterophorus, Rumex dentatus, and Vicoa indica* are common weeds of Rabi wheat crops dominated spin the study area. The weeds like species of *Euphorbia, and Polygonum barbatum, Polygonum persicara Melilotus alba,* were reported particularly from irrigated fields. Some weeds reported from the study area, such as *Achyranthus aspera, Calotropis procera, Cannabis sativa, Chenopodium album* and *Cynodon dactylon* are of medicinally importance. The weeds like *Amaranthus viridis, Chenopodium album, Lathyrus aphaca, Vicia hirsuta and V. sativa*are used in cooking recipes by Gond and other local tribes of the study area.. The present study may behelpful in identification of some common weeds of Wheat Rabi crops.

It may be helpful for taxonomists, agriculturists and scientists involved in the management of weeds. Two monocot and eighteen dicot families are arranged alphabetically with their botanical names, available vernacular names and flowering and fruiting season are mentioned (Table 1). These findings are in a greater analogy with the previous work of Kaul (1986) and Singh *et al.* (2007), moreover, the recent studies of Hussain *et al.* (2004 & 2009) also show a varying flora.

Table 1: List of weed plants in Bhandara district.

Sr. no	Name of weed plant	family	Local name	Propagation
1	*Cochlearia cochlearioides* (Roth) Sant.	Brassicaceae		Seeds
2	*Cleome viscose* L.	Cleomaceae	Tilvan	Seeds
3	*Hybanthus enneaspermus* (L.) F. Muell.	Violaceae	Ratanparas	Seeds
4	*Polycarpaea corymbosa* (L.) Lamk.	Caryophyllaceae		Seeds
5	*Spergula arvensis* L.	Caryophyllaceae		Seeds
6	*Vaccaria pyramidata* Medik.	Caryophyllaceae		Seeds
7	*Portulaca oleracea* L.	Portulaceae		Seeds
8	*Portulaca quadrifida* L.	Portulaceae		Seeds
9	*Biophytum sensitivum* (L.) DC	Oxiladaceae		Seeds
10	*Oxalis corniculata* L.	Oxiladaceae	Tipani	Seeds
11	*Cardiospermum helicacabum* L.	Sapindaceae	Kapalphodi	Seeds
12	*Cassia occidentalis* L.	Caesalpinaceae	Rantarota	Seeds
13	*Cassia tora* L.	Caesalpinaceae	Tarota	Seeds
14	*Clitoria ternatea* L.	Pappilionaceae	Gokarni	Seeds
15	*Melilotus alba* Desr.	Pappilionaceae	Ranmethi	Seeds
16	*Melilotus indica* (L.) Att.	Pappilionaceae	ranmethi	Seeds
17	*Phaseolus aconitifolius* Jacq.	Pappilionaceae	Moth	Seeds
18	*Rhynchosia bracteata* Benth	Pappilionaceae		Seeds
19	*Rhynchosia capitata* DC.	Pappilionaceae	Papra	Seeds
20	*Ammannia baccifera* L.	Lythraceae	Dhanbhaji	Seeds
21	*Bidens biternata* (Lour.) Merr. & Sherff.	Asteraceae	Putiyam	Seeds
22	*Conyza aegyptica* Ait.	Asteraceae		Seeds
23	*Conyza ambigua* DC.	Asteraceae		Seeds
24	*Eclipta prostrata* (L.) L.	Asteraceae	Maka	Seeds
25	*Parthenium hysterophorus* L	Asteraceae	Gajargavat	Seeds
26	*Sphaeranthus indicus* L.	Asteraceae	Godri	Seeds
27	*Tridax procumbens* L.	Asteraceae	Kambarmodi	Seeds
28	*Vicoa indica* (L.) DC.	Asteraceae	Sonuli	Seeds
29	*Anagallis arvensis* L.	Primulaceae		Seeds
30	*Calotropis procera* (Ait.) R. Br.	Asclepiadaceae	Rui	Seeds
31	*Centaurium centauriodes* (Roxb.) Rao & Hemadri.	Gentianaceae		Seeds
32	*Convolvulus arvensis* L.	Convolvulaceae	Chandvel	Seeds
33	*Evolvulus alsinoides* (L.) L.	Convolvulaceae	Shankaveli	Seeds
34	*Evolvulus nummularius* L.	Convolvulaceae		Seeds
35	*Physalis minima* L.	Solanaceae	Kamini	Seeds
36	*Solanum nigrum* L.	Solanaceae	Kamuni	Seeds
37	*Lindernia ciliata* (Colsm.) Penn.	Scrophulariaceae		Seeds
38	*Lindernia parviflora* (Roxb.) Haines	Scrophulariaceae		Seeds
39	*Hemigraphis latebrosa* (Roth.) Nees.	Acanthaceae		Seeds
40	*Rungia pectinata* (L.) Nees.	Acanthaceae		Seeds
41	*Leucas aspera* (Willd) Spreng.	Lamiaceae	Kumbha	Seeds
42	*Leucas utricifolia* R. Br.	Lamiaceae		Seeds
43	*Boerhavia diffusa* L.	Nyctaginaceae	Khaparkuti	Seeds
44	*Achyranthes aspera* L.	Amaranthaceae	Aghada	Seeds
45	*Aerva lanata* (L.) Juss.	Amaranthaceae	Pandharafeda	Seeds
46	*Alternanthera pungens* Humb.	Amaranthaceae		Seeds
47	*Amaranthus spinosus* L	Amaranthaceae	Katemath	Seeds
48	*Amaranthus viridus* L.	Amaranthaceae	Chavali	Seeds
49	*Celosia argentea* L	Amaranthaceae	kukada	Seeds
50	*Gamphrena celosioides* Mart.	Amaranthaceae		Seeds
51	*Chenopodium album* L.	Chenopodiaceae	Chakwat	Seeds
52	*Rumex dentatus* L.	Polygoniaceae	Ranpalak	Seeds

Table 1: Continued..

Sr. no	Name of weed plant	family	Local name	Propagation
53	*Crozophora rottleri* (Geis.) Juss.	Euphorbiaceae	Bothri	Seeds
54	*Euphorbia dracunculoides* Lamk.	Euphorbiaceae	Pisola	Seeds
55	*Euphorbia geniculata* Orteg.	Euphorbiaceae	Dudhani	Seeds
56	*Euphorbia heterophylla* L.	Euphorbiaceae		Seeds
57	*Euphorbia laeta* Heyne ex Roth.	Euphorbiaceae		Seeds
58	*Euphorbia prostrata* Ait.	Euphorbiaceae		Seeds
59	*Euphorbia thymifolia* L.	Euphorbiaceae		Seeds
60	*Phyllanthus maderaspatensis* L.	Euphorbiaceae	Ranavati	Seeds
61	*Commelina benghalensis* L.	Commelinaceae	Kena	Seeds
62	*Cyanotis cristata* (L.) D. Don.	Commelinaceae		Seeds
63	*Cyperus compressus* L.	Cyperaceae		Seeds
64	*Cyperus iria* L.	Cyperaceae		Seeds
65	*Cyperus rotundes* L.	Cyperaceae	Nagarmotha	Seeds
66	*Apluda mutica* L.	Poaceae		Seeds
67	*Arundo donax* L.	Poaceae		Seeds
68	*Chrysopogon fulvus* (Spreng) Chiov	Poaceae		Seeds
69	*Cynodon dactylon* (L.) Pers.	Poaceae	Durva	Seeds
70	*Eleusine indica* L.	Poaceae	Pandur	Seeds
71	*Eragrostiella bifaria* (Vahl) Bor	Poaceae		Seeds
72	*Erogrostis coarctata* Stapf.	Poaceae		Seeds
73	*Hetropogan contort* L.	Poaceae	Kasuri	Seeds
74	*Paspalum geminatum* (Forssk) Stapf.	Poaceae		Seeds
75	*Rottboellia exaltata* L.	Poaceae	Bursali	Seeds
76	*Setaria intermedia* Roem & Shult.	Poaceae		Seeds

REFERENCES

Dangwal LR Singh A, Singh T Sharma A and Sharma C (2010) Effect of weeds on the yield of wheat crop in Tehsil Nowshera. *J. American Sci.* 6(10):405-407.

Gadpayale JV. Chaturvedi AA (2011) "Wound Healing Plants of Bhandara District of Maharashtra State, India: *Current Botany*: 2(10):01-06ISSN:2220-4822. *Online issue*.

Gadpayale JV, Chaturvedi AA, Khobragade DP, Sathawane, KN (2013) Ethnobotanical Survey of Wild Fruits Plants in Bhandara District (M.S.), India, *Proceeding of NCEB*- 2013, ISBN-978-81-926403-0-3, P. 50-54.

Gupta A, Joshi, SP, ,Manahas, RK. (2008) Multivariate analysis of diversity and Composition of weeds communities of wheat fields in Doon valley. Ecological research Lab., Department of Botany, D.A.V. (PG). College, Dehradun (248007) Uttrakhand India. Holm,

Pancho J,h Herberger , D. Plucknett. (1979) A Geographical Atlas of World Weeds. John Wiley and Sons, New York, 391 pp.

Holm L, Plucknett D, Pancho J, Herberger J (1977) The World's Worst Weeds: Distribution and Biology. University of Hawaii Press, Honolulu, 609 pp.

Hussain F, Murad A, Durrani MJ (2004) Weed communities in the wheat fields of Mastuj District Chitral, Pakistan. Pak. J. Weed Sci. Res. 10(3-4): 101-108.

Hussain F, Shah SM, Fazal-e-Hadi, Asadullah.(2009). Diversity and ecological characteristics of weeds of wheat fields oUniversity of Peshawar Botanical Garden at AzaKhel, District Nowshera, Pakistan. Pak. J. Weed Sci. Res. 15 (4):283-294.

Jethro Tull (1731) ' Horse Hoeing Husbandry'. Berkshire. MDCC, 33.

Kaul MK (1986) Weed flora of Kashmir valley. *Journal of economics and taxonomic Botany*. Additional series scientific publishers, Jodhpur, India.]

Oudhia P and Tripathi, RS (1997) Allelopathic effects of *Parthenium hysterophorus* L. on kodo, Mustard and problematic weeds. First Intern. Conf. on *Parthenium* management. 11. UAS, Dhaward. India. 6-8 Oct. 1997, pp.136-139.

Oudhia P and Tripathi RS (1998) Allelopathic potential of *Datura stramonium* L. Crop Res. 16(1): 37-40

Shailey and Gaur, RD (1993) Phyto-sociological studies of crops and weed association of Pauri district. Department of Botany. H.N.B Garhwal University. Uttrakhand, India.

Singh KN, Ara S, Wani GA Hasan, B, Khanday, BA (2007) A phyto-sociological association of weeds in winter crops of Kasmir valley. Indian J. Weed Sci. 39(1-2), 33-40.

Twari VJ (2013) Biodiversity of genus *Euphorbia* L., subgenus *Chamaesyce* raf., Euphobiaceae, proc.of conf. BDPP; 101-108.

RESEARCH ARTICLE

Survey and collection of wild relatives of crop plants from Bhandara District, India

Pedhekar AK

Department of Botany, J.M.Patel College Bhandara, MS, India.

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Pedhekar AK (2014) Survey and collection of wild relatives of crop plants from Bhandara District, India. *Int. J. of Life Sciences,* Special Issue A2:132-134.

Acknowledgements:
Tribal people Mr. Ramadas & Mr. Gaju Kodape, forest workers at Bhandara forest Department (fig.1). Mr. Ramu Patekar (shepherd) native of village korambhi near Bhandara assisted to the author time to time during field collections.

ABSTRACT

The present paper deals with survey and collection of six wild species of the genus *Vigna*(Fabaceae) In the context of correct names, distribution and environmental adaptability etc, from different localities of Bhandara District of Maharashtra. Presently the species collected so far are rare an uncommon in Bhandara district jurisdiction. The main objective of this survey to introduce and acclimatize these species in the Botanical garden and to study them from different angles to save the biodiversity of nature.

Keywords: Survey and collection, wild *Vigna* Species.

INTRODUCTION

The search for wild species is necessitated for a quest for wider genetic base to solve the problem of resistance to diseases, a greater range of environmental adaptation, better yields and better nutritional and economic character (Ignacimuthu and Babu, 1984). It is true that that very wide gene pool exists in the wild species from which transfer to the cultigens are quite feasible (Smartt, 1981); most species are cross compatible even though partial barriers are naturally to be expected here and there (Singh, 1989). The wild species also assume greater significance when good resistance or adaptation is not found in the primitive cultivars. The species considered to be wild prototypes or more closely related to the cultigen, offer good scope for utilization and exploitation (Jain and Mahra, 1980). Further wild and cultivated forms of overlapping distribution often exchanging genes through introgressing provide unique situation for gene transfer between two population. Today in most crops the need for a wider genetic base is strongly apparent. This can generally be provided from wild species and primitive cultivars.

MATERIALS AND METHODS

Collection of plant material was carried out by keeping in mind the external features of the genus Vegan especially trifoliate leaves yellow flowers trailing habit cordite or appendage stipules below the base straight or spirally twisted keel, estate fruit and some more (Chandel,1984). The collection was made in every season of the year august 2011-2012 it was possible to collect four cultivated species viz. *V. radiate, V. mungo, V. unguiculata* and *V. trilobata var. pusilla* and *V. aconitifolius* and three wild forms viz. *V. trilobata var.*

sublobata from the plain areas of Bhandara district in the next year 2012-2013 search was undertaken in the forest areas where the grazing of animals was strictly prohibited precious wild forms such as *V.angularis, V. umbellate &V. radiata var.sublobata* were search out. Herbarium sheets of *Vigna unbellata(thumb) ohwi & Ohashi Vigna trilobata Verdc.var.trilobata Vigna trilobata Verdc.var.pusilla,Vigna angularis wild Ohwi & Ohashi Vigna radiata wilzek. var. sublobata rob. Verdc.Vigna vexillata A. Rich* were compared with those kept in the herbarium of botanical survey of India Pune and confirmation was made the six wild and four cultivated along with different localities of Bhandara districts are enlisted below.

RESULTS AND DISCUSSION

While studying the wild forms following questions are came acrossed?

Why seeds of wild forms were not giving positive response to emergence like cultivated species in agricultural mode of farming?

Why seeds of wild forms show late germination in nature?

Why flowering period in wild forms were late as compared to cultivated species?

The answers of these questions were tried to find out collectively in present study:

It was experienced that when seeds of wild forms sown in the soil at a particular depth as per common agricultural practice of cultivation, seeds were not showing emergence within a expected days or never show germination whereas seeds of wild gave better response to emergence in natural habitats. Shattering of pods is a common feature in wild forms during which seeds thrown with jerk hyphazardly away on the super facial level of the soil. This is because of exposure of seeds to climatic factors like high humidity and cold during winter, high intensity of light and temperature during summer and moisture during rainy season etc. for 6 to 8 months (Sept. to Oct.- June to July). These fluctuations in the environment makes degradation of the outer hard seed coat and slowly the scar and seed coat ruins, and becomes permeable to water seed imbibes water, which results in emergence of seedling is late in wild forms. As the emergence of seedling is late so the flowering periodalso delayed by 15 days or even a month as compared to cultivated species.

Table 1 :

Name of species	Locality	Species in association	Ecological condition
Vigna trilobata Verdc var. trilobata Fig.3 & 4	Bhandara and its vicinity. Pizdura village 3 km from Temburna phata, Warora Dist. Chandrapur. Korambhi village 5 km. from Bhandara. Khindsi area Ramtek. Not seen in Nagzira Forest.	In association with I*ndigofera cordifolia, Tephrosia purpurea, Indigofera linnifolina, Alycicarpus sp. Tridax procumbens.*	Frequent in grasslands around cultivated fields.
Vigna trilobata verdc.var.pusilla. Fig. 5	Pauni tehsil on hills and on bare land of hilly slopes on eithers road sides nearer to Pauni.	*Sida rhombifolia, Sida acuta, Alterrnanthera sessilis,Trichodesma zeylanicum. Goniogyna hirta, Leucas sp. Lagasca mollis.*	Growing on gravelly bare land
Vigna angularis verdc. Fig. 6	Road sides of Tumsar to Chandrapur and in core area of the forest	*Boerhaavia diffusa. Commelina bengalensis.*	Growing in lomy red black or rocky soil in forest.
Vigna radiata (L.)wilczek var sublobata Roxb Verdc. Fig.7	On the bank of Nallah covering the edges of garden & lake near by mouda on either sides of the Nallah of Gunthala on road sides of kamthi to mouda on either sides of steps to khindsi lake Ramtek Dist. Nagpur.	*Rhynchosia minima Lagasca mollis, Sebania sesban, Alycicaropus sp. etc.*	Growing on the banks of nalahs, ponds, lakes ditches.Trailing on the neighbouring plants/objects soil condition specially humus mixed soil some times on black cotton soil.
Vignavexillata (L.) Rich. Fig.8	From ditches of hill located back side of the hills in the core area 2-3 km interior from kamthi to Nagpur road.	*Tectona grandis, bamboos, grasses like Sida rhombifolia, Lantana indica, Trichodesma zeylanicum, in rocky and sloppy* p*laces in humus.*	Growing in dance thick forest where sunlight is diffused on rocky lomy clay mixed moist soil condition.

Fig. 1: ***Tribal informants***

Fig.2: ***V. umbellata***

Fig.3: ***V.trilo.var. trilobata***

Fig.4: ***Dolichos trilobatus***

Fig. 5: ***V. trilo. Var. pusilla***

Fig.6: ***V. angularis***

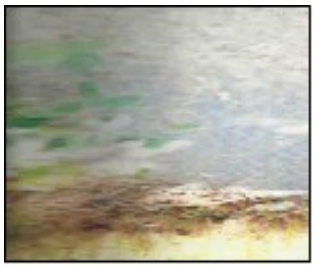


Fig. 7: ***V. radiata var. sublobata***

Fig.8: ***V. vexillata***

Fig. 1: Tribal Informant's from Korambhi village.(Forest workers of Bhandara.)Whole plant figures, **Fig.** 2*V. umbellata* (Thunb.) Ohwi & Ohashi. Whole Plant. **Fig. 3:** *V. trilobata (L.)Verdc.Var. trilobata.* whole plant (uprooted). **Fig. 4:** *Dolichos trilobatus* whole plant, **Fig. 5***: V.trilobata* (L.)Verdc.*Var. pusilla* whole plant in natural habitat. **Fig. 6***: V. angularis* (Willd.)Ohwi & Ohashi. wholeplant in green house. **Fig. 7***: V. radiata* (L.)Wilczek *Var. sublobata* (Roxby.)Verdc. whole plant in natural habitat (uprooted). **Fig. 8:** *V. vexillata* (L.) A. Rich. whole plant in natural habitat of Nagzira.

CONCLUSION

During the survey of wild *Vigna Species* in Bhandara district and its vicinity, author came across some experiences were already discussed in result and discussion. The plant species so far collected were not acclimatize to the environmental conditions of the plain areas so they can be grown in green houses. The genetical importance of wild plant species is precious so their conservation and maintainance is a present need in view to carry their gene pool in crop plants. the wild relatives of the crop plants were on the way of extinction due to urbanization and unbearable human disturbances, therefore their protection is an urgent need of the present day.

REFERENCES

Chandel KPS (1984) Role of wild *Vigna* species in the Evolution and Improvement of mung (*Vignaradiata*(*L. Wilczek*) And urd bean (*V. mungo(L.) Hepper*). *Ann. Agric. Res*.,

Dhore MA and Joshi PA (1988) Flora of Melghat Tiger Reserve. Directorate, project Tiger Melghat, Paratwada; Dist. Amravati. Maharashtra.

Ignacimuthu and Babu CR (1984) Phenotypic variations in natural populations of *Vigna* radiatta (L.) Wilczek var. sublobata (Roxb.)Verdc. (Leguminosae – Papilionoideae) *Indian J., Genet.*

Jain HK and Mahra KL (1980) Evolution, adaptation relationship and uses of the species of *Vigna* cultivated in India. Advances in Legume Sciences (Summerfield R. J. Bunting, A. K. edn.)Vol.I Proc. Intern.Legume Conference, Kew Royal Botanic Garden Kew, Richmound, Survey, England.

Patel RI (1968) Forest flora of Melghat, Rabat press.Meerat.Prain, 1997.Some additional Luguminosae. *J. Asiatic Soc. Bengal*, 66:421-425

Singh D (1989) The Genus *Vigna Savi* (Fabaceae) In Bihar. *J. Econ. Tax. Bot*.

Smartt J (1981) Gene Pools In *Phaseolus* And *Vigna* Cultigens. *Euphytica*, 30:445-449

Ugemuge NR (1986) Flora of Nagpur District. Shree prakashan Nagpur

RESEARCH ARTICLE

Study of Fruit, Seed and Embryo In *Tecoma Stans* (Linn.) H.B. & K. Nov. Gen

Labhane NM[1] and Dongarwar NM[2]

[1]*Department of Botany, Bhavan's College, Andheri-W, Mumbai-58*

[2]*Department of Botany, RTM Nagpur University campus, Nagpur-33*

Email- nlabhane@yahoo.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Labhane NM and Dongarwar NM (2014) Study Of Fruit, Seed and Embryo In *Tecoma Stans* (Linn.) H.B. & K. Nov. Gen, *Int. J. of Life Sciences,* Special Issue A2: 135-138

Acknowledgement:
Authors thank Prof. K.H. Makde for his critical guidance. First author is thankful to Dr. VI Katchi, Principal, Bhavan's College, Andheri for constant encouragement.

ABSTRACT

Tecoma stans (Linn.)H.B. & K. Nov. Gen is a species of flowering perennial shrub belonging to family Tecomaceae, and is native to South America. *Tecoma stans* is medicinally important since different plant parts have nephrotoxic, antifungal and antibacterial properties. The flowers arise in condensed raceme with bright yellow colour flowers. Each ovary contains many ovules. The fruit are elongated and compressed with about 11-20 cm, with two sections each containing about 10-20 seed in each locule. Seeds are non endospermic, with seed coat showing papery appearance. The structure of embryo is very distinct. In most of the angiosperms, the two cotyledons are mostly folded, and thus prevent the exposure of the growing tips to outer environmental conditions. However in *Tecoma stans* it is found that the two cotyledons are unfolded, which leads to exposure of the plumule and the radical. The shape of the embryo seems to be very characteristic, adapting itself to be dispersed at longer distances. The embryo also seems to have evolved in order to orient itself according to the shape of the seed for longer distance dispersal. However the structure of the embryo seems to have detrimental effect on the survival of the species in xeric condition, since the plumule is not having the said protection which is normally seen in case of many angiosperms.

Key words – Seed, embryo, non-endospermic, abortion.

INTRODUCTION

The reproductive capacity or potential of plants is a very critical aspect of plant reproduction, which depends on the structure of fruit, seed and the embryo. Reproductive capacity of many plants is extremely great and that there are large differences between species. These differences may be the result of different selective pressures and are related to the ability of a species to persist in time and in space (Harper and White, 1974). Reproductive strategy may also affect the ability of a species to colonize vacant habitat and thus may be an important determinant of meta-population dynamics (Pannell and Barrett 1998). As a result, there has been much interest in how variation in reproductive mode affects geographical distribution and the capacity for range expansion, which in the extreme case is manifested as biological invasion (Pysek, 1997).

Tecoma stans (Linn.) H.B. & K. Nov. Gen is a species of flowering perennial shrub belonging to family Tecomaceae (which was placed earlier in family Bignoniaceae), and is native to South America. The flowers arise in terminal raceme with bright yellow colour flowers. Each ovary contains many ovules.

The fruit are elongated and compressed. The importance of the fruit, seed and embryo has been emphasized by several authors with respect to the perpetuation of the species (Korkutal, 2005; Labhane and Dongarwar, 2012). The present paper deals with the study of the fruit, seed and embryo with respect to its perpetuation.

MATERIALS AND METHODS

The plant twigs were collected from various parts of Mumbai and Nagpur. The plant was identified with the help of Flora of Maharashtra (Singh et al., 2001). The twigs containing fruits were collected during the end of the growing season, when the fruits were more or less green in coloured but ripe enough to dissect out the seed and the embryo. The dissected fruit, seed and the embryo were observed under dissecting microscope. The viable embryo and the unviable embryos were identified with respect to presence or absence of embryo inside the seed. The unviable seeds contain the underdeveloped and withered embryos.

RESULTS AND DISCUSSION

The fruit size varies from 12-20 cm in length and 0.5 - 0.6 cm in breath. The mature seed is approximately 0.5 cm × 12 cm. The mature embryo dissected is about 0.3 × 0.6 cm. The seeds are non-endospermic. The plants selected in the present investigation were further explored with respect to presence or absence of viable embryos. The number of seeds present in a mature fruit varies from 7-36. The Viable seed are characterised by fully developed fruit, whereas the non viable fruits contains hollow seeds. The viable seed only contains the embryo, whereas the non-viable seeds are devoid of any embryo (Table-1, Plate-1).

The percentage viability is less in Mumbai region as compared to Nagpur. The most probably reason can be attributed to the effect of pollution in metro cities. Pollution seems to have effect on morphology and metabolic phenomena including photosynthesis (Nighat and Mahmooduzzafar, 2000) and carbohydrate accumulation, along with the reproductive capacity of the plant (Salisbury, 1942).

The fruits are categorized as small, medium and large, based on its length. The reproductive capacity of the plant shows great variability, with respect to the size of the fruit namely the small, medium and large fruits.

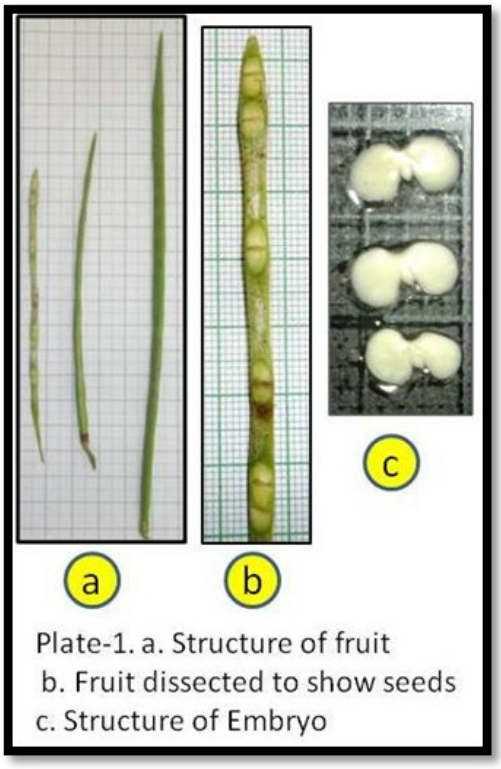


Plate-1. a. Structure of fruit
b. Fruit dissected to show seeds
c. Structure of Embryo

The small as well as the large fruits in most of the cases shows the presence of seeds without any embryo. However the medium size fruits show the more viable number of seeds. The loss of viability in case of larger fruits can be attributed to the absence of well developed or thin testa, non-availability of endosperms and structure of embryo (Table-2, Plate-1). The embryo abortion is also more in case of seed observed from Mumbai region as compared to Nagpur. The embryo abortion in Mumbai region can also be related to pollution since Nagpur is considered as less polluted city as compared to Mumbai. The work on embryo abortion has also been reported in *Asclepias speciosa*, *Oxalis magnifica*, *Epilobium angustifolium*, *Dalbergia sissoo Cynoglossum officinale*, *Schima wallichii*, some Acanthaceae members (Labhane & Dongarwar, 2012) etc. However, the embryo abortion is very common among many fruit plants (Nakamura, 1988).

The structure of embryo is very distinct in case of *T. stans* (Plate-1). In most of the angiosperms, the two cotyledons are mostly folded, and thus prevent the exposure of the growing tips to outer environmental conditions. However in *T. stans* it is found that the two cotyledons are unfolded, which leads to exposure of the plumule and the radical. The structure of embryo shows great variation in morphology (Periasamy, 1990).

Table 1: Showing the number of seeds in each fruit and viability of the seed with respect to the presence or absence of embryo.

Sr. no.	Size of fruit	No. of seed in fruit	Viable /Non-viable seed	Place of collection
1.	Long	36	All are non-viable	Mumbai
2.	Medium	14	All are non-viable	Mumbai
3.	Medium	18	2 non-viable, rest viable	Mumbai
4.	Medium	18	All are viable	Mumbai
5.	Medium	18	3 non-viable, rest viable	Mumbai
6.	Medium	17	All are viable	Mumbai
7.	Small	7	All are non-viable	Mumbai
8.	Medium	18	All are viable	Mumbai
9.	Medium	17	All are viable	Mumbai
10.	Small	7	All are non-viable	Mumbai
Total		**170 (17±8)**	**101 viable/ 69 Non viable**	
1.	Small	**7**	All are non-viable	Nagpur
2.	Small	8	All are non-viable	Nagpur
3.	Medium	16	All are viable	Nagpur
4.	Medium	18	All are viable	Nagpur
5.	Medium	17	All are viable	Nagpur
6.	Small	7	All are non-viable	Nagpur
7.	Medium	18	4 non-viable, rest viable	Nagpur
8.	Long	34	All are non-viable	Nagpur
9.	Medium	17	All are viable	Nagpur
10.	Medium	18	All are viable	Nagpur
Total		**160 (16±8)**	**100 viable/ 60 Non viable**	

(The above table shows the average of number of seeds present in each fruit collected from 10 different plants at each location). The figure in the bracket indicates the mean and its standard deviation.

Table 2: Showing number of seeds in the fruit with abortive and viable embryo

Sr. no.	No. of seeds	No. of embryo	No. of young/ mature embryo	No. of aborted embryo	No. of viable embryo	Place of collection
1.	40	-	All mature	All abortive	Nil	Nagpur
2.	43	-	All mature	All abortive	Nil	Mumbai
3.	24	22	22 mature	2 abortive	22	Mumbai
4.	25	21	21 mature	4 abortive	21	Nagpur
5.	18	18	18 mature	-	18	Nagpur
6.	18	14	14 mature	4 abortive	14	Mumbai
7.	31	30	30 mature	1 abortive	30	Nagpur
8.	42	39	39 mature	3 abortive	39	Mumbai
9.	18	18	18 mature	-	18	Nagpur
10.	18	17	17 mature	1 abortive	17	Nagpur
11.	7	-	-	All abortive	Nil	Mumbai
12.	7	-	-	All abortive	Nil	Nagpur
13	38	-	All mature	All abortive	Nil	Nagpur
14	41	-	All mature	All abortive	Nil	Mumbai
15	26	22	22 mature	4 abortive	22	Mumbai
16	25	22	22 mature	3 abortive	22	Nagpur
17	9	-	-	All abortive	Nil	Mumbai
18	9	-	-	All abortive	Nil	Nagpur
19	31	29	29 mature	2 abortive	29	Nagpur
20	42	38	38 mature	4 abortive	38	Mumbai
TOTAL	**512**	**290**	**290**	**222**	**290**	

(N=20, fruit and seeds from 20 different plants were randomly collected and analyzed for embryo abortion)

CONCLUSION

The structure of the fruit, seed and embryo seems to have detrimental effect on the survival of the species in xeric condition. The seed has been adapted for dispersal for longer distances being papery; however the evolution in the structure of seed seems to have led to the formation of flattened and unfolded embryo exposing both the radicle and the plumule to adversaries of nature. The condition of the seed becomes even more precarious since the seed is devoid of endosperm.

REFERENCES

Dangwal LR Singh A, Singh T Sharma A and Sharma C (2010) Effect of weeds on the yield of wheat crop in Tehsil Nowshera. *J. American Sci.* 6(10):405-407.

Gadpayale JV. Chaturvedi AA (2011) "Wound Healing Plants of Bhandara District of Maharashtra State, India: *Current Botany*: 2(10):01-06ISSN:2220-4822. *Online issue*.

Gadpayale JV, Chaturvedi AA, Khobragade DP, Sathawane, KN (2013) Ethnobotanical Survey of Wild Fruits Plants in Bhandara District (M.S.), India, *Proceeding of NCEB*- 2013, ISBN-978-81-926403-0-3, P. 50-54.

Gupta A, Joshi, SP, ,Manahas, RK. (2008) Multivariate analysis of diversity and Composition of weeds communities of wheat fields in Doon valley. Ecological research Lab., Department of Botany, D.A.V. (PG). College, Dehradun (248007) Uttrakhand India. Holm,

Pancho J,h Herberger , D. Plucknett. (1979) A Geographical Atlas of World Weeds. John Wiley and Sons, New York, 391 pp.

Holm L, Plucknett D, Pancho J, Herberger J (1977) The World's Worst Weeds: Distribution and Biology. University of Hawaii Press, Honolulu, 609 pp.

Hussain F, Murad A, Durrani MJ (2004) Weed communities in the wheat fields of Mastuj District Chitral, Pakistan. Pak. J. Weed Sci. Res. 10(3-4): 101-108.

Hussain F, Shah SM, Fazal-e-Hadi, Asadullah.(2009). Diversity and ecological characteristics of weeds of wheat fields oUniversity of Peshawar Botanical Garden at AzaKhel, District Nowshera, Pakistan. Pak. J. Weed Sci. Res. 15 (4):283-294.

Jethro Tull (1731) ' Horse Hoeing Husbandry'. Berkshire. MDCC, 33.

Kaul MK (1986) Weed flora of Kashmir valley. *Journal of economics and taxonomic Botany*. Additional series scientific publishers, Jodhpur, India.]

Oudhia P and Tripathi, RS (1997) Allelopathic effects of *Parthenium hysterophorus* L. on kodo, Mustard and problematic weeds. First Intern. Conf. on *Parthenium* management. 11. UAS, Dhaward. India. 6-8 Oct. 1997, pp.136-139.

Oudhia P and Tripathi RS (1998) Allelopathic potential of *Datura stramonium* L. Crop Res. 16(1): 37-40

Shailey and Gaur, RD (1993) Phyto-sociological studies of crops and weed association of Pauri district. Department of Botany. H.N.B Garhwal University. Uttrakhand, India.

Singh KN, Ara S, Wani GA Hasan, B, Khanday, BA (2007) A phyto-sociological association of weeds in winter crops of Kasmir valley. Indian J. Weed Sci. 39(1-2), 33-40.

Twari VJ (2013) Biodiversity of genus *Euphorbia* L., subgenus *Chamaesyce* raf., Euphobiaceae, proc.of conf. BDPP; 101-108.

RESEARCH ARTICLE

Study of Population and Identification of Zooplanktons in three different water samples near Amravati Region

Wagh (Patil) Sanjeevani D

Department of Zoology, Shri. Shivaji Sceicne College, Amravati Abstract

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Wagh (Patil) Sanjeevani D (2014) Study of Population and Identification of Zooplanktons in three different water samples near Amravati Region, *Int. J. of Life Sciences*, 2014, Special Issue A2: 139-140.

ABSTRACT

The word 'Plankton', originated from Greek word, 'planktons' which means drifting about in water under the action of water movement in the various functional aspects of an aquatic systems such as food chains, food web energy flow and cycling of matter, which are influenced by zooplankatons and phytoplanktons which are important biotic component of an aquatic ecosystem. They play important role in recycling the energy within their respective environment.

Key words : Zooplankton, Phytoplanktons, energy recycling, food chain, food webs.

INTRODUCTION

Water, the most vital abiotic factor are component is unique and fascinating for the study of it's biota. Water itself occurs in three stages (solid, liquid and gases) on earth. It acts as solvent for variety of inorganic, organic and gaseous substances. In precipitation, it becomes a mixture and acts as a limiting factor that, inturn regulates biotic diversity and biomass energy, material cycle, tropic levels and rate of succession. Water also contain biodiversity of aquatic flora and fauna. The cylic function of aquatic habitats is influenced by zooplanktons and phytoplanktons which are it's important biotic components.They recycle the energy within the respective environment. (Rajshekhar *et al*., 2010, Sharma and Sharma, 2011; Saboor and Altaf; 1995; Vasanth *et al*., 2011.)

In the present study, population of zooplanktons and phytoplanktons is under consideration and observe species are collected and identified from the three different water samples from the Amravati region.

MATERIAL AND METHOD

Studies on zooplankton and phytoplankton were carried out from September 20013 to May 2014. To study the population of Zooplankton and Phytoplankton and for their proper identification three different water samples were collected from Purna River, Wadali Lake and Amba Nala. Water samples were taken from each source by filtering one liter surface water through 'Planktron Net' made up of blotting silk cloth no. 20. Extreme care was taken in order to keep the water undisturbed at the time of sampling. The collected samples were preserved in 4% formalin. The preserved samples were brought to the laboratory for qualitative and quantitative analysis. "Drop Count method" was used in present study.

RESULT AND DISCUSSION

The qualitative and quantitative analysis of three different water samples showed the presence of following taxons.

In the Present Study the different population of Zooplanktons were observed in the different month, form September 2013 to May 2014 , in three different water samples. The water Samples was Collected from Purna River (Sample 1), Wadali lake (Sample 2), Ambanala Water (Sample 3). Over all observation state that Protozoan population is more as compared to the others and there number is increasing from September to May. The Zooplankton population is represented by rotifers, copepods, cladocerans And protozoans. The number was Lowest during winter and highest during summer. The studyindicate that temperature plays important role in the distribution of zooplankton (Akin-oriolas, 2003; Akthar *et al*., 2007; Battish, 1992; Frenando, 1980) Ingole *et al*., 2011 Joshep and Yamakanamardi, 2011).

Table 1: Monthly variations of zooplanktons in three waters samples in Amravati region for September 2013 to may 2014.

Zooplanktons	Sampling station	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Rotifer	Sample 1	5	6	4	5	7	8	10	8	9	62
	Sample 2	4	5	5	8	10	11	11	12	10	77
	Sample 3	3	2	3	4	5	7	8	10	11	53
	Mean	4	4.6	4	5.6	7.3	8.6	9.6	10	10	64
Copepoda	Sample 1	4	5	8	10	12	13	15	12	14	93
	Sample 2	3	2	5	6	8	10	12	14	15	75
	Sample 3	5	6	8	9	11	12	10	12	13	86
	Mean	4	4.3	7	8.3	10.3	11.6	12.3	12.6	14	84.6
Cladocera	Sample 1	5	4	3	2	4	6	7	8	11	50
	Sample 2	5	6	7	8	11	12	10	12	13	85
	Sample 3	4	3	2	3	5	6	8	10	12	53
	Mean	4.6	4.3	4	5.4	6.6	8	8.3	10	12	62.6
Protozoa	Sample 1	6	8	7	6	8	10	11	10	10	76
	Sample 2	5	6	7	8	10	12	13	14	15	90
	Sample 3	7	9	10	12	11	12	14	15	15	105
	Mean	6	7.6	8	8.6	9.6	11.3	12.6	13	13.3	90.3

Purna River water (Sample 1); Wadali Lake water (Sample 2); Amba nala water (Sample 3)

Table 2: Annual variation in zooplankton composition form Amravati city from September 2013 to may 2014.

Zooplanktons	Number of organisms
Rotifer	64
Copepoda	84.6
cladocera	62.6
protozoa	90.3

REFERENCES

Akin-oriolas GA (2003) Zooplankton Association And Environmentals Factor in ogupa and Ona River, Nigeria. *Rev. Biol.Trop*.,(2). 391-398.

Akthar R, Jyoti MKN, sawhey and Rajendra Singh (2007) Studies on Population Dynamics of Cladocerans and Copepopds in Sarkoot Pond,Dist. Doda, Jammu and Kashmir. *J. Aqu. Biol.*, 22(2) :15-18.

Battish SK (1992) Freshwater zooplankton of India. Oxford and IBH Publishing Co. Pvt. Ltd.New Delhi.

Fernando CH (1980) The Fresh water Zooplankton of Sri lanka with the discussion of Tropical Freshwater zooplankton Composition., *Hydrobiologia*, 65:85-129.

Ingole SB, Kadam GA, Naik SB and Kulkarny GK (2011)Water quality of Majalgoan Dam with special reference to Zooplankton. Limnology current Perspective Edited by .V.B. Sakhare (Daya Publishing House), New Delhi: 248-263.

Joshep B and Yamakanamardi MS (2011) "Monthly Changes in the Abundance and Biomass o Zooplankton and Water quality parameter in Kulkarahali Lake of Mysore ", *J Environ.Bio.,* 32:551-557.

Rajashekhar M, Vijaykumar K and Paerveen Zebra (2010) Seasonal variations of Zooplankton community in freshwater reserviour Gulberga District, Karanataka, South India. *Int J. of Systems Biology,* (1):6-11.

Sharama BK and Sharma S (2011) Zooplankton diversity of Loktak lake, Manipur, India. *J. of Threatened Taxa*., 3 (5):1745.

Saboor,A and K, Altaf (1995) Qualitative and quantitive analysis of zooplankton population of a tropical pond during summer and rainy season. *J. Ecobiol*., 7 (4): 269-275.

Vasanth KB, Khajure PV and Roopa SV (2011) Zooplankton and bacterial diversity in three ponds of Karwar District ,Karnataka, *Rec Res, Sci Tech*: 39-48.

RESEARCH ARTICLE

Impact of polluted air on pollen production of plants from industrial area of Nagpur

Jaiswal RN and Kalkar SA*

Department of Botany, Institute of Science, Nagpur-440001(M.S.), India
**Corresponding author email : surekhakalkar@gmail.com,*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Jaiswal RN and Kalkar SA (2014) Impact of polluted air on pollen production of plants from industrial area of Nagpur, Int. J. of Life Sciences, 2014, Special Issue A2: 141-142.

ABSTRACT

Pollen grain is male reproductive unit of plant and pollen production influences pollination, fertilization and ultimately productivity of the plant. Pollen physiological aspects like pollen production of plants in *Delonix regia, Butea monosperma, Cassia fistula* and *Lagerstroemia speciosa* were carried out in MIDC Industrial Area, Hingna, Nagpur and Civil lines area was taken as control area for experimental purpose. The studies were carried out throughout blooming period at fortnightly intervals. It was observed the average pollen production of the experimental plants in industrial area was comparatively less than control area. It is essential to recognize allergenic contributors in each area. Hence, the present studies will be helpful to add some knowledge to various fields like agriculture, palynology, aerobiology and allergy.

Keywords: Pollen production, palynology, aerobiology, allergy.

INTRODUCTION

Role of pollen production in pollination and fertilization was studied by Khanduri (2011). The number may vary from plant to plant with reference to its mode of pollination. Industrial area is one of the highly polluted areas in any country. Harmful emissions from various types of industries & gaseous pollutants released in the atmosphere by it are not only harmful for human health but it also affects plants in many ways Over the centuries, concurrent with industrialization and population growth, air pollution has increased from a local nuisance to a global problem. Air pollution can affect pollen grains indirectly via the soil. If a plant grows in polluted soil, its physiological functions may change and affect the properties of the developing pollen grains (Helender *et al*; 1997). The number may vary from plant to plant with reference to its mode of pollination. *Delonix regia* , ,*Butea monosperma,* , *Cassia fistula* and *Lagerstroemia speciosa* found grown in various areas of Nagpur. The survey of these plants was carried out at fortnightly intervals in MIDC area, it is considered as one of polluted area of Nagpur. Civil lines area was taken as control, pollen production during their blooming period was carried out in both the area. The purpose of the study was to know effects of industrial emissions in the air on pollen production and hence to know its allergenic potential.

MATERIAL AND METHODS

The survey was carried out from Jan 2011 to Jan 2012, pollen production was carried out during the flowering period of all plants of both industrial and non industrial area, , *Butea monosperma* Feb-March, *Lagerstroemia parviflora* March to May, *Cassia fistula* end of April to first week of June, *Delonix regia* April to June . Pollen production per flower was done by method suggested by Erdtman (1943). From fully mature bud, anthers were collected and crushed in 50% glycerin filtered, then dispersed uniformly in a test tube making total volume up to 10ml. Standardization of dropper was made by confirmation that 20 drops of suspension make the volume of 1ml. One drop of each suspension was taken on four slides with the help of dropper and covered with cover slip. Four such readings from a same suspension were taken and then mean number of pollen production was calculated. Thus 8 such buds were utilized for study and from that total number of pollen grains per flower was calculated.

RESULT AND DISCUSSION

It was found that among five experimental plant studied in Industrial and control area pollen production was highest in *Delonix regia* 41,942 and 53,812, *Cassia siamea* 29,674 and 36,516 *Lagerstroemia speciosa* 29,390 and 34,979 *Butea monosperma* 20,991 and 30,307 *Cassia fistula* 19,145 and 28,187 respectively (Table 1 and Figure 1).

The estimation of total pollen production per plant is useful not only from an aerobiological but also from an agronomical stand point, as the production of seeds often depends on the production of pollen.(Faegri and Iversen, 1989; Cour and Campo, 1980; Allison 1990; Campbell and Halama, 1993).

Table 1: Pollen Production in Experimental Plants

Plant Name	Average no. of pollen production per flower during whole blooming period	
	(Indl. Area)	(Control Area)
Butea monosperma	20,991	30,307
Delonix regia	41,942	53,812
Cassia fistula	19,145	28,187
Cassia siamea	29,674	36,516
Lagerstroemia speciosa	29,390	34,979

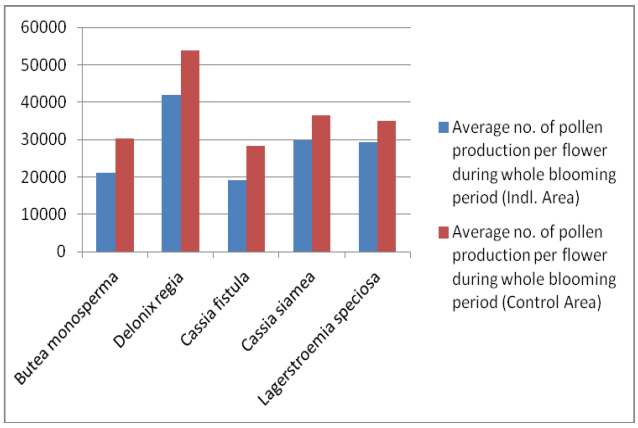


Fig. 1: Pollen Production in Experimental Plants of Industrial (Indl) and Control area

Knowledge of anthesis and pollen production is essential to study of pollination, developing a functional model for forecasting pollen concentrations and to understand more about the ecological background levels the pollen production. Plants being constantly exposed to different air pollutant, shows specific response in the form of injury symptoms. The pollen production was found comparatively less in industrial area than area, which may be due to industrial air pollution. Gaikwad *et al.* (2006) conducted study on plant bioindicator & observed that they are very sensitive & affected by increased atmospheric pollution. Polluted air of industrial area might be responsible for this physiological effect and thus pollen can act as bio indicator of air pollution.

REFERENCES

Allison TD (1990) Pollen production and plant density affect pollination and seed production in *Taxus canadensis*. Ecology, 71: 516-522.

Campbell, DR and KJ Halama, (1993) Resource and pollen limitations to lifetime seed production in natural plant population. Ecology, 74: 1043-10

Cour P and M Van Campo (1980) Prevision d recoletesa partir de l'analyse du contenu

Erdtman G (1943) An Introduction to Pollen Analysis. Chronica Botanica Co

Faegri K and J Iversen (1989) Textbook of Pollen Analysis. 4 th ed. K. Faegri, PE Kalland and th K.Krzywinski. J. Wiley and Sons, Chichester/ NewYork/ Brisbane/ Toronto/ Singapore.

Gaikwad PD *et al.* (2006) Bull.Mater.Sci.29.169.

Helender Savolainenj and Ahlholmj (1997) Effects of air pollution and other environmental factors on birch pollen allergens. *Allergy3*: 1207–1214.

Khanduri VP (2011) Variation in Anthesis and Pollen Production in Plants. *American- Eurasian J. Agric. And Environ. Sci., 11 (1)*: 834-839.

RESEARCH ARTICLE

Changes in Chlorophyll Contents in Plants Grown in Municipal Solid Waste

Shirbhate NS[1] and Malode SN[2]

[1]*Vidya Vikas Arts, Commerce and Science College, Samudrapur, Dist. Wardha, India*

[2]*Dept. of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati, India.*

Corresponding author email: satishmalode17@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Shirbhate NS and Malode SN (2014) Changes in Chlorophyll Contents in Plants Grown in Municipal Solid Waste, *Int. J. of Life Sciences,* Special Issue A2: 143-146.

Acknowledgement: The authors are extremely thankful to Amravati Municipal Corporation, Amravati, for permitting soil sampling from Sukali compost and landfill depot, Amravati. Authors are also thankful to DST-New Delhi for providing necessary infrastructure facility under FIST programme, at Department of Botany, G.V.I.S.H. Amravati

ABSTRACT

A study investigated during the remediation effect of nutrient amendments of municipal solid waste polluted soil on chlorophyll contents of *T. stans*, *C. tora*, *P. pinnata*, *B. napus*, *A. manihot, T. erecta* ,*C. officinalis* and B. *juncea*. Soil samples were polluted with different waste material viz. 30-45 % organic matter, 6-10 % recyclables and the rest as inert matter. Municipal solid waste soil samples from Sukali compost, landfill depot sites, Amravati were collected and selected plants were grown for further study. The data indicates that Municipal solid waste contaminated soil may have improved chlorophyll contents of some plants. The chlorophyll contents significantly increase in some plants i.e. *C. tora*, *P. pinnata*, *T. erecta*, *B. napus* and *A. manihot* and affected adversely on remaining plants i.e. *T. stans*, *P. pinnata* and *B. juncea*.

Key words: Municipal solid waste, remediation, heavy metals, waste soil, control soil and chlorophyll.

INTRODUCTION

In Indian cities, solid waste generation rate is continuously goes on increasing day by day in most of states, metropolitan and large cities. The average per capita solid waste generation in India (EPTRI, 1995) has increased from 0.32 kg/day in 1971-73 to 0.48 kg/day in 1994. In 1995, EPRIT, Hyderabad showed that 23 big Indian cities generated 11 million tons (million tons) of solid waste every year. The Solid Waste Management in state of Maharashtra, particularly in its major cities, is of serious concern. Sukali compost and landfill depot, Amravati selected for study, this landfill site is a highly disturbed area, because of the constant turning of soil due to solid waste dumping. About 79 % of land in Sukali compost depot are totally filled up only remain 21 % of land for further loading of waste material, it also filled up in upcoming year. Hence, it is necessary study critically on present situation and to suggest possible solutions for its safe management for disposal. The aim of present study was to analyze various minerals, nutrients and heavy metals of waste soil. After analysis of various different parameters of waste soil, second part of the investigation was carried out to study its effect on chlorophyll content of some plants.

MATERIALS AND METHODS

Selection of site and sample collection: Soil samples were collected in summer season 2009-2011 from 3 different spots of Sukali compost depot.

Physicochemical and Metal analysis: Moisture content (Dhyansingh et al.,

1999) and soil texture (Arora and Pathak, 1989) was analyze. pH, Electrical conductivity and temperature of the soil was measured by pH meter, conductivity meter and thermometer. Colour notations indicated by using Munsell`s soil colour chart. Na, K and Ca ions was analyzed by flame photometer (Hanway and Heidel, 1952). The organic carbon in the sample was oxidized with potassium dichromate and sulphuric acid (Walkely and Black, 1934). Calcium carbonate by titrimetric method (Piper, 1966). The chloride content of the soil was directly measured by titrimetric method (Santra et al., 2006). Detection and analysis of metal ions such as Cu, Zn, Cr, Ni, Fe, Mn and Co from soil and sediments, wet oxidation of sample were carried out. Wet oxidation employs oxidizing acids like HNO_3 – $HCLO_4$ di- acid mixture (Jackson, 1958).

Chlorophyll contents of plants: Chlorophyll was extracted in 80% acetone and absorbance at 663 nm and 645 nm on using UV-Visible spectrophotometer (Elico SL 164). Leaves samples with control and treatments were estimated following the procedure of (Whatley and Arnon, 1963).

Statistical analysis: The difference between control and waste soil compared using *t* tests and significant differences were found at ($p< 0.01$), ($p< 0.05$) and ($p< 0.2$).

RESULTS AND DISCUSSION

A rise in temperature of soil accelerates chemical reactions, reduces solubility of gases and decrease pH of soil. The soils are neutral to alkaline in reaction; pH of control soil was (7.76) slightly lower as compared to waste soil (8.37).The organic carbon content in waste soil (43.17 %) its higher than in control soil (34.35 %). Moisture content in waste soil was found to be very low (3.92 %) as compared to control soil (6.62 %). The chlorides content in waste soil (49.7 mg/ kg) it was 20-30 % higher than control soil (42.6 mg/ kg). The conductivity of waste soil was much higher (1.792 $X10^6$) than control (0.128 $X10^6$). The overall mean exchangeable bases in waste soils were record as to be Na (26.5 mg/kg), K (89 mg/kg), Ca (400 mg/kg), $CaCo_3$ (79.1 %) respectively. In waste soil Na, K and $CaCo_3$ concentration 50-70 % higher than garden soil (control). The distribution of metals concentration present in the soil is shown in **(Table)**. Iron (Fe) was the highest concentration in both the waste and garden (control) soil. Zinc (Zn) and Manganese (Mn) second highest element in waste soil its concentration somewhat higher than garden (control) soil. Cobalt was totally absent in control as well as waste soil. Cr concentration in waste soil was 30-35 % higher than control soil. Cu concentration in waste soil was recorded 65-70 % higher than control.

Table 1: Physicochemical analyses of waste soil collect from Municipal Corporation Sukali compost and landfill Depot, Amravati.

Sr.No.	Parameters	Garden (Control Soil)	Municipal (Waste Soil)
1	Temperature(^{0}C)	32.4	35.5
2	pH	7.76	8.37
3	Colour	Dark reddish brown	Grayish dark brown
4	Moiture content (%)	6.62	3.93
5	Moisture correction factor (mcf)	1.06	0.13
6	Soil texture	Sandy loam	Sandy
7	Organic Carban (%)	34.35	43.17
8	Chlorides (mg/Kg)	42.6	49.7
9	Conductivity µmoho/m	0.128 $X10^6$	1.792$X10^6$
10	Na (mg/Kg)	4	26.5
11	K (mg/Kg)	13	89
12	Ca (mg/Kg)	890	400
13	$CaCO_3$ (%)	24.16	79.1
14	Heavy Metals		
I	Cu (mg/g)	0.699	1.001
II	Zn (mg/g)	1.684	5.058
III	Cr (mg/g)	0.168	0.536
IV	Ni (mg/g)	0.061	0.053
V	Fe (mg/g)	22.41	21.65
VI	Mn (mg/g)	4.695	5.982
VII	Co (mg/g)	-0.075	-0.100

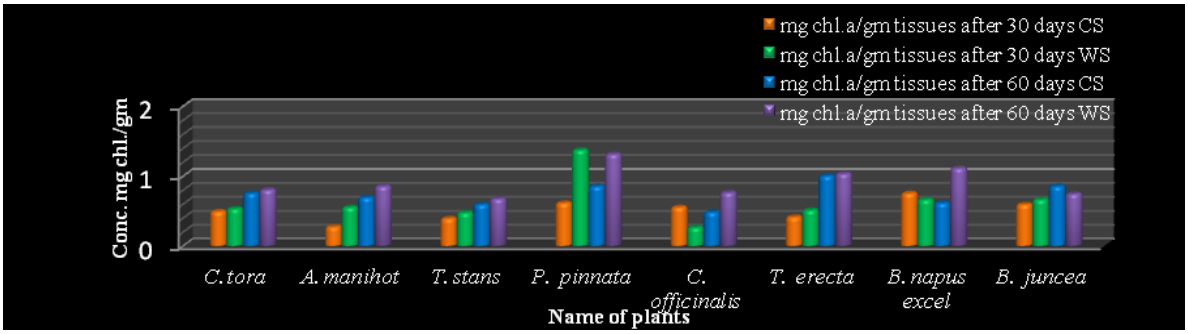


Fig. 1: Comparative study of Chl. a content in various plant species grown in CS and WS.

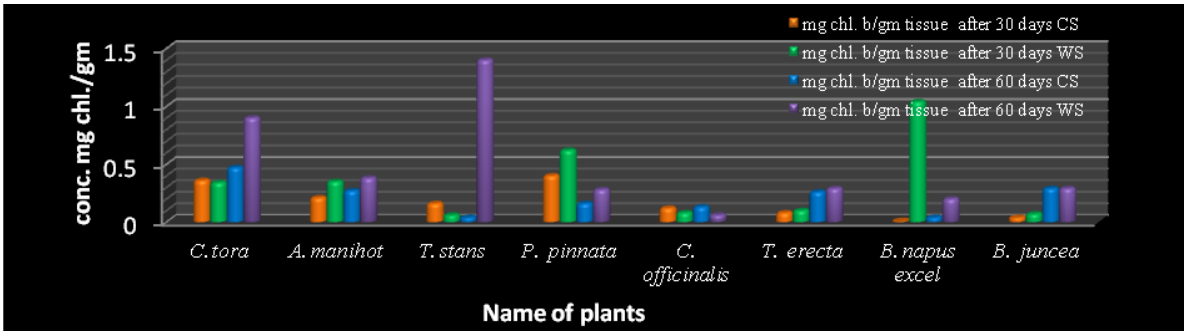


Fig. 2: Comparative study of Chl. b content in various plant species grown in CS and WS.

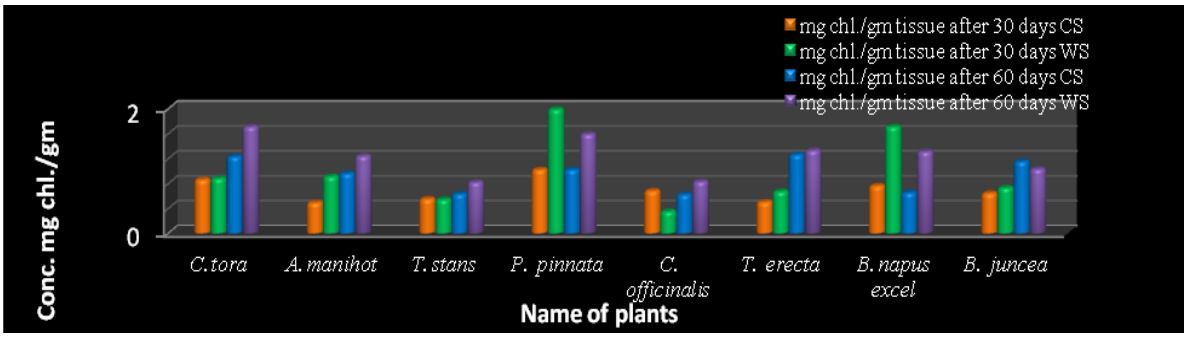


Fig. 3: Comparative study of total Chl. content in various plant species grown in CS and WS.

Effect of municipal solid waste on chlorophyll contents plants

The comparative study of chlorophyll content (Chl. a, Chl. b and total Chl.) in the number of plants grown in WS and CS after 30 and 60 days were shown in Fig 1 to 3. The data recorded from the present study, some of the plants were grow in waste soil i.e. *P. pinnata*, *T. erecta* and *B. napus excel* recorded highest concentration of chl. a during experimental period (Fig.1). However relation between chl. a after 30 and 60 days in CS and WS growing plants, higher amount of chl. a were recorded in WS growing plants as compared to CS except *B. juncea.* Analysis of variance showed that the effect of WS treatment was statistically significant at $p < 0.2$ percent level after 30 days and $p < 0.05$ percent level after 60 days (Fig. 1).

The plants were growing in waste soil i.e. *T. stans* and *C. tora* recorded highest conc. of chl. b during experimental period (Fig. 2). However relation between chl. b after 30 and 60 days in CS and WS growing plants, higher amount of chl. b was recorded in WS growing plants as compared to CS. Higher amount of chl. b contents were found in *T. stans*, *C. tora*, *P. pinnata* and *B. napus* (70-85 %); *A. manihot* and *T. erecta* (40-60 %).*C. officinalis* and B. *juncea* chl. b contents was higher or equal in CS as compared to WS. Analysis of variance showed that the effect of WS treatment was statistically significant in $p < 0.2$ percent level after 30 days and $p < 0.05$ percent level after 60 days in some plants i.e. *T. stans*, *C. tora*, *P. pinnata*, *B. napus*, *A. manihot* and *T. erecta* (Fig.2). The maximum amount of total Chl. contents recorded in WS in some plants i.e. *C. tora*, *P. pinnata*, *T. erecta*, *B. napus* and *A. manihot*

(Fig. 3). Relation in total chlorophyll amounts (Fig. 3) in WS and CS, in *C. tora* (35-40 %), *A. manihot* (20-22 %), *T. stans* (20-21 %), *C. officinalis* (30-32 %), *T. erecta* (35-37 %) and *B. juncea* (25-27 %) higher in WS as compared to CS growing plants after 30 and 60 days. Analysis of variance showed that the effect of WS treatment on total chl. production of plants was statistically significant in $p < 0.2$ and $p < 0.05$ percent level after 30 days and $p < 0.05$ and $p < 0.01$ percent level after 60 days in some plants.

Anikwe and Nwobodo (2001) reported that municipal wastes increase the nitrogen, pH, cation exchange capacity (K, Na, Cl etc.), percentage of base saturation and organic matter. In present study, the concentration of K in WS was 80-90 % higher over the CS (Table). Potassium has reported to be involved in maximum increase in nutrient uptake by virtue of more photosynthesis resulting in more chlorophyll formation with an increased leaf area (Belorkar et al., 1992). All these plants tolerate higher concentration of heavy metal. The result of present study shows that, the plants absorbs and extracts more amount of Cu from waste soil, it affect on total chlorophyll content of plant. Chlorophyll pigment play an important role in photosynthesis, its sensitivity hampers the biomass production. Hall and Williams (2003) reported that Cu is an integral component of certain electron transfer proteins in photosynthesis (e.g. plastocyanin) and respiration (e.g. Cytochrome C oxidase) and it plays a significant role in growth and chlorophyll production. In *P. pinnata* (32-33 %) and *B. napus* (5-6 %) rise total chl. contents after 30 days this value lowered down after 60 days in *P. pinnata* (15-16 %) due to metal saturation increased after 60 days (Shirbhate and Malode, 2012).

CONCLUSION

All the recorded minerals and metals in waste soil samples were 30-80 folds higher than garden soil (control soil - CS). Minerals and metals of waste soil (WS) sometimes involve in growth of some plants. The different elements of waste soil involved in maximum increase in nutrient uptake by virtue of more photosynthesis resulting in more chlorophyll formation. In this way it may possible to solve environmental pollution problems also.

REFERENCES

Anikwe MAN, Nwobodo KCA (2001) Long Term Effect of Municipal Waste Disposal on Soil Properties and productivity of Sites used for Urban Agriculture in Abakaliki, Nigeria. Bioresources Technol., 83, 241-251.

Arora S, Pathak, SC(1989)Laboratory techniques in modern biology. 2nd Edi.KalyaniPublishers,New Delhi-110002, 73-89.

Belorkar PV, Patel BN, Golliwar VJ, Kothare AJ (1992) Effect of Nitrogen and spacing on growth, flowering and yield of African marigold. Journal of soils crops, 2:15-27; 62-64.

Dhyan Singh, ChhonkarP K, Pandey R N (1999) Soil plant and water analysis –A method manual. IARI, New Delhi,pp 255.

Environment Protection Training and Research Institute (EPTRI) (1995)Hyderabad, Status of Solid Waste Disposal in Metropolis Hyderabad, 46.

Hall JL, Williams LE (2003) Transition metals transporters in plants. Journal of Experimental Botany, 54(393):2601-2613.

Hanway JJ, Heidel H (1952) Soil analysis methods as used in lowa state college soil testing laboratory,Lowa Agri.57.1-31. http://www.cpcb.com

Jackson ML (1958) Soil and Chemical Analysis. Prentic-Hall, Englewood Cliffs, NJ, USA.

Kim KH, Kim SH (1999). Water, Air and Soil Pollution, 111:109-122.

Klorke A (1979) Content of arsenic, cadmium, chromium, fluoride, lead, mercury and nickel in plants grown on contaminated soil, paper presented at united Nations-ECE Symposium. In Chon HT, Ahn, JS, Jung, MC, 672-679.

Piper CS (1966) Soil and plant analysis. Hans's publications, Bombay.

Santra SC, Chatterji TP, Das AP (2006) College Botany Practical.Vol.1New Central Book Agency (P) Ltd.221.

Shirbhate N,Malode S. N.(2012) Heavy metals phytoremediation by *Pongamiapinnata* (L) growing in contaminated soil from municipal solid waste landfills and compost Sukali depot, Amravati (M.S.). International Journal of advanced biological research, Vol.2 (1):147-152.

Walkely AJ,Black IA (1934) Estimation soil organic carbon by chromic acid titration method. Soil sci., 37, 29-38.

Whatley FR, Arnon DI (1963)Methods in Enzymology, Academic Press, New York, 1: 308.

RESEARCH ARTICLE

Seasonal Diversity of Copepods in Relation with Physico-Chemical Status of Devtaki Pond, Distt. Gondia, Gondia (M.S.), India

Meshram Wasudha J

Department of Zoolog, Jagat Arts, Commerce and I.H.P. Science College, Goregaon -441801, Distt. Gondia, (Maharashtra), India.

e-mail: wasudhagajbhiye@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Meshram Wasudha J (2014) Seasonal Diversity of Copepods in Relation WithPhysico-Chemical Status of Devtaki Pond, Distt. Gondia, Gondia (M.S.), India, *Int. J. of Life Sciences*, 2014, Special Issue A2: 147-149.

ABSTRACT

The present study is focused on the seasonal variations of copepods in relation with the physico- chemical parameters of a Devtaki pond, Gondia, Gondia District, Maharashtra. The pond is surrounded by slums of Govindpur and Chhota Gondia areas in the town. Seasonal changes in physico-chemical parameters such as water temperature, P^H, Dissolved Oxygen and inorganic contents were studied month wise from June 2006 to May 2007. Studies showed the seasonal fluctuations in water temperature (25° C-35° C), Transparency (13-20 cm), P^H (7.1-8.3), Dissolved Oxygen (3.4-10.5 mg/l), Free Carbon Dioxide (6.0-17.5 mg/l), Total alkalinity (103-309mg/l), Chlorides (15.6-72.0 mg/l), Total Hardness (475-830 mg/l), Phosphate (2.07-7.15 mg/l), Nitrates (2.09-4.06 mg/l), Copepods were recorded as 1430 ind/lit. The study revealed that there is an indication of pollution in the pond due to anthropogenic activities, rapid encroachments of the area, domestic sewage, the pond water is being polluted. Hence preventive measures are required to avoid further deterioration of the pond water quality.

Keywords : Devtaki pond, physico-chemical parameters, copepods.

INTRODUCTION

Water is essential for the existence of life on the earth. No wonder that water is aptly said the 'Liquid of Life' or 'The Universal Solvent' or the 'Elixir of Life. The physico-chemical characteristics of pond water have direct impact on aquatic organisms as well as on human being using such water. The quality of water is getting deteriorated due to the industrialization, urbanization and pesticides use which run off with water and contaminate the water bodies. The quality of water is assessed on the basis of physico-chemical and biological parameters in order to complete set of information. Copepoda is one of the important groups of zooplankton in aquatic ecosystem. Copepods are found almost universally in freshwater habitat. They provide food for fishes in fresh water ponds, lakes and play a major role in fish growth and their production.

Seasonal variations with reference to physico-chemical factors was undertaken to study the pond ecosystem with seasonal changes in response to physico-chemical and biological factors during different seasons of the year.

MATERIALS AND METHODS

Devtaki pond is located at 21º 27' and 13.62" N, 80º 12' and 38.51" E. It is about 1032 ft. above the mean sea level (MSL), with net area of 0.06 sq.km. It is surrounded by the dense populated slum areas of Gondia town. It is called as Devtaki, meaning God's pond, because of Lord Shiva and Vithal- Rukhmini temples on its bank.

The investigations on physico-chemical and biological parameters were carried out during June 2006 to May 2007. Monthly water samples were collected and brought to the laboratory for further analysis. Physico-chemical parameters like temperature, transparency, p^H, dissolved oxygen, free carbon dioxide, chloride, hardness and nutrients like phosphates and nitrates. (APHA, 1975). At the same time the plankton samples were collected by using standard nylon plankton net made by bolting silk no. 25 planktons were preserved in 4% and identified using (Edmondson 1959) and other standard manuals.

Devtaki Pond

Fig.1 : Map showing Devtaki pond in Gondia District and satellite view of Devtaki pond.

RESULTS AND DISCUSSION

During the present investigation the physical parameters such as temperature, transparency and chemical parameters namely p^H, dissolved oxygen, free carbon dioxide, chlorine, hardness, alkalinity, phosphate and nitrates. The density and diversity of copepods were studied from June 2006 to May 2007. Table no. 1 shows the seasonal variations of various physico-chemical parameters of Devtaki pond during the study period.

Parameters like water temperature (32.12 ºC), free carbon dioxide (13.72 mg/l), total alkalinity (279.5 mg/l), nitrates (3.46 mg/l) and phosphates (5.99 mg/l) were maximum during summer while transparency (18.25 cm), p^H (7.92), dissolved oxygen (8.48 mg/l) showed its peak in winter and total hardness (715.25 mg/l) and chloride (56.3 mg/l) were recorded maximum during monsoon season.

Table 1: Annual range, Seasonal variations in Physico-chemical Parameters of Devtaki Pond during 2006-2007.

Parameters	Range	Monsoon	Winter	Summer
Water Temperature (ºC)	25-35	31.05 ± 2.209	25.88±0.829	32.12±2.236
Transparency (cm)	13-20	15± 0.935	18.25 ± 1.145	14.63 ± 1.92
P^H	7.1-8.3	7.43 ± 0.294	7.92 ± 0.238	7.9 ± 0.316
Dissolved oxygen (mg/l)	3.4-10.5	6.25 ± 1.581	8.48 ± 1.645	4.6 ± 0.948
Free Carbon dioxide(mg/l)	6-17.5	12.35 ± 2.546	7.1 ± 0.821	13.72 ± 2.64
Total Alkalinity (mg/l)	103-309	154.5 ± 46.241	192.25 ±35.891	279.5 ± 19.241
Total Hardness (mg/l)	475-830	715.25 ± 100.686	699.25 ± 30.727	541.25 ± 52.227
Chloride (mg/l)	15.6-72.0	56.3 ± 11.091	37.05 ± 7.437	20.85 ± 4.049
Nitrate (mg/l)	2.09-4.06	3.39 ± 0.321	2.26 ± 1.191	3.46 ± 0.458
Phosphate (mg/l)	2.07-7.15	4.42 ± 1.330	3.25 ± 0.803	5.99 ± 0.908

Total 5 species of copepods were recorded during the study period. The most diversified species was Cyclops (325 ind/lit.), Diaptomus spp.(279 ind/lit.), Macrocyclops (226 ind/lit.), Mesocyclops (300 ind/lit.) and Eucyclops (300 ind/lit.). Total population of copepods was recorded as 1430 ind/lit.). Seasonal population density of copepods recorded its peak during winter (728 ind/lit.i.e 49%), during summer (372 ind/lit.i.e 28%) while least during monsoon (330 ind/lit.i.e 23%)

Copepodes build up their population taking more time than rotifers and other zooplanktons. However, once they become dominant, they continue to dominate the habitat till the hydrobiological condition favour their existence. Prabhavathy and Sreenivasan (1977).

The seasonal study of copepods biodiversity of Devtaki pond showed the peak in density and diversity during winter indicating the influence of various physico-chemical factors. In the present investigations, the nutrients such as nitrates, phosphates etc. were recorded in lower concentration while peak in pH anddissolved oxygen during winter season which may result into the increased population of copepods during the season while lower population was recorded during summer and monsoon season.

Similar results recorded by Kamble et al. (2005) in Khatijapur Tank, Achalpur have reported the pollution indicator species like Cyclops were recorded more during the winter season. It might be due to the abundance of diatoms and blue green algae (Meshram, 1996). This pattern of distribution may be due to the interaction of biotic and abiotic components of water. Choubey (1997) found high density of copepod during October. Water temperature and availability of food organisms affect the copepod population. Rao et al. (2001) has reported maximum count of zooplankton during summer while among this Copepodes during winter. Least count of both reported during monsoon season.

Kumar (2001) has also reported maximum number of Copepodes species during winter than summer season. The less number of these species during summer might be attributed to the higher temperature, evaporation of water or might be due to the depletion of the important factors such as Dissolved oxygen. The reduction in the number of species may also be due to predation. Welch (1952) also reported quantitatively less plankton in tropical inland waters. Sharma et al. (2007) in urban lake, Udaipur has reported the dominanace of crustacean zooplanktons quantitatively. This is also supported by Bohra (1976), Govind (1978) and Sumitra (2001) also found dominance of copepods in stagnant waters.

CONCLUSION

Having a glimpse of observations on physico-chemical parameters, such as temperature, transparency, P^H, dissolved oxygen, free carbon dioxide, total alkalinity, total hardness, nitrates and phosphates have the direct impact on occurrence, density and diversity of copepods in Devtaki pond. Occurrence of these bio indicator species at higher rate indicates the mesosaprobic nature of this pond.

REFERENCES

APHA (1975) Standard Method For Examination of Water and Waste Water. American Public Health Association, Washington, D.C. (17th Ed.) 1452pp.

Edmondson WT (1959) Freshwater Ecology, 2nd Ed. John Wiley & Sons, Inc New York.

Kumar KS (2001) Studies on Fresh water Copepodes and Cladocera of DharmapuriDistt. Tamil Nadu *J. Aqua.Biol .*,16 (1 &2) : 5-10pp.

Bohra OP.(1976). Some aspects of Limnology of Padamsagar and Ranisagar.Ph.D. Thesis, University of Jodhpur, (Raj.) India.

Kamble BB, Meshram CB (2005)A preliminary study on zooplankton diversity of Khatijapur tank near Achalpur, Dist. Amaravati, M.S. J. Aqua. Biol., 20 (2), 2005 : 45-47 pp.

Meshram CB (1996)limnological studies of Wadali lake, Amaravati, Govind, V.B. (1978) : In Proc. Sem. Ecol. Fish Fresh W. Reservoir (1969). pp : 99-128 pp.

Govind VB (1978) In Proc. Sem. Ecol. Fish Fresh W. Reservoir (1969).pp : 99-128 pp.Ph.D. Thesis.

RaoNarsimha P., Jaya Raju PB.(2001)LImnological investigations and diversity of plankton in sewage fed fish Culture pond at Nambur near Guntur, A.P., India. J.Aqua. Biol., 16 (1 & 2): 11-14 pp.

SharmaMadhu Sudan, Sumitra, Meena, Sharma, Vipul, Malara, Heena, and Sharma, Riddhi (2007) Eutrophication process in an urban lake system of Udaipur, NSL – 2007, Jaipur :31-34 pp.

Sumitra Meena (2001) Studies on biodiversity of Freshwater Zooplankton on relation to organic Pollution.A Ph.D. Thesis, MohanlalSukhadia University, Udaipur (Raj.)

UshaChoubey(1997) J. Aqua.Biol. 21(2) 67-71 pp.

Prabhavathy G., Sreenivasan A. (1977) Ecology of warm freshwater zooplankton of Tamil Nadu. Proc.Of Sym. On warm water zooplankton, N.I.O.., Goa, Spl, Publication : 319-399 pp.

Welch PS (1952) : Limnology, II edition. McGraw Hill book company, Inc. New York, Pp : 538 pp.

RESEARCH ARTICLE

Biodiversity of NTFPs and its usages from Tirora Tehsil of Gondia District (MS), INDIA

Zode Ravindra[1] Tagade Walay[1] and Chaturvedi Alka[2]

[1]*Department of Botany, C. J. Patel College, Tirora*

[2] *Department of Botany, University Campus, Nagpur*

**Corresponding author email: ravizode31@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Zode Ravindra, Tagade Walay and Chaturvedi Alka (2014) Biodiversity of NTFPs and its usages from Tirora Tehsil of Gondia District (MS), India, *Int. J. of Life Sciences,* Special Issue, A2:150-152.

ABSTRACT

Non-timber forest products are much important in worldwide for their significant role in livelihood, which encompasses with medicinal plants, dyes, mushrooms, fruits, bark, leaves, flowers, seeds, honey, roots and tubers. 45 different plant species were mostly extracted as NTFPs for Edible, Construction, fodder, fuel, medicine, household and commercial purposes. Apart from this, Wild edible vegetables are common NTFPs such as Mushroom and the honeys that have been extracted widely through the tehsil. The present study suggests that, tribal peoples are more dependent on NTFPs. The collectors most in need of income support from NTFPs are least able to benefit from an NTFP-based development strategy as they have the poorest developed skills, lack resources to store.

Key words: - NTFPs, Diversity, Livelihood, Dependency, Used pattern.

INTRODUCTION

In India, more than half of its population lives in rural areas and a large tribal population are dependent on NTFPs for their sustenance and cash income (Hedge *et al*., 1996). NTFPs are significant especially for poor peoples, which provide the alternative to food as well as income source. Out of 3000 forest product, 126 forest species were identified as a potential market product (Maithani 1994). Non-timber forest products (NTFPs) serve the valuable products for enhancing the rural development, expands economic growth, cultural endurance, and environmental health in local, national and international markets (Wilkinson & Elivitch, 2000). The socio-economic importance and the value of NTFPs in the economics of tropical countries are now well recognized (Gupta and Gularis, 1982; FAO, 1995). In almost all tropical countries, the collection of NTFPs is a major economic activity (Alexander *et al*., 2001; Ambrose, 2003). In this paper we estimate the quantities of NTFPs are harvested and it's used pattern in different ways. However, overharvesting of NTFPs can have a negative impact on conservation of biodiversity. In general, however, the impact of extraction of NTFPs on forest structure and composition is unknown for most extractive reserves.

MATERIAL AND METHODS

***Study Area* :** Geographically, Tirora Tehsil is located in north-western part of Gondia district, Eastern Maharashtra of Central India. It lies between 21 22'03" to 21 38'09"N latitude and 80 00'00" to 80 21'24" E longitudes.

Total of 9 villages were selected for present investigation and are covered by 2013.45 ha. forest area. These villages are Berdipar, Bhajepar, Chorkhamara, Ghoti, Lonara, Sarra, Nimgaon, Bodalkasa, Mangezari and Balapur. The Present Study carried out during the month of January to November 2013. Extensive Village survey was conducted to capture information on aspects of NTFPs dependence and its use patterns in the village. A total of 180 individual, 20 individuals from each village actively involved in collection of NTFPs were interviewed through the household survey

RESULTS & DISCUSSION

During the investigations, total 45 plants were identified as NTFPs. Out of 45 plants, 26 plants were observed as Edible, 4 plants were used for construction purposes, and 15 and 31 plants are used for commercial and medicinal purposes, respectively (Table 1). Basu and Mukharjee (1996) have studied the uses of some plants as source of food in "Paharies" of Purulia District and recorded the 16 wild plants as food source.

Table 1: Different Parts of NTFPs used for Different purposes (Use pattern)

S.N	Botanical Name	Family	Local Name	Parts used	Use pattern	A	B	C	D
1	*Buchanania lanzan* Spreng.	Anacardiaceae	Charoli	Seed	Edible,	√	√	√	√
				Leaves	Plate Making				
2	*Semecarpus anacardium* L.	Anacardiaceae	Bhelau	Fruits	Edible, Medicine	√			√
				Seed					
3	*Mangifera indica* L.	Annacardiaceae	Aam	Fruits	Edible	√		√	
4	*Annona squamosa* L.	Annonaceae	Sitaphal	Fruits	Edible, Medicinal	√		√	√
5	*Amorphophallus campanulatus* (Roxb.)	Aracaeae	Suran	Tuber	Edible, Medicinal	√			√
6	*Asparagus racemosus* (Kunth) Baker	Asparagaceae	Shatavari	Tuber	Medicinal				√
7	*Cassia tora* L.	Caesalpiniaceae	Tarota	Leaves, Flower	Edible, Medicinal	√			√
8	*Terminalia chebula* Retz.	Combretaceae	Hirda	Fruits	Medicinal, edible	√		√	√
9	*Terminalia bellerica* (Gaertn.) Roxb.	Combretaceae	Behada	Fruits	Medicinal, edible	√		√	√
10	*Diospyros melanoxylon* Willd.	Ebenaceae	Tendu patta	Leaves	Beedi making			√	
11	*Embilca officinalis* Gaertn.	Euphorbiaceae	Aola	Fruits	Medicinal, Edible	√		√	√
12	*Bauhinia vahlii* Wt.&Arn.	Fabaceae	Mahur	Leaves	Plates making			√	
13	*Butea monosperma* (Lamk.) Taub.	Fabaceae	Palas	Leaves	Plates, dye, Lac making			√	
				Flower					
14	*Pongamia pinnata* (L.) Merr. Interpr.	Fabaceae	Karanja	Fruits	Medicinal				√
15	*Chlorophytum tuberosum* Baker.	Liliaceae	Musali	Tuber	Edible, Medicinal	√			√
16	*Phoenix sylvestris* (L.) Roxb.	Palmae	Sindi	Leaves	Broom making, Edible	√	√	√	
				Fruits					
17	*Tamarindus indica* L.	Papilionanceae	Chinch/ Imali	Fruits	Medicinal ,Edible	√		√	√
				Leaves					
18	*Bambusa*	Poaceae	Bamboo	Stem	Basket and Household		√	√	
19	*Ziziphus sp.*	Rhamnaceae	Ghoti	Fruits	Edible, Medicinal	√			√
20	*Ziziphus jujuba* Lamk.	Rhamnaceae	Ber	Fruits	Edible	√		√	
21	*Ziziphus oenoplea* L.	Rhamnaceae	Aeroni	Fruits	Edible	√			
22	*Aegle marmalos* (L.) Corr.	Rutaceae	Bel	Fruits	Edible , Medicinal	√			√
23	*Madhuca longifolia* (Koen.) Mac.	Sapotaceae Sterculiaceae	Mahua	Flowers	Edible, liquor Edible, Medicinal	√		√	√
				Seeds					
24	*Sterculia urens* Roxb.			Gum		√			√
25	*Curcuma aromatica* L.	Zingiberaceae	Ranhalad	Rhizome	Edible, Medicinal	√			√
26	*Tinospora cordifolia* (Willd)	Menispermaceae	Guduchi/ Gudwel	Whole plant	Medicinal				√
27	*Carissa carandas*	Apocynaceae	Karvanda	Fruits	Edible	√			
28	*Helicteres isora* L.	Sterculiaceae	Murad-sheng	Friuts	Medicinal				√
29	*Curculigo orchioides* (Gaertn.)	Amaryllidaceae/ Hypoxidoideae	Kali-musali	Roots	Medicinal				√
30	*Andrographis paniculata* (Burn.F.) Wallich	Acanthaceae	Bhuinimb	Whole plant	Medicinal				√
31	*Dioscorea bulbifera* L.	Dioscoriaceae	Matalu	Tubers,bulbils	Edible	√			
32	*Costus sp.* Koenig	Costaceae	Dukar-kanda	Bulbils	Medicinal				√
33			Padar	Leaves	Household		√		
34	*Lawsonia inermis* L.	Lythraceae	Mahendi plant	Leaves	Dyes			√	

Table 1: Continued…

S.N	Botanical Name	Family	Local Name	Parts used	Use pattern	A	B	C	D
35	*Hemidesmus indicus* (L.) R.Brown	Periplocaceae	Anantmud /Khoberwell	Roots	Medicinal				√
36	*Cassia fistula*	Caesalpinaceae	Bahawa	Seeds	Medicinal	√			√
				Flower	Edible				
37	*Moringa oleifera*	Moringaceae	Shevaga	Fruits	Edible	√			
38	*Ricinus communis*	Euphorbiaeae	Eranda	Fruit oil	Medicinal & edible	√			√
39	*Spilanthes paniculata Wall. Ex DC*	Asteraceae	Akkalkhada	Leaves	Medicinal				√
40	*Bombax ceiba*	Bombacaceae	Katesawar	Bark	Medicinal				√
41	*Nerium indicum Mill*		Kanher	Seed	Medicinal				√
42	*Ficus racemosa*	Moraceae	Umber		Edible, Medicinal	√			√
43	*Manilkarazapota (L.) P. van.*	Sapotaceae	Chiku	Fruits	Edible	√			
44	*Terminalia arjuna*	Combretaceae	Arjun-Ajn	Bark	Medicinal				√
45	*Abrus precatorius L.*	Fabaceae	Gunj	Seeds	Medicinal				√
	Total		**26**	**4**	**15**	**31**			

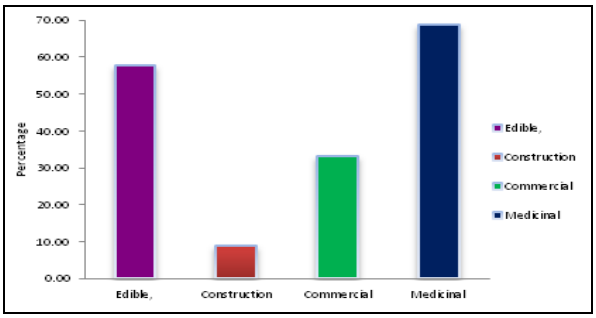


Fig. 1 Use of Pattern of NTFPs

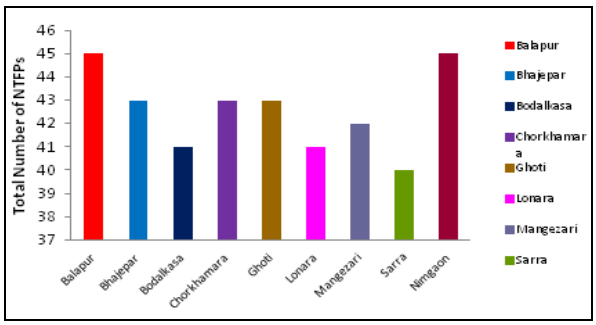


Fig. 2: Total NTFPs found in villages of Tirora Tehsil

Apart from this total 68.89% and 57.78% NTFPs are used as Edible and Medicinal purpose, respectively. However, only 8.89% and 33.33% are used for construction and commercial purposes, respectively (Graph-1). Similarly In west Bengal, various districts such as Purulia in which the local people prefer traditional medicine due to its low cost and social prejudice (Chakraborty *et al.,* 2003).

In Balapur, Nimgaon villages the maximum amount of NTFPs are used for livelihood as compare to the Bhajepar, Chorkhamara, and Ghoti while in Mangezari, Bodalkasa, Lonara and Sarra were less amount of NTFPs found (Graph 2). Wild edible vegetables such as Mushroom and the honeys are extracted widely. Maske et. al. 2011 demonstrates that NTFP are alternative sources of income to the villager to improve their socio-economic condition as well as increasing the income level and employment opportunities.

CONCLUSION

The present study suggests that, Tribal peoples are more dependent on NTFPs. Thus the forest resources in the form of NTFPs play an important role in the socio-economic safety net of the forest dwellers. The study reveals that almost all of the forest dwellers depend on the forest products other than timber to varying degrees. The rich NTFP resource, therefore, calls for further research on various aspects and a framework for sustainable utilization.

REFERENCES

Alexander SJ, McLain RJ, Blanter KA (2001) Socioeconomic research on non-timber forest products in the Pacific North-west, *J. Sustainable*., 13:95 -105.

Ambrose-Oji B (2003) The contribution of NTFPs to the forest poor:evidence from the tropical forest zone of South-west Cameron. *Int. For.Rev.*, 5:231-233.

Basu R, Mukharji PK(1996) Food plants of the tribe Paharies of Purulia .Ad. *Plant Sci.*, 9(2):209 -210.

Chakraborty MK, Bhattacharjee A (2003) Plants used as mastica-tories by the ethnic communities of Parulia district, West Bengal, India. *J.Econ. Taxon. Bot., 27(3):568-570.*

FAO (1991) Non wood forest products: The way Ahead, Rome, Italy.

Hegde R, Suryprakash S, Achoth L, Bawa KS (1996).Extraction of NTFPs in the Forests of B.R. Hills. Contribution to Rural Income.Economic Botany, 50, 243p. In: Uma Shankar R, *et al.* (ed.) 2004.

Mahesh M and Alka C (2011) Impact of NTFPs on rural tribes economy in Gondia District of Maharashtra , India.

Maithani GP (1994) Management perspectives of Minor Forest Produce.MFP News, October-December, 1994.Dehradun.

Wilkinson MK, Elivitch RC (2000) Non-Timber Forest Products for pacific islands: An introductory guide for producers. Agroforestry Guides for pacific Islands, Permanent Agriculture Resources, Holualoa, Hawaii, USA.

RESEARCH ARTICLE

Studies on farmland avian diversity with special reference to importance of hedges in conserving farmland bird diversity.

Kukade Rutuja Jayprakash

Depatment of Environmental Science, Shri Shivaji Science College, Amravati, India, 444603

Email ID - rutujakukade@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kukade Rutuja Jayprakash (2014) Studies on farmland avian diversity with special reference to importance of hedges in conserving farmland bird diversity, *Int. J. of Life Sciences,* Special Issue, A2 :153-155.

ABSTRACT

Agricultural ornithology aims at obtaining scientific information on birds in relation to agriculture and using this information for their management. Most of bird species play a useful role in agriculture by having a potent check on insect and rodent pests. The paper deals with the research work carried out in an Agricultural field near Akot city (Latitude 21°06'N, 77°06'E Longitude) of Maharashtra state. Birds were surveyed in the agricultural field and in the adjoining hedges with the help of binocular once in a week. Total 64 bird species were observed during the study span. The study revealed that there is a difference in bird richness and diversity between the habitats of agro-ecosystem in the study area. Hedges provide important nesting, feeding and sheltering sites for birds in agricultural areas.

Key Words - Agricultural ornithology, Hedges, Pest Control.

INTRODUCTION

Agricultural ornithology may be defined as the science of birds in relation to agriculture. Alternatively, it may be taken as ecology and management of birds in agro-ecosystems. Avian management includes both conservation of useful species and control of pest birds. Birds constitute an important component of agro-ecosystems. The dual role of birds in agriculture is very well known (Ali, 1949, 1971). Birds are the key species in an agricultural ecosystem for maintaining the ecological balance (Haslem and Bennett, 2008). Their positive and negative roles in agriculture production were very well illustrated (Ali, 1949 and 1971) Hedges are more than just lines of shrubs. They usually have some sort of herbaceous growth at or near the base and many contain mature trees. Hedgerows are important landscape elements for birds in agricultural areas by providing nesting sites, feeding resources and shelter (Hinsley and Bellamy, 2000). Research work had carried out in a Agricultural field of about four hector near Akot city (Latitude 21°06'N, 77°06'E Longitude) of Maharashtra state. Field had Jute and cotton crop which were separated by thick hedgerows.

MATERIAL AND METHODS

The farmland bird diversity was studied for a period of one year from 2012 to 2013. To study the avifaunal diversity 'Complete Census Method' (Whitworth *et al*., 2007) was used. During study birds were observed weekly while walking in the field, with the help of binocular (Olympus 10x50) and identified up to species level using physical features with the aid of Keys Ali (1996); Ali and Reply (1987); Grimmett (2000). Birds just flying over were not included in the study. Birds were also recorded in hedges. The species of the birds encountered during each visit were enlisted and other details like abundance of the birds and their status was also recorded. Feeding habits of the birds were observed at different times of the day. In some cases individual birds were observed continuously from a vantage point to understand its' feeding mode. The abundance and the status of species are based on the Checklist of Birds of Maharashtra (Abdulali, 1972).

RESULT AND DISCUSSION

During the study span, 64 bird species belonging to 34 different families were observed. Their family-wise list depicting common as well as scientific names, status, and abundance and feeding habits is given in table1. Rose-ringed parakeet, blue rock pigeon and House crow were the tree most common species in the agricultural field. Most of the birds were recorded in or near hedges. Batary *et al.,* (2010) reported that increasing hedge length enhanced significantly the number of species. This study also shows that hedge length has a stronger effect on bird richness than management. Benton *et al*., (2003) supported that the increasing length of hedges enhances birds in conventional fields too. Therefore, bird conservation in intensively used agricultural landscapes should concentrate on hedges or green lanes.

Many birds like Red-vented Bulbul (*Pycnonotus cafer*), Large Grey Babbler (*Turdoides malcolmi*), Jungle Babbler(*Turdoides striata*), Ashy Prinia (*Prinia socialis*), Common Tailorbird (*Orthotomus sutorius*), Oriental Magpie Robin (*Copsychus saularis*), Indian Robin (*Saxicoloides fulicatus*) found nesting in hedge rows during the study. There was also the occurrence of brood parasitism by Asian Koel (*Eudynamys scolopaceus*). Though hedges provide good nesting sites, farmland birds may also face higher nest predation due to higher nest densities. Similar opinion was expressed by Newton, (1998). Preference for hedges can be explained by the higher resource availability for birds, such as nesting and sheltering sites and food in agricultural areas. Hinsley and Bellamy, (2000) also concluded the same.

Not all farmland species use hedges, like Red-wattled lapwing (*Vanellus indicus*), actively avoiding them as they prefer more open areas as they are ground nesters. Jute plantation was severely affected by Lepidopteron pest which was the food of many birds like Indian Roller (*Coracias benghalensis*), Red-vented Bulbul (*Pycnonotus cafer*), Large Grey Babbler (*Turdoides malcolmi*), Jungle Babbler(*Turdoides striata*), Ashy Prinia (*Prinia socialis*), Common Tailorbird (*Orthotomus sutorius*), Oriental Magpie Robin (*Copsychus saularis*), Indian Robin (*Saxicoloides fulicatus*). All these insectivorous birds played very useful role in controlling insect pest in Jute as well as Cotton crops. Presence huge number of birds in this agricultural field was found to be useful for controlling the crop pest as the crop was not food of any bird.

Cutting of hedge rows was done which dwindled the bird diversity in this field. Complete removal of hedges destroyed their roosting and nesting sites. Lack (1987), also noticed that hedge cutting has a severe effect on bird diversity. Kuchler and Walter (2007), has observed excessive hedge cutting and even complete removal in early spring in more than half of their studied landscapes.

CONCLUSION

It is concluded from the study that hedges provide important nesting, feeding and sheltering sites for birds in agricultural areas so that hedges are important in conserving avifaunal diversity of farmland. Hedge length had the strongest positive effect on bird diversity, so providing more hedgerows and carefully managing them, can significantly contribute to the conservation of farmland birds. Most of the birds looked for their food in the agricultural field and made the hedges their resting and breeding place. The highest diversity of birds was due to more diversity of plants which gives more choice for the food preference of the bird species. The considerable numbers of bushes and plants at the boundary of agricultural land accommodate the large number of bird's population. Thus planting trees in agricultural lands and well managed hedges can increase the bird diversity. Large scale cutting of hedges should be

avoided to maintain the avifauna of agricultural landscapes.

Rose-ringed parakeet is probably the only species that seems to be exclusively harmful to agriculture, particularly for horticulture. House crow and blue rock pigeon have also been considered to be harmful. House sparrow, Little Brown Dove and Baya weaver bird have a neutral status in relation to agriculture while a large majority of the species in the agricultural bird communities are useful. It is well known that insectivorous and predatory birds play a very useful role in controlling insect and rodent pests of crops. Presence huge number of birds in this agricultural field is eco-friendly and useful for controlling the pests on the crop so, hedgerows must be saved to conserve the farmland bird diversity. Hedges should be maintained properly and not allowed to become invasive thereby reducing the utilizable area of the field.

REFERENCES

Ali S and Ripley SD (1987) Compact Handbook of the Birds India and Pakistan together with those of Bangladesh, Nepal, Bhutan and Shri Lanka. 2nd Ed. Oxford Univ. Press, Oxford New York,

Batary P, Matthiesen T and Tscharntken T (2010) Landscape-moderated importance of hedges in conserving farmland bird diversity of organic vs. conventional croplands and grasslands. Agro ecology, Georg-August University, Waldweg 26, D-37073 Gottingen, Germany.

Benton TG, Vickery JA and Wilson JD (2003) Farmland biodiversity: is habitat heterogeneity the key? *Trends in Ecology and Evolution*, 18, 182–188.

Grimmett R, Inskipp C and Inskipp T (2000) Pocket Guide to the Birds of Indian Subcontinent. Oxford university press, 384 pp.

Haslem A and Bennett AF (2008) Birds in agricultural mosaics: the influence of landscape pattern and countryside heterogeneity. *Ecological Applications*, 18:185–196.

Hinsley SA and Bellamy, PE (2000) The influence of hedge structure, management andlandscape context on the value of hedgerows to birds: a review. *Journal ofEnviron. Management,* 60: 33–49.

Kuchler-Krischun J and Walter A (2007) Nationale Strategie zur biologischen Vielfalt. BMU, Berlin, Germany.

Lack PC (1987) The effects of severe hedge cutting on a breeding bird population. Bird Study 34: 139–146.

Mariappan N, Ahamed Kalfan BK and Krishnakumar S (2013)Assessment of Bird Population in Different Habitats of Agricultural Ecosystem International Journal of Scientific Research in Environmental Sciences (IJSRES), 1(11), pp. 306-316, 2013

Whitworth, Darrell, Scott Newman; Taej Mundkur and Harris (2007) Wildbirds and Avian Influenza, an Introduction to applied field research and disease sampling techniques. Food and Agricultural Organisation of the United Nations. Rome.:85-87.

RESEARCH ARTICLE

Studies on qualitative phytochemical analysis of selected species of *Piper*

Hutke Varsha* and Suple Sonali

P.G. Dept. of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati .India

** Corresponding author vdhutke@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Hutke Varsha and Suple Sonali (2014) Studies on qualitative phytochemical analysis of selected species of *Piper*, *Int. J. of Life Sciences,* Special Issue A2: 156-158.

ABSTRACT

Piper nigrum L. (fruits), *P. longum* L. (fruits) and *P. betle* L. (leaves) were screened for secondary metabolites and reported different medicinal compounds as alkaloids, glycoside, phytosterols, saponins, phenolic compounds, tannins and proteins. Dry powder of plant samples were extracted with petroleum ether, acetone, ethanol and distilled water. The solvent free extract was then subjected to qualitative tests for the identification of various plant constituent. f The results revealed that among the four extracts, ethanol and water extracts exhibited high test for various chemical compounds whereas petroleum ether and acetone extracts had moderate test or in sometime it was negative.

Keywords: *Piper nigrum , P. longum* and *P.betle* medicinal plant, solvent extract.

INTRODUCTION

According to World Health Organization (WHO) variety of drugs are obtained from medicinal plants. In developed countries about 80% of individuals depends on compounds derived from medicinal plant. In this regards properties, safety and efficiency of them should be investigated (Dawoud and El-Morsy, 2012). Plants are the basic source of knowledge of modern medicine. The basic molecular and active structures for synthetic fields are provided by rich natural sources. This made worldwide interest in medicinal plants reflects recognition of the validity of many traditional claims regarding the value of natural product in health care. Most of the drugs derived from plants were developed because of their use in traditional medicine.

As phytochemicals play an important role in the biological activities and hence the rationale of the present study was to carry out preliminary phytochemical screening of three species of *Piper* i.e. *Piper betle*, *Piper longum* and *Piper nigrum*. The genus *Piper* belonging to the family Piperaceae contain more than 700 species they grow in tropical and subtropical rain forest. Due to multidimensional effect on various system of body, it has been described as antipyretic, diuretic, aphrodisiac, immune-stimulant, antioxidant hepatoprotective, digestive, rubefacient counter irritant, antiseptic, antispasmodic.

MATERIAL AND METHODS

Extraction: Plant material i.e. leaves of *Piper betel*, fruits of *Piper nigrum* and *Piper longum* was purchased from local market of Amravati. Leaves of *Piper*

betel, fruits of *P. nigrum* and *P. longum* were first dried under shed and then powdered. The shed dried powder materials were extracted in Soxhlets assembly with petroleum ether, acetone, ethanol and distilled water. The extracts obtained in each solvent were concentrated, distilling off the solvent and evaporate to dryness and weighed. Its percentage was calculated in terms of dry weight of plant material. The colour of the extracts was noted in each sample.

Chemical Test: The solvent free extract obtained as above was then subjected to qualitative test for the identification of various plant constituent from the sample by using standard procedures (Harborne, 1973; Trease and Evans, 1983;)

RESULTS AND DISCUSSION

Preliminary phytochemical screening has done of three *Piper* species and results are incorporated in Table-I and Table–II. Result in table I showed the texture and color of extracts in different solvents. Results of the phytochemical screening were presented in Table II.

Preliminary phytochemical screening of leaves of *Piper betel* revealed the presence of different types of secondary metabolites such as alkaloids, sugar, phytosterols, saponins, phenolic compounds and tannins, gum mucilage, flavonoids and proteins while glycosides, Fixed Oil & Fats were absent.

Table 1: Nature and colour of extracts of *Piper* species

Plants	Texture				Colour			
	P. Ether	Acetone	Ethanol	Water	P.E.	Acetone	Ethanol	Water
Piper betel	Sticky	Sticky	Sticky	Crystal	Brown	Dark Brown	Dark green	Brown
Piper longum	Sticky	Sticky	Sticky	Crystal	Brown	Dark Brown	Dark brown	Greenish
Piper nigrum	Sticky	Sticky	Sticky	Crystal	Brown	Dark Brown	Yellow brown	Brown

Table 2: Phytochemical Test of *Piper* species

Plant	*Piper betel*				*Piper longum*				*Piper nigrum*			
Tests	**P.E**	**AC**	**Et**	**D/W**	**P.E**	**Ace**	**Et.**	**D/W**	**P.E**	**Ace**	**Et**	**D/W**
Alkaloids												
Mayer's	+	+	++	+	++	+	+	++	-	+	+	+
Wagner's	++	+++	++	++	+	+	++	++	+	+	++	+
Hager's	++	+++	++	++	+++	++	++	+	+	++	++	+
Sugar												
Fehling test	+	-	-	-	+	+	+	-	-	+	-	-
Benedict test	+	+	-	+	+	+	+	-	+	+	-	+
Saponin	++	++	+	+	++	+	++	+	++	++	++	+
Proteins												
Biuret test	+	+	+	+	-	-	-	-	+	+	+	+
Glycosides	-	-	-	-	-	-	-	-	+	+	++	+
Phenolic Compounds & Tannins												
Ferric chloride	-	-	-	-	+	-	-	-	+	+	+	+
Gelatin test	++	-	-	-	+	+	-	-	+	+	+	+
Lead acetate	++	++	+	++	+	+	++	++	++	++	++	++
Fixed Oil & Fats	-	-	-	-	-	-	-	-	-	-	-	-
Gum & Mucilage	+	-	+	+	-	-	-	-	+	+	-	-
Flavanoids	-	-	+	+	-	-	-	-	+	+	-	-
Phytosterols												
Liberman&Burchard's	+	+	+	+	-	-	-	-	+	++	++	+

ACE- Acetone; Et- Ethanole; D/W- Distilled water

In earlier study different medicinal compounds such as alkaloid, glycoside, steroid, reducing sugar and tannins were present and gums and flavonoids were absent (Gupta *et al*., 2010; Periyanayagum *et al*., 2012).

Piper longum L. exhibited the positive test for alkaloids, sugar, phytosterols, saponins, phenolic compounds and tannins where as it was negative for proteins, glycosides, Fixed Oil & Fats, flavonoids and phytosterols. Alkaloids was found in *P.longum* by Swapna *et al*., (2012); Ujjaliya *et al*., (2012) and Sharma *et al*., (2012). The test for alkaloids, tannins, phenols, essential oil, proteins and terpenoids is positive (Trivedi *et al*., 2011; Singh, 2012).

Phytochemical study showed that alkaloids, sugar, glycosides, phytosterols, saponins, phenolic compounds and tannins, gum mucilage, flavonoids and proteins were present and Fixed Oil & Fats were absent in extracts of *Piper nigrum.* Trivedi *et al*., (2011); Shiney and Ganesh, (2012); Nahak and Sahu, (2011) reported the presence of alkaloids, glycosides, tannins, phenols, essential oil and proteins in *Piper nigrum.*

REFERENCES

Dawoud G T M and El-Morsy T H(2012) Phytochemical and microbiological studies of *Petrea volubilies* L. *J American Science* 8(8): 202- 208.

Gupta DR (2010) Chemical and biological study of Ethanolic extracts of *Piper betle* L. (Family Piperaceae), *Mikania scandens* (L) Willd. (Family Asteraceae) and *Polypodium* sp. (Family Polypodiaceae). *Int. J. of Pharma. & Biological Archives*, 3(4): 914-917.

Harborne JB (1973) Phytochemical Methods. Chapman and Hall, London.

Nahak G, Sahu KR (2011) Phytochemical evaluation and antioxidant activity of *Piper cubeba* and *Piper nigrum*. *Journal of Applied Pharmaceutical Science*, (8): 153-157.

Periyanayagam K, Jagadeesan M, Kavimani S and Vetriselvan T (2012) Pharmacognostical & phytophysicochemical profile of the leaves of *Piper betle* L. var pachaikodi (Piperaceae) – valuable assessment of its quality. *The Asian Pacific Journal of Tropical Biomedicine*, 1691(12): 602-627.

Sharma V, Renuka K, Palak V, Harish RC and Prajapati PK (2012) Pharmacognostical & Phytochemical study of *Piper longum* and *Piper retrofractum* Vahl. *Journal of Pharmaceutical & Scientific Innovation*,1(1): 62-66.

Shiney RB and Ganesh P (2012) Phytochemical analysis and comparative effect of *Cinnamomum zeylanicus*, *Piper nigrum* and *Pimpinella anisum* with selected antibiotics and its antibacterial activity against Enterobacteriaceae family. *International Journal of Pharmaceutical and Biological Archives*, 3(4): 914-917.

Singh M (2012) Comparative Phytochemical and antioxidant study of aqueous extracts of *Glycyrrhiza gilabra* (Mulethi) and *Piper longum* (long pepper). *Int J. Drug Research & Technology*, 2(2): 203-207.

Swapna Deepthi PR, Junise V, Shibin P, Senthila S, Rajesh RS (2012) Isolation, identification and antimycobacterial evaluation of Piperin from *Piper longum. Der pharmacia Lettre*, 4(3) : 863-68.

Trease G E and Evans W C (1983) Pharmacognosy, 12th edition. Bailliere Tindall, East Bourne, BN213UN.

Trivedi M, Khemani A, Vachhans VD, Shah CP and Santani DD (2011) Pharmacognostic, phytochemical analysis and antimicrobial activity of two *Piper* species. *Int J. of Comprehensive Pharmacy*, 7(05): 1-4

Ujjaliya Nitin UBL, Vivek P, Remadevi R (2012) A comparative Phytochemical screening of root and stem of *Piper longum* L. *Int. J. of Res. Article,* 3(1): 67-69.

RESEARCH ARTICLE

Phytoplankton biodiversity in lakes of Nagpur city; A Bio-indicator of water quality

Giripunje Manisha D[1], Fulke Abhay B[2] and Meshram Pravin U[1]

[1]*Department of Environmental Science, SevadalMahila Mahavidyalaya, Nagpur- 440015, Maharashtra, India.*

[2]*CSIR-National Environmental Engineering Research Institute, Nagpur-440020, Maharashtra, India.*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Giripunje Manisha D, Fulke Abhay B and Meshram Pravin U (2014) Phytoplankton biodiversity in lakes of Nagpur city; A Bio-indicator of water quality, *Int. J. of Life Sciences,* Special issue, A2: 159-162.

Acknowledgment:
Authors are grateful to the Principal, Sevadal Mahila Mahavidyalaya, Nagpur for providing resources for successful conduct of this work.

ABSTRACT

The study of phytoplankton count and trend of algal diversity for seasonal changes was conducted at three study sites such as Futala, Gandhisagar and Ambazari lakes of Nagpur, Maharashtra, India. The study revealed that, phytoplankton population increased with increase in climatic temperature and nutrients. Overall fifty-two phytoplankton taxa were recorded in three lakes of the city. All three lakes predominantly consisted of chlorophyta, cyanophyta and bacillariophyta. However, in this study the Shannon Wiener diversity Index values for all three lakes indicated oligotropic water.

Keywords: Phytoplankton, Futala Lake, Gandhisagar Lake, Ambazari Lake, Shannon Wiener diversity Index

INTRODUCTION

The term 'plankton' refers to the group of organisms that float on the surface water. Most of the floating plankton in the major water-bodies is the unicellular microscopic algae collectively called phytoplankton (Ward and Whipple, 1966). Like plants on land all phytoplankton photosynthesize, but some get energy by consuming other organisms. Phytoplankton growth depends on the availability of carbon dioxide, sunlight, and nutrients. Like land plants, phytoplankton also requires nutrients such as nitrate, phosphate, silicate, and calcium. Some phytoplankton can fix nitrogen and can grow where nitrate concentrations are low. Phytoplankton need trace amount of iron for growth, which helps them adapt well in large areas of the ocean where the iron concentrations are low (Reynolds, 2006). Other factors influencing phytoplankton growth rates include temperature, salinity, depth, wind, and kinds of predators. There has been much interest in the processes influencing the development of phytoplankton communities, primarily in relation to physical-chemical factors (Akbay *et al*., 1999). Phytoplankton as fundamental indicators of ecosystem status is sensitive to environmental changes at small spatial scales. The phytoplankton in a reservoir is an important biological indicator of the water quality. Phytoplankton is primary producer, forming the basis of the food chain which exhibit excellent continuity through time and with varying water quality.

The current study was conducted to study the composition and diversity of phytoplankton in three lakes of Nagpur City like Futala lake, Gandhi sagar lake and Ambazari lake.

MATERIAL AND METHODS

Sampling Station: The study was conducted in three lakes in Nagpur city like Futala lake, Gandhi sagar lake and Ambazari lake (Fig.1). Futala lake (alias Telankhedi Lake) is located at latitude of 21'09'11.74'' north and longitude 79'02'32.77'' east, a century old and has historical importance. The catchment area of Futalalake is 0.40 km^2. Futalalake is used for fishing and immersion of idol and religious practices. Gandhi Sagarlake (alias Shukravari Talao/ Jumma Talao) is located at latitude of 21°8'44.82" north and longitude 79°5'59.50" east. The catchment area of Gandhi Sagarlake is 0.181 km^2. Gandhi Sagar lake a historic lake that is more than 275 years old and was traditionally a source of water supply during the regime of the king of Nagpur, the Chand Sultan. Gandhi Sagar lake is also used for fishing and for religious practices such as idol immersion. The Ambazari lake lies between latitude of 20'35'21.44'' north and longitude of 78'15'79.40'' east. Ambazari lake is the biggest lake in the city with an catchment area of 1.185 km^2. Ambazari lake supplies water for each drinking and irrigation purpose to the urban population of Nagpur.

Figure 1: A map showing Futala, Gandhisagar and Ambazari lakes, Nagpur, Maharashtra, India.

Sampling: Water samples and algal bloom biomass were collected in sterilized sampling bottles from Futala, Gandhi sagar and Ambazari lakes and immediately preserved with Lugol's iodine (APHA, 2005)

Community Compositions: The phytoplankton density is low in clean water while it is high in polluted water. Therefore, the sample from a clean water source needs to be concentrated before counting for accurate estimation. The water sample was concentrated by centrifugation at 250 rpm for 15 minutes. The supernatant water was decanted and the pellet of algal cells was suspended in 1 ml distilled water. The total count of phytoplankton population was enumerated by Lackey's drop count method (Lackey, 1938). The Lackey's drop count method is a reliable method for getting plankton counts especially with samples containing a dense plankton population. Briefly, 0.04 ml of concentrated water sample was placed on a glass slide and covered with an 18 millimeters glass cover slip (No. 1). Using an Olympus microscope BX51 (Olympus, Japan), under a magnification of 100X and 400X phytoplankton were observed and counted in at least 10 microscopic fields. The identification was confirmed by referring the keys (Prescott, 1978; Ward and Whipple,1966). A biological community, whose composition is influenced by environmental conditions and availability of required resources, may undergo changes for their number and types of species and their populations. A widely accepted ecological idea is that community with many species with high diversity will have stability and thus have the ability to resist adverse environment influences to a particular extent. Shannon Wiener diversity Index (SWI) is a measure of diversity of phytoplankton that accounts for total count and individual count of phytoplankton in water samples. SWI values in the range of 3 and above are considered to represent oligotropic indicating healthful condition of water. The SWI values between 1 and 3 considered as eutropic condition indicating partially poor productivity (Pielou,1966).

RESULTS AND DISCUSSION

Phytoplankton communities and count of Nagpur lakes like Futala lake, Gandhisagar lake and Ambazari lake during monsoon, winter and summer seasons consisted of 52 taxa belonging to six taxonomical divisions: Chlorophyta (*n=23*), Cyanobacteria (*n=13*), Cryptophyta (*n=1*), Bacillariophyta (*n=10*), Euglenozoa (*n=4*) and Pyrhhophyta (*n=1*) (Table 1 and Table 2). Green, blue-green and brown algae were present in the highest numbers throughout the three seasons and dominated predominantly by *Chlorella* sp., *Scenedesmus* sp., *Ankistrodesmus*sp., *Pediastrum*sp. (green algae); *Anacystis*sp., *Oscillotoria*sp., *Spirulina*sp., *Anabaena* sp. (blue-green algae); and *Navicula* sp., *Melosira* sp., *Synedra* sp. (brown algae). Excessive growth of some algal genera such as, *Scenedesmus*,

Anabaena, *Aphanizomenon*, *Anacystis*, *Oscillatoria*, *Pediastrum* and *Melosira*indicate nutrient enrichment of aquatic bodiescopiotrophic condition of water. Count ofphytoplankton in Futala lake, Gandhisagar lake and Ambazari lake varied from 1604 to 7872 phytoplanton/ml, 1340 to 9352 phytoplanton/ml and 1840 to 4984 phytoplanton/ml respectively spanning the three seasons (Figure 2 and 3). The phytoplankton abundance was observed to be highest during summer in all three lakes, this may be because of the increased salinity, pH, high-temperature and high-intensity of light penetration (Giripunje *et al*., 2013). The influence of nutrient and sunlight on phytoplankton abundance and diversity has also been reported from the southern part of Orissa at Gopalpur (Gouda, Panigrahy, 1996). In the monsoon season the storm water increased the volume of lake water, thereby resulting in dilution of organic pollution in lakes in comparison with winter and summer seasons. An abundance of phytoplankton indicates nutrient load. SWI values for all the three lakes spanning the three seasons wereranged from 3.010 to 3.850 (Table1).

Table1: Seasonal phytoplankton abundance and diversity in Futala, Gandhisagar and Ambazari lakes of Nagpur, India

Taxonomic divisions	Identified taxa
Cyanophyta (13)	*Anacystis, Microcystis, Gomphosphaeria, Chroothece, Chroococcus, Merismopedia, Dactylococcopsis, Aphanothece, Arthospira, Oscillotoria, Spirulina, Lyngbya, Anabaena*
Euglenozoea(4)	*Euglena, Phacus , Lepocindis, Gonyostomum*
Chlorophyta(23)	*Coleochaete, Chlorella, Actinastrum, Coelastrum, Ankistrodesmus, Elakatothrix, Pediastrum, Tetrastrum, Zygnema, Chlorococcum, Crucigenia, Chlamydomonas, Phacotus, Scenedesmus, Tetraedron, Gonium, Tetradesmus, Desmidium, Spondylomorum ,Closterium, Staurastrum, Cosmarium, Chloromonas*
Bacilleriophyta(10)	*Synedra, Coscinodiscus, Cyclotella, Hydrosera, Diatoma, Tabellaria, Rhoicosphenia, Navicula, Nitzschia, Fragillaria.*
Cryptophyta(1)	*Cryptomonas*
Pyrhhophyta(1)	*Urococcus*

Table2: Phytoplankton taxa observed in climatic seasons of Futala, Gandhisagar and Ambazari lakes of Nagpur, India

Lakes	Seasons*	Phytoplankton (No/ml)	Percentage composition of algal divisions						
			Cyanophyta	Euglenozoa	Chlorophyta	Bacillariophyta	Cryptophyta	Pyrhhophyta	SWI*
Futala	M	1604	15	2	66	15	1	1	3.02
	W	4592	19	1	37	40	3	-	3.07
	S	7872	22	2	18	55	2	1	3.43
Gandhi sagar	M	1340	46	1	33	12	8	-	3.09
	W	4984	52	1	28	15	4	-	3.01
	S	9352	58	1	21	14	6	-	3.42
Ambazari	M	1840	44	1	38	15	2	-	3.85
	W	3360	33	1	47	17	1	1	3.78
	S	4984	37	1	43	18	1	-	3.44

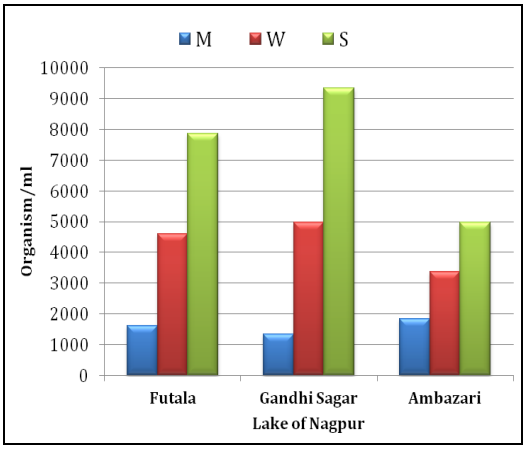


Figure 2: Seasonal trend of phytoplankton count in lakes of Nagpur

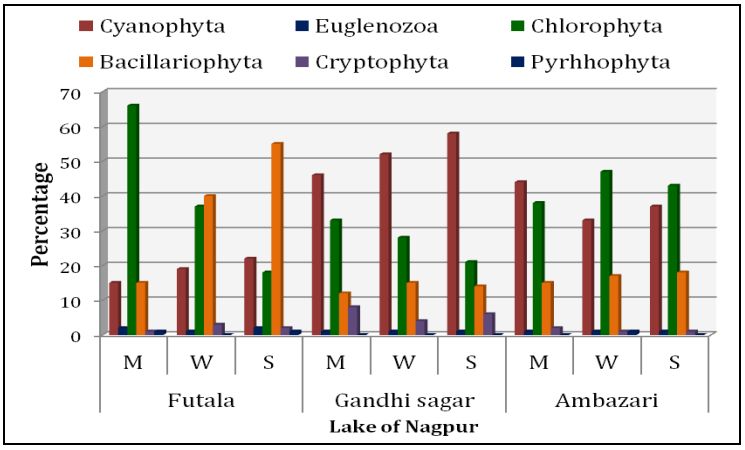


Figure 3: Seasonal trend of percentage composition of algal divisions in lakes of Nagpur

In an another study by Wilham in 1968 it was shown that the abundance and diversity of phytoplankton increased with increasing organic pollution in the lakes of United States (Wilham and Dorris, 1968). Excessive fishing, washing of cattles and heavy religious practices like idol immersion have been loading organic burden on the aquatic ecosystem. We believe suitable evaluation have to convalesce the health of Futala, Gandhisagar and Ambazari lakes of Nagpur, Maharashtra, India.

CONCLUSION

The study shows that the phytoplankton abundance and diversity was affected by the environmental conditions. The phytoplankton abundance and diversity was evaluated as an indicator of pollution that also affected by seasonal changes.

REFERENCES

Akbay N, Anul S, Yerti S, Soyupak M and Yurteri C (1999) Seasonal distribution of large phytoplankton in Keban dam reservoir. *Plankton Research*, 21 (4): 771-787.

APHA, AWWA, WEF (2005) Standard Methods for the Examination of Water and Wastewater.21st Ed.

Giripunje MD, Fulke AB, Khairnar K, Meshram PU and Paunikar WN (2013) A review of phytoplankton ecology in freshwater lakes of India. *Lakes reservoirs and ponds,* 7, 2: 127-141.

Gouda R and Panigrahy RC (1996) Ecology of phytoplankton in coastal waters off Gopalpur, east coast of India. *Indian J. Mar. Sci.*, 2: 13-18.

Lackey JB (1938) The manipulation and counting of river plankton and changes in some organisms due to formalin preservation. U.S. Public Health Reports, 53: 2080 - 2093.

Pielou EC (1966) Shannon's formula as a measure of species diversity: its use and misuse. *Am. Nat.*, 100:463–465.

Prescott GW (1978) How to know freshwater algae, Wm. C. Brown Company Publishers, Dubuque, Iowa

Reynolds CS (2006) The ecology of phytoplankton, pp: 535.

Ward HB and Whipple GC (1966) Freshwater biology, John Wiley and Sons, USA.

Wilham JL and Dorris TC (1968) Biological parameters of water quality criteria. *Bioscience*, 18: 447,481.

RESEARCH ARTICLE

Conservation of Ethnomedicinal *Anisomelis indica*(L) plant

Ulhe SK[1] and Narkhede SD[2]*

[1]*Institute of Science, Nagpur, India*

[2]*Government Science College, Gadchiroli, India.*

**Corresponding Author E-mail: botanysharu@rediffmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Ulhe SK and Narkhede SD (2014) Conservation of Ethno-medicinal *Anisomelis indica* (L) plant, *Int. J. of Life Sciences,* Special issue A2: 163-165.

ABSTRACT

Anisomeles indica (L) commonly called "Gopoli", a wild plant of family Lamiaceae is used traditionally as an analgesic, antiinflammatory and snakebites. Medicinally it has been proven to possess antioxidant and antimicrobial properties.. To search novel active compounds from plant origin and to access the valuable thereupatic properties with minimum side effects, application of advanced method like GC-MS computational techniques plays an important role in the development of drug of interest. The compounds were identified in aerial parts of *Anisomeles indica*. are *Tetracosapentaene,2,6,10,15,19,23-hexamethyl-,22-Stigmasten-3-one. Anisomeles indica* is becoming rare in some regions of Nagpur. The efforts should be made to create of awareness in the society regarding its conservation. Plantation of this species should be increased.

Key word: Conservation, GC-MS, ethnobotany, compounds. *Anisomeles indica*

INTRODUCTION

The plant *Anisomeles indica*, commonly known as "Gopoli" belongs to the family Lamiaceae and is an ethonobotanically important medicinal plant. Almost all parts of this plant are being used in traditional medicines to treat various diseases.

The plant is used traditionally as an analgesic, antiinflammatory and in skin problems such as snakebites. Medicinally it has beenproven to possess vario us pharmacological activities like antioxidant, antimicrobial, our knowledge of the intimate relationship between early man and plants has come to us mainly through tradition. (Chatterjee and Pakrashi, 1997) Interest and support for the conservation and development of ethnomedicinal plant is increasing in all parts of the world. As per world Health organization (WHO) estimates almost 80% of the population of developing countries relies on traditional medicine mostly plant drugs for their primary health care needs. Ethnomedicinal plants have been identified as one of the trust area by the Ministry and different programmes have been initiated for conservation medicinal plant found in forest and protected areas as well as cultivation of these plants in the degraded forest areas. Usually the dried parts of medicinal plant leaves flower,fruit,seed,stems,wood,bark,roots, and whole plant etc. are used as raw materials for the production traditional remedies of Ayurveda, Siddha, Unani, Homeopathy and other systems of medicine including the folk, ethno or tribal medicine. The plant is used in folk medicine to cure gastric catarrh and intermittent fever. Its essential oil is used in uterine

affection. (Kirtikar *et al.,* 1999; Anonymous, 2003) *A. indica* L. is reported to haveantipyretic, analgesic, antiinflammatory activity and it also acts as natural herbicide in wheat fields (Dharmasiri *et al.,* 2000; 2003). Medicinal plantscontaining natural and it synthesiz chemical compound belonging to two research targets.

MATERIALS AND METHODS

During present work, *Anisomeles indica* has been collected from Gorewada forest areas of the Nagpur region, authenticated and allowed to dry in shade. The shade dried leaf material was powdered using mortar and pestle.

GC-MS Analysis: The test plant extracts were subjected to GC-MS analysis at laboratory's (IIT Bombay) Sophisticated Analytical Instrument Facility (formerly RSIC), Indian Institute of Technology, Powai, Mumbai – 400076, India.

RESULTS AND DISCUSSION

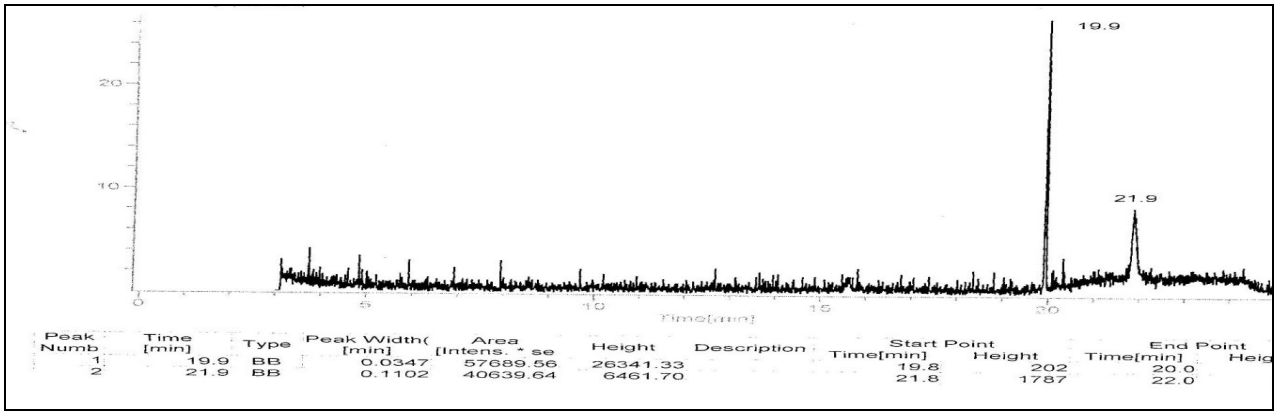
Ethno medicinal uses of Anisomelis indica:

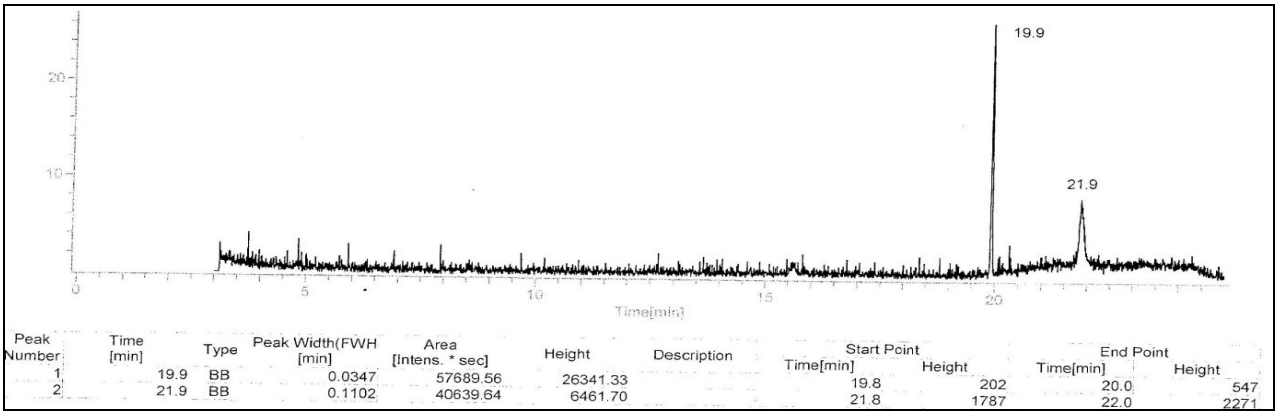
The plant isused in folk medicine as a cure in gastric-catarrh and intermittent fever and essential oil presnt in herb isused in uterine affection. (Kirtikar *et al.,* 1999; Anonymous, 2003). *A indica* Linn. is reported to analgesic, antiinflammatory activity and acts as natural herbicide in wheat fields. There is need to develop alternative antibiotic drugs from plants. One approach is to screen local medicinal plant which represent rich source of novel antimicrobial agents.

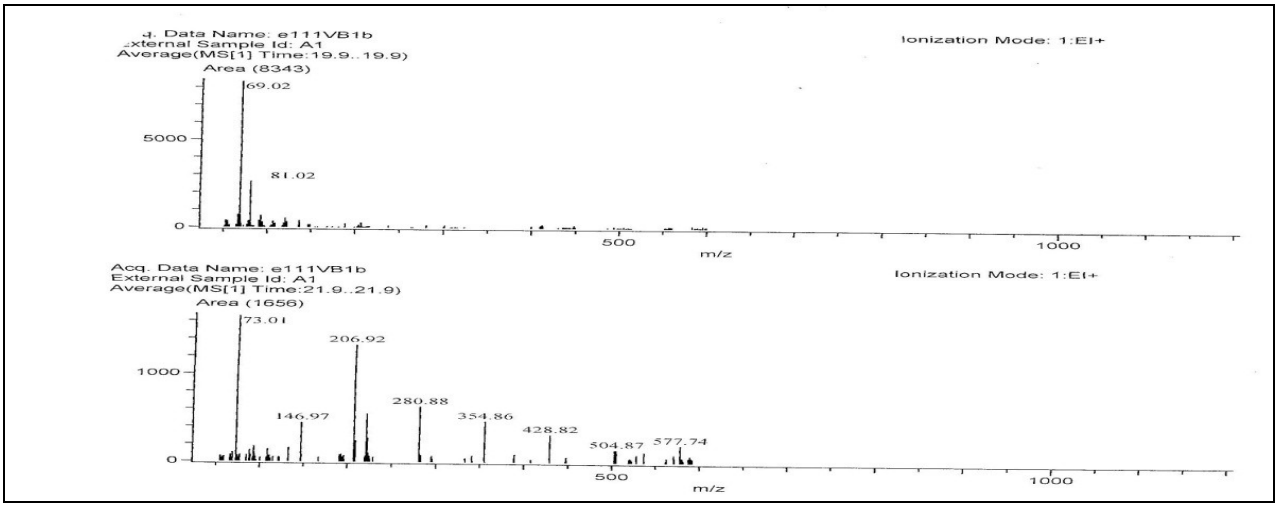
Table 1: The chemical Composition *Anisomelis indica* (wild) Linn.

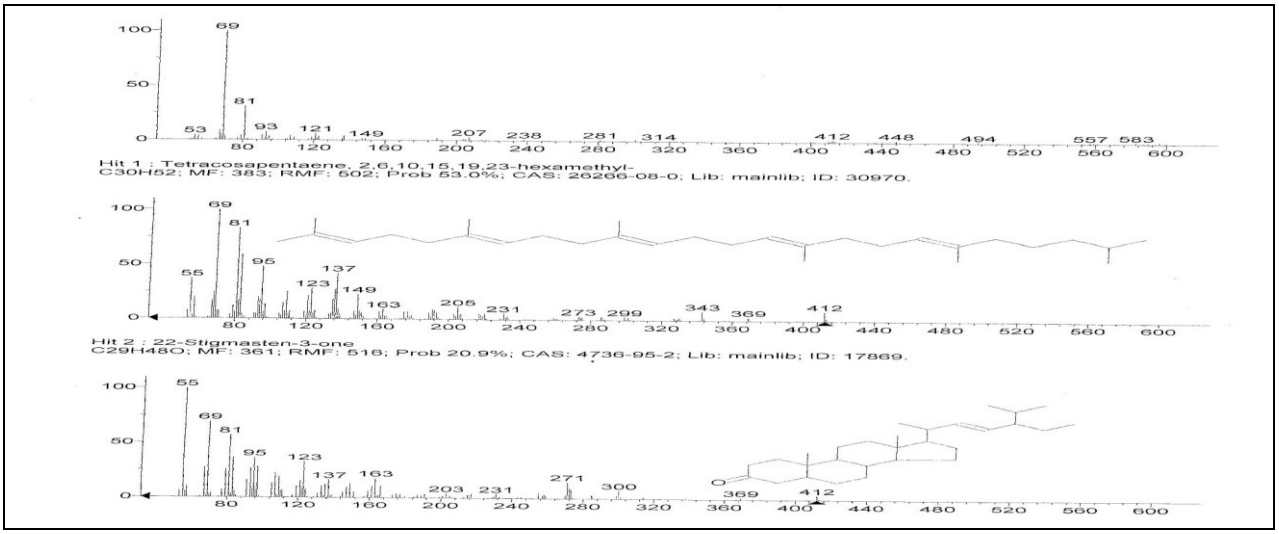
S. N	R.T	Name of compound	Molecular formula	Mol. Weight	Peak Area
1	19.9	Tetracosapentaene,2,6,10,15,19,23-hexamethyl-	$C_{30}H_{52}$	412	57689
2	19.9	22-Stigmasten-3-one	$C_{29}H_{48}O$	412	57689

Fig. 1: GC-MS Chromatogram of *Anisomelis indica* Plant









CONCLUSION

The present investigation was carried out on *Anisomelis indica* plant of Lamiaceae family to study the presence of medicinally active phytochemicals in the leaves. The chemical composition of the essential compounds from the leaves *Anisomelis indica* of collected from Gorewada forest and PDKV forest which experienced different climatic and geographic circumstances, were determined by GC-MS. The present investigations concluded that the leaf *Anisomelis indica* of contains chemical compounds. These chemicals are widely used in Ayurvedic traditional medicines. This study concludes and recommends further advanced study of these plants, so that it will help in preserving our traditional knowledge. the present GC-MS screening may serve as pavements for the researcher to select a group of plants having similar chemical constituents of particular class to isolate biologically active principles and future studies on family Lamiaceae.

REFERENCES

Anonymous (2003) The Wealth of India, Raw Materials, Vol 6. Ne w Delhi: Publication and Information Directorate, CSIR, 295-6.

Chatterjee A and Pakrashi SC (1997) The Treatise On Indian medicinal plants.5PID,New Delhi.

Dharmasiri M, Thabrew M, Ratnasooriya W (2000) Antiinflammat ory effects of *Anisomeles indica*,*Phytomed,* 7, 97.

Dharmasiri M, Thabrew M, Ratnasooriya W (2003) Water extract of leaves and stems of *Anisomelesindica* possesses analgesic a nd antihy peralgesic activities in rats, *Pharmaceutical Bio*, 41,3744.

Kirtikar KR and Basu BD (1991) Indian medicinal plants, Singh B and Singh M.P. Publishers, Vol. 3.

RESEARCH ARTICLE

A Natural Colorant for silk fiber *: Plumeria rubra*

Deshpande Rupali and Chaturvedi Alka

P.G.T.D. of Botany, R.T.M. Nagpur University Campus, Amravati road Nagpur, Maharashtra- 440033
Email: - deshpanderups@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Deshpande Rupali and Chaturvedi Alka (2014) A Natural Colorant for silk fiber *: Plumeria rubra ., Int. J. of Life Sciences,* Special Issue A2: 166-168.

Acknowledgement:
The authors acknowledge UGC for funding and Department of Botany RTM Nagpur University Nagpur for facilitating the research.

ABSTRACT

Plumeria rubra L. a member of family Apocyanaceae is a very common ornamental plant. Flower of *Plumeria* is found to be a good source of natural dye for producing various green and ivory shades on silk cloth. Aqueous medium was suitable for extraction of dye from the flower. Alum, Chromes, Copper sulfate, Ferrous sulfate, Acid, Sodium Hydroxide and Sodium chloride with different combinations were used to get different shades of color. Premordant method is useful for dyeing. Excellent fastness to sunlight was found in all mordant combination. Pretreatment of *Terminalia chebula* to silk cloth enhanced the shade and improve the color fastness property of dye. Color change was found in all samples subjected to dry and wet crocking. Only 30 gm material is required for dyeing 5 meter silk cloth. This dye is biodegradable and the technology is found to be economically viable.

Key words: *Plumeria,* Mordant, Color Fastness, Biodegradable.

INTRODUCTION

Recently number of commercial dyers and small textile export houses are searching possibilities of using natural dyes on regular basis for dyeing and printing textiles to overcome the environmental pollution caused by the synthetic dyes (Mahanta and Tiwari, 2005). For successful commercial use of natural dyes we need to explore new plant resources from nature and to adopt appropriate and standardized dyeing techniques. *Plumeria rubra* a member of family Apocyanaceae is a very common ornamental plant. Originally native to Mexico, Central America, Colombia and Venezuela, it has been widely cultivated in subtropical and tropical climates worldwide and is a popular garden and park plant, as well as being used in temples and cemeteries. It grows as a spreading tree to 7-8 m (20-25 ft) high and wide, and is flushed with fragrant flowers of shades of pink, white and yellow over the summer and autumn (Siva 2007). Flower of *Plumeria* is found to be a good source of natural dye for producing various shades on silk cloth. Selective mordant or their combinations can be applied on the Silk cloth to obtain varying color shades and to increase the dye uptake and to improve the color fastness behavior of dye. The present paper reports the studies carried out on the application of dye on silk cloth and the effect of various chemical mordant, pretreatment of cloth by *Terminalia chebula* (hirda) on shade of dye.

MATERIALS AND METHODS

***Selection and preparation of dye material*:** Collected fresh flowers were dried in shade. Grinded material used to extract dye.

Selection and preparation of fibers for dyeing: Silk cloth was washed with detergent soap and rinsed thoroughly to remove traces of detergent. Divide this cloth in to two parts. Pretreated one part with *Terminalia chebula* (hirda) by boiling the cloth in the aqueous extract for half an hour.

***Extraction of dye and dyeing of fabrics*:** The dye was extracted in pure water medium by boiling dye material for one hour. Various combination of mordant like Alum, Acid, Sodium hydroxide, Sodium chloride, Copper sulfate, Ferrous sulfate, Potassium Chromate was used (Dasa D. et.al. 2008).

***Procedure*:-**Extract was obtained by boiling 3 gm powder material in 500 ml water for one hour. Cloth (plain as well as pretreated) was dipped in 1 % solution of above mordant for one hour before dyeing (premordant technique). Premordant cloth was dyed by soaking that cloth in extract for 2 hours.

RESULTS AND DISCUSSION

Aqueous medium was found best for extracting dye from *Plumeria* flowers good amount of dye was yielded in it (Mahanta D. and Tiwari S. C.2005). After comparing the result of premordant, simultaneous mordant and post mordant technique (Dasa D. et.al. 2008). Premordant method was selected in this investigation. Cloth was premordated by using various mordant (as mentioned above). Water fastness and light fastness property dye was checked by regular washing and drying cloth in sunlight (Dasa D. et.al. 2008). Various color shades were obtained from same extract by using different mordants. Shades were different in plain silk cloth and pretreated silk cloth (Siva R. 2007).

In plain silk cloth desert ivory colour was observed in control solution and Various Ivory shades were found in NaCl, $FeSO_4$+NaOH and K_2CrO_4 solution.(Table1).Various light green shades were observed in Alum, $CuSO_4$, $CuSO_4$+K_2CrO_7, $CuSO_4$+NaOH solutions. Metallic green colour was found in Fe SO_4 and Fe SO_4+ $CuSO_4$ solution.

In pretreated silk cloth Brown shade was observed in control solution and A range of brown shade was observed in $CuSO_4$, $CuSO_4$+K_2CrO_7, $CuSO_4$+NaOH solutions as well as in NaCl, Fe SO_4+NaOH and K_2CrO_7 solution (Table 2).Fresh green shade was found in Alum solution. Black shade was obtained in Fe SO_4 and Fe SO_4+ $CuSO_4$ solution (photo plate).

Photo plate 1.

Table .1 Shades on Plain Silk Cloth

Sr. No.	Name of Mordant	Color Obtained on Silk Cloth	Fastness of Dye	
			Washing	Light
1	Control	Plumy skin Brown	3/5	3/5
2	Alum	Plumy Fresh green	4/5	4/5
3	Sodium Hydroxide	Plumy woody brown	4/5	4/5
4	Sodium Chloride	Plumy tinch woody brown	3/5	3/5
5	Ferrous Sulphate	Plumy black	3/5	3/5
6	Copper Sulphate	Plumy deep green	5/5	5/5
7	Potassium Chromate	Plumy green	3/5	3/5
8	Copper Sulphate + Potasium Chromate	Plumy woody brown	4/5	3/5
9	Copper Sulphate + Sodium Hydroxide	Plumy deep olive green	5/5	5/5
10	Copper Sulphate + Ferrous Sulphate	Plumy black	3/5	3/5
11	Ferrous Sulphate + Acid	Plumy coco brown	5/5	5/5
12	Ferrous Sulphate + Potassium Chromate	Plumy grey green	5/5	5/5

Table. 2 Shades on Pretreated Silk Cloth

Sr.No.	Name of Mordant	Color Obtained on Silk Cloth	Fastness Dye	
			Washing	Light
1	Control	Plumy deep skin brown	4/5	4/5
2	Alum	Plumy deep Fresh green	4/5	4/5
3	Sodium Hydroxide	Plumy khaki brown	3/5	3/5
4	Sodium Chloride	Plumy deep woody brown	5/5	5/5
5	Ferrous Sulphate	Plumy deep black	5/5	5/5
6	Copper Sulphate	Plumy woody brown	5/5	5/5
7	Potassium Chromate	Plumy russet grey	4/5	4/5
8	Copper Sulphate + Potasium Chromate	Plumy bark brown	5/5	5/5
9	Copper Sulphate + Sodium Hydroxide	Plumy deep skin brown	5/5	5/5
10	Copper Sulphate + Ferrous Sulphate	Plumy black	5/5	5/5
11	Ferrous Sulphate + Acid	Plumy deep coco brown	5/5	5/5
12	Ferrous Sulphate + Potassium Chromate	Plumy deep skin brown	5/5	5/5

CONCLUSION

Plumeria is found to be a good source of green colorant on silk cloth. With the use of different mordant various shades were produced from extraction. Alum is the good mordant for fresh green color. Hirda pretreatment improves the fastness property of dye. Used mordant are not harmful for skin and biodegradable in nature. As the wide distribution of plant, ample amount of flowers were available throughout year. Extraction method is economically viable and dye is biodegradable in nature. Natural coloration is known from ancient time as artisanal practices for handicraft, paintings and handloom textiles, (Samanta A. et al 2009). The chemistry of interaction of such colorant with textile is of relatively recent interest for producing eco-friendly textile, this dye may help to solve some problems relative to application method, reproducibility and color fastness.

REFERENCES

Dasa D. et.al. 2008, Coloration of Wool and Silk with Rheum Emodi, *Indian Journal of Fibre & Textile Research,* (33), pp. 163-170.

Mahanta D. and Tiwari S. C.2005 , Natural dye Yielding Plants and Indigenous Knowledge on Dye Preparation in Arunachal Pradesh, Northeast India., *Current Science* , 88 (9),1474-1479 .

Sachan K. and Kapoor V. P.2007, Optimization of Extraction and Dyeing Condition for Traditional Turmeric Dye., *Indian Journal of Traditional Knowledge*, 6(2),270-278.

Samanta A. and Agrawal preeti , Application of Natural Dyes On Textile., *Indian Journal of Fiber and Textile Research* , 34, 384-399 (2009).

Siva R. 2007, Status of Natural Dyes and Dye Yielding Plants in India . *Current Science,* 92 (7), 916- 925

RESEARCH ARTICLE

Seasonal Variations in Zooplankton Diversity of Railway Pond, Gondia, District Gondia (M.S.)

Gadekar GP

Department of Zoology, Dhote Bandhu Science College, Gondia (M.S)

Address for correspondence Email: gunwantpgadekar1975@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Gadekar GP (2014) Seasonal Variations in Zooplankton Diversity of Railway Pond, Gondia, District Gondia (M.S), *Int. J. of Life Sciences,* Special Issue A2: 169-171.

ABSTRACT

Zooplankton community is cosmopolitan in nature and they inhabit all freshwater habitats of the world. These are not only useful as bioindicators, but are also helpful for ameliorating polluted waters. Hence qualitative and quantitative studies of zooplankton diversity are of great importance. An ecological study on a tropical pond situated in the centre of the Gondia city, was conducted with special reference to zooplankton diversity in relation to trophic status. In the present study, monthly changes in diversity and density of zooplankton assemblages had been recorded during January 2013 to December 2013, at three selected sites of Railway pond situated near Gondia railway station of Gondia city, Maharashtra. The population at Railway pond consisted of 20 genera of zooplankton. The recorded genera were categorized into 5 different groups – Protozoa, Cladocera, Rotifera, Copepoda and Ostracoda,

Keywords- Zooplankton, diversity, seasonal variation, Railway pond

INTRODUCTION

All the aquatic system and their biota affect directly or indirectly human beings. All forms of life, on the Earth depend upon water for their mere existence. Among all the freshwater aquatic biota, zooplankton population is able to reflect the nature and potential of any aquatic systems (Kumar *et al*. 2010). Zooplankton are microscopic, free floating organisms occurred in all natural water bodies. They are a major mode of energy source between phytoplankton and other aquatic animals. They occupy an intermediate position in the aquatic food web (Altaff, 2004). Zooplankton diversity is one of the most important ecological parameters in water quality assessment. Different environmental factors that determine the characteristics of water have great importance upon the growth and the abundance of zooplankton (Thirumala *et al*. 2007). According to Dadhich and Sexena (1999) the zooplankton plays an integral role and serves bio indicators and it is a well suited tool for understanding water pollution status (Ahmad, 1996; Contreras *et al*., 2009). Hence for any scientific utilization of water resources plankton study is of primary interest.

A number of studies has been carried out on the condition of ecology and freshwater bodies in various parts of India (Smitha *et al*, 2007) but in some parts of Vidarbha region (M.S), the ecological studies of freshwater bodies especially zooplankton studies is very scanty. So that the present investigation made an attempt to study the zooplanktons species in Railway pond.

MATERIALS AND METHODS

Study area: The area selected for the present study is the Railway pond which is a large aquatic body with a depth of about 20 feet. It has less human interference and is situated in a Gondia city near railway station. They possess fishes such as major carp and Tilipia. The water is used for pooja purposes only.

This work is resulted from limnological investigations undertaken between January 2013– December 2013. Various aquatic plants common in these pats included *Eichhornia, Hydrilla, Lemna, Pistia, Azolla,* and *Sagittaria* sp.

***Zooplankton sampling*:** Zooplankton samples were collected by filtering 200 litres of water from the surface of the water body through plankton net (40 µm mesh size) and was fixed immediately with 4% formalin. The systematic identification of zooplankton was made by using standard keys of Dhanapathi (2000) and Altaff (2004). The quantitative analysis of planktonic organisms was carried out using Sedgwick Rafter's plankton counting chamber.

RESULTS AND DISCUSSION

The seasonal variations in water quality parameters of the pond have a marked influence on the numerical abundance of zooplankton. Jeppesen *et al*. (2002) has stated that the abundance and diversity of zooplankton vary according to limnological features and the trophic state of freshwater bodies. Zooplankton provides the main food for fishes and can be used as indicators of the trophic status of water body (Verma and Munshi, 1987; Rao and Muley, 1981).

The present study was undertaken to investigate the seasonal variations in zooplankton diversity of Railway pond of Gondia city. A total 20 zooplanktonic fauna were encountered during the present study. Out of 20 species of zooplankton, 3 species belonged to Protozoa, 10 species to Rotifera, 3 species to Cladocera, 3 species to Copepoda and only 1 species to Ostracoda.

During the present investigation class Rotifera was dominated among all the zooplanktonic groups in all the seasons. However the diversity of zooplankton varied from season to season and the maximum diversity was recorded in winter season while minimum was observed in monsoon season (Table 1).

Table 1: Seasonal variation in zooplankton population of Railway pond, Gondia

Protozoa	**Summer**	**Monsoon**	**Winter**
Arcella sp.	+	-	+
Difflugia sp.	+	+	+
Paramoecium sp.	+	-	+
Rotifers			
Brachionus calyciflorus	-	+	+
Brachionus caudatus	-	-	+
Brachionus terminalis	+	+	+
Brachionus angularis	+	+	+
Brachionus forficula		+	+
Brachionus falcatus	+	+	+
Cephlodella gibba	+	+	+
Keratella tropica	+	+	+
Lecane sp	+	+	+
Lepadella sp	-	+	+
Cladosera			
Bosmina sp	+	+	+
Daphnia sp	+	+	+
Moina sp.	+	-	-
Copepoda			
Cyclops sp.	+	+	-
Diaptomus nauplius	+	+	+
Heleodiaptomus viduus	+	-	+
Ostracoda			
Cypris sp	+	-	+

Only 1 species of Protozoa species were recorded during monsoon season along with 9 species of Rotifera, 2 species of Cladocera, 2 species of Copepoda and no species of Ostracoda. The maximum contribution was made by Rotifera (Table 1).

Class Protozoa contributed 3 species during the winter season. Class Rotifera showed its present with 7 species and Cladocera 2 species and, Copepoda 2 species and Ostracoda 1 species of the total zooplankton population during winter season (Table 1).

On the basis of qualitative study, species of *Difflugia* was the most common species which occurred throughout the study period among the class Protozoa while as among the Rotifera *Brachionus terminalis*, *Brachionus angularis*, *Brachionus falcatus*, *Cephlodella gibba*, *Keratella tropica, Lecane sp* were the dominant species. *Bosmina sp*. and *Daphnia sp* were dominant among Cladocera. *Diaptomus nauplius* was recorded during all the seasons among Copepoda and no species of class Ostracoda namely was found throughout the study period.

A marked seasonal variation in zooplankton population was recorded during the present investigation. In general, the maximum density was observed in winter season (18 species) and summer season (16 species), while low density was observed in monsoon season (14 species). The winter season is most favorable period for the growth and multiplication of zooplankton species. The period of August to November is the most favorable for growth of zooplankton population and this may be due to increase of phytoplankton population. The same result has been also reported by Kumar, (2001). Less zooplankton population during monsoon season is due to high turbidity which restricts growth of the planktonic population. Besides this, regular flash out of pond water during the rain is also a major cause of less plankton diversity as well as density

CONCLUSION

Zooplanktonic population of the Railway pond reveals the eutrophic condition of the pond which is an account of activities such as domestic waste disposal in the form of sewage and solid wastes, disposal of wastes materials of railway station, dumping of dead animals, human wastes etc.

REFERENCES

Kumar P, Sonaullah, F and Wanganeo, A (2010) A preliminary limnological study on Shershah Suri Pond, Sasaram, Bihar. *Asian Journal of Experimental Science*. 24(2): 219-226.

Altaff K (2004) A manual of Zooplankton. University grants commission, New Delhi, Pp 1-145.

Thirumala S, Kiran BR, Puttaiah T, Vijaya K and Harish Babu K (2007) Zooplankton diversity and its relationship with physico-chemical parameters of in Ayyanakere Lake Western Ghats, *Indian Journal of Zoology*. 27 (2): 203-207.

Dadhick N and Saxena MM (1999) Zooplankton as indicators of trophical status of some desert waters near Bikaner. *Journal of Environmental Pollution*. 6: 251-254

Ahmad MS (1996) Ecological survey of some algal flora of polluted habitats of Darbhanga. *Journal of Environmental Pollution*. 3: 147-151.

Contreras JJ, Sarma SS, Merino-Ibarra, M and Nandini S (2009) Seasonal changes in the rotifer (Rotifera) diversity from a tropical high altitude reservoir Valle de bravo, Mexico). *Journal of Environmental Biology*. 30:191-195.

Smitha PG, Byrappa K and Ramaswamy SN (2007) Physico-chemical characteristics of water samples of Bantwal Taluk, South-Eastern Karnataka, India. *Journal of Environmental Biology*.595

Dhanapathi MV (2000). Taxonomic notes on the Rotifers from India-IAAB publication, Hydrabad: 175.

Jeppesen E, Jensen JP and Sondergard M (2002) Response of phytoplankton, zooplankton and fist to re.oligotrophication: An 11 year study of 23 Danish lakes. *Aquatic ecosystems health and management*.5: 31-43.

Verma PK and Munshi D (1987) Plankton community structure of Badua reservoir, Bhagalpur (India). *Tropical Ecology*.28:200-207.

Rao MB and Muley EV (1981) Seasonal and Species of Zooplankton organisms and their succession in two freshwater ponds at Waghuli poona, *proc. Symp. Ecol. Anim. Pool. Zool. Surv. India,* 2: 63-64.

Kumar KS (2001) The fresh water zooplankton of some lakes in Dharmapuri district Tamilnadu. Journal of Aquatic Biology.16:5-10.

RESEARCH ARTICLE

Phytochemical investigation of *Aristolochia indica* L. An Ethno-medicine on Snake Bite

Bawankule Devesh* and Chaturvedi Alka

P.G. Department of Botany RTM Nagpur University, Nagpur, India.

**Corresponding author email: deveshbawankule@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Bawankule Devesh and Chaturvedi Alka (2014) Phytochemical investigation of *Aristolochia indica* L.- An Ethno-medicine on Snake Bite. *Int. J. of Life Sciences,* Special issue, A2 :172-174.

Acknowledgements:
Authors are thankful to Dr. N.R. Ugemuge UGC Emertus fellow for their guidance during work. Authors also thankful to Head of the Department and other faculties P.G Botany RTM Nagpur University for providing me necessary facility during work.

ABSTRACT

Aristolochia indica L. a threatened medicinal plant belongs to the family Aristolochiaceae used traditionally as an antidote on snake bite and other diseases. However, the present study is the Ethnobotanical survey and the major reasons for thelow populations of *Aristolochia indica*were documented. Preliminary phytochemical analysis of *Aristolochia indica* gave positive test for various compounds, also qualitatively analyzed with the help of thin layer chromatographic techniques.

Keywords: *Aristolochia indica*, survey,phytochemical screening, Bhandara.

INTRODUCTION

Snakebite is a common medical emergency encountered in the rural area. About 35,000 to 50,000 people died of snakebite every year in India. Antivenom is a Specific antidote for snakebite envenomation. Antivenomic medicines against snakebites are lacking in the many remote area of India. Antiserum being the only therapeutic agent, its development from animal source is time consuming and expensive. Although use of plants against snakebite has been long recognized. Many Indian medicinal plants are recommended by traditional people use for the treatment of snakebite. As they vary from place to place, present study was taken to study the plant used by locals of Bhandara district (Maharashtra).

Aristolochia indica L. a threatened medicinal plant belongs to the family Aristolochiaceae commonly called as Duck weed, Niroki (vaidus) is a threatened medicinal plant. Root and leaves of *Aristolochia indica* is used medicine in a number of diseases such as fever, dry cough, cholera, ulcers, leprosy and also used as antimicrobial activity. In Bonde village of Bhandara district traditional people give aqueous extract of fruits part of Aristolochia indica as a antidote for snake bite. However, there is no scientific work report of this plant fruit part having traditional use as an antidote for snake bites, and so it has been selected to Phytochemical Investigation of fruit on *Aristolochia indica* an Ethnomedicine in snake bite.

MATERIAL AND METHODS

Aristolochia indica L. is a threatened medicinal plant. It is a twining herb, semiwoody; leaves are broadly ovate, exstipulate. Fruit are capsule and Seedsdeltoid-ovate, acute, flat, and winged.

Collection of plant material: Fruits of *Aristolochia indica* L. were collected from wild state in Bonde village of Bhandara district and shade dried for about 10-15 days. The shade dried plant material was further analysis.

Preliminary Phytochemical Analysis: For preliminary detection of Phytochemical constitutes, 2g powder material of fruit part was taken and crude extracted with chloroform for about 3 days by maceration. The chloroform extract (1a) was distilled off and the residue (1a) was dried overnight on filter paper. This chloroform extract was tested for the presence of alkaloid, steroid, anthocyanins, anthocyanidins, Anthraquinones, caretonoid, Coumarins, emodins, flavonoids, polyuronoids, tannins, triterpenoids, volatile oils, saponins. Same procedure was repeated with Petroleum ether, Methanol and Water.

Fresh material of various plant parts under study were used for screening of anthraquinones. Similarly 70% ethanol extract was tested for presence of cardiac glycosides.

RESULTS AND DISCUSSION

Ethnobotanical survey:

Vidharbha region having one of the richest tribal culture in India. Bhandara district having maximum tribal population in the region which includes Gond, Gowari, Pradhan, Dhiwar tribes. Ethnobotanical information was gathered through several visits, group discussion in the study area. An attempt has been made to expose traditional medicinal knowledge about the selected plant *Aristolochia indica* which were used by local tribal peoples from Sakoli region of Bhandara district. They give medicine after confirmation of the poisonous snake bite in the form of aqueous extract of the fruits of *Aristolochia indica.* First dose will be of one or two complete fruits. After treating person with first dose, if the person does not get relief, they again treated with the second dose after 15 to 30 minutes. The patient gets completely relief in two-three hours.

Threat analysis:

The major reasons for the low population of *Aristolochia indica* were documented under the threat analysis study. The complete defoliation of leaves and flower because of larval attack on this plant causes the early death of this plant. The larval stage is identified as *Pachliopta aristolochiae* commonly called as Common rose butterfly.The caterpillar is velvety colour and has a white band on a segment on its middle reminiscent of a belt or collar. It has a numerous fleshy red-tipped white protuberance on the body. It is bulky and slow in its movement. Over exploitation of fruits and other parts is also one of the reason for low population.

Table 1: Phytochemical analysis of fruits extract.

Sr. No.	Phytochemical		Chloroform	Petroleum ether	Methanol (Alcohol)	Water
1	Alkaloids	Wagner reg.	+	+	+	-
		Mayer reg.	+	-	-	+
		Dragondrof reg.	+	+	-	+
2	Anthocyanins		-	-	+	+
	Anthocyanidins		-	-	+	+
3	Anthracene glycosides		-	-	-	+
4	Anthraquinones		+	+	-	-
5	Cardiac glycosides		+	+	-	+
6	Caretenoide		+	+	+	-
7	Coumarins		+	+	+	+
8	Emodins		-	+	-	+
9	Flavonoides		-	-	+	+
10	Polyuronoids		+	+	+	+
11	Saponoids		-	-	-	-
12	Steroids		+	+	+	-
13	Tannin		-	+	+	+
14	Triterpenoids		+	+	-	+
15	Volatile oil		-	+	-	+

Phytochemical screening:

The plants for preliminary phytochemical analysis of *Aristolochia indica* fruits gave positive test for 14 compounds, Chloroform extract gave positive test for 8 compounds, Petroleum extract gave positive test for 12 compounds, Methanol extract gave positive test for 9 compounds and water extract gave positive test for 12 compounds (table 1).

Thin layer Chromatography of Fruit:

In qualitative analysis, in which Thin-Layer Chromatography were done the various compound like alkaloids, anthraquinones and anthracene derivative, flavonoids, coumarins was observed with different bands of different Rf values, alkaloids 0.85 and 0.93, anthraquinones and anthracene derivative range from 0.70 to 0.97, coumarins were range from 0.82 to 0.90 and flavonoids shows 0.70.

After the conformation of Rf value of standard flavonoid (Kaempheral) with the sample extract it is concluded that the flavonoid type (Kaempheral) is present in the sample (fig-1).

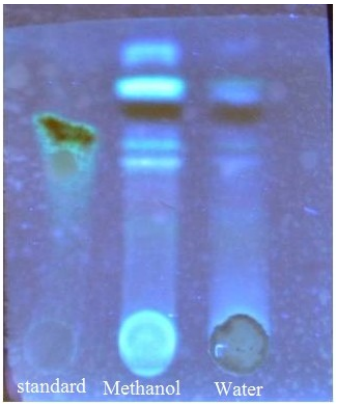


Fig-1. TLC of Flavonoid(Kaempheral)

CONCLUSION

A vast knowledge of forest aboriginal people of how to use plant against different illness as well as infectious diseases having a great importance. The finding of the present study will serve as a reference in the preparation of medicinal monograph of *Aristolochia indica.* In future it is necessary to conserve this plant for medicinal uses for example tissue culture technique may be more useful in the conservation point of view to make the drug available throughout the year. Further investigations are needed for identification and purification of the active components involve in the neutralization of snake venom.

REFERENCES

Dass and Bhattacharjee A (1970) *A systamatic approch to phytochemical screening. Trop Sci.*, XII 54-58.

Bhattacharjee P and Bhattcharjee D (2013) Characterization of the aqueous extract of the root of *Aristolochia indica:* Evaluation of its traditional use as an antidote for snake bites. *Journal of Ethnopharmacology, 145* (19): 220-226.

Harborne JB (1984) *Phytochemical method: A guide to moderna technique of plant analysis* . Chopman and Hall, London.

Sati H, Sati B, Saklani S, Bhatt PC, Mishra AB (2011) Phytochemical and Pharmacological Potential of *Aristolochia indica*: *Res. J. of Pharma., Biol. and Chem. Sci., 2* (4):647.

Kritikar KR and Basu BD (2005) *Indian medicinal plants* (Vol. III). International book distributers.

Kokate CK. *Preliminary Phytochemical Screening. Practical Pharmacognosy.* 4th Ed., Nirali Prakashan, Pune, India.2000; 107.

Mall M, Tomer M, Sushma, Dhore B and Ghosh AK (2011) Pharmacognostical and Phytochemical Invistigation of aerial parts of *Aristolochia indica* l: *Int. J. of Res. in Ayurveda & pharmacy*: 1282-1285.

Meenatchisundaram S, Prajish, Parameswari G (2008) Study of antivenome activity of *Aristolochia indica* and *Andrographis paniculata* plant extracts against Echiscarinatus venom. *Journal of Toxicology.,* 6 (1):

Murugan M and Mohan VR (2012) Effect of different solvant extracts of *Vitex trifoliaL.* and *Aristolochia indicaL.* for potential antibacterial activity. *Science Research Reporter, 2(1)*, 110-114.

Singh NP and Karthikeyan S. (2001) Flora of Maharashtra state, Volume II, Botanical Survey of India.

Nandakarni K (1927) *Indian materia medica.* Vol. 1. popular prakashan.

Pattar PV and Jayaraj M (2012) Invistigation of whole plant of *Aristolochia indica. international journal of pharmaceutical Science Review and Research* , 95-98.

Sharma SK, Francois C (2004) Impact of snake bites and determinant of fatal outcomes in southern Nepal. *Am.J. Trop Med Hyg., 71* (2), 234-238.

RESEARCH ARTICLE

Diversity of Phytoplankton In Relation to Physico-Chemical Characteristic of Nav-Talav, Bhandara (M.S.)

Thakur PP, Dudhat IN, Kalbande SG and Dongre VR

Department of Zoology, J. M. Patel College, Bhandara (M.S.) 441904
Email.: veena_dongre@yahoo.com

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Thakur PP, Dudhat IN, Kalbande SG and Dongre VR (2014) Diversity of Phytoplankton In Relation to Physico-Chemical Characteristic of Nav-Talav, Bhandara (M.S.), *Int. J. of Life Sciences,* Special Issue, A2: 175-178.

Acknowledgement:
We are thankful to the principal of J. M. Patel College, for encouraging and providing laboratory facilities to conduct this work.

ABSTRACT

The present study deals with study of diversity of Phytoplankton in relation to physic-chemical characteristics of 'Nav – Talav', Bhandara (M.S.) India, during the period of one year 2013 - 2014. Nav – Talav is located at Bhandara - Tumsar Road. It is perennial lake receives water from rain. The water level remains more of less constant except the level decreases slightly in the summer season. In this Talav, the Phytoplanktons are abundant. The water spread area is 27 hect.and water is used not only for the agriculture activity but also for fishery activities. There are 30 species of Phytoplanktons are observed and identified the study. These identified Phytoplanktonsbelongs to various families like Bacillariophyceae, Chlorophyceae, Cyanophyceae. It was concluded that the dominant species are spirogyra, Euglenopolymorpha, Anabena and Spirulina.

Key words : *Abundant, dominant, perennial, phytoplankton and nav-talav.*

INTRODUCTION

The distribution and variability of the principle plant nutrients in lake, largely determine the biomass and productivity of Phytoplankton. They are natural inhabitants of water and serve as the basis of food chain within the ecosystem. They are also involved in the water pollution in a number of significant ways (Latha and Rajlakshmi, 2006). Water is a vital resource used for various activities such as drinking, irrigation, fish production, industrial cooling, power generation and many others. (Sathe *et al*., 2001). Fresh water is perhaps the most vulnerable habitats and is more likely to be changed by the activities of man. This essential resource is becoming increasingly scarce in many parts of the world due to severe impairment of water quality (Nefeesa and Narayana, 2006). The increasing anthropogenic influences in recent years in and around aquatic systems and their catchment areas have contributed to a large extent to a large extent to deterioration of water quality and dwindling of water bodies leading to their accelerated eutrophication.

The planktonic study is a very useful tool for assessment of water quality in any type of water body and also contributes to understanding of the basic nature and general economy of the lake (Pawar *et al*., 2006). Unplanned urbanization rapid industrialization and indiscriminate use of artificial chemicals in agriculture are causing heavy varied pollution in aquatic environments leading deterioration of water quality and depletion of aquatic biota (Yeole and Patil, 2005).

Talav are the shallow bodies of standing waters with silght wave action and may be naturally created of manmade. Nav Talav was chosen for the study where several Phytoplankton species occur and fishing also carried out regularly. This Talav is situated in Bhandara District on Bhandara – Tumsar Road. The area spread of this Talav is 27 hect. For present investigation two sites were selected, viz sites. A and site B. These are opposite to each other. The production of Phytoplankton is directly correlated with phosphate, silicates as well as nitrogen (Borse *et al*., 2000). These three elements are essential for the bloom of Phytoplankton. The Phytoplankton and zooplankton are always inversely proportional in an aquatic environment because the zooplankton feed on the phytoplankton. Thus density of phytoplankton is directly correlated with fishery potentiality of an aquatic ecosystem. In the present study main focus has been on the species composition of phytoplankton of Nav-Talav of Bhandara District.

MATERIALS AND METHODS

Collection of Phytoplankton samples were made by using a half meter bottling nylon net 21, mesh size 0.069 mm from two sites (A and B) during fish catching. The a biotic factors such as pH, free carbon dioxide, dissolved oxygen, total alkalinity and chlorides were analyzed following standard methods (APHA 2010)

The samples were allowed to settle by adding Lugol's iodine, centrifuged and the concentrate was made up to 20ml with 4% formalin for quantitative estimation of Phytoplankton.

RESULT AND DISCUSSION

Distribution of Phytoplankton and their variation at different zones of a water body is known to be influenced by the physic – chemical parameters of water (Yeragi *et al*., 2003).

Regular sampling of water was made from the different regions of this pond. The physic – chemical parameters like pH, temperature, dissolved oxygen, free CO_2, alkalinity hardness, chlorides. TDS were recorded. Temperature varied from 27^0-35^0 maximum temperature was recorded during summer at both sizes. pH shows neutral to alkaline nature (7.0 – 8.3). Do was varied from 6.4 to 14.2 mg/L., it was maximum during summer season at both stations. Free CO_2 varied from (6.50 – 18 mg/L.) it was maximum during winter. The hardness varied from (250 – 380) mg/L and chlorides varied from (16 - 80) mg. /L control Phytoplankton diversity and density.

In the present study, the species composition of Phytoplankton revealed total number of 30 species from two sites site B showed less abundance of species class Bacillariophyceae (8 Sp.) Chlorophyceae (15 Sp.). Cyanophyceae (7 sp.). Blue green show dominance at site 1 during summer.

Table 1: Physico – chemical parameters from two sites of Nav – Talav during 2013 – 2014.

Parameters	Site 'A'			Site 'B'		
	Summer	Monsoon	Winter	Summer	Monsoon	Winter
Temp.	33 – 35^0	29 – 31^0	27 – 28^0	33 – 35^0	29 – 31^0	27 – 28^0
pH	7.5 – 8.3	7.1 – 8	7.5 – 8.2	7.5 – 8.3	7 – 8	7.4 – 8.2
DO	6.4	2.2	14.2	6.4	2.1	14.2
CO_2	6.50– 6.55	9.24	17.62	6.50	9.80	18
Alkalinity	212 – 214	120 – 125	170 – 175	212 – 214	121 – 124	170 – 175
Hardness	370 – 380	250 – 255	295	380	250-255	295
Chlorides	80 - 75	16 – 20	20 – 30	80 – 75	16 – 21	20 – 31
Nitrites	80 – 90	20 – 25	70 - 75	81 – 95	20 – 25	70 – 76
TDS	2000 – 2050	900 – 910	1420 – 1450	2100 – 2200	900 – 970	1420 - 1450

Table 2: Phytoplankton diversity and abundance

Sr. No.	Taxa	A	B
	Bacillariophyceae		
1	Coscinodiscus SPS	++	++
2	R. setigera	++	++
3	FragillariaCapurnia	++	+
4	Naviculagracilis	+	+
5	Navicularadiosa	+	+
6	Fragilariarumpens	+	+
7	Cymbellamarathwadensis	++	++
8	Naviculadelicatula	++	+
	Chlorophyceae		
9	Ankistrodesmusfalcatus	+	+
10	Chlamydomonas conferta	++	+
11	Chlorella congla – merata	+	+
12	Chlorella valgoris	+	+
13	Chladophora	+	+
14	Closteriumlinneticum	+	+
15	Cosmariumcontractum	+	+
16	Oedogonium patulum	++	++
17	Pediastrum Duplex	+	+
18	Pediastrum simplex	++	++
19	Scendesmus armadas	+	+
20	Spirogyra	++	++
21	Zyqnema species	++	+
22	Spirogyra	++	++
23	Chara	++	++
	Cyanophyeae		
24	Anabaena constrica	++	++
25	Nostoc	++	++
26	Oscillatoria tenuis	+	+
27	Lyngbya	+	-
28	Merismopedia minima	+	+
29	Phormidiumdimorphum	+	+
30	Phormidiumtennvespirulina	+	+
++ More abundant; + Abundant; - Rare			

REFERENCES

APHA (2010) Standard methods of examination of water. Washington D.C.

Borse SK and Bhave (2000) Seasonal temperature variation and its influence on the level of dissolved co_2 and pH in AnerRiver, Jalgaon. *Asia J. Micro.Biotech and Env.sci*., 2(3-4):159-163

Latha KS, Rajalaxmi (2006) Biodiversity of phytoplankton in goutami-Godavaryestuary, Yanam,Pondicherry (U.T.) *Journal of Aquatic Biology*, 21(2):5-8

Nafeesa Begum, Narayana (2006) Phytoplankton diversity of four lentik water bodies in and around Davangareecity, Karnataka, *Journal of Aquatic Biology*, 21(2):13-18.

Pawar SK, Pulle JS, Shendge KM (2006) The study on phytoplankton of pethwadajDam,Taluka Kandhar-Dis.-Nanded,Maharashtra, *J-Auua.Bio*., 21(1):1-6.

Sethe SS, Khabade SA and Hujare MS (2001) Hydrobiological studies on two manmade reservoirs from TasgaonTahsil (M.S.),India.

Yeragi Aarati S, Yeragi SG and Yeragi SS (2003) Biodiversity of marine phytoplankton in a marine ecosystem, Acharya Creek, M.S. *J.Aqua.Bio.,* 18(2): 27-32.

Yeole SM and Patil GP (2005):Physico-chemical status of Yedshi lake in relation to water pollution, *J.Aqua.Biol*.,20(1):41-44.

RESEARCH ARTICLE

Quality assessment of borewell water: A case study of Gadchandur area in Chandrapur district

Pidurkar RS[1]*, Lanjewar MR[2] and Lanjewar RB[3]

[1]*Sardar Patel Mahavidyalaya, Chandrapur, India*

[2]*Department of Chemistry, R.T.M. Nagpur University, Nagpur, India*

[3]*Department of Chemistry, Dharampeth M.P.Deo Memorial Science College, Nagpur, India*

** Corresponding author email : pidurkar.raju@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Pidurkar RS, Lanjewar MR and Lanjewar RB (2014) Quality assessment of borewell water : A case study of Gadchandur area in Chandrapur district *Int. J. of Life Sciences,* Special Issue A2: 178-181

ABSTRACT

The present study was carried out with a view to have an understanding about the pollution status of water from Gadchandur area (Chandrapur district) particularly water quality in vicinity of industrial area. Evaluation of physico-chemical parameters was carried out. Fifteen samples were collected from various selected sites. The analysis of parameters using standard methods and their comparison with standard values suggested that most of the parameters are within the permissible limit. The present paper accounts water quality of various sites of Gadchandur area in Chandrapur district.

Keywords: Ground water, physico-chemical parameters, TDS, DO, APHA

INTRODUCTION

Rapid industrialization and urbanization is leading to deterioration of environmental conditions on global scale. In recent years environmental pollution has become a critical problem which affect on atmospheric properties, human health, soil, water, vegetation, animal and the whole ecosystem. Due to intense industrial activities and dense settlement in urban and industrial areas, the environmental pollution becoming growing hazards to human health. Water plays an important role in human life and its elemental composition is important to life processes as it provides all the essential nutrients to living organism**.** Due to tremendous increase in pollution, technological advancement and industrial growth, the lack of safe drinking water emerge as major problem for significant proportion of global population.

Water is a prime natural resources and a basic human need. The present work is carried out in vicinity of Gadchandur area in Chandrapur district in order to study the water quality. Gadchandur is situated on Eastern side of Maharashtra state and shares the state border of Andhra Pradesh, lies between degree of $19^0$43'N $79^0$10'E, the adjoining districts are Garhchiroli on eastern side, on Southern side Adilabad district of Andhra Pradesh, on western side Yavatmal District. The Gadchandur area falls under the Penganga basin and Wardha river basin.

MATERIALS AND METHODS

***Study Area*:** The Physico-chemical parameters of ground water of 15 stations in Gadchandur area were studied. The water samples were collected from bore wells located in this area. Ultratech, Ambuja, Manikgarh and Murali cement factories are located near this area. The samples were collected in clean polythene bottles without air bubbles, the bottles were rinsed using double distilled water before sampling and tightly sealed after collection and labeled. Analysis of pH, Total dissolved solids, fluoride, iron, nitrate, sulphate, dissolved oxygen, alkalinity, chlorides, total hardness and turbidity was carried out in laboratory and data is reported in Table No. 1.

RESULTS AND DISCUSSION

The samples collected from Gadchandur area were analyzed. The analysis of water samples includes determination of physico-chemical parameters which were analysed in winter [February 2014] season have been shown in Table 1.

Temperature: Temperatures of groundwater samples were measured in-situ. The water temperature was recorded between 28.8^{0}C to 30.1^{0}C. The water temperature has close relation to the variation of atmospheric temperature (Sunkad, 2004). Water temperature above 30^{0}C is unfit for public use (Zajic,1971). Temperature of W3 and W10 were found to be above 30^{0}C.

pH: pH of water the major ecological factor and is most important in controlling the activities and distribution of aquatic flora and fauna. On an average, pH values of most of the water samples were well within the range given in the WHO recommendations. This shows that all water samples except sample no. W12 were slightly alkaline.

Total Dissolved Solids: The average value of TDS in water samples ranges from 331ppm to 1110ppm. The observations show that the TDS of samples except W3, W4 and W6 are beyond desirable limit.

Turbidity: Turbidity in water may be caused by suspended matter such as clay, slit, finely divided organic and inorganic matter, soluble coloured organic compounds, planktons and other microscopic constituents. Turbidity of W5 and W12 were beyond desirable limit.

Alkalinity: Alkalinity of natural water may be attributed to the presence of salts of weak acids such as bicarbonates, phosphates, silicates and borates (Dara, 2011) which induce buffer capacity and lowering of pH. Alkalinity of different sites in Gadchandur area varied from 115ppm to 227ppm. Alkalinity of W10 was more than desirable limit.

Chlorides: In potable water, the salty taste is produced by chloride concentration and it is variable and dependent on chemical composition of water. In this study, chloride was found in range of 21.99ppm to 199ppm. High concentration of chloride may indicate high concentration of pollutant. The values observed in present study were in the range of permissible limit.

Fluorides: The values of fluoride content of most of the sampling sites were within the permissible limit. It does not cause any dental carries and danger of fluorosis. But sample no. W2, W6, W9 and W13 were having high fluoride content than desirable limit which may cause dental fluorosis and hence the water is unfit for drinking. Sample No. W14 has very low fluoride content which may cause dental carries. Hence it is also unfit for drinking.

Iron: Iron was found ranging from 0.038ppm to 0.999ppm in water samples from study area. Fe content for most of the samples was within the limit which indicates that water is fit for drinking. Fe content of sample no. W5 was very high due to which it is unfit for drinking.

Hardness: Hardness is the property of water which prevents the lather formation with soap and increases the boiling points of water (Patil and Patil, 2010). This soap consuming capacity is mainly due to presence of calcium and magnesium ions in the water. Total hardness of different sites in Gadchandur area varied from 144ppm to 732ppm. which shows that water is safe for drinking purpose except sample W2, W7, W8 and W12. The result shows that all the samples were moderately soft except sample W2, W7, W8 and W12 as per WHO's limit.

Nitrates: Nitrate is the more stable oxidized form of combined nitrogen in most environmental media. Most nitrogenous materials in natural waters tend to be converted to nitrate, and, therefore, all sources of combined nitrogen (particularly organic nitrogen and ammonia) should be considered as potential nitrate sources. Drinking water containing more than 45ppm NO_3^- can cause blue baby or methamoglobinemia in

Table 1: Physicochemical parameters of fifteen water samples of Gadchandur area.

Sr. No.	Site Code	Temp. (°C)	pH	TDS (ppm)	Turbidity (NTU)	Alkalinity (ppm)	Cl^- (ppm)	F^- (ppm)	Fe (ppm)	Total Hardness (ppm)	NO_3^- (ppm)	SO_4^{2-} (ppm)	DO (ppm)	C.O.D.	B.O.D.
1	(Thutra) W1	29.5	7.10	530	1.65	157	55.98	1.195	0.221	290	150.2	60	4.0	ND	ND
2	(Gopalpur) W2	28.8	7.28	505	0.54	143	37.99	3.442	0.078	562	12.88	140	4.2	ND	ND
3	(Manoli) W3	30.1	7.34	382	1.79	146	43.99	0.532	0.265	298	16.70	30	3.8	ND	ND
4	(Bailampur) W4	29.2	7.20	331	2.72	115	21.99	0.437	0.240	240	3.98	20	4.0	ND	ND
5	(Gadchandur) W5	29.2	7.12	730	20.5	149	115.96	0.620	0.999	322	7.29	135	3.8	ND	ND
6	(Pimpalgaon) W6	28.9	7.24	418	0.78	118	23.99	1.714	0.073	288	12.65	35	4.0	ND	ND
7	(Bibi) W7	29.3	7.19	974	0.35	150	197.94	0.739	0.043	732	153.39	65	3.8	ND	ND
8	(Nanda) W8	29.3	7.25	776	1.16	144	115.96	0.939	0.162	490	153.41	70	4.4	ND	ND
9	(Awalpur) W9	28.9	7.44	565	0.36	189	53.98	1.715	0.038	334	15.67	60	4.6	ND	ND
10	(Hirapur) W10	30.1	7.35	658	4.36	227	47.99	1.572	0.285	406	17.27	40	4.2	ND	ND
11	(Nokari) W11	29.7	7.17	581	0.69	131	45.99	1.157	0.107	294	9.78	130	4.4	ND	ND
12	(Palgaon) W12	29.1	6.98	1110	5.96	119	199.94	0.658	0.457	490	153.31	380	3.8	ND	ND
13	(Hardona) W13	28.6	7.30	541	1.35	144	39.99	2.154	0.137	368	20.32	50	4.4	ND	ND
14	(Uparwahi) W14	29.3	7.19	573	2.13	148	55.98	0.263	0.231	222	9.06	70	4.0	ND	ND
15	(Mangi) W15	29.5	7.50	525	4.69	153	47.99	1.375	0.171	144	5.64	50	4.2	ND	ND
BIS/ WHO		----	6.5–8.5	500	1 – 5	200	250	0.5–1.5	0.300	300	45	200	4 - 6		

infants and gastric carcinomas (Hopps and Feder, 1986; Jalali, 2005) W1, W7, W8 and W12 samples from study area have NO_3^- content above 45ppm which shows high level of pollution.

Sulphates: Water containing high level of sulphates particularly magnesium sulphate and sodium sulphate may have a laxative effect on a person using the water for the first time. In groundwater samples of study area, SO_4^{2-} concentration ranged from 20ppm to 380ppm. The concentrations of SO_4^{2-} in most of the samples were lower than the desirable limit (200ppm) accepted for drinking purpose. Sample no. W12 having SO_4^{2-} content higher than desirable limit is unfit for drinking.

Dissolved Oxygen: In natural and waste water, DO level depends on the physical, chemical and biological activities of the water body. The analysis of DO plays key role in water pollution control activities and waste treatment process control (Day, 2012) DO values of water samples in the study area are ranged from 3.8ppm to 4.6ppm. Some samples shows less amount of DO than BIS values.

CONCLUSION

The results revealed that majority of the sampling stations had permissible range of concentrations of salts while some of them is highly polluted. The parameters in most of the water samples are in normal range and indicated better quality of water. It is advisable that people from this area uses bore well water for domestic purpose.

REFERENCES

Sunkad BN and Patil HS (2004) Water quality assessment of fort lake of Belgaum. *J. Environ Biol*., 25:99-102.

Zajic JC (1971) Water pollution Disposal and Re-use.Vol.1, Marel Dekkar, Inc., New York.

Dara SS (2011) A Text Book of Experiments in Engineering Chemistry, S.Chand Publisher, New Delhi

Patil VT and Patil RR (2010) Physicochemical analysis of selected groundwater samples of Amalner Town in Jalgaon District, Maharashtra, India. *E- Journal of Chemistry*, 7(1):111-116

Hopps HC and Feder GL (1986) Chemcial qualities of water that contribute to human health in a positive way. *Total Environ*., 54: 207-216.

Jalali M (2005) Nitrarte pollution in groundwater in Toyserkan, Western Iran. *Environmental Earth Sciences*, 62(5):907-913.

Day AK (2012) Environmental Chemistry, Seventh Edition,New Age International New Delhi

RESEARCH ARTICLE

Assessment of Bacteriological Quality of Drinking Water available in Dental Clinic in Akola City, India

Banginwar YS and Dawande AY

Department of Microbiology, Arts And Science College, Pulgaon, India.

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Banginwar YS and Dawande AY (2014) Assessment of Bacteriological Quality of Drinking Water available in Dental Clinic in Akola City, India. *Int. J. of Life Sciences*, 2014, Special Issue A2: 182-184.

Acknowledgement:
The authors are thankful to Dr.V B Hadge, Principal, Arts and Science college, Pulgaon for providing laboratory facilities.

ABSTRACT

A study of bacterial contamination of 85 water samples was conducted in monsoon for 31 dental clinics along with one dental college unit in Akola city and reported prevalence of diverse groups of bacteria. A few bacteria were detected in the tap water upstream, scalar line, high speed hand piece and three war syringes of the clinics. The Gram positive cocci and Gram negative bacilli were observed predominant including *E. coli, Salmonella typhimurium* and *Staphylococcus aureus.*

Keyword: Dental clinic, *E. coli, Salmonella typhimurium, Staphylococcus aureus.*

INTRODUCTION

Presently, Dental clinics are well equipped with compressed air and water pipes. Water is used as an air turbine coolant for washing purpose when teeth are scraped or extracted and also for mouth rinsing and gargling. It was pointed out that the water delivered to dental clinics and dental college is often contaminated with microorganisms. In India, chlorinated water is provided to dental clinics and lays down minimum levels for residual chlorine in water, but in practice, several dental clinics do not use the chlorinated water.

Dental unit waterlines are an integral part of dental surgery equipment, supplying water as a coolant for air-turbines. These waterlines are susceptible to biofilm formation because they are made from a variety of plastic materials. The plastic surfaces promote growth of bacteria in the biofilm. Therefore it is proposed to assess the quality of drinking water available in dental clinic of Akola city for prevalence of bacteria.

MATERIALS AND METHOD

***Collection of water sample from the various Dental clinics*:**

Altogether 85 water samples (each sample was about 25-30 ml) were obtained from the study area in sterile bottle in hygienic condition as the standard norms of drinking water for examination. The above water samples were collected by using syringe, high-speed hand piece, scalar line, overhead tank water line and water reservoir. These samples were examined for prevalence bacterial contamination on CLED (Cystein lactose electrolyte deficient) agar medium.

***Isolation of bacteria on CLED agar plate*:** A drop of water from collected sample was immediately placed on the CLED agar plate and allowed to then incubate the plate for 24 hours at 37^0 C. The growth and colour of colonies on the plate were observed for 48 hours.

***Identification of bacteria*:** Isolates of bacteria were identified on the basic of morphology, Gram staining, motility, cultural characteristics, biochemical test and special tests.

RESULT AND DISCUSSION

The water from the entire dental clinic sample contained predominantly Gram negative bacilli and few gram positive bacteria. Previous report stated that the water use in dental clinic are sterilized or chlorinated and free from bacterial contaminants. The present survey revealed that most of clinics did not follow the proper hygienic condition,

Table 1: Survey of water samples from study area.

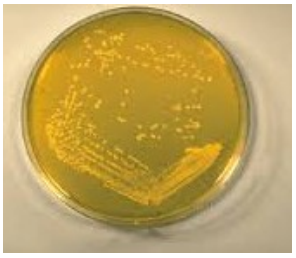
Total Water samples from study area			Water samples from dental clinic		
Total samples	Contaminated samples	Non-contaminated samples	Total dental clinic	Contaminated samples	Non-contaminated samples
85	29	56	30	21	09

Table 2: Assessment of contaminated water from dental clinic and Dental hospital

Culture no	Gram staining	Motility	Lactose fermentation	Mannitol fermentation	Indol test	MR test	VP test	Citrate	TSI agar H2S gas	Colonies on CLED agar	Identified organism
2C	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
2D	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
4C	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
5A	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
5A1	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
6E	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
8B	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
8D	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
9C	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
10A	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
10B	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
10B1	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
10C	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
11D	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
12C	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
14D	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
15C	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
18A	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
20A1	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
21E	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
22B	+	-	A	A	-	+	+	+	-	Yellow pin point	*S.aureus*
25D	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
27D	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
28A	-	+	AG	AG	+	+	-	-	-	Yellow	*E.coli*
29B	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
29D	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*
29E	-	+	-	AG	-	+	-	+	+	Bluish	*Salmonella typhimurium*

E.Coil on MacConkey Agar

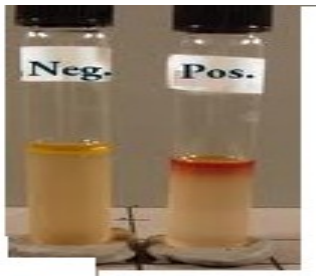
Salmonella typhimurium on MacConkey Agar



S.aureus on CLED media

Citrate test positive

TSI test positive



Indol test positive

did not use sterile/chlorinated water or those who use the same, the pipe line container, scalar line, three way syringe open to air may contaminated the sterilize water. Present report indicates the prevalence of *E.coli* in the water of dental clinic, which confirm the previous report.

The report also indicate the prevalence of Gram positive organism such as *Staphylococcus aureus* which are not inheriting of water, this contamination may due to oral cavity to hand piece to reservoir of water and scalar line then indicate that in dental clinics were may be contaminated in two different way either from contaminated reservoir or pipe line and supplied to patient generally Gram negative contamination and through oral cavity of patient to pipe line and reservoir.

CONCLUSION

The examination of water samples from different dental clinics and one dental college hospital in Akola city revealed that nearly 70 per cent dental clinics did not followed proper surgical procedure and avoid to use chlorinated or sterile water. Due to unhygienic surgical procedure and contaminated water, the patient attending the dental clinic may infected with hospital borne infection. Out of total study area, 21 dental clinics used pathogenic bacterial contaminated water containing *E. coli, Salmonella typhimurium* and *Staphylococcus aureus.* It is sorry to reveal that most of the dental clinic understudy did not use the sterile water and proper surgical procedure for the extraction of teeth, scraping and mouth rinsing.

REFERENCES

American Dental Association (ADA) (1999) Dental unit waterlines: approaching the year 2000. ADA Council on Scientific Affairs. J Am Dent Assoc, 130(11): 1653-1664.

Abel LC, Miller RC and Ryge G (1971) Studies on dental bacterial contamination of water delivered by dental units. *Journal of Laboratory Research* 50,1567-1569

Gross A, Devine MJ and Cutright DE (1976) Microbial contamination of dental and ultrasonic scalar. Journal of Peridontology 47, 671-673.

Mc Entegrat MG and Clark A (1973) Colonization of dental units by water bacteria. *British Dental Journal* 134, 140-142.

Furuhashi M and Miyamae T (1985) Prevention of bacterial contamination of water in dental units. *Journal of Hospital Infections* 6, 81-88.

Walker RJ, Burke FJ, Miller CH and Palenik CJ (2004) An investigation of the microbial contamination of dental unit air and water lines. *Int Dent Journal*, 54(6): 438-444.

RESEARCH ARTICLE

Evaluation of *in Vitro* Salt Tolerance in Medicinally Important Legume

Tiwari Punita

Department of Botany, Shri Shivaji Science College, Congress Nagar, Nagpur 440012.

Email id: punitatiwari9@yahoo.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Tiwari Punita (2014) Evaluation of *in Vitro* Salt Tolerance in Medicinally Important Legume, *Int. J. of Life Sciences,* Special Issue, A2: 185-187.

Acknowledgement
Author is grateful to D.K. Burghate, Principal, Shivaji Science College, Nagpur, for facilitation and Prof. Y.K. Bansal, Dept of Biological Sciences, R.D. University, Jabalpur, for guidance.

ABSTRACT

The use of saline water for irrigation has been reported. Much research has been done on the effect of irrigation with low quality matter on saline tolerant species, little is known about the salinity tolerance of legume plant. Despite the wide range of medicinal use of *Psorelea. corylifolia*, the plant has not received much attention. The present work has been taken up to evaluate *in vitro* salt tolerance capability of callus and its response to organogenesis with different cones of salt. The results revealed highest, 93% per cent of shooting in 25 mM salt conc. with 10 mg/l BAP alone; 5 mg/l BAP in combination with 2.5 mg/l. NAA induced 90% shooting with 50 mM salt conc. In 25 & 50 mM salt conc. the callus was appeared white & light green in color and soft & friable in texture with shoot buds and good viability. Tolerance for salt in explants of *P. corylifolia* was reported highest at low salt conc. i.e. 25 mM & moderate at 50 mM . Salt tolerance level declined with increased in salts conc.

Key words: Salt tolerance, organogenesis response, friable, callus, *Psorelea corylifolia*

INTRODUCTION

Plants of the family Leguminosae are not only a source of proteinaceous human food to the predominantly vegetarian population (Kochar, 1981) but they are also having potent medicinal value and used in indigenous medicines by tribal people. Plant growth is greatly influenced by various environmental factors such as temperature, light, water and nutrient availability (Rajam, 1997).The limited mater resources in arid & semiarid areas form a major constraints for socio economic development. (Hamdy *et al*., 2002).The use of saline water for irrigation has been reported by (Katerji et.al 2001). Much research has been done on the effect of irrigation with low quality mater on saline tolerant species, a little is known about the salinity tolerance of legume plant. *Psorelea corylifolia* L commonly known as '*Babchi*', an erect annual important medicinal plant of Leguminosae widely distributed in the tropical and subtropical regions (Jain, 1994). It is used as anthelmintic, laxative, diuretic and diaphoretic in febrile conditions.

Despite the wide range of medicinal uses of *P. corylifolia*, the plant has not been fully studied. There is pressing need to make plants more tolerant to such conditions and improvement of salt tolerance in *vitro*. Therefore, the present work has been taken up to evaluate in vitro salt tolerance capability of callus and its response to organogenesis with different conc. of salt.

MATERIAL AND METHOD

Seeds of *Psorelea corylifolia*, obtained from local medicinal plant agency, were surface sterilized with aqueous solution of 0.1% mercuric chloride for 1 min and then rinsed with sterile distilled water for 4-5 times. The seeds were allowed to germinate on sterile moist blotter paper in Petri plates as well as in sterile moist cotton in flasks at 22-25°C temperature in dark. Hypocotyls and leaf explants were excised from 3 to 4 days old seedlings and placed aseptically on sterile solidified MS medium containing 2% sucrose; 0.8% agar and different conc. of salt solution (25 mM, 50 mM, 75 mM and 100 mM) to test salt tolerance and also effect of growth regulators to check the growth along with salt. Cultures were maintained under white fluorescent light with light /dark cycle of 16 hrs/8 hrs at 25± 2°C. MS Media containing various conc. of salt (25 mM- 100 mM) and different combinations of growth regulators (NAA, 2,4-D, BAP, 0.5 – 10 mg/l) was tested to report the effect of salt conc. on growth and callus in response of *P. corylifolia*.

RESULT AND DISCUSSION

MS medium containing various conc. of salt (25 mM – 100 mM) and diff. concs .and combinations of growth regulators (NAA, 2, 4-D, BAP, 0.5 – 10 mg/l) were taken to observe the effect of salt concs. on organogenesis and caullogenesis in *P. corylifolia*. Highest, 93 per cent shooting was observed in 25 mM salt conc. with 10 mg/l BAP alone.5 mg/l BAP in combination with 2.5 mg/l. The seeds receiving treatment of NAA had 90% shoot response with 50 mM salt conc. Rhizogenesis was observed in callus when media was supplemented with 5 mg/l IBA and 25 mM salt conc. (77%) while lower conc. of IBA alone i.e. (0.5 – 2.5 mg/l, no rooting was observed in callus (Table 1). When callus with shoot buds & regenerated shoots were sub-cultured on media augmented with 5 & 10 mg/l IBA 78- 84% of shoots exhibited rooting. Callus also showed variation in its texture & friability. The results indicated that, in 25 & 50 mM salt conc. the callus was appeared white & light green, soft and friable with shoot buds and good viability. With 75 to 100 mM conc. of salt, the callus appeared light to dark brown, hard and exhibited no viability (Table-1).

The primary growth rate of the callus was slightly affected at a low salt conc.i.e.50mM. However, this effect increased with increasing salt conc i.e. 75 – 100 mM where no shooting was observed and callus produced were also not viable. These results confirmed with earlier findings (Katerji *et al*., 2001; Gandour, 2002; Leskeys *et al*., 1999).

Table 1: *In vitro* response of hypocotyl explants of *P. corylifolia* after 25 days in different salt conc.

Salt conc. (mM)	GR (mg/L)	% Conc	texture	%S
25mM	5BAP/2.5NAA	98	W,F	82
	1 2,4-D/10 BAP	92	W,S,F	58
	1NAA	86	W,S	85
	10BAP	67	G , S	93
50mM	5BAP/2.5NAA	95	W,S,F	90
	12,4-D/10BAP	90	W,F	28
	1NAA	80	W,F	45
	10 BAP	47	G,F	82
75mM	5BAP/2.5NAA	77	Lb, F	-
	12,4-D/10BAP	80	Lb,H	-
	1NAA	45	Lb,,H	-
	10 BAP	36	Lb,,H	-
100mM	5BAP/2.5NAA	22	DB, H	-
	12,4-D/10BAP	25	DB, H	-
	1NAA	20	DB, H	-
	10 BAP	13	DB, H	-

Growth of shoot response and rhizogenesis at higher salinity level was almost negligible. This result is in confirmation with the finding of Hoffman *et al*., (1997) and Mac Adam *et al* (1997). Tolerance for salt in explants of *P. corylifolia* was reported highest at low salt conc. i.e. 25 mM & moderate at 50 mM and as the salt conc. increased it exhibited almost negligible tolerance level. It may be due to cellular dehydration caused by higher conc. of salt as reported in past by several workers (Bartels and Nelson, 1994). Interaction between growth regulators and salt conc. can have synergistic and antagonistic effect on cell growth (Thomshow, 2001).

CONCLUSION

Tolerance for salt in explants of *P. corylifolia* was highest at low salt conc. i.e. 25 mM; moderate at 50 mM and as the salt conc. increased it exhibited almost negligible tolerance level. It is concluded that the use

of *in vitro* technique to estimate salt tolerance in legumes is an efficient system but still more investigations is in urgent need in this regard.

REFERENCES

Bartels D, Nelson D. (1994) Approaches to improve stress tolerance using molecular genetics. *Plant cell Environ*. 17, 659-667.

Gandour G. (2002) Effect of salinity on Development and production of chickpea genotypes. *PhD Thesis,* Aleppo University, Faculty of Agriculture, Aleppo, Syria.

Hamdy A, Katerji N, Van Hoorn JW, Hamdy A, Mastrorilli M, (2002) Mediterranean crop responses to water and soil salinity, ecophysiological and agronomic analyses. Options *Mediterraneennes Serie* B 36: p:1-3

Hoffman GJ, Jobes JA, Alves WJ (1983) Response of Tsll fescue to irrigation water salinity, leaching fraction, and irrigation frequency Agri. Water. Manage. Amesterdam: *Elsevier Scientific.* 7 (4): 439-456.

Jain SK (1994) Ethnobotany & Research in medicinal plants in India. *Enthnobot. Search, New Drugs.* 185: 153-168.

Kochar SL (1981) Economics Botany In The Tropics. Mc Milan India Ltd. Delhi.

Katerji N, Van Hoorn JW, Hamdy A, Mastrorilli M, Oweis T, Erskine W. (2001) Response of two varieties of lentil to soil salinity. *Agricultural Water Management* , 47: 179-190.

Leskys AM, Devitt DA, Morris RL, Verchick LS. (1999) Response of tall fescue to saline water as influenced by leaching fractions and irrigation uniformity distributions. Argo. J. Madison, wis: *American Society of Agronomy*, 91(3): 409.

MacAdam JW, Drost DT, Dudley LM, Soltani N. (1997) Shoot growth, plant tissue elemental composition and soil salinity following irrigation of Alfalafa and Tall fescue with high sulphate waters.J.Plant. Nutr. Monticello, N.Y.: *Marcel Dekker Inc*. 20(9): 1137-1153.

Rajam MV, Dagar S, Waie B, Yadav JS, Kumar PA, Shoeb F, Kumaria R (1998) Genetic Engineering of Polyamine and Carbohydrate Metabolism for osmotic stress tolerance in Higher Plants, J.Biosci., 23. No. 4, PP 473-482.

Thomashow M. (2001) So whats new in the field of plant cold acclimation? *Lots Plant Physiol*. 125:89-93.

RESEARCH ARTICLE

Application of Microbial Inoculant strains to *Cajanus cajan*

Jachak Rashmi

Department Microbiology, S. K. Porwal College, Kamptee)

Address for correspondence Email- drrajachak@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Jachak Rashmi (2014) Application of Microbial Inoculant strains to *Cajanuscajan*, *Int. J. of Life Sciences,* Special Issue A2: 188-190.

Acknowledgement:
The author would like to thank to the Dr. P.B. Nandkar, for their valuable suggestions and Dr. K.H. Makade for providing all necessary facilities. Heartful thanks to the Dr. P. Bhattacharya, Director of Regional Biofertiliser Development Centre (RBDC) Govt. of India, Nagpur for their valuable suggestions.

ABSTRACT

'Microbial inoculants' containing live or latent cells of efficient strains of nitrogen fixing, microorganism used for application to seed and seedling plants. Soils are composting areas with the objectives of increasing the number of such microorganisms. Microbial processes are not only quick but consume relatively less energy than industrial process. In present study, application of different strains of biofertiliser to *Cajanuscajan* . Wild strain is collected from the root nodules of plant. Both the strains wild and metallic are developed in Norris and Date medium. Individual application of these fertilisers shows less growth as comparative the combination of the all metallic strains except in cadmium strain. Very less growth was obtained while using Cd-t strain. Cu-t strain shows maximum growth than Zn-t and Wild strains.

Keywords: *Rhizobium*, metal strain, biofertiliser, *Cajanus cajan*

INTRODUCTION

High concentrations of copper inhibits growth of microorganisms and also become toxic to plants where as copper deficient plants bear smaller nodules and incorporate carbon slowely to amino acids (Gachter *et al.,*1973). The first scientist Raulin (1969) who reported the essentiality of Zn for plants. Zinc is an essential element for an organism because of its central role as enzyme co-factor in many metabolic processes (Evans and Sorger, 1966). Cadmium is non-essential and extremely toxic, by substituting for zinc in enzyme system it poisons to important metabolic processes.

Microorganisms develop more resistance to heavy metals and adapt particular condition containing toxic metal in their media. Among metals copper and zinc are considered to be essential for the growth and yield of crop plants. In the context, the application of both essential and non-essential heavy metals are taken into account through the organism which improved the soil fertility, integrated plant nutrient supply system and yield of crops.

MATERIAL AND METHODS

Collection and Isolation of *Rhizobium* (W-t): The *Rhizobium* was isolated from the root nodule of *Cajanuscajan* (Aasha) the field Nagpur. After selection, wash the nodules and immerse undamaged nodule in 95% ethanol for 5-10 seconds; then rinse it in sterile water. Sterilise nodule surface by acidified mercuric chloride solution (0.1 % w/v) again rinse 5-6 times in sterile water

Preparation of Heavy metal strain (Cu-t, Zn-t and Cd-t): The culture media with Copper, Zinc and Cadmium of different dilution of stock were made separately and growth of *Rhizobium* was determined and observed microscopically and by using spectrophotometer. After about 35 generations adapted metal tolerant strain at Cu-t o.25 Zn-t 0.18 and Cd- t 0.35 were obtained.

***Field application of Wild and Metal strain of Biofertilisers*:** Field experiment was conducted by giving four treatments replicated in thrice (as shown in table) as per Factorial Randomised Block Designed (FRBD). The biofertilisers in liquid form were inoculated 1ml/seedling plant. The biofertilisers in liquid form were inoculated 1ml/plant.

Treatments

No treatment = T
Treatment with W-t strain of *Rhizobium* = T1
Treatment with Cu-t 0.25 strain of*Rhizobium* = T2
Treatment with Zn-t 0.18 strain of *Rhizobium* = T3
Treatment with Cd-t 0.35 strain of *Rhizobium* = T4
Treatment with (T2+T3+T4) = T5

RESULTS AND DISCUSSION

Heavy metal toxicity to microorganisms:

The metallic strain were obtained as Cu-t 0.25, Zn-t 0.18 and Cd-t 0.35.The increase in number and dry weight of nodules and grain yields of lentil when seeds were soaked in 0.35 percent copper sulphate prior to *Rhizobium* inoculation (Khurana *et al.*, 1976). Zinc deficiency decreased shoot weights, nodule weights and the amounts of N_2 - fixed (Demeterio et al., 1972). It can be recovered by a spray of 0.5 percent of w/v $ZnSO_4$, the balanced P (25-50 ppm) and also reported that the tolerance of bacteria to Cd was appearently species specific in sensitivity to Cd.

Cajanuscajan (Tur)

Effect of wild strain of *Rhizobium sp.* on *Cajanuscajan*

The wild strains of and *Rhizobium* used the biofertilisers. Table shows that the plant height 165-170 cm, 14-16 branches/plant with yield 142- 150 gm/plant, having 11-12.40 gm/100 seeds test weight obtained. This crop responded favourably to nitrogen and *Rhizobium* inoculation in a variety of ICPL 87 during 1992 to 1993 treatment with 15 kg N/ha and *Rhizobium* inoculation gave significantly higher yields than the control (Singh et al, 1998).

Effect of copper strain (Cu-t) of *Rhizobium* sp. on *Cajanuscajan*

Using this strain of Microbial inoculant plant height obtained. Slightly higher height 173-178 cm, 16-18 branches yield 148-160 with 13.15 gm/100 seeds were obtained. Copper is one of the few metallic element which occur in nature (Massey, 1973). It is an important element for all forms as like participation in a number of biochemical reactions (Maelstrom and Neailands, 1964).

Effect of zinc strain (Zn-t) of *Rhizobium sp.* on *Cajanuscajan*

Like copper strain similar treatment were obtained given when using the zinc strains of *Rhizobium* sp. as the biofertiliser. The maximum height 170-175 cm, 15-18 branches with yield 145-160 gm/plant and 11.52 gm/100 seeds were obtained. Similar results obtained by Saharawat et al. (1998) that the uptake of Zn significantly increased only with the smallest rate of P application.

Effect of cadmium strain (Cd-t) of *Rhizobium sp.* on *Cajanuscajan*

Using cadmium strain of dual application of *Rhizobium sp.* of thebiofertiliser theplant height160-165 cm, 12-16 branches with grain yield 140-145 gm/plant and having test weight 10-12 gm/100 seed were obtained.

Table 1: Effect of Wild and metallic strain of *Rhizobium* on *Cajanuscajan*(Tur-plant)

Treatment	T (No treat)	T1 (W-t)	T2 (Cu-t)	T3 (Zn-t)	T4 (Cd-t)	T5 (T2+T3+T4)
Plant height(cm)	145-150	165-170	173-178	170-175	160-165	175-185
No. branches/plant	10-12	14-16	16-18	15-18	12-16	18-20
Grain wt./plant (gm)	130-135	142-150	148-160	145-160	140-145	155-165
Test weight/ 100 seeds (gm)	8.5-9.0	11.12-12.40	13.15	11.52	10-12	13.65

Maize crop in Cd-enriched sludge/compost amended soils did not show any toxic influenced even at highest doses at 224 t/ha in any soil types (Ramachandran and D'souza, 1999).

Effect of mixed metallic strains of (Cu-t, Zn-t and Cd-t) *Rhizobium sp.*on*Cajanuscajan*

In this all mixed strains Cu, Zn and Cd of *Rhizobium* sp. used as biofertilisers. The plant height 175-185cm, 18-20 branches, yield 155-165gm/plant and test weight 13.65 gm/100 seeds were obtained. The application of inoculant increased the macronutrients N,P,K and micronutrient Cu, Zn, Mn and Fe contents in Paddy grain yield (Ramani and Pillai, 1992).

CONCLUSION

From the above study the maximum growth and yield of plant is observed due to the combination of all metallic strain than the individual inoculation. The metallic strain improved growth of plant and fertility of soil. While single individual application shows that the Cu and zinc shows significantly more beneficial than Cd and w strain of Rhizobium. Study of Cd strain shows the adverse effect on *Cajanuscajan*

REFERENCES

Demeterio JL, Ellis R. (Jr.) and Paulsen GM (1972) Nodulation and nitrogen fixation by two soyabeanvarities as affected by phsophorus and zinc nutrition. *J. Agron.,* 64, 566-568.

Evans HJ and Sorger GJ (1966) Role of mineral elements with emphasis on the univalent cations.*Ann, Rev. Plant Physiol.* 17, 47-76.

Gachter RK, Lum-shue-chan and Chau YK (1973) Complexing capacity of the nutrient medium and its relation to inhibition of algal photosynthesis by copper. *Hydrologie.*35,252-261.

Khurana AS, Dhingra KK, Phutela RP and Sekhan HS (1976) Response of lentil to *Rhizobium* inocullation as influenced by nitrogen molybdenum and other Ions. Paper presented at "second All India symposium an soil Biology and Ecology, held at Bangloro from 22-26th Nov. 1976.

Malstorm BG and Neilands JB (1964) Metalloproteins. *Ann.* Rev. *Biochem.* 33, 331-354.

Massey AG (1973) Copper. In : comprehensive Inorganic chemistry. eds: Bailer Jr. J.C.; Emeleus, H.J,. Hyholm, R.; and Trotman - Dickenson A.F.) Pergamon Press, oxford. 36, 1-78.

Ramchandran V and D'souza TJ (1999). Plant uptake of cadmium, zinc and manganese from soils amended with increasing levels of Cd-enriched sewage sludges and city comports. *J. Indian. Sci, Soil. Sci*. 47(4), 738-743.

Raulin J (1969) Studies cliniquessurla vegetation. *Ann. Sci. Nat. Botan. Biol. Vegetale., 11,* 93-299.

Ramani KJ and Pillai RN (1992) Effects of Blue green algae inoculation on Nutrient content and yield of transplanted rice.J. maha. agric. Univ. 17(3), 489-490.

Sahrawat KL, Rego TJ, Rahman MH and Rao JK (1998) Phosphorus Response effects on macro and micronutrient removal by *Sorghum* under rainfed cropping on a vertisol, *J. of* Indian Soci. Soil Sci. 46(1), 58-60.

Shukla UC and Yadav OP (1982) Effect of Phosphorus and Zinc on nodulation and nitrogen fixation in chickpea *(Cicerarietinum L.) Pl. Soil. 65 , 239-248.*

Singh GV, Rana NS and Ahlawat IPS (1998) *Effect of nitrogen, Rhizobium inoculation* and phosphorus on growth and yield of pigeonpea (Cajanuscajan). *Indian J. Agron*., *43(2),* 358-361.

RESEARCH ARTICLE

Diarrhoea: Local Herbal Treatment from Sakoli Taluka of Bhandara District of Maharastra State

Zingare Arun K

Dept. of Botany, M. B. Patel Cellege, Sakoli-441802.

Email : arunzingare@yahoo.in

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Zingare Arun K (2014) Diarrhoea: Local Herbal Treatment from Sakoli Taluka of Bhandara District of Maharastra State, *Int. J. of Life Sciences,* Special Issue, A2: 191-193.

ABSTRACT

Sakoli taluka of Bhandara District is rich in plant diversity. Many tribal communities resides in the region, An ethnomedicinal survey was conducted on the treatment of various diseases in this area. During the investigations, 14species of plants belonging to 14families were recorded as being used for treatment of diarrhea, whichwere used by the tribal peoples as the traditional healing medicine for this ailment. A brief enumerationof the plants along with their mode of uses has been provided.

Key words: Diarrhoea; Sakoli; Ethnomedicine; Traditional Knowledge

INTRODUCTION

Accordingto the World Health Organization, diarrhoea is the passage of three or more loose or liquid stools per day, or more frequently than is normal for the individual. It is usually a symptom of gastrointestinal infection and this can be caused by a variety of bacterial, viral and other parasitic organisms. Diarrhoea is one of the leading causes of death among children under five globally. More than one in ten child-deaths, about 800,000 each year, are due to diarrhoea (Bryce *et al*. 2005, UNICEF/WHO 2009). In India alone, about 0.4 million children die due to diarrhoea annually (Kumar and Vollmer 2011). Use of local wild plants against these kinds of ailments has always been an integral part of indigenous traditional knowledge. Traditional healers employ methods basedon the ecological, socio-cultural and religious background of their people to provide health care (Anyinam 1995, Gesler 1992, Good 1980). Diarrhoea is the commonest ailment suffered by children in this area, especially in the interior part of the district where, local health care is not available. Not only the childrens but adults also suffer from this ailment in enormous amount especially during rainy season. To cure this ailment, there are numerous traditional methods or practices followed by the folk people and local tribal communities like Halba, Gond, Pradhanof the Sakoli taluka of Bhandara District (Eastern Vidarbha). This area has a rich floral diversity with enormous number of ethnomedicinal plants indicating rich heritage of traditional medicines (zingare *et al.,* 2012). Area of the district is under forest cover with recognized national parks and wildlife sanctuaries.

METHODOLOGY

An ethnobotanical survey was conducted indifferent tribal localities in the district during theyears 2011 - 2012. Different communities of people were Interviewed, local herbalpractitioners like the Medicine men, vaidus, poojari and also with seniormen and women using questionnaire(Jain 1995). These people have been using variousplants for the treatment of diarrhoea especially inthe rural areas. The informationregarding mode of use, parts used, amount andperiodicity of dosage and local name was collectedfrom them. The voucher specimens were processedinto mounted herbarium sheets following theconventional methodology (Jain and Rao 1977)and were deposited at the Departmental Herbarium.

Enumeration

In the enumeration, the names of 14 plantsused by the ethnic people of Sakoli taluka for the treatment of diarrhoea and dysentery have been arranged alphabetically along with their correct botanical name, family, English and localname, parts used, and method of administration. [Abbreviations used: EN = English Name; LN= Local Name].

RESULTS AND DISCUSION

AcoruscalamusLinn. [Acoraceae]; E N: Sweet sedge; LN: Wekhand.

Powdered dried rhizome is taken orally with a glass of luke-warm water, 3 - 4 times a day till cured.

Aeglemarmelos(Linn.) Correa [Rutaceae]E; N:Bael Tree; LN: 'Bel';

Pulp of ripe fruit is chewed and swallowed2 - 3 times a day.

Bauhinia variegataLinn. [Caesalpiniaceae]; EN: Buddhist bauhinia; LN: Shahara;

The dried roots and bark of stem are cut into small pieces and 2 - 3 spoonfuls of its extracted juice in water are administered thrice a day till cured.

Bombax ceiba Linn. [Bombacaceae]; EN: Red cotton tree; LN: Kate sawar.

Two spoonfuls of the powdered dried root is taken orally with water before bed.

Cannabis sativa Linn. [Cannabaceae]; EN: Hemp; LN: 'Ganja';

Dried flowers are smashed and taken in empty stomach once daily in the morning.

Centellaasiatica (Linn.)Urb. [Apiaceae]; EN: Indian pennywort; LN: 'Bramhi';

The aerial parts are mixed with young shoots of Justicia adhcrtoda (in equal proportion) and 2 spoonfuls of the paste are taken with water against juvenile dysentery.

Holarrhenaantidysentrica (Buch.-Ham.) G. Don [Apocynaceae]; EN: Easter Tree; LN: Kuda;Three spoonfuls of bark and seed decoctionin water are administered orally against diarrhea and amoebic dysentery.

Justicia adhatoda Linn. [Acanthaceae]; EN:Malabar nut: LN: 'Adulsa':

The aerial parts are mixed with young shoots of Justicia adhcrtoda (in equal proportion) and 2 spoonfuls of the paste are taken with water against juvenile dysentery.

Mimosa pudica Linn. [Mimosaceae]; EN: Touch me not plant; LN: Lajalu;

3 - 4 spoonful of root-decoction is taken orallythrice a day.

Oxalis corniculata Linn. [Oxalidaceae]; EN: Yellow sorrel; LN: 'Ambali, Chicha;

7 - 8 grams of fresh leaves and shoots are chewed 3 - 4 times a day and its juice is sucked and swallowed.

Psidiumguajava Linn. [Myrtaceae]; EN:Guava; LN: 'peru';

Young leaves are chewed for its juice. Thesemi-ripe fruits and the bark are also eaten to cure diarrhoea.

Punicagranatum Linn. [Punicaceae]; EN:Pomegranate; LN: 'Daalimb':

Extract of unripe fruits is taken orally 3 - 4times a day.

Rhododendron arboreum Smith [Ericaceae];EN: Nepalese Rhododendron Tree; LN:'Lalburansh' ; Young leaves and corolla are chewed andswallowed during diarrhoea.

Terminalia chebula Retz. [Combretaceae];EN: Chebulicmyrobalan; LN: 'Hirda';

Powder of dried fruits and bark are administered orally with water in empty stomach.

Traditional health care system is helpful for saving the life of rural peoples where the modern health care

systems are not available and also in such regions where modern health care is not available at all.

In the present study, it was found that a total of 14 species of plants belonging to 14 families are being used as an antidiarrhoeal and antidysentric medicines by the tribal people of the Sakoli region. These traditional people have a strong belief in their practice and they have developed such knowledge through the centuries of their existence. But careful approaches should be followed before administering these drugs. The lack of proper documentation and the inroad facilities of the developed world are forcing depletion of this traditional knowledge, which has to be preservedfor the future benefit of the human civilization. The documentation and digitalization of ethnic information is of utmost importance. However, the present study may create some awareness and precautions among the people which might help to conserve their rich and effective ethno medicinal knowledge in this botanically blessed region.

REFERENCES

Zingare AK et al. (2012) Ethnomedicinal Plant Diversity of Sakoli Taluka of Bhandara District (M.S.) *Journal of Science Information / Special Issue, 3.*

Anyinam C (1995) Ecology and ethnomedicine: Exploring lini. between current environmental crisis and indigenous medical practices. *Social Science and Medicine* 40(3): 321-329.

Bryce J, Boshci Pinto C, Shibuya K, Black RE (2005) The Child health epidemiology Reference group. WHO estimates of the causes of the death in childrens. *Lancet,* 365:1147-52.

UNICEF/WHO (2009) Diarrhoea: why children are still dying and what can be done? *Division of policy and practice*, *UNICEF*, New York, USA.

Kumar S and Vollmer S (2011) Does improved sanitation reduce Diarrhoea in Childrens in Rural India? Pp1-40. In: Poverty, Equity and Growth in Developing and Transition Countries: Statistical Methods and Empirical Analysis. Courant Research center, Gorge- August- Universitate Gottingen, Discussion paper No. 107

Gesler WM (1992) Theraputic Landscapes: Medicinal Issues in Light of New Cultural Geography. *Social Science and Medicine,* 34: 735.

Good C (1980) Ethnomedical system in Africa and the LDC's: Key issues in medical Geography. Pp. 93-116. In: M. S. Meade (ed.) Conceputual and Methodological Issues in Medical Geography. University of North Carolina, Chapel Hill, North Carolina.

Jain SK (1995) A manual of Ethnobotany. 2nd edn. Scientific Publishers, Jodhpur.

Jain SK and Rao RR (1977) A Handbook of field and Herbarium Methods. Today and Tomarrows Printers and Publishers, New Delhi.

RESEARCH ARTICLE

Notable medicinal plants used by tribals of Tirora tehsil of Gondia district (M.S.), India, to Cure Women related problems

Qureshi Parveen S

P.G. Department of Botany, J. M. Patel College,Bhandara.(M.S.)India.

drsdprvnqureshi17@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Qureshi Parveen S (2014) Notable medicinal plants used by tribals of Tirora tehsil of Gondia district (M.S.), India, to Cure Women related problems, *Int. J. of Life Sciences,* Special Issue A2: 194-196.

ABSTRACT

The present paper deals with the medicinal plants used by the tribes of Tirora Tehsil of Gondia district (M.S) to cure various problems related to women. The people from these region with a vast heritage and diverse ethinic culture and rich biodiversity is said to be a great emporium of ethno botanical health. But due to deforestation, loss of biodiversity and indiscriminate exploitation of wild and natural resources many valuable herbs are at the stage of extinction. Documenting the traditional knowledge is important for the conservation of medicinal plants as well as their sustainable utilization.

Key Words: conservation, deforestation, ethnic culture, exploitation

INTRODUCTION

India is predominantly a village based country and endowed with rich wealth of medicinal plants. Medicinal plants play an important role in combating diseases prevalent among human beings, since times immemorial. The tribal people and ethenic races have developed their own culture, customs and medicinal practices. Numerous wild and cultivated plants play a key role in among tribal cultures and relationships of these plants has continued from one generation to another. The knowledge acquired by forest dwellers, tribal healers, vaidyas in understanding these plants and properties possessed by roots, stems, leaves, flowers and fruits of these plants have immense value in traditional medicines which they are practiced. They have dependence on such flora based on their experimentation on human beings. The present report has been conducted in Tirora tehsil of Gondia district, Maharashtra Tirora is well known for its natural diverse Flora and Fauna. Tirora tehsil covered the area about 1562 square kilometer. The natural vegetation of this tehsil includes the most of the plant species of medicinal importance, which were regularly being used by the tribal peoples to cure various diseases. The main purpose of this study was to assess the modern utilization of this forest by the local population with a focus on the plants known and utilized by women in their everyday care giving.

MATERIALS AND METHODS

The survey was carried out in Tirora tehsil during March 2012 to March

2013. Tribal villages and forest area of Tirora tehsil of Gondia district were visited and ethnobotanical data was documented related to cure the various problems of the tribal women.

RESULTS AND DISCUSSION

The detailed information of the documented medicinal plants against cure of women related problem are presented below.

Table 1: List of medicinal plants used cure of women related problem

Botanical name	Family	Vernacular name	Part used
Menstrual disorder:			
Butea monosperma (Lam)Taub	Fabaceae	Palas	Dried powder of bark to cure irregular mensuration
Bombax ceiba L.(T)	Bombacaceae	Simul	Root decotiation to cure irregular mensuration
Cassia fistula Linn (T)	Cessalpineaceae	Amaltas	Bark powder irregular mensuration
Asparagus racemosus Wild.	Liliaceae	Shatawari	Root , Stem to control excess bleeding discharge during mensuration
Saraca asoka (Roxb)Dewild	Caselpineaceae	Ashok	Bark-menstrual pain and regulation of menses.
Ricinus communis L(S)	Euphorbiaceae	Arandi	Leaf juice externally applied on stomach to promote menstruation in case of less menstruation.
Psidium guajava L.	Myrataceae	Jamb	Leaf, bark for painfull mensuration
Urinary problems:			
Acacia nilotica (Linn)Wild	Mimosaceae	Babul	Pods used in urenogenitial problems
Tephrosia purpurea (L.Pers)	Fabaceae	sarponkha	Pods used in urinary problems.
Leucorrhoea:			
Withania sominifera Duneal. (H)	Solanaceae	Ashwagandha	Root powder
Punica granatum Linn.(T)	Punicaceae	Anar	Leaf powder
Mangifera indica.L(T)	Anacardaceae	Aam	Seed Powder
Sida cordifolia L.(S)	Malvaceae	Bharela	Leaf powder
Lactation:			
Carica papaya L.	Caricaceae	Papita	Fruits increase Lactation
Euphorbia hirta L.	Euphorbiaceae	Dudhi	Whole plants to increase Lactation
Easy delivery			
Plumbago zeylinca L.	Plumbaginaceae	Chitrak	Root powder used for easy delivery
Achyranthus aspera L	Amaranthaceae	Chircharita	Root powder relief in painfull delivery.
Boerhaavia diffusa L.	Nyctaginaceae	Purnarva	Whole plant for easy delivery
Abortion			
Botanical name	Family	Vernacular name	Parts used
Cuscutta reflexa	Cuscuttaceae	Amarbel	Stem used
Heliotropium indicum	Boraginaceae	Hatthi soond	Flower induce abortion
Jatropa curcus	Euphorbiaceae	Erindi	Root

Recently there has been a new spurt of interest in herbal medicine mainly because of the search for potentiality new medicine and the need for conservation and utilization of these resources found in the ethno diverse belt for socio economic development. The present study shows that the knowledge and usage of herbal medicine for the treatment of various problems related to tribal women of Tirora tehsil is still a major part of their life and culture. The data collected show that majority of remedies are taken orally. The local communities has special information about the mode of application and curative properties of various plants grown in vicinity, their practices are based on their belief system, past experiences and traditions. Hence safe guarding such valuable knowledge and practices of traditional community for future generation is urgently needed. It is high time to examine our medical heritage for its potential on scientific basis.

CONCLUSION

The information generated from the present study regarding the medicinal plants use by tribal people of Tirora need a thorough photochemical investigation including alkaloid extraction and isolation along with few clinical trials this could help in mass awareness regarding the need for conservation of such plants and also in the promotion of ethno medico botany knowledge with in the region besides contributing to the preservation and enrichment of the gene bank of such economically important species before they are lost forever.

REFERENCES

Shrivastava Ankur (2013) Ethnomedicinal plants used for the treatment of gynecological disorder by tribal of Dindori district of M.P., *Int J. of Pharm.& Life science*, 4 (12) : 12.

Gadgil M (1991) Conserving India's biodiversity-The social context, Evol trends plants, 5.

Kumar Aneil O, Rao Krishna M and Raghava TV, Rao (2012) Ethnomedicinal plants used by the tribals of sudi konda forest.

Rai Rajiv and Vijendranath (2003) Use of medicinal plants by traditional herbal healers in Central India, World forestry Congress, ,Qubec city Canada.

RESEARCH ARTICLE

Correlation of Molluscan diversity with physico-chemical characteristics of water of Gorewada reservoir, Nagpur, India.

Dorlikar AV, Mohite AS and Charde PN

P.G. Department of Zoology and Research Academy, Sevadal College for Women, Nagpur-440009, India

**Corresponding Author*: A.V. Dorlikar: *Mail*: ajaydorlikar@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Dorlikar AV, Mohite AS and Charde PN (2014) Correlation of Molluscan diversity with physico-chemical characteristics of water of Gorewada reservoir, Nagpur, India. *Int. J. of Life Sciences,* Special issue, A2: 197-201.

ABSTRACT

Aim of the present study is to assess the species diversity of molluscsand impact of physico-chemical parameters on their diversity from Gorewada reservoir on monthly basis. During present investigation, a total of 12 species of molluscs representing 06 orders, 08 families and 10 genera were recorded from the Gorewada reservoir. Gastropods substituted a dominant group of macro-invertebrates present throughout the study period. Ten species of gastropod recorded were *Melaniascabra*; *Melaniastritella*; *Faunus ater*; *Viviparous bengalensis; Endolanorbisexustus; Anisusconvexiusculus; Lymnaealuteola; Lymnaeaacuminata; Pilaglobosa and Gabbiastenothyroides.* Among the *bivalve molluscs* only *Lamelliden smarginalis* and *Corbiculastriatella* were present as macro-invertebrate benthos.The α- diversity indices for molluscan species that are Simpson index, Dominance index, Shannon-Weiner index, Margalef richness index, Menhink index, Equitability Index were also calculated and correlated with physico-chemical parameters that are pH , Water Temp, Transparency, Electrical Conductivity, Dissolved Oxygen, Dissolved CO_2, Alkalinity, Total Dissolved Solids, Total Hardness, Chloride, Sulphates, Nitrates, Inorganic Phosphorus, B.O.D. and C.O.D.

Keywords: Gorewada reservoir, Gastropods, physico-chemical parameters, α-diversity indices

INTRODUCTION

Gorewada reservoir is the precious aquatic ecosystem playing significant role in supplying potable water to Nagpur city as well as sustain a rich aquatic fauna. Among the macro-invertebrates, molluscsare an integral component of aquatic ecosystem and are very sensitive to changes in water quality, making them an excellent indicator species, thus assessing the trophic statusof freshwater systems(Choubisa, 1992). In India, till today, 5070 species of molluscs have been recorded of which, 3370 species are from marine habitats (SubbaRao, 1991). There are 1671 species of non marine mollusks living in the wild in India (Ramakrishna and Mitra, 2002).

This includes 1488 terrestrial species in 140 genera and 183 freshwater species in 53 genera. (Arvind *et al.*, 2005).Thus aim of study is to determine the monthly variation in water quality parameters and its impact on the molluscan density and diversity.

MATERIALS AND METHODS

Gorewada lake is one of the fresh water and artificial lake situated in the north–west corner of the Nagpur city ($79^0.11'$ E latitude, $21^0.11'$ N, longitude and 303m (M.S.L) altitude).

Collection of molluscan fauna has been made fromGorewada reservoir on monthly basis from the profundal zone by using Ekman dredge. The samples from littoral zone have been collected by scoop net. The samples have been washed and shifted through a grade 40 mesh size sieve. 3 samples were taken from reservoir to minimize the sampling error. The collected organisms were fixed in 5% formalin solution and enumerated group wise and preserved organisms were identified standard keys provided by Ward and Whipple (1959), Tonapi (1980) and Adoni*et.al*. (1985). Numbers of each species were expressed as organisms/m^2. Water samples were collectedon a monthly basis for a period of six months. The parameters included water temperature, pH, transparency, electrical conductivity, dissolved oxygen, free CO_2, alkalinity, total dissolved solids, total hardness, chloride, sulphate, nitrate, Inorganic phosphate, biological oxygen demand and chemical oxygen demand. For the estimation of dissolved oxygen andbiological oxygen demand, water samples werefixed at the sites. The collection, preservation and analysis of various parameters of water samples from different sampling locations were carried out by following the standard methods (APHA, 2005;Saxena, 1994; Manivasakam, 1982; Trivedy and Goel, 1986). Triplicates of each analysis were performed and mean values were used for calculation. Six indices were used to estimate α–biodiversity of molluscan species.Species diversity index was calculated based on Simpson (1949) and Shannon-Weiner(1949) ; richness index was adopted by Margalef (1951) and Menhinic (1964) and equitability Index by Magurran (1988). Dominance index or Simpson's index of diversity was calculated using formula 1- Simpson index.

Statistical Analysis

The correlation coefficient matrix between each pair of parameters wereestimated to identify the highly correlated and interrelated water quality parameters and different α-diversity molluscan indices. Statistical analysis was carried out using Statistical Package for SocialSciences (SPSS 10.0).

RESULTS AND DISCUSSION

A total of 12 species of molluscs representing 06 orders, 08 families and 10 genera were recorded from the Gorewada reservoir. The recorded species are represented in Table 1.

Gastropods substituted a dominant group of macro-invertebrates present throughout the study period. Ten species of gastropods representing 04 orders, 06 families and 08 genera were recorded during present study. Among gastropods species, *Melaniascabra, Melaniastritella* and *Anisusconvexiusculus* were recorded abundantly during entire study period. The density of order Gastropoda ranged between 33 to 65 organisms/m^2 with maximum density in summer and minimum in winter season(Figure 1). Pelycypods were represented by only two species belonging to 02 orders,02 families and 02 species. Among pelycypods *Corbiculastriatella* was recorded as a most dominant species. Density of Pelecypoda group was recorded and represented by 5 to13 organisms/m^2 with maximum density in summer and minimum in winter season (Figure1). Molluscan abundance during summer may be due to increased temperature which may enhance the rate of decomposition of organic matter in the reservoir (Malhotra *et al*., 1996).

Table 1: Molluscanfauna recorded in Gorewada reservoir, during January 2008 to June, 2008.

Class	Order	Family	Genus and species
Gastropoda	Mesogastropoda		*Melaniascabra*
			M. striatella
			Faunus ater
		Viviparidae	*Viviparous bengalensis*
	Basommatophora	Planorbidae	*Indoplanorbisexustus*
			Anisusconvexiusculus
		Lymneidae	*Lymnaeaacuminata*
			Lymnaealuteola
	Architaenioglossa	Ampullariidae	*Pilaglobosa*
	Caenogastropoda	Bithyniidae	*Gabbiastenothyroides*
Pelecypoda	Eulamellibranchia	Unionidae	*Lamellidensmarginalis*
	Veneroida	Corbiculidae	*Corbiculastriatella*

Table 2: Range of variation, mean and standard deviation, Coefficient of variation, Variance of the physico-chemical characteristics of water of Gorewada reservoir.

S. No	Parameter	Unit	Range of Variation		Mean ± Std. Deviation	Coefficient of Variation	Variance
			Min	Max			
1.	pH	--	7.30	8.10	7.70 ± 0.268	0.034	0.072
2.	Water Temp.	^{0}C	20.2	23.7	21.7 ±1.31	0.060	1.710
3.	Transparency	Cm.	19.4	32.0	25.0 ± 4.33	0.173	18.782
4.	Electrical Conductivity	µ mho cm^{-1}	110	172	136 ± 23.0	0.169	531.2
5.	Dissolved Oxygen	mgL^{-1}	7.40	8.40	7.97 ± 0.403	0.050	0.162
6.	Dissolved CO_2	mgL^{-1}	0.0	0.3	0.167 ± 0.103	0.619	0.010
7.	Alkalinity	mgL^{-1}	84	178	127 ± 41.9	0.329	1759.46
8.	Total Dissolved Solids	mgL^{-1}	222	490	385 ± 102	0.264	10340.26
9.	Total Hardness	mgL^{-1}	110	160	134 ±21.4	0.160	457.86
10.	Chloride	mgL^{-1}	22.60	32.80	27.617 ± 3.42	0.123	11.67
11.	Sulphates	mgL^{-1}	4.55	14.50	8.66 ± 4.75	0.547	22.52
12.	Nitrates	mgL^{-1}	0.65	0.9	0.77 ± 0.104	0.133	0.010
13.	Inorganic Phosphorus	mgL^{-1}	1.50	3.40	2.28 ± 0.77	0.340	0.605
14.	B.O.D.	mgL^{-1}	2.0	3.1	2.48 ± 0.44	0.177	0.193
15.	C.O.D.	mgL^{-1}	6.60	9.80	8.56 ± 1.28	0.148	1.626

Table 3. Correlation coefficient (*r*) between physico-chemical parameters and molluscan abundance in the Gorewada reservoir*.

Parameters	Gastropoda	Pelecypoda
pH	0.403	0.106
Temp	0.634	0.566
Trans	-0.398	-0.706
Cond	-0.348	-0.292
DO	-0.071	-0.066
CO_2	0.458	0.571
Alkalinity	0.848	0.782
TDS	0.622	0.913
Hardness	0.988	0.775
Chlorides	0.722	0.682
Sulphates	0.47	0.448
Nitrates	0.267	0.744
In.PO_4	0.296	0.504
BOD	0.905	0.839
COD	0.843	0.4

*The values (*r*) ranged above 0.811 and 0.910 are significant at P < 0.05 and P < 0.01, respectively for two tailed test.

The physico-chemical parameters of water, Mean, standard deviation, Coefficient of variation, Variance at Gorewada reservoir have been given in the Table 2. The diversity indices during study period are presented in figure 2.The molluscan fauna in the study area showed great diversity during the study period. Values of Simpson index ranged from 0.12 to 0.2.Dominance index varied from 0.79 to 0.87. Shannon- Weiner index was in between 3.3 to 3.5.Margalef richness index values varied from 2.54 to 3.02. Menhink index was least (1.337) during summer and highest (1.94) during the winter season. Equitability index was minimum during summer (0.93) and highest during winter (0.98) and premansoon period (0.97).Values of coefficient of correlation (r) of molluscan abundance with physico-chemical parametersare shown in Table 3.The values of coefficient of correlation (r) indicate that there was a moderate positive correlation between the Gastropods and temperature, TDS and chlorides while significant positive correlation between alkalinity and hardness, BOD and COD at 5% level of significance.

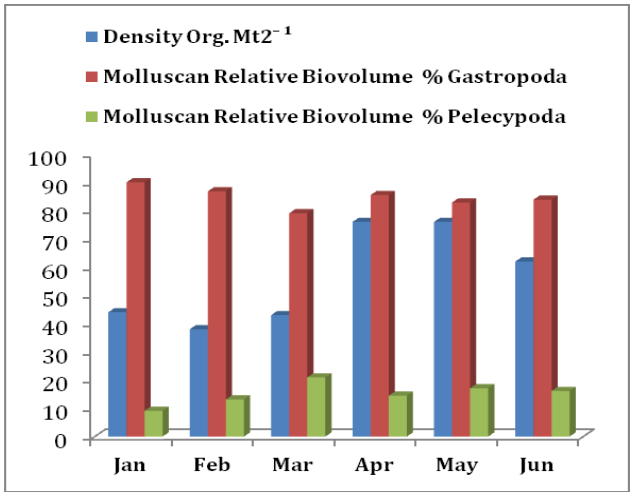


Fig. 1: Molluscan Density (Organisms Mt$^{2-1}$) and relative biovolume in % .

Table 4. Correlation matrix of physico-chemical parameters, α-diversity indices and equitability indices in theGorewada reservoir,*The values (*r*) ranged from 0.8114 to 0.9171 and 0.9172 to above are significant at P < 0.05(2-tailed) and P < 0.01(2-tailed), respectively.

	λ	1-λ	*H´*	R1	R2	E	pH	TEMP	TRA	CON	DO	CO_2	Alk	TDS	HD	Cl	S	Nit	In.Po_4	BOD	COD
λ	1																				
1-λ	-0.99	1																			
H´	-0.96	0.96	1																		
R1	-0.90	0.91	0.77	1																	
R2	-0.90	0.91	0.77	1	1																
E	-0.96	0.96	1	0.77	0.77	1															
pH	0.07	-0.08	0.11	-0.40	-0.40	0.11	1														
TEMP	0.29	-0.32	-0.06	-0.66	-0.66	-0.06	0.804	1													
TRA	-0.24	0.29	0.13	0.50	0.50	0.13	-0.14	-0.60	1												
CON	-0.29	0.31	0.27	0.43	0.43	0.27	-0.67	-0.44	0.13	1											
DO	0.16	-0.17	-0.33	0.01	0.01	-0.33	-0.31	-0.502	0.03	-0.28	1										
CO_2	0.14	-0.17	0.07	-0.49	-0.49	0.07	0.43	0.85	-0.81	0	-0.56	1									
Alk	0.63	-0.66	-0.46	-0.89	-0.89	-0.46	0.69	0.9	-0.60	-0.62	-0.19	0.67	1								
TDS	0.50	-0.54	-0.39	-0.72	-0.72	-0.38	0.24	0.72	-0.90	-0.29	-0.17	0.79	0.79	1							
HD	0.88	-0.88	-0.73	-0.96	-0.96	-0.73	0.41	0.65	-0.34	-0.29	-0.20	0.48	0.83	0.60	1						
Cl	0.71	-0.72	-0.65	-0.77	-0.77	-0.65	0.54	0.56	-0.20	-0.80	0.006	0.17	0.81	0.54	0.71	1					
S	0.29	-0.31	-0.17	-0.53	-0.53	-0.17	0.81	0.76	-0.23	-0.83	-0.27	0.37	0.79	0.50	0.49	0.85	1				
Nit	0.28	-0.32	-0.27	-0.4	-0.4	-0.27	0.10	0.46	-0.63	-0.41	-0.16	0.46	0.55	0.81	0.27	0.58	0.59	1			
In.PO_4	0.49	-0.50	-0.57	-0.32	-0.32	-0.57	-0.65	-0.24	-0.45	0.34	0.46	0.06	-0.002	0.36	0.21	-0.10	-0.50	0.13	1		
BOD	0.81	-0.81	-0.66	-0.88	-0.88	-0.66	0.25	0.64	-0.43	-0.08	-0.39	0.60	0.76	0.69	0.94	0.60	0.40	0.405	0.29	1	
COD	0.63	-0.63	-0.46	-0.80	-0.80	-0.46	0.73	0.66	-0.16	-0.51	-0.03	0.33	0.78	0.30	0.82	0.63	0.54	-0.06	-0.09	0.61	1

λ: Simpson's index; 1-λ: Dominance index; *H´*: Shannon-Weiner index; R1: Margalef richness index; R2:Menhink index:E: Equitability index; TEMP:Temperature; TRA:Transparency; CON:Conductivity; DO;Dossolved oxygen; Alk:Alkalinity;TDS: Total dissolved solids; HD:Hardness; Cl:Chlorides; S:Sulphates;Nit:Nitrates;In.PO_4:Inorganic phosphates; BOD:Biological oxygen demand;COD: Chemical oxygen demand.

The pelecypods showed significant positive correlation between TDS and BOD at 5% level of significance while moderate positive correlation was observed in between pelycypods and temperature, CO_2, alkalinity, hardness, chlorides, nitrate and inorganic phosphates. A moderate negative correlation exists between pelycypod population with transparency. Correlation matrix of physico-chemical parameters, α-diversity indices and equitability indices in the Gorewada reservoir is represented in Table 4.

REFERENCES

Adoni AD, Joshi G, Ghosh K, Chourasia SK, Vaishya AK, Yadav M, Verma HG (1985) Work Book on Limnology. Pratibha Publishers, Sagar, India pp. 216.

APHA (2005) Standard methods for the examination of water and waste water. 21st edition; American public health Association, American water works association, Water environment federation, Washington DC, USA.

Aravind NA, Rajashekhar KP, Madhayystha NA (2005) Species diversity, endemism and distribution of land snails of the Western Ghats, India. *Records of the Western Australian Museum,* Supplement 68: 31–38

Choubisa SL (1992) Molluscs as bio-indicators of trophic stages of rivers and lentic environments. *Bull. Pure Appl. Sci.* 11: 35-40.

Magurran AE (1988) Ecological Diversity and Its Measurement. Princeton University Press, Princeton, New Jersey.

Manivasakam N (1982) Industrial Effluents.Origin, characteristics, effects, analysis and treatment. 4th Edition, Sakthi publications, Coimbatore, 267-333.

Margalef DR (1951) Diversidad de especies en les communideades natural *Public Institutte of Biologic*, Barcelonia, 9: 5– 27.

Menhinick EP (1964) A comparison of some species-individuals diversity indices applied to samples of field insects. *Ecology.*45: 859-861.

Ramakrishna Mitra (2002) Endemic land molluscs of India. *Records of Zoological Survey of India, Occasional Paper,* 196: 1-65.

Saxena MM (1994) Environmental Analysis – water, soil and air. Agro Botanical Publishers (India), 2nd Edition, 4-86: 121-125

Shannon CE and Wiener W (1949) *The mathematical theory of communication.* University of Illinois Press Urbana, pp. 125.

Simpson EH (1949) Measurement of diversity. – *Nature* pp. 163-688.

SubbaRao NV (1991) Mollusca in Animal Resources of India (Zoological Survey of India, Calcutta): pp. 125–147.

Tonapi GT (1980) Fresh water animal of Indian Ecological approach.Oxford and IBH Publishing Co., New Delhi, India pp.341.

Trivedy RK and Goel PK (1986) Chemical and biological methods for water pollution studies, Environmental Publication, Karad Maharastra, India. pp. 247.

Ward HB and Whipple GC (1959) *Freshwater Biology*. Edmondson WT (ed.) 2nd Edition, John Wileyand Sons Inc., New York. pp. 124.

RESEARCH ARTICLE

Blue Green Algae & Euglenoids of Water Bodies Near Malegaon

Yogesh Shastri

Department of Botany, M.S.G. College Malegaon Camp Dist. Nasik

Manuscript details:

Date of publication 18.10.2014

Available online on
http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Yogesh Shastri (2014) Blue Green Algae & Euglenoids of Water Bodies Near Malegaon. *Int. J. of Life Sciences*, 2014, Special Issue A2: 202-203.

ABSTRACT

The present study deals with diversity of blue green algae and euglenoids from two water bodies near Malegaon, Dist. Nasik. The survey was conducted from (January - December 1997). The first water body is river Mosam flowing through Malegaon, where 33 blue green algae & 23euglenoids were reported. In BGA *Oscillatoria* is a largest genus having 15 species each and G*loeocapsa* hasone spp. only. The second water body is percolation pond of Pimpalgaon, near Malegaon. In pond 10 BGA and 8 euglenoids were observed. In blue green algae 6 genera and 10 spp. were noted during present study.

Key words : Green Algae, Euglonoids & Water Bodies

INTRODUCTION

Algae forms important group of primitive, simple, cryptogamic thallophytes. About 90% of total photosynthesis in the world caused by algae. Algae play an important role in the primary productivity of any aquatic ecosystem and forms the base of food chain. Algal diversity have been studied by many workers in India (Forest, 1954; Desikachary, 1959; Vyas and Kumar, 1968). There is no publish record on algae of river Mosam and pond of Pimpalgaon. Therefore present work was undertaken. River Mosam a tributary of Girna, takes it's origin in Salher Mulher hills at an altitude 820 meters above MSL. The percolation pond is situated at Pimpalgaon 15 Km. away from the Malegaon. It is a small water body.The pond plays an important role in maintaining the water table and it is also use by the local people for washing and bathing.

MATERIAL AND METHODS

The algal samples were collected from three sampling stations for one year on monthly basis from (January to December, 1997), from 2 water bodies i.e. river Mosam and percolation pond. The samples were preserved in 4% formalin and taxonomic studies were conducted with the help of standard literature on the subject.

RESULT AND DISCUSSION

List of Blue green algae and Euglenophyceae found in river Mosam.

Cyanophyceae: *Chroococcus turgidus* (Kutz.) Nag., C. *minutus* (Kutz.) Nag., C. *minor* (Kutz.) Nag., *Gloeacapsa gelatinosa* kutz., *Aphanocapsa banaresensis*

Bharadwaja, *A. bifor-mis* A. Br., *Merismopedia convoluta* Breb.,. *M. punctate* meyen, *M. glauca* (Ehr.) Nag., *M. elegans* A. Br., *Spirulina labyrinthiformis* - (menegh) Gomont, *S. meneghin-iana* Zanard ex Gomont, *S. subtilissima* Kutz. ex~ Gomont, *S. major* Kutz. ex Gomont, *Oscillatoria orna-ta* Kutz. ex Gomont, *O. subbrevis* schmidle, *O. subbrevis f.* crassa *Dixit,* O. *curviceps* Ag. ex Gomont, *O. princeps* Vaucher ex Gomont, *O. laete-virens* Var. minimus Biswas, *O. chlorina* Kutz. ex Gomont, *O. homogenea* Fremy, *O. chalybea* (Mertens) Gomont Var. *insularis* Gardner, *O. Coralliane* (Kutz.) Gomont, *O. tenuis* Ag. ex Gomont, *O. amphibia* Ag. ex Gomont, *O. formosa* Bory ex Gomont/. *loktakensis* Bruhl and Biswas, *O. splendida* Grev. ex Gomont, *O. acuta* Bruhl et Biswas, *Phormidium ambiguum* Gomont Var. *major* Lefnmer-mann, *P. corium* (Ag.) Gomont Var. *capitatum* Gardner, *Lyngbya corticicola* Bruhl et Biswas, L *truncicola* Ghose.

Euglenophyceae: *Euglena acus.* Ehr., E. *cyclopicola* Gickelhorn, E.deses Ehr., E. *flava* Dang., *E. gracilis* Klebs., *E. haematodes* (Ehr.) Lemm., *E. limosa* Gard., E. *oxyuris* Schmarda, *E. proxima* Dang., E. *retronata* Johns., E. *schmitzii* Gojdics., £. *sociabilis* Dang., *Lepocinclis* orum (Ehr.) Lemm., *Phacus brevicaudatus* (Klebs) Lemm., *P. caudatus* Hueb., P. *orbicularis* Hueb., P. *horridus* Pochmann, *P, curvicauda* Swirenko, P. *anamolus* Fritsch et Rich., P. *allatus* Klebs var. *lemmermanni* Swirenko, P. *peteloti* Lefevre, *Trachelomonas ovalis* Daday., *T. planktonica* var. *oblonga* Drez. Cyanophycean algae grew fairly well throughout the year at all stations and better growth was recorded in summer season, similar observations were made by Vyas and Kumar (1968). In Cyanophyceae *Oscillatoria* is the largest genus having 15 species and *Gloeocapsa* has one species only. Members of Euglenophyceae showed their maximum growth in June and July. Vyas and Kumar (1968) also observed Euglenophyceae in rainy season. Among the Euglenoids four genera were encountered, *Euglena, Phacus, Lepocinclis* and *Trachelomonas.* List of Blue Green algae & Euglenophyceae found in percolation pond of Pimpalgaon.

BGA - *Aphanocapsa biformis A.Br, Merismopedia punctata Meyen, Spirulina meneghiniana Zanard ex Gomont, S. subtilissima Kutz ex Gomont, Oscillatoria subbrevis Schmidle, O.tambi Woronichin, Phornidium bohneri Schmidle, P. anomala Rao, C.D.,P. ambiguum Gomont Var. major Lemmeermall, Anabaena variabilis Kuetz. ex Born. et Flah.*

Tucker & Loyd (1984) stated that moderately high temperature supports the groth of BGA. In present study luxurient groth of BGA has been recoreded in summer season. Philipose 1959 Emphasized that natural factors like alkalinity, nitrates and phosphates are responsible for luxrient groth of BGA. Vyas and Kumar, (1968) attributed abundance of cyanophytceae to higher values of pH, temperature, phospate, nitrate and relative dissolved oxygen.

Euglenophyceae : *Euglena flava Dang, E.virdis Ehr, Phacus acuminatus Stokes, T. longicaudatus (Ehr) Luj, P. anamolus Fritsch et Rich, P. peteloti Lefevre, P. racivorskii Drezepolskii, Trachelomonas, ovalis Daddy.*
Percolation pond showed maximum population of Euglenoids during October, November and December. According to Manikya Reddy, P. (1984) lower pH is responsible for Euglenoid growth. The Euglenoid in percolation pond grow well when pH was 9.09.

CONCLUSION

On the basis of present study following conclusion can be drawn in river Mosam BGA grew well thoroughout the year at all stations and better growth was recorded in summer season. Members of Euglenophyceae showed their maximum growth in rainy season. Vyas and Kumar (1968) observed Euglenophyceae in same season. In percolation pond temperature is main factor which control the periodicity of BGA. Euglenoids grow well at pH 9.09.

REFERENCES

Desikachary TV (1959) *Cyanophyta,* I.C.A.R., New Delhi

Forest HS (1954) *Hand book of algae,* The university of Tennessee, Knoxville

Reddy Manikya P (1984) Ecological studies in river Tungabhadra (A.P.) with special reference to the effect of paper mill effluents on the river. Ph.D. thesis. Osmania university, Hyderabad (A.P) India.

Philipose MT (1959) Fresh water phytoplankton of inland fisheries. Proc. Symp. Algology I.C.A.R.New Delhi, 272- 291.

Tucker CS and Loyd SW (1984) Phytoeaankton communities in channel cat fish ponds. *Hydrobiologia*, 112:137- 141.

Vyas LN and Kumar HD (1968) Studies on the phytoplankton and other algae of Indrasagar tank, Udaipur, *Hydrobiologia*, 31 421-433.

RESEARCH ARTICLE

Mediation for Healthy Environment and Sustainable Development

Rewatkar VK

Department of Botany, Shri Dnyanesh Mahavidyalaya. Nawargaon, Dist Chandrapur

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Rewatkar VK (2014) Mediation for Healthy Environment and Sustainable Development *Int. J. of Life Sciences*, 2014, Special Issue A2: 204-206.

ABSTRACT

During the past several decades, scientific development has taken place at a staggering rate. However, since the storehouse of nature is limitless, the more we know, the more remains to be known. Today despite of many developments there is much fear, hatred and disharmony between individuals, communities and nations. This has led to the buildup of destructive weapons and the grave possibility of thermonuclear war. All the problems related to outer environment are serious today because our inner environment is polluted totally. If we clean the inner environment, outer environment becomes heaven automatically. Meditation or concentration is a best way for cleaning inner environment. In scientific language, concentration decrease the entropy of the nervous system: when we approach the absolute Kelvin, just as the entropy of matter drops to near zero levels, implies that the neuronal disorder keeps disappearing as we concentrate. Mediation is the process of learning to control mind-the most difficult task on the earth because we have made zero progress in understanding and controlling our mind. The need of sound mental health cannot be overlooked. A man with self-control is the most precious gem that one can offer to society. He is like a diamond among pieces of carbon. But meditation can convert those pieces of carbon into diamonds. Thus meditation or concentration is the only way for making healthy environment. The secret of making outer environment healthy is in our inside. Whenever we want to produce something, we should not depend upon the outside source instead to deep and seek the infinite source through meditation. Meditation means oneness with supreme energy. It is a path to peace prosperity, unity, just unconditional surrender to the Lord (Supreme power)

Keywords: Meditation, healthy environment, Sustainable development, sadguru, Shaktipat etc.

INTRODUCTION

This century is called 'Century of tension'. Due to modernization and mechanization man has become like a machine without mind. To achieve all modern facilities he is running in a rat race and forgetting to look after his health. Tension prone diseases are increasing like high blood pressure, diabetes and myocardial infarction. The most common cause of a weakened immunity in healthy individual is stress and ageing. Stress impedes cell's ability to repair DNA damage. However in last few decades science has become more proof and statistic oriented; and in this process mind was separated from body, without realizing that it is the mind-body complex, which responds together to any situation within or outside in the surrounding. There have been many studies that have shown how we react to stressful events in the setbacks or deadlines at work, conflicts and losses at home.

The need of sound mental health cannot be overlooked. Much remains to be accomplished in the area of both mental and physical health. Many serious diseases still threaten mankind. The basic cause of this problem is that the general levels of conscience, consciousness and other spiritual qualities have not evolved to the same extent that the material side of civilization has. The spiritual evolution through mediation alone is the solution to the problems the society is facing.

Meditation:

Meditation means oneness with supreme energy. It is a path to peace, prosperity, unity just unconditional surrender to the Lord. When this meditation is done under the able guidance of Sadguru and proper environment it gives true results. It is said that the seers of art of living, by Sadguru of meditation utilize self generated ultra sound energy through Naam Smaran Jap of Siddha Mantra for the power of concentration of mind. The ultrasonic used in Jap meditation cannot be heard by ears as they are totally non audible sound. The frequency of this Ultra sound is 14-35 MHz i.e. 14,000,000-35,000,000. (Figure - 1) concerned individual (doing Naam Jap) feels vibrations in tissues/organs where it is acting.

Manasik Naam Jap: It is reciting name of Almighty repeatedly and frequently without movement of tongue and lips. No sound is heard. Repeated recital is done while each breathing i.e. while inspiring and expiring the breath. It is not heard by anybody. It is within the performing person.

Meditating mind while breathing noiselessly and concentration produces Ultra Sonic energy which is distributed to whole body and is being continuously, slowly and steadily processed.

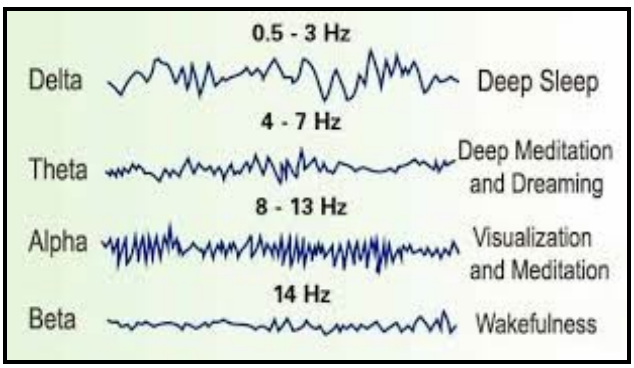


Figure-1 Brain waves pattern

The transmission of this energy from the Sadguru to disciple is called Shaktipat. There are three way of Shaktipat- by Mantra, Sankalpa and Drushti. By this Shaktipat, the dormant kundalini- Adishakti Prime energy is awakened. Once the kundalini is awakened by Siddha Sadguru (who aquire the skill of performing deeds in special way they are with us), all the persons need to do is meditation and Naam Smaran Jap regularly with no pause or long gap; while performing all our daily responsibilities to the best of our ability.

The place of kundalini in our body is at the base of the spinal cord. Also there are 6 chakras in our body along with spinal cord. They are correlated in modern science of medicine as follows

- ***Muladhar chakra*** near anal opening is called Pelvic plexus.
- ***Swadhisthan chakra*** near pubic symphysis called Arotic Plexus.
- ***Manipur chakra*** near umbilicus is called Solar plexus.
- ***Anahat chakra*** near centre of chest is called as Cardiac Plexus.
- ***Vishudha chakra*** at neck is called Cervical Plexus.
- ***Adnya chakra*** at nasion is called as Optic Chiasma or Optic thalamus.
- ***Sahartras chakra*** is associated with transcendence.

  These chakras are linked together with the Sushumna Nadi inside the hallow opening of the spinal cord known as inside the hallow opening of the spinal cord known as shown in Figure-2 ***Canalis Centralis***.

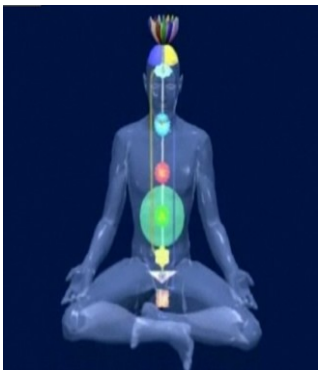


Figure 2: Shushumna nadi (*Canalis Centralis*)

Through these chakras (plexuses) different nerves come out and they supply to organs like Eyes, Ears, Trachaea, Lungs, Salivery grands, Stomach, Deodenum,

Small and Large intestine, Liver, Spleen, Pancreas, Kidneys and Rectum. We are called healthy when all these organs are working properly. These plexuses which control all these organs are activated by vibrations generated due to ultra sonics produced in Naam Smaran Jap. The energy produced is transmitted to whole body by brain for energizing the whole body.

RESULTS

It has been documented in many researches that Meditation reduces mental tension, stress and its all effects, mind can become thoughtless. On EEG (Electro Eneephalo Gram) it is seen that Alpha Waves are generated when mind is thoughtless (Figure – 1).

- It also increases natural killer cell count[1].
- It restores HPA- Axis diurinal rhythm[2].
- It also reduces side effects of cyto-toxic therapy and increases disease free survival[3].
- Normally we breadth 500 ml air in and 500 ml air out during respiration in deep breathing (in meditation) we can breadth 3500 ml air, our vital capacity is 4600 ml[4].
- Meditating mind control and correct cellular dysfunction it regularizes apoptosis i.e. cell death which happens in every day after about 100-120 days and cells regenerate this tries to keep body fit[5].
- Meditating mind produces energy which imparts positive energy to whole body. Physical, mental and psychological aspects of the performing individual are taken care of[6].

Side Effects

Yes, they include joy, peace, confidence, HEALTH and simple way to find spiritual transformation from Homo Sapiens to Homo *Sapiens Spiritus*.

CONCLUSION

On the basis of present study following conclusion can be drawn in river Mosam BGA grew well thoroughout the year at all stations and better growth was recorded in summer season. Members of Euglenophyceae showed their maximum growth in rainy season. Vyas and Kumar (1968) observed Euglenophyceae in same season. In percolation pond temperature is main factor which control the periodicity of BGA. Euglenoids grow well at pH 9.09.

REFERENCES

Ader R. Felten DL and Cohen. Interaction between the brain and the immune system. Annual Review of Pharmacology and Toxicology. 30: 561-602, 1990.

Levine S, Coe C and Weiner S G "Psychoneuronendocrinology of Stress": A psychobiological perspective, In psychoendrocrinology. Eds. Brush FR and Levine. S. Acadmeic Press 1989.

Irwin M., Daniels M, Risch S C, Bloom E and Weiner H, Plasma cortisol and natural killer cell activity during bereavement. Biological Psychiatry 24: 173-178, 1988.

Kiecolt- Glaser JK, Glaser R et al, Modulation of cellular immunity in medical students. Journal of Behavioral Medicine, 9: 5-21, 1986.

Webber M M, Prolactin in the etiology and progression of human prostate carcinoma, Proceeding of AACR, 27: 222, 1986.

.

RESEARCH ARTICLE

Statue of Malaria in Motala Taluka of Buldana District (M.S.)

Kakde Vandana R*, Thakur Abhay C and Dipke Vaishali G

Department of Zoology, Jijamata Mahavidyalaya, Buldana 443001

E mail: *vrkakde@gmail.com*

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Kakde Vandana R, Thakur Abhay C, Dipke Vaishali G (2014) Statue of Malaria in Motala Taluka of Buldana District (M.S.)*Int. J. of Life Sciences,* Special Issue, A2: 207-210.

ABSTRACT

Malaria, a major tropical disease, is also vector transmitted; in this case the vector is mosquito (Female Anopheles). In this paper, present status of Malaria in Motala Taluka of Buldana District (M.S.) is going to report based on survey conducted by Government agencies like Municipal Committee, Z.P. & Malaria Era diction Department. In Buldana District *Plasmodium vivox* and *Plasmodium falciparum* are found abundantly. There is complete absence of *Plasmodium oval* [7] and *Plasmodium malariae* in the vicinity of Buldana. During 2013-14 about 4, 71, 925 samples are examined out of them positive samples are 180 (06 samples are of *Plasmodium falciparum).*Need of health education and penetration of hygiene sense are preventive measures against such vector borne diseases.

Keywords: Population, Vector, transmitted, parasites, Era diction, flora and fauna.

INTRODUCTION

A number of important human diseases caused by organism ranging from virus to worm are transmitted by blood. Feeding arthropods, these vectors insect the organisms into humans as they take a blood meal [AB4]Arthropod, transmitted infections are common in warmer countries, but occur worldwide. Malaria, a major tropical disease, is also vector transmitted; in this case the vector is mosquito (Female Anopheles). Vector Borne disease are the main causes of illness & death and have emerged as major public health problems. These diseases are transmitted through mosquitoes, sand fly and other vectors. A large number of protozoan's are parasites to human beings and animals. There is about 2,000 species of mosquitoes ranging from tropics to Arctic circles [AB9] Malaria, a major tropical disease, is also vector transmitted; in this case the vector is mosquito (Female Anopheles)[AB1].

Origin of Research Problem: In the year 1953, National malaria control program me was established. In a momentous decision the World Health Assembly in 1955 urged member states to abandon malaria control and take up malaria eradication as an international objective. Most malaria us countries mounted eradication campaigns during 1957-1960 within the framework of WHO global campaign of malaria eradication. In 1973-1978 there was marked global resurgence of malaria.

Review of Research and Development in the Subject: The main credit goes to Ronald Ross, who, while working in Sicunderabad (Andra Pradesh, India)

discovered the transmission of Malaria by Anopheline mosquito (Female Anopheles mosquito) in 1897. Ross found malaria parasites growing as cysts coo cysts) on the stomach wall of an Anopheline mosquito *(Anopheles Stephens)* which had previously fed on malaria patient.

DDT which was synthesized as long ago as 1874, remained obscure until 1939, when Paul Muller in Switzerland discovered its insecticidal properties an observation which he received a Nobel prize. This opened a new chapter in Malaria control. In 1948 the concept of malaria eradication was first presented by Pampana. By 1951 WHO was actively involved in malaria control projects, mainly in Asia. The initial results of malaria control were extremely encouraging. In the year 1953, National malaria control program me was established. In a momentous decision the World Health Assembly in 1955 urged member states to abandon malaria control and take up malaria eradication as an international objective. Most malaria us countries mounted eradication campaigns during 1957-1960 within the framework of WHO global campaign of malaria eradication. In 1973-1978 there was marked global resurgence of malaria. Recognizing the growing menace of malaria, the pendulum has again swung back to the concept of eradication.

Natural history: Malaria is one of the oldest recorded diseased in the world in the 18th century Italy, people associated malaria with "bad air" – malaria- from which the name malaria is derived in 1880 Laveran a French Army Surgeon discovered the malaria parasite in Algiers, North Africa. Throughout the ages, suspicion fell on the part played by insects, and the mosquito was incriminated in folklore in Africa, Asia and Europe [AB2].

Transmission of disease by vectors: Disease transmission by insect has major implication for host, the vector and the parasite. To consider the parasite first it require the organism to be present in right place (in the blood) and the right time Blood is an inhospitable environment, and this may require quite subtle evasion mechanism for parasite survival, means for the disease may be controlled by controlling the vector. Malaria is initiated by the bite of an infected female anopheles mosquito. Malaria is restricted to area, where these mosquito's can blood i.e. the tropics bet 60N and 40 S. It is of major importance in Africa and India, the Far East and South America. Because of drug and insecticide resistance malaria is now on the increase globally. About 35% of world's population is estimated to be infected and with some 10 million new cases annually and perhaps 2 million deaths. Malaria can also be transmitted by blood transfusion, needle and accidents or very rarely from mother to fetus.

Human Malaria Parasites[2]

	Plasmodium falciparum	***P. Vivox***	***P.Malarie***	***P. Ovale***
	West, East, Central Africa	India North	Tropical	Tropical
Major distribution	Middle, East, South America	East Africa, South America far East	Africa, India, far East	Africa
Common Name	Malignant tertian	Benign tertian	Quart an	Ovale tertian
Incubation period	6-14 days	12-17 days	13-40 days	9-18 days
Asexual blood cycle (fever cycle)	48 hours	48 hours	72 hours	50 hours
Major complication	Cerebral malaria anemia, hypoglycemia jaundice, pulmonary edema, shock	--	Necrotic Syndrome	---

MATERIAL AND METHOD

Study of this topic "Present status of Malaria in Motala Taluka of Buldana District (M.S.)" investigation is done on the basis of survey conducted by Government agencies like Municipal Committee, Z.P. & Malaria Eradication Department. Investigation and search for the said topic is essential. Data will be collected after survey of different agencies. Analysis will be done. After due discussion, conclusion will made.

RESULT AND DISCUSSION

National Vector Borne Disease Control Programme Unit Motala Dist.Buldana Month wise positive

Month	Year 2013-14	
	Total	PF
April	13	01
May	11	00
June	22	00
July	21	01
Aug.	24	00
Sep.	18	01
Oct.	10	01
Nov.	11	01
Dec.	09	00
Jan.	06	00
Feb.	11	00
Mar.	15	01
Total	180	06

National Vector Borne Disease Control Programme Unit Motala Dist. Buldana Month wise Surveillance Wise Blood Smear Collection Data

Month	Year 2013-14			
	ACT	PASS	MCM	Total
Aril	18070	11313	22	30311
May	11833	10186	33	28549
June	21213	11206	17	32436
July	27557	20785	63	48405
Aug.	23449	25670	87	55206
Sep	25265	20607	54	45926
Oct.	32785	22535	76	55456
Nov.	20929	15742	145	36816
Dec.	21514	14748	22	36284
Jan.	20965	14556	03	35524
Feb.	18804	12983	16	31802
Mar	18860	16279	71	35210
Total	274041	197275	609	471925

National Vector Borne Disease Control Program me Unit Motala Dist. Buldana Month wise Surveillance Wise Blood Smear Collection Data

Year	Population	D/S Call & Exam				Positive				API	ADER	SPR	SFR	%
		ACT	PASS	MCN	Total	PV	PF	Mix	Total					
2012	2511581	245464	150418	1086	406988	200	10	00	210	0.08	15.58	0.05	0.062	4.76%
2013	2625622	272875	185363	563	462355	159	05	01	175	0.07	17.28	0.04	0.001	3.43%

National insect borne disease eradication programme, Improved Malaria treatment chart w.e.f. 01/05/2007

Age Group	Control treatment			P.V. Eradication treatment							P.F. Eradication			
	Ist day	IInd day	IIIrd day	Ist day		IInd day		IIIrd day		IV to XIV	Ist day		IInd day	IIIrd day
	Chloro m.g.	Chloro m.g.	Chloro m.g.	Chlo m.g.	Prima m.g.	Chlo	Prima	Chlo	Prima	Prima	Chlo m.g.	Prima m.g.	Chlo m.g.	Chlo m.g.
Below 1 year	75	75	37.5	75	Nil	75	Nil	37.5	Nil	Nil	7.5	Nil	75	37.5
1 to 4 years	150	150	75	150	2.5	150	2.5	75	2.5	2.5	150	7.5	150	7.5
5 to 8 years	300	300	150	300	5	300	5	150	5	5	300	15	300	150
9 to 14 years	450	450	225	450	10	450	10	225	10	10	450	30	450	225
Above 15 years	600	600	300	600	15	600	15	300	15	15	600	45	600	300

CONCLUSIONS AND TREATMENTS

Malaria, a major tropical disease, is also vector transmitted; in this case the vector is mosquito (Female Anopheles). Malaria has an immunosuppressive effect. Malaria is diagnosed by finding parasitized red cells in a blood cell.

Treatment:-

A) Chemical
(1) Quinine (2) Chloro quinine (3) Mosquito repellent (4) Malaria vaccine

B) Physical – Nets, Bed net

C) Biological

Birds, Fishes like Guppy in water bodies, insectivorous plants. Distraction of mosquito breeding centers.

REFERENCES

Agrawal V.K.-Zoology, for degree students Page No. 131

Cedric Mims; Dockrell Hazel M.; Goering Richard V.-Medical Microbiology, Third Edition, Elsevier Science, Page No.391-394

Grassi and Felcetti, 1890- Protozoa-*Plasmodium vivox* .

Kotpal R.L.-Protozoa, Page No. *Plasmodium vivox*-Page No.154-179 .

Laveran 1881, Grassi and Felcetti 1890- Protozoa-*Plasmodium malariae* .Maharashtra Health Status, 2004.

Pradeep, Mittal, Pandey, Status of Insecticide Resistance of Malaria, Environmental Health Project, March 2004.

Stephens, 1922-Protozoa- *Plasmodium oval.*

Welch, 1897-Protozoa- *Plasmodium falciparum.*

Welcome Trust, Malaria Atlas Project, 2010.

RESEARCH ARTICLE

Biodiversity of Aquatic Plants of Shivnibandh Lake of Sakoli Tehsil of Bhandara District of MS, India

Tiwari Vijay Jagdishprasad

P.G. Department of Botany, J. M. Patel College, Bhandara 441 904, M.S., India.

Email: vijaysstiwari@gmail.com

Manuscript details:

Date of publication 18.10.2014

Available online on http://www.ijlsci.in

ISSN: 2320-964X (Online)
ISSN: 2320-7817 (Print)

Editor: Dr. Arvind Chavhan

Cite this article as:
Tiwari Vijay Jagdishprasad (2014) Biodiversity of Aquatic Plants of Shivnibandh Lake of SakoliTehsil ofBhandara District of MS, India, *Int. J. of Life Sciences,* Special Issue, A2: 211-213.

Acknowledgements:
Author is thankful to Principal Vikas Dhomne for providing basic infrastructure to carry out present research work. Author express his deep sense of gratitude to the government officers of forest department and irrigation department for comfortable stay in guest houses during the course of field study.

ABSTRACT

The aim of present study was to document the aquatic plant diversity of Shivnibandh lake of Sakoli tehsil of Bhandara district of M.S. Floristic surveys were carried out during 2010 to 2014. Herbarium specimens were prepared and identification was confirmed through floras. 121 plant species of hydrophytes belonging to41 families and 83 genera were documented during field visits. Conservation of aquatic plants is urgently needed to protect endemic and endangered plant species.

Key words: biodiversity, hydrophytes, aquatic plants

INTRODUCTION

The hydrosphere of the earth is composed of all water bodies viz., oceans, rivers, ponds, lakes, ditches, streams etc. Aquatic bodies are natural water resources. Due to rapid industrialization, urbanization and rapid population growth the water bodies are polluted. It has disturbed the growth of flora and fauna. Works on floristic study of composition of hydrophytes in different water reservoirs in different parts of India were carried out by several workers like Cook (1996), Agharkar (1923), Dutta *et al.* (2002), Ghosai *et al.* (1993). Subrahmanyam (1962) has described 117 aquatic plants**.** Lavania *et al.* (1990) has compiled the wetland flora of India. Bhaisare *et al.* (2013) reported 71 hydrophytes from Ravanwadi Lake of Bhandara tehsil. The Bhandara district is known as a Lake district of Maharashtra because it is inhabited by 1572 minor and major lakes and ponds. The district receives heavy rainfall hence Paddy is the main revenue crop of farmers. The district is also known as rice bowl of M.S. From biodiversity point of view many of the perennial and ephemeral lakes of district still remain unexplored. Therefore it is the urgent need of time to conduct such study. The paper for the first time present a checklist of aquatic angiosperm of Shivnibandh Lake.

MATERIALS AND METHOD

The Shivnibandh lake lies between 21°00′00″N & 79°59′00″E. It is a perennial earthen dam. The length of dam is 298.70 M. The maximum height of dam is 8.83 M. Total Storage capacity is 11.635 MCum. The catchment Area is 19.42 sq.km. The submergence area is 489.60 hectare. The irrigation potential is 1852 hectare. It is popular tourist spot for its scenic beauty. The lake is surro-unded by dry deciduous forest wherein teak and bamboo are the dominant element. The lake is about 45 km. away from the district headquarter

The study area was explored thoroughly and detail observations on hydrophytes plants are noted in the field book. Frequent field visits were conducted in various seasons to collect plant species. Hydrophytes were collected according to conventional herbarium techniques (Jain and Rao 1976). The Map indicate the locality of field study.

RESULTS AND DISCUSSION

The hydrophytic taxa is categorized as follows –1. Free Floating 2. Suspended 3.Submerged Anchored 4. Floating Leaves / Shoot Anchored 5. Emergent Amphibians 6. Wetlands and Swampy Hydrophytes 7. Hydrophytes growing along bank and margin of the lake. The present enumeration include Family, Genus, Species Names and Authority.

i) Free Floating Hydrophytes:

Araceae: *Pistia stratiotes L.*

Pontederiaceae: *Eichhornia crassipes (Mart.)Solms., Wolffia arrhiza (L.) Harkel ex Wimmer.*

Lemnaceae: *Spirodela polyrhiza (L.) Schleiden.*

Trapaceae: *Trapa natans L.*

Poaceae: *Hygrorhiza aristata (Retz.)Nees.ex.Wt.&Arn.*

Pteridophyte: *Azolla pinnata R.Br.*

ii) Suspended Hydrophytes

Ceratophyllaceae: *Ceratophyllum demersum L.*

Lentibulariaceae: *Utricularia caerulea L., U.exoleta R.Br., U.flexuosa Vahl., U.stellaris L.f.*

iii) Submerged Anchored

Hydrocharitaceae : *Hydrilla verticillata (L.f.)Royle., Ottelia alismoides (L.)Pers, Vallisneria spiralis L.,*

Potamogetonaceae : *Potamogeton crispus L., P.nodosus Poir., P.pectinatus L.*

iv)Floating Leaves/ Shoot Anchored Hydrophytes

Aponogetonaceae: *Aponogeton natans (L.) Engl. & Krause*

Convolvulaceae; *Ipomoea aquatica Forsk.*

Nelumbonaceae: *Nelumbo nucifera Gaertn*.

Nymphaeaceae: *Nymphaea nouchali Burm.f., N.stellata Willd*.

Menyanthaceae: *Nymphoides cristata (Roxb.)Kuntze., N. indica (L.)Kuntze*.

Alismataceae: *Caldesia parnassiifolia (L.)Parl.*

Lemnaceae: *Lemna paucicostata Hagelm.,*

v) Emergent Amphibious

Fabaceae*: Aeschynomene indica L., Alysicarpus bupleurifolius (L.)DC*

Eriocaulaceae: *Eriocaulon quinquangulare L., E. tuncatum Willd., E.cinereum R.Br.*

Polygonaceae: *Polygonum barbatum L., P.glabrum Willd., P.plebeium R.Br., P.hydropiperL.*

Onagraceae: *Ludwegia adscandens(L.)Hara, L.octavalis(Jacq.)Raven*

Pontederiaceae: *Monocharia vaginalis (Burm.f.)Presl.,*

Alismataceae: *Sagittaria trifolia L., Limnophyton obtusifolium (L.)Miq.*

Cyperaceae: *Schoenoplectus articulates (L.)Palla*.

Typhaceae:*Typha angustata Chaub & Bory*

Poaceae: *Vetiveria zizanoides(L.)Nach.*

Scrophulariaceae: *Limnophila heterophylla(Roxb.)Bentham., L.indica (L.)Druce.*

vi) Wetland Hydrophytes

Amaranthaceae*: Alternanthera pungens Kunth.*

Brassicaceae: *Rorripa indica (L.)Hiern.*

Lythraceae: *Ammania baccifera L., Rotala indica(Willd.)Koehne.*

Scrophulariaceae: *Bacopa monnieri (L.)Pennell.,*

Asteraceae: *Eclipta prostrata (L.)Mant., Caesulia axillaris Roxb., Sphaeranthus indicus L.,Centepeda minima(L.)A.Br.et.Aeschers.*

Poaceae: *Eragrostis viscosa(Retz.)Trin., E.aspera(Jacq.)Nees., E.tenella (L.)P.Beauv.ex.Roem & Schult., E.pilosa (L.)P.Beauv., Coix lacryma-jobi L., Echinochloa colonum (L.)Link., E.stagnina(Retz.)Pal.-Beauv.*

Boraginaceae: *Coldenia procumbens L.*

Fabaceae: *Alysicarpus vaginalis (L)DC.*

Cyperaceae: *Cyperus iria L., C.exaltatus Retz., C.flavidus Retz., C.michelianus (L.)Link. C.corymbosus Rottlb., C.nutans Vahl., Fimbrstylis falcate (Vahl.)Kunth., F.miliacea (L.)Vahl., F.ovata(Burm.f.)Kern., F.tetragona R.Br.*

Rubiaceae: *Dentella repens(L.)Forst*

Acanthaceae*: Hygrophila auriculata (K.Schum.)Heine*

Scrophulariaceae: *Lindernia antipoda (L.)Alston., L.crustacea (L.)F.V.Muller., L.parviflora(Roxb.)Haines., Veronica anagallis-aquatica L.*

vii) Species along banks/margin of lakes and ponds

Commelinaceae: Floscopa scandens Lour.

Convolvulaceae: *Evolvulus alsinoides (L.)L., Ipomoea fistulosa Mart.ex.Choisy.*

Chenopodiaceae: Chenopodium ambrosioides L., Acalypha indica L.

Euphorbiaceae: *Chrozophora prostrate Dalz., Croton bonplandianum Baill.,Phyllanthus asparulatus Hutch., P.maderaspatensis L., P.virgatus Forst., Jatropha gossypifolia L,* Tiliaceae: *Corchorus capsularis L., Triumfetta rhomboidea Jacq*.

Asteraceae: *Grangea maderaspatana (L.)Poir.,*

Boraginaceae: *Heliotropium indicum L.*

Lamiaceae: *Leucas aspera (Willd.)Spreng, L.cephalotes Spreng.*

Solanaceae: *Nicotiana plumbaginifolia Viv.*

Verbenaceae: *Phyla nodiflora (L.)Greene.*

Polygonaceae: *Rumex dentatus L.*

Asteraceae: *Xanthium strumarium L., Parthenium hysterophorous L., Ageratum conyzoides, Vernonia cineria L., Gnephalium luteo-album L.*

Caesalpiniaceae: *Cassia tora L.,*

Acanthaceae*: Hygrophila auriculata (K.Schum)Heine.*

Commelinaceae: *Commelina benghalensis L., C.hasskarlii L*

.Poaceae:*Imperata cylinderica Beauv., Heteropogon contortus(L.)Pal.Beauv.ex.Roem & Schult., Saccharum spontaneum L., Oryza rufipogon Griff.*

Scrophulariaceae: *Lindernia antipoda Alst.*

Molluginaceae: *Mollugo pentaphylla L.*

Pteridophyte: *Marsilea quadrifolia L.*

Amaranthaceae: *Amaranthus spinosus L., Aerva lanata(L.)Juss.ex.Schult*.

Cyperaceae: *Cyperus nutans Vah., C.rotundus L., C.flavidus Retz., C.iria L., C.difformisL., C.clarkei Cook., Furiena ciliaris (L.)Roxb., Fimbristylis tetragona R.Br., Kyllinga tenuifolia Steud., Eleocharis geniculata (L.) Roem & Schult.*

DISSCUSSION & CONCLUSION

A total number of 121 species distributed among 83 genera and 41families were recorded . Families with maximum number of species are Cyperaceae, Poaceae, Asteraceae and Euphorbiaceae. Further quantitative and qualitative floristic survey is needed to save these hydrophytes.

REFERENCES

Agarkar S P (1923) The present position of our knowledge of the aquatic flora of India., Indian Bot. Soc.3: 252-260.

Bhaisare M S, Tiwari V J & Kunjalwar S G (2013) Biodiversity of Wet and Marshy Places- Ravanwadi Lake of Bhandara District of Maharashtra State, India., In Kapgate, D K., Saha R C (Eds.) UGC sponsored National Seminar on *Biodiversity- A Global Need*., J M Patel College, Bhandara.

Cook C D K (1996) *Aquatic and Wetland Plants of India*. Oxford Uni.Press.

Dutta S A., Desai N, Almeida S M and Das A P (2002) Aquatic Macrophytes of Apalchand Reserve in Jalpaiguri district of Wst Bengal., In Perspective of Plant Biodiversity ,(Ed.Das A P) Dehradun

Ghosai S K, Santra S C & Mukherjee P K (1993) Phenological Studies in Aquatic Macrophyte Plants of Lower Gangetic Delta., West Bengal, India., Feddes Repertorium 104:93-111.

Jain S K & Rao R R (1976) *A Handbook of Field and Herbarium Methods*., Today and Tomorrow Publ., New Delhi

Lavania G S., Paliwal, S C & Gopal B (1990) *Aquatic Vegetation of Indian Subcontinent*: In E. Gopal (Ed.)Ecology and Management of the Aquatic Vegetation of the Indian Subcontinent. Dordredcht: Kluwer Academy Publishers.

Subrahmanyam K (1962) *Aquatic Angiosperm*., Botanical Monograph 3. CSIR Publ., New Delhi.

ABSTRACTS

BC-11.No.19-2014

Prevalence of Intestinal Parasitic infection among school children in Buldana City.

Jadhav MD, Jadhav AS, Kakde VR and Parekar, ST

Department of Microbiology and Zoology, Jijamata Mahavidyalaya, Buldana

ABSTRACT

Intestinal parasitosis is a public health infection among the school Children. The present study is undertaken to determine its prevalence among the school children. Faecal sample from the students was examined by direct smear technique and result was correlated with their Socioeconomic Status and hygienic behaviour. Altogether 42 species of intestinal Parasites are identified with an overall prevalence of (25.5%). The predominant parasites involved included *Entamoeba histolytica* 30 (58.82%) and *Ascaris lumbricoides*12 (23.52%).Prevalence rate was 25.5%, boys being highly infected (44%) than girls (19.3%). *Entamoeba histolytica* (15%) was the commonest Parasite followed by *Ascaris lumbricoides* (6%).The highest positive rate was found among Children of 3-5 years age (80%) and least among those above 9-10 year age (7%). Intestinal Parasitosis and transmission of infectious diseases can be prevented creating awareness about personal hygiene.

Key words: Parasitosis, smear, prevalence, infectious diseases, technique.

*****

BC-12.No.20-2014

An aeromycological study in the atmosphere of Nagpur (M.S.)

Mohture VM[1] and Kalkar SA[2]

[1]Rashtrapita Mahatma Gandhi Arts and Science College Nagbhid, Dist. Chandrapur (M.S.) India.
[2]Department of Botany, Institute of Science, Nagpur (M.S.) India.

ABSTRACT

Air monitoring was undertaken to determine the conc. of airborne mycoflora from the atmosphere of Nagpur during February 2006 to January 2007. An outdoor survey was conducted at Nagpur using Rotorod air sampler and by exposing petriplates containing Potato dextrose agar to assess the complete mycoflora. Aeromycoflora remained prevalent throughout a year in variable concentration may be in response to meteorological factors. A total of 56 fungal types and 21 types of viable colony were recorded. Aspergilli, *Cladosporium*, *Alternaria*, *Curvularia*, *Nigrospora* spores were reported dominant with higher frequencies while subdominant species included *Alternaria alternata*, *Aspergillus niger*, *Curvularia lunata*, *Cladosporium cladosporoides*. Deuteromycota contributed higher prevalence (88.95%) followed by Basidiomycetes (9.34%) and Ascomycetes (1.70%). Among them, *Cladosporium* (34.31%) was the most dominant genus followed by *Alternaria* (20.31%), *Nigrospora* (12.90%), Aspergilli (6.18%) *and Curvularia* (5.76%). The dominant fungal colonies observed were *Alternaria alternata* (17.50%), *Cladosporium cladosporoides* (10.89%), *Curvularia lunata* (15.40%), *Aspergillus niger* (9.88%), *Fusarium oxysporum* (7.47%). The occurrence of air borne fungi was correlated with climatic conditions. An attempt was made to forecast atmospheric fungal concentration of Nagpur.

Key words: Rotorod air sampler / Meteorological factors /Aeromycoflora / Potato dextrose agar.

*****

BC-13.No.21-2014

Ethnomedicinal Survey for Important Plants of Kalmeshwar Taluka, District Nagpur

Hiwale SR and Shrirame AM

K.Z.S. Science College, Department of Botany, Bramhani, Kalmeshwar, Dist. Nagpur

ABSTRACT

An ethnomedicinal survey was carried out in Kalmeshwar taluka, District Nagpur for documentation of important flora and information from local community about their medicinal uses. The indigenous knowledge of local traditional uses was collected through questionnaire and personal interviews during field trips. Plants with their correct nomenclature were arranged by family name, vernacular name, part use, ethnomedicinal remedies and ethnomedicinal uses. The identification and nomenclature of the listed plants were based on The Flora of Maharashtra and Flora of Nagpur. A number plants species were

identified by taxonomic description and locally by ethnomedicinal knowledge of people existing in the region. Plant specimens collected, identified, preserved and mounted were deposited in the department of botany, for future references.

Key words: Ethnomedicinal survey, Indigenous knowledge, Kalmeshwar taluka

*****

BC-17.No.25-2014

Diversity indices of woodland of Seminary Hills, Nagpur

Surpam Dewanand C, Kamble Rahul B and Chaturvedi Alka

PGTD of Botany, RTM Nagpur University Nagpur-440033

ABSTRACT

The vegetation diversity of the country not only provide an endless opportunity to study the plant systematics but it also opens several new vistas of plant sciences like ethnobotany, biotechnology, endemism, phytogeography of biodiversity and its conservational strategies. This study was carried out in the forest of Seminary Hills which is characterized by a uniform distribution of individuals with mixed species composition and various selected five sites are represented by different combinations of dominants and co- dominants woodland species. The density and size distribution of trees contribute to the structural pattern characteristics of the forest. Altogether, 33 tree species of 29 genera belonging to 20 families were observed. The area is blessed with rich vegetation. It showed the most prominent woody elements like *Hardwickia binata, Anogeissus latifolia, Boswelia serrata, Gardenia resinifera, Dalbergia sissoo, Chloroxylon sweitenia, Sterculia urens, Tectona grandis* etc. RD, RF and RBA were calculated to evaluate its Important Value Indices to characterize the species dominance which indicates larger tree diversity in smaller area. Shannon-Wiener Diversity index observed ranges from 12.94 to 30.97 while Simpson's index with 0.1223 to 0.1389 in selected sites.

Key words: Tree diversity, Population Study, Diversity Indices, Seminary Hills, Nagpur

*****

BC-24.No.31-2014

Aeromonas hydrophila infection associated with the use of medicinal leeches.

Deshmukh SS

Shri Shivaji Science College Congress Nagar,Nagpur

ABSTRACT

Aeromonas hydrophila is the predominant bacterial flora in the gut of the leech, where it plays an essential role for the animal in the digestion of blood. *Aeromonas* is the most common microorganism in leech infections and may cause a wide spectrum of diseases such as cellulitis, ocular infections, arthritis, myocarditis, peritonitis, meningitis, bacteremia and sepsis .Such type of infection required systemic antibiotic therapy. Medicinal leech, *Hirudo medicinalis*, has been used in plastic and reconstructive surgery, to relieve venous congestion and enhances the success rate in problematic plastic surgery cases. In many countries, wild leeches are still provided from local markets. The potential for *A. hydrophila* wound infection, and appropriate antibiotic prophylaxis of the leech or patient should be considered when medicinal leeches are used.

Key words: *Hirudo medicinalis*, *Aeromonas hydrophila*, symbiosis, associated infection

*****

BC-26.No.33-2014

Avian biodiversity on *Pithecellobium dulce* (Chichbilai) tree during flowering and fruiting season in & Around Nagpur city (M.S.), India

Dapke SN[1], Koushik SA[1] and Didolkar RV[2]

[1]Department of Zoology, Institute of Science College Nagpur (India)
[2]Department of Zoology, L.A.D. & Smt. R.P. College for Women, Nagpur (India)

ABSTRACT

Present work was undertaken to study avian biodiversity on specific tree *Pithecellobium dulce* commonly called Chichbilai. Study was conducted during January to June 2013. In *P.dulce* flowering begins in January to March and the fruits ripen from

April to June. Observations were carried out thrice a week at four sites in and around Nagpur, Maharashtra. Observations indicated that various local and migratory birds were mostly attracted to flowers and fruits of this plant. Flowers and fruits are reported to have effective anti-inflammatory, anti-bacterial, antioxidant and hepatoprotective properties. They possibly play role in reducing oxidative stress and giving immunological benefits to birds.

Key words: Avian biodiversity, *Pithecellobium dulce,* Nagpur

*****

BC-27.No.34-2014

Comparative study of multidrug resistant nonfermenters isolates from different clinical specimens of Rjshahi Bangladesh, Akola and Beed (MS) India

Sarkar AK[1], Shaker Md[1], Musaddiq M[2] and Yesmin T[3]

[1]Department of Microbiology, KSK College, Beed[1]

[2]Shri Shivaji College of Arts, Commerce and Science Akola

[3]Institute of Biological Science, Rajshahi University, Rajshahi, Bangladesh

ABSTRACT

Nonfermentative gram-negative bacilli are a group of aerobic non-spore forming bacilli that either do not use carbohydrates as a source of energy or degrade them through metabolic pathways other then fermentation. Non-fermentative organisms are becoming widely important as they are difficult to be detected with conventional test system used routinely in clinical laboratories. *Pseudomonas aeruginosa* and *B cepacia* complex are particularly important pathogens in patient with cystic fibrosis, whereas *P aeruginosa, S maltophilia,* and *Acinetobacter spp* are major causes of health care associated infection, particularly in patients who are hospitalized and critically ill. Other members of the *Burkholderia* group such as *Burkholderia mallei* and *Burkholderia pseudomallei*. Non fermentative gram negative bacteria pose a particular difficulty for the health care community because they represent the problem of multidrug resistance to the maximum. a number of strains have now been identified that exhibit resistance to essentially all commonly used antibiotics, including anti pseudomonal penicillins and cephalosporins, amino-glycosides, tetracyclines, fluoroquinolones, trimethoprim-sulfamethoxazole, and carbapenems. Polymyxins are the remaining antibiotic drug class with fairly consistent activity agains tmulti drug-resistant strains of *P. aeruginosa, Acinetobacter spp*, and *S. matophilia*. However, most multidrug-resistant *B.cepacia* is not susceptible to polymyxins. The present study is carried to Isolation identification and comparative study of different multidrug resistant nonfermenting bacteria isolates from Rajshahi Bangladesh, Beed, and Akola Maharashtra.

Key words: Multidrug resistant, Non fermentative bacteria

*****

BC-31a.N0.39-2014

Preliminary phytochemical study of some Hibiscus species

Kothale KV and Khorgade RV

P.G. Department of Botany Govt. Vidarbha Institute of Science & Humanities, Amravati.

ABSTRACT

Hibiscus is a genus of Malvaceae widely distributed worldwide and its many species are grown for showy flowers or used as a landscape shrubs and are medicinally as well as economically important. *Hibiscus rosa-sinensis Linn., Hibiscus ovalifolius Forsk., Hibiscus panduraeformis Burm*., and *Hibiscus trionum Linn.* analysed phytochemically. They are used in traditional medicine and in treatment of gonorrhea, menorrhagia, and refrigerant drink in fevers. The alcoholic extract of flowers of *Hibiscus rosa-sinensis Linn.*has been proved to possess anticonvulsant property. Powdered leaves of *Hibiscus rosa-sinensis Linn* lowered of blood pressure. Plant extract was prepared in various solvents. Phytochemical tests were carried out especially secondary metabolites from the selected species of *Hibiscus rosa-sinensis Linn.*

Key words : phytochemical study, secondary metabolites, *Hibiscus*.

*****

BC-31b No.40-2014

Preliminary phytochemical screening of some members of family Sapotaceae

Kothale KV and Thakur SB

P.G. Department of Botany Govt. Vidarbha Institute of Science & Humanities, Amravati.

ABSTRACT

Nutritional quality and antioxidant activity of *Achras sapota Linn.* and *Mimusops hexandra Roxb.* have been studied with the help of phytochemical analysis. Plant extract was prepared in in various solvents and phytochemically tested in the solvent where the good extraction and active extraction observed. *Achras sapota Linn.* and *Mimusops hexandra Roxb.* Leaves and stem are one of the rich source of ascorbic acid, phenolic compounds, carotenoids, alkaloids,amino acids and carbohydrates. Triterpenoids present in the leaves of the *Achras sapota Linn.* the extract caused a fall in systolic, diastolic and mean arterial blood pressure. *Mimusops hexandra Roxb.* leaves, bark and fruits are traditionally used to cure the fever, as appetizer and in treatment of leprosy. Both the plants are medicinally and economically important.

Key word :-Phytochemical analysis, antioxidant, nutritional.

*****

BC-32. No.41-2014

Ethnobotanical studies of Samudrapur Tahsil of Dist. Wardha

Shende JJ[1], Rajurkar BM[1], Mhaiskar[1] and Dalal LP[2]

[1]Department of Botany, R. S. Bidkar College, Hinganghat, Dist. Wardha (MS)

[2]Jankidevi Bajaj College of Science, Wardha (MS)

ABSTRACT

The present communication is a part of survey being conducted for ethnobotanical studies of Samudrapur tahsil of Wardha district (MS). Fifty four plants of families belonging to angiosperms has been identified. These families includes Fabaceae (8), Moraceae and Apiaceae each (4), Zingiberaceae (3), Euphorbiaceae (3), Meliaceae (2), Liliaceae (2), Myrtacaceae (2), Apocynaceae (2), Asteraceae (2), Anacardaceae (2), Acanthaceae (2), Solanaceae (2), Rutaceae (2), Asclepiadaceae (3), Verbenaceae (2), Rosaceae, Malvaceae, Cucurbitaceae, Lythraceae, Araceae, Lauraceae, Santalaceae, Poaceae and Plumbaginaceae each (1). The most frequently utilized plants parts were leaves (42) followed by the flowers (14), roots (11), whole plant (10), fruits (10), barks (9), seeds (8), rhizome (4), latex and oil (2), bulb and stem each (1). *Azadirachta indica, Aloe vera, Ocimum sanctum, Adhatoda vasica, Curcuma longa, Zingiber officinale, Emblica officinales, Clerodendrum infortunatum* and *Allium sativum* were found most dominant. All these plants constitute new records for the study area as for as ethnobotanical importance is concerned. The diseases found to be control were antipyretic, leprosy, diabetics, epilepsy, snake bite, jaundice, skin diseases, wound, laxative, gastrointestinal disorders, menopause, miscarriage, lactation, appetite, diarrhea, antioxidant, inflammation, pain, indigestion, optic infection, pile, respiratory disorders, aphrodisiac, carminative, uterine infection, bone fracture, isabgoal, antiplasmodic, fever, hyperdyspepsia, cardiac problem, goiter, abortifacient, rheumatism, narcotic, diuretic, nervous disorders and mental disorders, etc.

Key words: Abortifacient, *Azadirachta indica*, families, Stomachic, ethnobotanical.

*****

BC-34.No.43-2014

Species richness and relative abundance of ants in Vidarbha Region (Ms)

Kadu Seema G

Department of Zoology, Shri Shivaji Science College, Nagpur

ABSTRACT

Among the arthropod fauna, ants constitute the largest chunk of the insects belonging to the endopterygote order Hymenoptera. About 15,000 living ant species are described all over the world that fall in to a single family, the Formicidae. In Vidarbha region most of the tropical, warm, and temperate genera of ants belong to the subfamilies Ponerinae and Componotinae are described. Beside these, considerable count of other of ants are also reported in this region. Ants are the

amazing, dominant and successful component of ecosystem, likely to be good indicators of ecosystem. The study of species richness and relative abundance of ant population and its cosmopolitan distribution is very important as they are considerable economic importance.

Key words: Endopteryote, Vidarbha, Ponerinae, Componotinae.

*****

BC-34.No.44-2014

Distribution pattern of fungi from soils of two different land use managements site

Jha AK[1] and Qureshi SO[2]

[1]Department of Zoology, Bhawabhuti Mahavidyalaya, Amgaon, Distt. Gondia (M.S), India

[2]Adarsha Mahavidyalaya, Dhamangaon Rly., Distt. Amravati, (M.S.), India

ABSTRACT

The distribution of fungi from the soil and litter of two different land use management sites i.e. natural forest site and paddy field site were investigated. The soil and litter were collected for a period of one year, May, 2011- April 2012 from all different land management's sites. Samples were drawn monthly from each site. Sterlised de-ionised water was used to prepare the soil suspension for dilution series. The fungi obtained from natural forest site belonged to 9 genera and from paddy field site belonged to 8 genera. The genus *Penicillium* was most dominant in both site followed by *Aspergillus* and *Trichoderma* in natural forest site; *Fusarium* and *Rhizopus* population in paddy field. In natural forest site, the greatest fungal count was recorded in August coincided with maximum conc. of soil factors like moisture and organic carbon where as in paddy field the maximum fungal count was encountered during November which coincided with maximum conc. of soil factors such as organic carbon, nitrate and phosphate. Probable reasons for data obtained are discussed and results are compared to those from other earlier investigations.

Key words: Distribution pattern, Moisture, Organic carbon, Nitrate and Phosphate

*****

BC-43.No.51-2014

Evaluate (*in vitro*) the bioefficacy of fungicides, bioagents and phytoextracts against pineapple disease of sugarcane caused by *Ceratocystis paradoxa*

Apet KT, Sayyad AS, Chavan PG and Wagh SS

Dept of Plant Pathology, College of Agriculture, V.N.M.K.V., Parbhani-431 402 (M.S.) India

ABSTRACT

Sugarcane (*Saccharum officinarum*) is prone to more than 150 diseases caused by many fungal, bacterial, viral, phytoplasma and nematode pathogens as well as abiotic factors right from planting to harvest; which may cause overall loss of 10-25 per cent annually throughout the world. Amongst the fungal diseases of sugarcane, pineapple disease caused by *Ceratocystis paradoxa* (De Seynes) Moreau has been reported to cause sugarcane sett rotting (pre- and post-emergence), loss in setts germination or even wilting of the young seedlings, reduction in yield and yield contributing parameters and juice quality. For the management of pineapple disease of sugarcane tested four non systemic (@ 1000 and 2000 ppm) concentration and six systemic fungicides (@ 500, 1000 ppm) concentration, six bioagents and twelve botanicals (@10, 15 and 20 %) concentration tested against *C. paradoxa* of pineapple disease of sugarcane. Result revealed that non systemic fungicides Thiram recorded highest average mycelial growth inhibition (79.64%); followed by Captan (77.07%) and Chlorothalonil (60.54%); however, Copper oxychloride was found least effective and among systemic fungicides Carbendazim and Propiconazole recorded highest average mycelial growth inhibition (each 94.44%); followed by Hexaconazole (91.66%) and Metalaxyl (90.27%); however, Thiophanate methyl was found least effective. Among biocontrol agent tested *T. viride* recorded significantly least mycelial growth (19.67 mm) with highest inhibition (77.40%) of the test pathogen over untreated control (90.00 mm and 0.00%). This was followed by *T. harzianum* and *T. hamatum* which recorded mycelial growth of 26.33 mm and 27.50 mm with inhibition of 70.74 and 69.44 per cent respectively. Among all botanicals tested, *A. sativum* was found most fungistatic and recorded significantly highest average mycelial growth inhibition (63.95%). This was followed by *Z. officinale* (61.48%) and *A. indica* (59.75%); whereas, *C. tora* was found less effective which recorded significantly least average mycelial growth inhibition (28.57%) of the test pathogen.

Key words: *Saccharum officinarum*, *Ceratocystis paradoxa, in vitro*, fungicides, bioagents, plantextracts

*****

BC-44.No.52-2014

In vitro Micropropagation of *Talinum portulacifolium,* an important multipurpose medicinal plant of India

Sanjay Kumar

Department of Botany, Chintamani College of Arts and Science , Gondpipari, Chandrapur.

ABSTRACT

The paper deals with *in vitro* micropropagation of *Talinum portulacifolium* (Family: Portulacaceae) is an important multipurpose medicinal plant in the local system of medicine. It is used as a green vegetable and also as a medicine for constipation and ulcer. A low survival rate by stem cutting restricts its mass propagation, hence protocol has been developed for rapid *in vitro* multiplication using nodal and inter nodal region as explants. The induction of multiple shoots and roots was tried on various media combination in laboratory. The optimum response of callus induction was achieved on MS Medium supplemented with 2mg/l NAA and 0.5mg/l BAP. Multiple shoot induction was achieved on MS Medium Supplemented with hormone combination 1mg/l BAP and 2mg/l NAA or 4mg/l BAP and 1mg/l NAA. The healthy shoot were rooted on MS Medium supplemented with 0.2mg/l IBA. The rapid *in vitro* multiplication will be useful in conservation and multiplication of important medicinal plant.

Key words : propagation , conservation, shoot multiplication, MS Medium.

*****

BC-45.No.53-2014

SEM Studies of Seed coat of*Arundinella pumilla* (Hochst.ex. A. Rich), *Chloris virgata* SW, *Leptochloa pancea* ((Retz) Ohwi and *Perotis indica* (L.)O.Ktze

Nikhade CA

Chintamani College of Arts and Science, Gondpipri, Chandrapur.

ABSTRACT

The paper deals with SEM studies of seed coat in above mentioned members of sub families Pooideae and family Poaceae. SEM technique has opened an entirely new field of micro-morphological research on seed coat and pericarp. The seed coal surface provides rather stable character and can be of greater taxonomic significance in many families, especially those with relatively small sized seed.

Key words: SEM, seed coat, pericarp, caryopsis, poaceae, pooideae.

*****

BC- 46.No.54-2014

Morpho and leaf architectural diversity in three medicinal species of Spilanthes (Asteraceae)

Jaisingpure Sarika R and Ingole Shubhangi N

Department of Botany, Bar.R.D.I.K. & N.K.D. college Badnera (Amravati)

ABSTRACT

Asteraceae (compositae) is widely distributed family of high economic importance. Many plants are medicinal like Spilanthes. In present work, morphological and leaf architectural diversity of *Spilanthes calva DC. ,Spilanthes acmella Murr.* and *Spilanthes radicans* Jacq has been studied. Leaf architecture now considered as one of the significant aspect in taxonomy and helps in identification of genera and species even in absence of flower. This aspect is found very useful in authentication of crude drugs and detection of adulterants. Distinct morphological variations are observed in colour of capitulum and leaf margin. Detail of leaf architecture has been studied of all these species, where in those major venation pattern is similar they can be separated on the basis of minor architectural features.

Key words – Spilanthes, leaf architecture, Asteraceae, major venation, diversity .

*****

BC-48.N0.56-2014

Studies on some ethanomedicinally important plants from Melghat forest.

Kothale KV and Deshmukh MK

P.G. Department of Botany, Government Vidarbha institute of science and Humanities, Amravati.

ABSTRACT

Vidarbha region is very rich in medicinal plants. In the present investigation, plants from various areas of Melghat region were studied. These plants have medicinal and economic importance in view of tribal and villagers. Tribal people have good knowledge about various medicinal plants and their preparations. They transfer their knowledge about medicinal plants to their children in verbal manner. So in this study the medicinal uses and their various treatments are documented properly.

Key words: Ethanomedicial, tribal, Melghat, knowledge, verbal

*****

BC-50.No.58-2014

Mycotoxigenicity of *Aspergillus, Penicillium* and *Fusarium* Spp. isolated from stored rice

Sawane Archana

Department of Botany, .Mathuradas. Mohota Science College, Nagpur

ABSTRACT

Rice (*Oryza sativa* L.) is an important food crop cultivated worldwide. It is not spared from natural mycotoxin contamination as bulk of it is grown in *kharif* or the wet season. Presence of mycotoxins like aflatoxin, citrinin, sterigmatocystin and ochratoxin has been detected as natural contaminants of rice in one or the other region of the world. However, only scanty information is available pertaining to presence of mycotoxin producing fungi and their toxins in India. Seed borne storage fungi namely *Aspergillus, Penicillium* and *Fusarium* were evaluated by standard blotter test on the 72 rice seed samples collected from different "godowns" of traders in rainy season, winter and summer season. *Aspergillus flavus, A. niger, A. fumigatus, A. ochraceus, A. terreus, A. versicolor, A. parasiticus, Penicillium oxalicum, P. citrinum, P. purpurogenum, P. frequentans, P. chrysogenum, Fusarium verticilloides, F. proliferatum, F. oxysporum and F. semitectum* were isolated from rice seeds. Mycotoxigenicity of these species was also studied by thin layer chromatography. Retardation factors of different spots relative to griseofulvin (Rfg) were compared with published data and secondary metabolites were identified. Ochratoxin A, Citrinin, Cyclopiazonic acid, Sterigmatocystin, Penicillic acid, Moniliformin and Fusarin C were produced by different isolates of storage fungi namely *Aspergillus, Penicillium* and *Fusarium* species.

Key words: *Aspergillus, Fusarium*, Mycotoxins, *Penicillium*, Rice

*****

BC-55.No.63-2014

Ethnomedicinal plants used by tribes of Junona village of Chandrapur District (MS), India.

Harney NV

Department of Zoology, Nilkanthrao Shinde Science and Arts College, Bhadrawati- 442902 (MS), India

ABSTRACT

The present study reports ethnomedicinal plants used by tribal people of Junona village of Chandrapur District (M.S.), India. Junona village comprises 69% population of tribal community. This village is surrounded by dense forest and the people collect the medicinal plant by their traditional knowledge which are used for some common diseases, but due to deforestation, loss of biodiversity and indiscriminate exploitation of wild and natural resources many valuable herbs are at the stage of extinction. A survey was conducted for documentation of traditional knowledge and practices of plants. The present paper enumerates traditional uses of 45 different plant species.

Key words- Ethnomedicinal plants, Tribes of Junona, uses.

*****

BC-56.No.64-2014

Morphological and biochemical characterization of *Curcuma* germplasm

Anju Jain, Rakesh Bhardwaj and Awani

Tissue Culture & Cryopreservation Unit, National Bureau of Plant Genetic Resources, New Delhi-12

Germplasm evaluation Division, National Bureau of Plant Genetic Resources, New Delhi-12

ABSTRACT

In vitro regeneration and curcumin content was assessed in 43 accessions of *Curcuma* comprising of 10 species, 13 cultivars and 20 accessions of *C. longa* collected from diverse sources. The germplasm is being multiplied and conserved in *in vitro* using nodal explants at Tissue culture repository of NBPGR through periodic subculture. After eight weeks of culture maximum shoots/ explants 4.79 in *Curcuma zeodoria* and minimum 2.58 in *Curcuma caesia* was recorded. Among the *cv.* maximum shoots/ explant 4.5 was recorded in NDH-98 and minimum 2.05 in Palam Pitamber. Germplasm of *C. longa* also showing variability with maximum 4.00 shoots/explants from Orissa and minimum 2.91 shoots/ explant from northeast region of India. Development of roots was observed after 4 week of inoculation on the medium. With highest 10.83 roots/ explants recorded in *C. amada* and minimum 2.75 in *C. longa* cv. PTS-62. *In vitro* regenerated plants produced healthy rhizomes when planted in pots containing soil, sand and FYM 2:1:1l. Total curcumin content estimation was done from acetone extract of dried and finely grinded rhizomes and estimated using spectrophotometer at 420nm. Curcumin content varies among the cv. from 0.877-3.709%; among species 0.172 - 4.073 % and among *C. longa* germplasm 0.535-3.770%.

*****

BC-58.No.66-2014

Comparative study of Soil from Pohara-Malkhed forest and agriculture area of District Amravati.

Tushar Hedau and Manisha Jane

Department of Environmental Science, Shri. Shivaji Science College Amravati

ABSTRACT

Soil is defined as the top layer of the earth's crust, formed by mineral particles, organic matter, water, air and living organisms. In comparative study, different parameter of soil like temperature, pH, water holding capacity, conductivity, alkalinity, nitrogen, organic matter, available phosphorous, available nitrogen, available potassium, exchangeable calcium, and exchangeable magnesium were analyzed monthly. The forest soil is more nutritious as compared to agricultural soil. Organic matter and pH, nitrogen, phosphorus and potassium are found in sufficient quantity indicating healthy state of the forest. Agriculture soil is rich in organic matter, may be due to decomposition residue remains of the crops. The nitrogen, phosphorus and potassium content are high, may be due to the addition of fertilizers. The alkaline soil supports plant growth. All these parameter showed that the agriculture soil is more fertile. On the basis of results, it is concluded that both soil samples were found in fertile in state. It gave good result to crop as well as plant growth.

Key words: Forest, Agricultural, Fertilizer.

*****

BC-60.No.68-2014

Studies on environmental pollution management with herbal pesticides

Urkude Rashmi

Shri. Shivaji Science College, Congress Nagar, Nagpur. M.S. India

ABSTRACT

India has treasure of indigenous plants and there is a vast scope for exploring inherent pesticidal properties from these plants to achieve this it was proposed to use different solvents such as alcohol, acetone and water to extract leaves content of plant *Ipomea carnea*, *Vitex negundo*, at 10% concentration and tested against insect pest *Spodoptera litura* (III instar larvae). This aspect leads to study pesticidal effect of plant extract on polyphagous pest *S. litura*. The order of effectiveness in terms of per cent mortality after 48 hours observed with 10% concentration of different solvent extract of *Ipomea carnea*; alcohol extract

(50.85)> *Ipomea carnea* acetone extract (48.85)> *Vitex negundo* alcohol extract (46.92)> *Vitex negundo* acetone extract (39.23)> *Vitex negundo* aqueous extract (39.15)> *Ipomea carnea* aqueous extract (33.00) followed by water spray as control treatment. Thus it could be concluded that Plant extracts of *Ipomea carnea* and *Vitex negundo* can be effectively used as a herbal pesticides.

Key words: Environmental pollution, management, Herbal pesticides

*****

BC-63.No.71-2014

Study of bacteria responsible for spoilage of onion

Umale AV and Musaddiq M

P.G. Department of Microbiology Shri Shivaji College of Arts, Commerce & Science Akola.

ABSTRACT

Onion is an important agricultural product of Central Vidrabha, with annual productivity about 160-170 lakh metric tons. The market prize is being low in crop season but that increases all most four times in offseason. Therefore the storage of onion and keeping quality is tremendous important. Almost 40% of total output is being spoiled due activity of microorganisms associated with onion bulb. In view of this, study was carried out to isolate bacteria associated with onion bulbs. The bacteria *Staphylococcus aureus, Streptococcus pyogens, Pseudomonas spp. E. coli* and *Bacillus spp.* are found associated with onion. This study helps to prevent the spoilage of onion.

Key words: Agricultural Product, Spoilage of Onion, Onion Spoilage Bacteria.

*****

BC-65.No.73-2014

To Study pathogenic bacteria associated with cases of Corneal Ulcers

Jain DN and Musaddiq M

P. G. Department of Microbiology, Shri. Shivaji College of Arts, Commerce & Science, Akola – 444001. (M.S.)

ABSTRACT

Number of blind people in the world is 45 million. Out of which 5.4 million blind people are in our country. Corneal ulcer is a major cause of blindness throughout the world. About 10% cases of blindness are due to corneal ulcer. "Corneal Ulcer means loss of corneal substances as a result of infection and formation of raw, excavated area." Corneal Ulcers can be caused by exogenous infections i.e. by viruses, bacteria, fungi or parasites and sometimes it is allergic in nature or it can be due to endogenous infections. Almost any organism can invade the corneal stroma if the normal corneal defense mechanisms, i.e., lids, tear film and corneal epithelium are compromised. Bacterial keratitis is serious ocular infectious disease that can lead to significant vision loss. Isolation and identification of pathogenic bacteria associated with cases of corneal ulcers during period of one year.

Keywords: *Corneal ulcer, Pathogenic bacteria, Ophthalmology*

*****

BC-66.No.74-2014

Studies on bacterial rhamnolipid production from hydrocarbon rich soil.

Dandale DV, Yeole AV, Tiwari RH and Zodpe SN

P.G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola

ABSTRACT

Biosurfacants are surface active compounds such as Rhamnolipid produced by *Pseudomonas aeruginosa.* Total Forty samples were collected from hydrocarbon rich area and grown on Cetrimide agar. Twenty isolates of *Pseudomonas species* were obtained. The Rhamnolipid producing strain was screen by Phenol sulphuric acid method and Haemolysis method. Further study is continued with the isolation and identification of Rhamnolipid producer strain from various sources and their Kinetic

study as well as on use of different raw materials for Rhamnolipid producing strain. Up till now satisfactory results are obtained from the study done for Rhamnolipid production.

Key words : *Pseudomonas aeruginosa,* Rhamnolipid, Hydrocarbon rich soil**.**

*****

BC-67.No.75-2014

Isolation and identification of *Acinetobacter* from various clinical samples.

Khan HN, Barate DL and Musaddiq M

P.G. Department of Microbiology, Shri Shivaji College of Arts, Commerce & Science, Akola

ABSTRACT

Acinetobacter species is ubiquitous and is now emerging as an important nosocomial pathogen. It is aerobic, Gram negative coccobacilli. Many strains of *Acinetobacter* show multi-drug resistance (MDR). We collected 65 clinical samples (blood and urine) from different hospitals and pathological laboratories of Akola city. From these 65 samples we found 10 (15%) isolates of *Acinetobacter,* these isolates were identified by cultural, morphological and biochemical characters. Further these isolates were checked for their antibiotic susceptibility pattern.

Key words: *Acinetobacter,* Antibiotic Susceptibility, Multi-Drug Resistance (Mdr).

*****

BC-68.No.76-2014

Biodiversity of pectinolytic bacteria isolated from soil samples of Akola Region

Aaisha GA, Khan IG, Barate DL, Musaddiq, M

P.G. Department of Microbiology, Shri Shivaji College of Arts, Commerce & Science, Akola

ABSTRACT

Pectin is a major component of primary cell wall of all plants and encompasses a range of galacturonic rich polysaccharides. Pectinase hydrolyzes pectic substances, have a share of 25% in the global sales of food enzymes. The present work has been undertaken for the screening and isolation of pectinase producing bacteria from soil samples collected from farms of various regions of Akola. Total 70 bacterial strains were isolated from 12 soil samples. Preliminary screening of pectinase producing bacterial strains was done by spot inoculation on Vincent's agar medium containing pectin. Out of 70 isolates, 36 isolates were found to be positive for pectinolytic activity giving clear zones ranging from 7 to 23 mm. The pectinase producing isolates were subjected for further identification by Standard Conventional methods. The isolates were identified as *Bacillus subtilis, B. cereus, B. licheniformis, Pseudomonas fluroscence, P. aeruginosa* and *Staphylococcus aureus.*

Key words: Pectinase, Pectinolytic Activity, Vincent's Agar Medium, Galacturonic**.**

*****

BC-69.No.77-2014.

Antibiotic resistant of pathogenic bacteria isolated from Milk and Milk Products in Akola City (M.S.)

Javed Khan and Musaddiq M

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Antimicrobial resistance is said to currently be the greatest challenge to the effective treatment of infections globally. This study evaluated the risks of antimicrobial resistant microbes associated with different Milk and Milk Products (Raw Milk, Packaged Milk , Curd , Khoa , Paneer) collected from local market of Akola. Common isolates identified were *E.coli, Salmonella tyhpi, Staphylococccus aureus* and *Shigella spp..* Antibiotic susceptibility tests indicated that all (100%) isolates were resistant to Ampicillin(AMP), Tetracycline (TET),Chloramphenico(CHL)l, Gentamycin(GEN), Cotrimoxazole(COT), Ceftriaxone (CTR), Vancomycin (VAN) and Methycillin (MET). *Staphylococcus aureus* was found that approximately 94% resistance and *Escherichia coli* was 85% resistant to all above antibiotics similarly 93% resistance for antibiotics was shown by *Salmonella*

typhi and 87% for *Shigella spp*. Even though the risk level varied from different types of Milk and Milk products. The study demonstrated that Milk and Milk products sold in Akola is a potential hazard of pathogenic food borne bacteria as well as antimicrobial resistant bacteria that may have public health implications. There is the need for some additional food safety measures to be applied before the consumption of milk.

Key words: *Antibiotic agents, Resistant bacteria, Milk* and *Milk products, etc.*

*****

BC-70.No.78-2014

Studies on biodiversity of chromogenic bacteria

Rokade MT and Pethe AS

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Pigments are coloured molecules. Bacteria like *Vibrio, Serratia, Proteus, Staphylococcus* produce pigments of diverse colour as part of their normal metabolism. A type of pigment is characteristic for pigmented bacteria. An ideal pigment producing microorganisms are capable of using a wide range of carbon and nitrogen source, have tolerance to pH, temperature, mineral and give reasonable colour yield. Some pigments are water soluble, they leak out of cells and diffuse through the water based culture medium. This causes the medium to change colour. Other pigments are water insoluble, they remain within the cells, chemically bacterial pigments are pyrole, phenazyne, carotenoid, xanthophylls, quine and quinine derivatives. It has been proved that only aerobic and facultative anaerobic bacteria are pigmented because molecular oxygen is essential for pigmentation. Therefore anaerobic bacteria are non-pigmented. In present investigation *Pseudomonas species, Bacillus sp., Staphylococcus sp., Serratia sp., Cynobacteria sp.* were isolated and studied.

Key words: Chromogenic bacteria, Bacterial pigments.

*****

BC-71.No.79-2014

Incidence of Salmonellosis from fruits and vegetables in Akola city of Maharashtra.

Sangole PP and M.Musaddiq M

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Fresh fruits & vegetables promote good health but harbour a wide range of microbial contaminants. Consumer demand is to use fresh vegetables & fruits which are bacteriologically safe. Pathogenic organism can enter in fruits & vegetables through damage surface, such as punctures, wound, cuts and splits that occur during growing or harvesting. Contamination from raw materials and equipments, additional processing conditions, improper handling, prevalence of unhygienic conditions contribute substantially to the entry of bacterial pathogens in juices prepared from fruits or vegetables. Tetrathionate Broth i.e. Muller –Kauffmann and Xylose Lysine Deoxycholate Agar was found to be most favourable medium for isolation *Salmonella* spp. The present study is carried to determine the effect of Salmonellosis cause by fruits & vegetables infected with *Salmonella* spp.

Key words: Fruits, Vegetables, Microbial Quality, Foodborne Pathogens.

*****

BC-72.No.80-2014

Designing of photobioreacter to Study biodiversity in green algae.

Bopale, PD, Pethe AS

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Photobioreacter used for cultivating various types of algae to produce biomass. The prefix "photo" particularly describe the bioreactor property to cultivate that organism which grow on utilizing light energy. Eg. Microalgae.The different

photobioreacter like plastic bags, plastic bottles, close and open photobioreacters, column photobioreacters was developed for cultivation of different type of green algae. In present investigation six types of photobioreacter were developed to study biodiversity of green algae.

Keywords: Photobioreacter ,Green Algae.

*****

BC-73.No.81-2014

Studies on different types of Melanin producing algae

Chopade RJ and Pethe AS

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Melanin is an imprecise term that describes a general category of high-molecular-weight dark pigments of biological origin. Based on biochemical characteristics, melanin is further differentiated into several types, including Eumelain, Phaeomelanin, Allomelanin, and Pyomelanin, Eumelanin and Phaeomelanin production occurs by the Mason-Raper pathway in which tyrosine is converted to dihydroxyphenylalanine (DOPA) and dopachrome by tyrosinase an oxygen. Allomelanins are produced from non-nitrogenous phenols and result in a wide range of diverse phenolic products. Melanin was produced by aerobically grown cultures in all media supplemented with Tyrosine or Phenylanine were studied. *Viz : Euglena, Nostoc, Cynobacteria, Cryophytes, Chlamydomonas, Spirogyra.*

Key words: Melanin, Black Algae

*****

BC-74.No.82-2014

Isolation of microorganisms associated with Municipal Solid Waste degradation

Lokhande Shilpa[1] and Musaddiq M[2]

[1]Shri D.M.Burungale College of Arts and Science,Shegaon-444203

[2]P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola

ABSTRACT

Cellulases are synthesized in nature by a number of fungi and bacteria. The cellulolytic microbes occupy a broad range of habitats. These microbes play a major role in converting the complex polysaccharides into simple sugars, which they assimilate. The cellulolytic microorganisms are ubiquitous in nature and they include protozoa, fungi and bacteria. Microbial cellulases find applications in various industries and constitute a major group of industrial enzymes. This study was aimed to screen the cellulolytic ability of fungi from native environmental source. Out of 114 fungal cultures isolated from saline belt of Akola and Buldhana District 80(70%) were found to posses cellulose degrading ability. Cellulolytic fungi belonged to *Aspergillus spp., Trichoderma spp., Fusarium spp., Penicillium spp., Rhizopus spp., and Cladosporium spp. Trichoderma viride* showed high cellulase activity followed by *Cladosporium spp. A.niger, Penicillium spp*. and *Fusarium spp*. showed moderate while *Rhizopus oryzae, Rhizopus spp*., showed low cellulase activity.

Key words: *Cellulases, Municipal Solid Waste, Saline belt, Cellulose degrading fungi.*

*****

BC-75.No.83-2014

Bacteriological studies of Neonatal Septicemia in Akola City of Maharashtra

Khan Sohail S and Musaddiq M

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Septicemia in neonates refers to generalized bacterial infection documented by positive blood culture in the first four weeks of life and is one of the four leading causes of neonatal mortality and morbidity in India, so the study is carried out by taking 65 neonates blood samples which were proceed by blood culture and sepsis screening, blood culture was carried out by

inoculating on brain heart infusion broth and subcultures were carried out on Blood agar and MacConkey agar, out of the total samples 38 samples were found to be blood culture positive. In the screening of proven cases abnormal values were seen in total leucocytes count 30 (46.1%), Neutrophils count 33 (50.7%), Hemoglobin level 22 (33.8%), Platelet count 24 (36.9%) positive C-reactive protein was observed in 32 (49.2%), rise ESR level 28 (43%). Total six different isolates were obtained from which *Klebsiella* spp. 13 (34.2%) and *Proteus* spp. 10 (26.3) was most predominant, the other isolates were *E.coli* 8 (21%), *Pseudomonas* spp. 7 (18.4%), *S.aureus* 2 (5.2%) and *Salmonella* spp. 1 (2.6%). The results showed that abnormal TLC count, Neutrophil count and positive CRP were significantly associated with blood culture proven septicemia and a majority of the bacterial isolates in neonatal sepsis were found sensitive to impanel, ciprofloxacin, meropenem and chloramphenicol and resistant to most of the commonly used antibiotics, eg. ampicillin and cephalexin.

Keywords: *Neonatal Septicemia, bacteriological studies, antimicrobial resistance, sepsis screen.*

*****

BC-76.No.84-2014

Incidences of food poisoning from fruit juices readily available market

Nikhat Sultana and Musaddiq M

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola.

ABSTRACT

Fresh fruits are essential component of the human diet and there is considerable evidence of the health and nutritional benefit associated with the consumption of fresh fruits. However, during processing contamination from raw materials, equipment or food handlers could be easily transferred to the final product of fruit juices resulting food born illness. Most of the juice prepared avocado, papaya mango, and pineapple juices. Common bacterial illness associated with contaminated fruit juices are Staphylococci food poisoning. *Salmonellosis, Shigellosis* and diarrhea associated enterotoxogenic *E.Coli*.

Keywords: Bacteria, Contamination, Locally prepared fresh fruit juice.

*****

BC-77.N0.85-2014

Isolation of aerobic fungi from Akola city

Patil VS and Rothe SP

Department of Botany, Shri Shivaji Arts, Commerce & Science College Akola, Maharashtra.

ABSTRACT

The environment contained all the major diverse group of microbes including fungi that contribute as major component of airspora. The study was undertaken during period from December to March to study of airspora in hospital and other important places such as bus stand, railway station, vegetables & fruit market. Asthana & Hawker's media 'A' was used for the isolation of aeromycoflora. Members of Deuteromycota contributed higher count isolates Various environmental factors such as wind, moisture, temperature, water potential, humidity & pH influences growth of fungi. Airspora varied from seasons to season. Most populated places of Akola city was studied to correlate the hazards of airspora. During present investigation a very wide spectra of outdoor air born fungi have been studied.

Keywords: Aeromycoflora, fungal spore

*****

BC-78.No.86-2014

Biodiversity of filamentous fungi

Padole SV and Pethe P

P. G. Department of Microbiology, Shri Shivaji College of Arts, Commerce and Science, Akola

ABSTRACT

In this study, natural fungal diversity of filamentous fungal species was collected from the area Akola region we have recovered different filamentous fungi. The common fungi encountered while study viz. *Aspergillus, Mucor, Penicillium,*

Fusarium species. The sample was collected and inoculated on specific media viz. potato dextrose agar or SDA. The diversity found on the leaves and household garbage.

Key words: *Filamentous Fungi; Diversity of Fungi; Aspergillus; Penicillium; Fusarium.*

*****

BC-81.No.89-2014

Studies on management of pollution at Badnera Railway Station

Kondrawar Snehal Y

Shri Shivaji Science College, Amravati

ABSTRACT

Indian Railways has always been a possession which has made us proud as an Indian. However it has been observed that open defecation through railways, unclean toilets, choked basins, litters in bogeys and along tracks are the causes that has compelled the environmental engineers to put a thought over improvement of sanitary practices in railways to prevent pollution. In view of this target, a study was undertaken for the management of pollution at Badnera Railway station as an improvement in sanitary practice.

Key words: Pollution, Sanitation, Management.

*****

BC-82.No.90-2014

Study and survey of biomedical waste management in Amravati Division

Gawai KJ and Ingole SP

Dept. of Environmental Science, Shri. Shivaji Science College, Amravati.

ABSTRACT

Biomedical waste is generated during the diagnosis, treatment and immunization of human beings. With the increase in immigration of people in cities, increasing urbanization, number of healthcare establishment is increasing with passing time which urges the need of treatment & disposal of biomedical waste coming out of it. If not disposes properly, this waste can pose threat not only to humans but also to the environment. The present work is carried out to evaluate the management of biomedical waste in Amravati Division. The information is collected through the survey, inquiry, personal visit to treatment plant. The result revealed that the management and disposal of Biomedical waste include collection of the waste in different coloured bags from registered health care establishment, its transport to common biomedical waste treatment facility, segregation of waste into infectious & non-infectious biomedical waste and final disposal & treatment of waste. It is mandatory that facility of treatment & disposal be provided to registered health care establishments only. However household Biomedical Waste is often neglected and hence while treating & disposing BMW this waste should also be taken into consideration. For this awareness is commons needs to be created and treatment of this household waste included with other biomedical waste. The treatment facility within GESS, Badnera and Atul Enviro systems, Jalna includes segregation of waste; autoclaving and shredding of plastic waste; incineration of infectious waste; sanitary burial of sharp waste etc. All these treatment helps to keep an environment hygienic and pleasant.

Key words: Biomedical waste, methods of treatment, Awareness.

*****

BC-83.No.91-2014

Conservation and Sustainable Development

Tirpude Jayashree B

Sevadal Mahila Mahavidyalaya & Research Academy, Nagpur

ABSTRACT

Sustainable development conserves land, water, plant, and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable. This term certainly captures multidimensionality of

sustainability particularly with respect to maintenance and management of natural ecosystem or resource-base. However, the biggest problem is designing the appropriate technology, as well as socially and ecologically compatible policy instruments and strategies, which can bring about appropriate human behavioural changes which are necessary to realize objectives of this definition.

Key words: *Conservation, Sustainability, development, nature, environment, earth etc.*

*****

BC-85.No.93-2014

Ingenious approach for development of liquid formulation using fluorescent *Pseudomonas* isolates

Ashwini Darokar[1] and Arti Shanware[2]

[1]Rajiv Gandhi Biotechnology Centre, L.I.T. Premises,

[2]R.T.M. Nagpur University, Nagpur-440033 (M.S)

ABSTRACT

Biotechnology has opened up new possibilities concerning the application of beneficial bacteria to the soil for the promotion of plant growth and the biological control of soil-borne pathogens. Since the large scale release of genetically engineered bacteria to the environment faces a number of regulatory hurdles, the need to isolate and select superior, naturally occurring rhizospheric bacteria continues to be of interest. Soil-borne, non-pathogenic bacteria with the ability to antagonize phytopathogens and thus prevent plant diseases represent a realistic alternative to chemical fertilizers. Amongst the PGPRs, fluorescent *Pseudomonas* have emerged as the largest and potentially the most promising group of PGPRs because of their ability to produce highly potent broad spectrum antibiotics such as Phenazine, Phloroglucinol, Pyrrolnitrin, Pyoluteorin, Viscosinamide, Oomycin which are effective against various phytopathogens, thus acting as effective biocontrol agents. The prime aim of this study is the development of liquid biofertilizer by using some competent strains of fluorescent *Pseudomonas* isolated from Vidarbha region and to mandate the technology from lab to land at low cost and reached to the end user efficiently. By providing the ecofriendly alternative to the chemical fertilizers, this study will definitely minimize the use of chemical fertilizers which in turn demolish the soil health.

Key words: Liquid Biofertilizer *Pseudomonas fluorescens,* PGPRs, Rhizosphere bacteria]

*****

BC-86. No. 94-2014

Allergic pollen producing plants in Firozabad district of Uttar Pradesh

Shalini Paliwal[1] and S P Paliwal[2]

[1]*Department of Botany, LAD College, Nagpur, Maharashtra*

[2]*Narain College, Shikohabad, 205 135 Firozabad, Uttar Pradesh*

ABSTRACT

The role of pollen grains as a causative agent to some allergic disorders such as asthma, allergic rhinitis, hay fever and dermatitis is common and very well established. As expected, the pollen diversity in India is more as compared to the western countries. Evidently, therefore, we need to develop our own standard of pollen allergens for proper diagnosis as well as therapy. The aim of this study is to identify the taxa which cause significant amounts of sensitization and to prepare a check list of allergenic biopollutants such as pollen grains and fungal spores. Upon aeropalynological survey of the atmosphere of Firozabad district during 2007-2009, the pollen of 66 plant species from 33 families have been identified as allergenically significant. Of these 20-25 species are cultivated for various purpose whereas the rest of the species grow in a wild state and produce large amount of allergenic pollen. Their frequency varies throughout the year and their increased incidence showed positive correlation with the increased number of patients suffering from allergic disease like rhinitis, hay fever, asthma, dermatitis etc. *Cynodon, dactylon, Parthenium hysterophorus, Achyrathus aspera, Zea mays* pollen were observed in high concentration and create problem in both human beings as well as in animals.

*****

BC-88.No.96-2014

Effect of *Aegle marmelos* leaves on rice weevils, *S. oryzae*

Juneja Sheetal B[1], Rai MM[2] and Rathod MK[2]

[1]Department of Zoology, Dhote Bandhu Science College, Gondia.

[2]C. S. B. R., Amba Vihar,RTM Nagpur University, Nagpur.

ABSTRACT

Aegle marmelos (L.) Corr. (Family : Rutaceae) is one of the most fascinating plant bearing multiple medicinal properties. This plant has been used in traditional system of medicine for the treatment of various diseases such as diarhoea, dysentery, diabetes, cancer, leucoderma, asthama, constipation, peptic ulcer, etc. This study is an attempt to study the grain protection capability of *A. mermelos* leaves against the infestation of stored wheat from rice weevil, *S. oryzae*. Mortality, grain damage and % weight loss were assessed in triplicates with four different concentrations of plant leaf powders, 0.3g, 0.6g, 1.2g and 1.8g / 50g of wheat respectively. At lower concentration, the leaf powders do not showed any significant effect. At higher conc. i.e. 1.2g onwards, the leaf powder showed its effect with 0% mortality of *S.oryzae*, no grain damage and weight loss. The further evaluation at different concentrations need to be investigated to utilize the *A. mermelos* leaves as grain protectant against other cereal grain pests.

*****

BC-90.No.98-2014

Survey of airborne fungi in asthma patient's home

Giri SK[1] and Matey PA[2]

[1]Department of Botany, [2] Department of Environmental Science

[2]Shri Mathuradas Mohota Science College, Nagpur- 440 009 (M.S.) India.

ABSTRACT

Fungi are eukaryotic organisms introduced into an indoor environment through natural open windows, doors, small ventilators and also mechanical ventilation systems. Indoor ambient concentrations of fungal spores are influenced by several factors including temperature, humidity, rainfall, and water intrusion into building structures, and also the extent of movement of outdoor air into a building. Residential homes of east and south parts of Nagpur city were surveyed during the study period and revealed the prevalence of airborne fungi in asthma patient's home during winter season (November, 2013 to February, 2014). Of the 12 species reported from the studied environments, *Cladosporium* was found to be dominant followed by *Aspergillus, Curvularia, Trichoderma, Rhizopus, Fusarium, Alternaria, Mucor & Nonsporulating fungi*. *Aspergilli* such as *A. flavus, A. niger, A. terrus, A. tameri, A. fumigatus* and *A. spp.* mostly found in ranges of relative humidity 47-60% and at temperature ranges from 27-33^{o}C. In the last decades, much interest has also grown for the fungi present in indoor environments, since exposure to airborne biological agents in both the occupational and residential environments could be associated with a wide range of adverse health effects with major public health impact, including infectious diseases, acute toxic effects, allergies and cancer. The present study was aim to find out the prevalence and concentration of fungal spores in residential homes of asthmatic patients located in two different sites of Nagpur city.

Key words: Asthma patient, home, Relative humidity, Temperature, Rainfall, Aspergillus, Indoor environment.

*****

BC-92.No100-2014

Report of *Sellaginella* from Deccan Intertrappean Beds of Patan, Chandrapur District (M.S.) India

Wanjari MH, Kapgate DK

Deptt. of Botany J. M. Patel College, Bhandara- 441906

ABSTRACT

The present paper deals with two specimens of Sellaginella plant material which was collected from the Deccan Intertrappean Beds of Patan (N 19^{0} 32.166, E 079^{0} 07.521); a small village from chandrapur district of Maharashtra; and both are present

near to each other. In its morphology it shows well preserved central axis on which sporophylls are born, but sporangium (Megasporangium and Microsporangium) absent. On the basis of external and internal morphology and comparision with the modern *Sellaginella* and due to close affinity it is named as *Sellaginella homeophyllii*. Fossil sporocarps of different pteridophytic types are well known from Deccan intertrappean exposures of India. However, vegetative parts are equally unknown. The present paper deals with vegetative part (Apical meristem of *sellaginella* strobilus) of plant material. The Pteridophytic remains are very common in the Deccan Intertrappean Series of India; the well-known specimens are *Azolla intertrappea* (Sahni, 1941), *Rodeites dakshini* (Sahni, 1943), *Surangea mohgaonse* (Chitley and Sheikh, 1971), *Salvinia intertrappea* (Mahabale, 1950; Paradkar and Barlinge, 1979), *Rhizomites dakshini* (Paradkar, 1971), *Sellaginella chitlei* (Kapgate and Sheikh, 1998). *Phlicorachionites mahabalei* (Mahajan and Sheikh, 1998), Acrostichum *intertrappeum* (Bonde and Kumaran, 2002).

Key words : *Sellaginella, sporangium, vegetative part, Strobilus, sporocarps, pteridophyta*.

*****

BC-94.No.102-2014

The Impact of Magnetic Water on Growth of Garden Plant as Vinca rosea

Bharambe CM, Bathe Prajakta and Rajput Pooja

Department of Zoology,Vidnyan Mahavidyalaya, Malpkapur Dist- Buldana (MS)

ABSTRACT
Magnetized water has been experimented on Vinca rosea growth. Plants are growing in plastic trays for 90 days and irrigating with magnetized water which prepared by using static magnetic field. Plants Height, leaf number, flower number and seed number were recorded up to the 90 days. Significant results showed that plants irrigated with magnetized water were taller than plants irrigated with tap water. The difference in height, number of leafs, number of flowers, and number of seeds was observed.

Key Words: Magnetic water, Vinca rosea.

*****

BC-95.No.105-2014

An Imperfect fossil fungi *Dematosporites mahabaleii* from Central India

Kapgate VD and Wanjari MH

[1]*S.K.K. Arts, Commere& Science College, Armori (Dist - Gadchiroli)*
[2]*J.M.Patel college, Bhandara*

ABSTRACT
This paper deals with fossil fungal spores with mycelium described from the Deccan Intertrappean Beds of Mohgaonkalan, Chindwara district, Madhya Pradesh, India. The fungus has Bicelled to 4-celled conidia with ostiole and mycelial cavities as that of family Dematiaceae viz., *Dematosporites mahabaleii*, found in petrified dicot leguminous fruit and leaf.

Key words :-Dematiaceae, Fungi ,Deccan Intertrappean, Mycellium. Central India.

*****

BC-96.No.104-2014

Estmation of variabilty in some *Curcuma* Species of Vidarbha Region using Morphological Traits

Shrikant Jain and Shital Surve

PG Department of Botany, Govt. Vidarbha Institute of Science and Humanities, Amravati

ABSTRACT
Genus *Curcuma* is gaining importance worldwide as a potential source of new drugs to combat a variety of ailments as the species contains numerous molecules. Despite the considerable economic potential of this genus, it's phylogeny and taxonomy remain poorly understood, mainly due to extensive polyploidization and hybridization resulting in different levels of genetic

and morphological variation among species. In present study individual of *Curcuma decipiens, C. pseudomontana*, and *C. zedoaria* were showed variations for rhizome length and width, plant height, sheath length, petiole length, leaf length and width, leaf area index, total number of leaves, flower length, calyx length and width, corolla length and width and lip length and width. The study revealed that genotypes of Curcuma appeared to have narrow genetic base, which have to undergone high level of genetic erosion and selection pressure. Thus, given data can be helpful to select wild parents in order to widen indogenous gene pool of turmeric for future breeding programmes.

Key words: *Curcuma decipiens*, *C. pseudomontana*, *C. zedoaria*, genetic erosion, selection pressure.

*****

BC-97.No.104-2014

Serum Electrolytes Observed in Tribes of Chikhaldhara Region. Dist. Amravati (M.S.)

Ingole AB

P.G. Dept Zoology, Shri Shivaji Sc. College, Amravati

ABSTRACT

The present cross sectional study was undertaken among the trible people of Chikhaldhara Region to estimate and compare some biochemical parameters such as Sodium and Potassium, concentration in different age groups of trible Male and Female. Total 257 Males and 319 Females were taken for examination. Concentration of serum Sodium and Potassium were calculated by Female photometry (Kramer 1971) method. The test of statistical significant (t Test) was used to compare population groups. The normal values of Sodium and Potassium, were not observed in studied.

*****

BC-98.No.105-2014

Enrichment of a microbial culture capable of degrading endosulphate, the toxic metabolite of endosulfan.

Prafulla Katkar

Department of Microbiology, Guru Nanak Science College, Ballarpur Dist. Chandrapur

ABSTRACT

The chlorinated cyclic sulphite diester endosulfan is a broad spectrum insecticide that has been used extensively for over 30 years on a variety of crops. Endosulfan is often classified as a cyclodiene and has the same primary action and target site as the other cyclodiens[1]. However, it has chemical and physical properties significantly different from other cyclodienes insecticide that affects both its environmental and biological fates. The aim of this research work is the investigation of an enzymatic Method for endosulfan degradation. Enzymatic degradation for pesticide is receiving serious attention as an alternative to existing methods, such as incineration and landfill. In particular, enzymatic insecticide bioremediation is the focus of extensive study after the isolation of enzymes capable of detoxifying a range of organophosphate compounds from several bacterial species. An essential step in the investigation of an enzymatic method for endosulfan degradation is the definitive identification of a biological source of endosulfan degrading activity.

Key words- Endosulfan, Microorganisms, Gas chromatography, Degradation, oxidation

*****

BC-99.No.107-2014

Diversity, indigenous use & conservation of ethnomedicinal wealth of Gondia District (M.S.) India.

Ghoshal KP

Department of Botany, M. B. Patel College of Arts, Comm. and Science, Deori

ABSTRACT

Traditional medical practice has been recognized by the World Health Organization as a building block of primary health care. Gondia district has a rich traditional knowledge of folk medicine practices. But rapid fragmentation of natural habitat and

unrestricted exploitations coupled with limited cultivation and insufficient attempt for its replacement has decreased this now day by day. As a result these wild stocks of medicinal plants are depleted with an increasing risk of loosing their genetic diversity and quality of these plants remains unknown. Many species are extinct or on the verge of extinction before they are known for their scientific uses. The present study was carried with an aim to document the ethnomedicinal diversity, of Gondia district with some of the threatened plant species and their conservational needs.

Key words: Ethnomedicinal, Threatened, conservation.

*****

BC-101.No.109-2014

Studies on gamma radiation induced sterility and effects on spermatogenesis in Gram Pod Borer, *Helicoverpa Armigera* (Hübner) (Lepidoptera: Noctuidae)

Dahegaonkar JS, Mohite AS, Dorlikar AV

P.G. Department of Zoology, Sevadal Mahila Mahavidyalaya, Nagpur-440009, India

ABSTRACT

Early pupae of *Helicoverpa armigera* reared on artificial diet were irradiated with sub-sterilizing dose of gamma irradiation (100 Gy) and examined the emerged adults for inherited sterility and histopathological effects on spermatogenesis. The impact of radiation on fecundity and fertility was ascertained in parental (P) and F_1 generations. 44% adult emergence in irradiated pupae was recorded as compared to 84% in normal pupae. Pupal period of irradiated pupae was found to be increased by two days in P generation. Significant reduction ($p \leq 0.01$) in fecundity was recorded in treated P crosses while, it was almost fell within the normal range in F_1 crosses when compared to controls. Fertility was significantly affected in all the crosses of P and F_1 generations. The deleterious effect was inherited in the F_1 generation and was expressed when F_1 progeny of the Nf x Tm cross were inbred. Irradiation resulted in many forms of abnormalities as separation of follicular tissue from testicular wall and septa leaving wide space. Disturbed cysts were present in the follicles. Dispersed spermatogenic stages were observed in the follicle. Spermatocytes necrosis with irregular shape and condensed nuclei was noticed. Retardation of sperm maturation, inhibition in growth of spermatids and degenerating spermatozoa were observed.

Key words: gamma irradiation, *Helicoverpa armigera*, inherited sterility, spermatogenesis

*****

BC-102.No.110-2014

Characterization and antiobiogram of *Enterobacteriaceae* isolated from Back yard poultry in Jabalpur (M.P.)

Shukla Satish[1] and Priti Mishra[2]

[1]*Central Poultry Diagnostic Lab (Phoenix Group), Jabalpur (M.P.)*

[2]*Department of fishery, Veterinary college, Jabalpur (M.P.) **

ABSTRACT

Antimicrobial resistance in bacteria from the family *Enterobacteriaceae* is an important indicator of the emergence of resistant bacterial strains in the community. This study investigated the antimicrobial susceptibility of commensal *Enterobacteriaceae* from back yard poultry to antimicrobial agents using the broth micro dilution. In all, 184 isolates (including 104 *Escherichia coli*, 44 *Klebsiella* spp, 20 *Salmonella* spp. and 16 *Enterobacter aerogenes*) were resistant to ampicillin (89.7%), chloramphenicol (73.9%), ciprofloxacin (33.2%), enrofloxacin (60.3%), neomycin (70.7%), norfloxacin (45.7%), streptomycin (78.8%) and tetracycline (73.4%). *Escherichia coli* was resistant to ampicillin (92.3%), chloramphenicol (73.1%), ciprofloxacin (34.6%), enrofloxacin (61.5%), neomycin (76.9%), norfloxacin (46.2%), streptomycin (80.8%)and tetracycline (76.9%). The rate of resistance in *Klebsiella* spp. was ampicillin (90.9%), chloramphenicol (72.7%), ciprofloxacin (54.5%), enrofloxacin (90.9%),neomycin (63.6%), norfl oxacin (63.6%), streptomycin(81.8%) and tetracycline (81.8%). *Salmonella* spp. showed resistance to ampicillin (80.0%), chloramphenicol (80.0%), enrofloxacin (20.0%), neomycin (80.0%), norfloxacin (20.0%),

streptomycin (80.0%) and tetracycline(35.0%) but were completely susceptible to ciprofl oxacin. *Enterobacter aerogenes* was resistant to ampicillin (81.3%), chloramphenicol (75.0%), ciprofloxacin (6.3%), enrofl oxacin (18.8%), neomycin (37.5%), norfloxacin (25.0%), streptomycin (56.3%) and tetracycline (75.0%). Overall, 147 (79.9%) out of 184 isolates demonstrated multidrug resistance to at least three unrelated antimicrobial agents. The high rate of antimicrobial resistance in bacterial isolates from free-range birds may have major implications for human and animal health with adverse economic implications.

Key words: multidrug resistance, Commensal *Enterobacteriaceae Back yard poultry*

*****

BC-106.No.114-2014

Pollens of *Apis dorsata* honey from Nagpur region.

Sulbha Kulkarni

Department of Botany, Sevadal Mahila Mahavidyalaya, Nagpur.

ABSTRACT

Honey is a sweet and viscous fluid produced by honeybees from the nectar of flowers. It is defined as a pure and natural product that does not include any other substances, such as water or sweetener. In the present study total 15 species of *Apis florea* honey were collected from Nagpur region to study the source of pollen in the honey. Eighteen families were identified from fifteen honey samples. Most prominent pollen sources were the member of Asteraceae, Amaranthaceae and Leguminosae. While the secondary pollen sources were the members of Myrtaceae, Euphorbiaceae, Malvaceae and the minor sources were the members of Poaceae and Fungal spores. On the basis of the percentage of occurrence of pollen in the honey samples, the samples may be identified as a unifloral, bifloral and multifloral honey.

Key words: *Apis florea*, prominent pollen, Honey.

*****

BC-107.No.115-2014

Effects of surrounding locality and environment on the puberty of child girls

Dhote Jayeshree D and Mohod Chaitali V

Department of Zoology, Shri Shivaji Science College,Amravati.

ABSTRACT

Puberty is less like a clock and more like a musical performance, with our bodies as the keyboards and the environment as the hands of pianist. Puberty is a stage of life where an individual exists in between the childhood and the arising adult. The present paper studies the effects caused due to the environment and locality on the puberty of girl child. The environmental factors may be enlisted as the effect of temperature, lightning, season. Environment can also be the part of the family or also can be defined as the environment in the family, neighborhoods, school environment; class performance, etc have an impact on the puberty of the girl Childs that causes early puberty. The surrounding covers basically the residence area, Garden area, society where there is a regular give and take with the people in it. Social environment also creates great variations on the girl child puberty.

Keywords: Puberty, Precocious Puberty, Adolescents, Neighborhoods environment.

*****

No.110.No.118-2014

Some eco-friendly bio-pesticides from Nagpur District

Meshram Reena, Alka Chaturvedi

P.G. Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur 440033

ABSTRACT

Many plant species from diverse flora and fauna in Nagpur distric are known to have biopesticide properties, which can be proved to be pest specific. The present paper is the survey of such plants having biopesticide properties and can be used for further studies.

Key words: Biopesticide, Nagpur

*****

BC-112.No.120-2014

Novel cost-effective downstream processing of biosurfactant recovery from fermented wastes.

Dubey Kirti V

Sevadal Mahila Mahavidyalaya, Nagpur

ABSTRACT

Novel process was developed for cost effective-recovery of biosurfactants produced by strains *Pseudomonas aeruginosa* strain BS-P and *Kocuria turfanesis* strain BS-J from fermented combination of distillery waste, whey waste and fruit processing waste (DW+WW+FPW) based on adsorption–desorption technique using egg shell waste as a new adsorbent. Preliminary study revealed less adsorption.capacity of egg shell for recovery of biosurfactants. Adsorption of biosurfactants was enhanced by inducing a change in the surface characteristics of the egg shell by HCl treatment which modified the surface topography of the egg shell. Comparative FTIR spectral analysis after HCl treatment resulted in marked changes in the groups present in the treated egg shell samples. At 2.0 % and 2.5 % HCl doses, gradually new groups viz. alkyl C-H and aldehyde C-H were obtained. Above 2.5% HCl concentration there was removal of the amide group as no peaks were observed at 3405 cm^{-1}. Corrosive property of HCl was observed at 3.0 % concentration which removed ketonic, alkyl, and aldehyde groups. Through batch studies a suitable usage rate of egg shell for both the biosurfactants determined and efficient removal of biosurfactant from fermented waste took place with lower dose of egg shell (3 % w/v) treated with 2.5% v/v HCl which was an optimum concentration for egg shell surface modification. Untreated egg shell took comparatively higher egg shell dose and longer contact time for adsorption of biosurfactants. HCl at 3% v/v also facilitated efficient removal of biosurfactants however, resulted in destruction of the calcite material of the egg shell. Biosurfactants adsorption follows Langmuir's model for egg shell like that on wood activated carbon and obey Freundlich adsorption isotherm also. Biosurfactant adsorption on 2.5% HCl treated egg shell (3% wt/v) required an equilibrium time of 5 h and 6 h for 100% adsorption of biosurfactant produced by strains BS-J and BS-P respectively. Biosurfactant desorption with standardized eluant has recovered 92.88-98.60 % of colour free biosurfactants from the egg shell using acetone. Reuse of egg shell was feasible for recovering biosurfactant up to five consecutive cycles as acetone treatment regenerated the egg shell to regain its original adsorption potential. The outcome of the present study will not only help to solve the problem of industrial wastes by their reuse but also can recover value added ecofriendly surfactants which has tremendous use in various industries.

*****

BC-113.No.121-2014

Morphoanatomical structural alterations in *Psoralea Corylifolia* (L) induced by Glyphosate

Mahakhode RH

Department of Botany, Shivaji Science College, Nagpur-12 (M.S.), India.

ABSTRACT

The present investigation deals with the effect of glyphosate on the morphoanatomical structures of *Psoralea corylifolia* seedling growing in cultivated fields of Vidarbha regions (M.S.). The seeds were treated with different concs. (100,200,400,600 & 800 ppm) of herbicide glyphosate. Seedlings raised from treated seeds, exhibited gradual decrease in growth of radicle and hypocotyl with an increase in concentrations of glyphosate. The radicle length at control and 100 ppm was 18.2mm and 9.6 mm, respectively. The decrease in length of hypocotyl at 100 ppm was 16.2 mm as against 32.4 mm in control, respectively. Inhibition of lateral roots and change in colour of cotyledons from green to creamy white was observed in early seedling growth. Glyphosate induced some remarkable anatomical changes in the hypocotyl, radicle and cotyledon . Hypocotyl showed dividing activities in the region of pericycle and endodermis forming a small mass of cells growing in the cortical region. At 400ppm the cortical cells were crushed and disintegrated and formed lacunae. In radicle at 400ppm from the immature endodermal and pericycle zone masses of meristematic cells developed oppositely. Only two of them grew considerably and penetrated in the cortex. The cortical cells were pressed by meristematic masses and became elongated and compact. The pith cells were disorganized. The cotyledons showed dehydration of mesophyll cells and developed lacunae.

Key words: *Psoralea corylifolia*, glyphosate, morphology, anatomy, seedlings.

*****

BC-118.No.126-2014

Biological activities of some 2-(4-chlorophenyl) amino-5- (4 – aryl)- 1, 3, 4 – oxadiazole Derivatives

Nazia A Rashidi

Department of Chemistry, Shri Mungsaji Maharaj Mahavidyalaya, Darwha Dist: Yavatmal (M.S), India.

ABSTRACT
Various different 2-(4-chlorophenyl) amino-5-(4-aryl)-1,3,4–oxadiazole were tested for their antimicrobial activity using agar diffusion method. The bacterial organisms used included gram-positive strains like *S. aureus*. Antifungal activity was performed against the fungus *A. niger* and *C. albican.* Gentamycin and Amphotericin were used as standard drugs for antibacterial and antifungal activities, respectively. Antimicrobial studies revealed that some compounds exhibited weak activity against tested organisms.

Key words: 2,5-Disubstituted 1, 3, 4-Oxadiazole, Antimicrobial activity, Gentamycin, Amphotericin

*****

BC-119.No.127-2014

Effect of Gamma Radiation on Germination and Antioxidant Activity in Wheat (*Triticum aestivum* L.)

Bala Sapna[1] and Chaturvedi Alka [2]

[1]*Post Graduate Teaching Department of Botany, Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur*

[2]*Mahatma Jyotiba Phule Shaikshanik Parisar, Amravati Road, Nagpur-440033,(India)*

ABSTRACT
In this investigation, the effect of gamma rays on seed germination and antioxidant activity of wheat (*Triticum aestivum* L.) were studied. The seeds of wheat genotype sharbati were exposed to different dosages of gamma rays like 20, 40 and 60 KR. The sensitivity of gamma irradiation was observed on different germination and growth parameters such as germination rate (%), seedling height (shoot length), root length, fresh and dry weight. The phenolic content and antioxidant capacity of two wheatgrass (wheat seedlings) were examined and compared for their free radical scavenging properties. Free radical scavenging properties of wheat grain extracts were evaluated by spectrophotometric method against stable 2, 2-diphenyl-1-picryhydrazyl radical (DPPH assay).The results showed that germination percentage, root and shoot length, and seedling dry weight decreased with increasing radiation. The hydro methanol extracts of wheatgrass have significant radical scavenging activity. The depressive effects were increased with increasing radiation dosages and 50 per cent reduction in germination and seedling size was observed at 60 KR of gamma rays irradiated seedlings and it was considered as LD50 value (Optimum dose) for gamma rays in wheat.

Key words: Gamma radiation, antioxidant activity, *Triticum aestivum*, free radical scavenging activity (DPPH assay).

*****

BC-120.No.128-2014

Trichome diversity in some taxa of family Lamiaceae

Tajne Dnyneshwari[1], Hate Sandeep[2], Ugemuge NR[1], Chaturvedi Alka[2]

[1]*P.G. Department of Botany, RTM Nagpur Uniersity Campus Nagpur*

[21]*Department of Botany, Sindhu Mahavidyalaya, Nagpur*

ABSTRACT
Systematics of trichome may also provide data which revise the taxonomic system constricted on the basis of external features. In spite of several instances of usefulness of this feature still there is paucity of data particularly while preparing the floras. Hence, considering the importance of trichome the present study was carried out with as aim to study, diversity and systematics of this taxonomic character, which would be helpful in identification and understanding the variation among the

genera. Some taxa of family Lamiaceae were studied and reported the diversity and significance of this features in systematics of family.

Key words – Diversity, Trichomes, Systematics & Lamiaceae

*****

BC-121. No.129-2014

Mitochondrial DNA mutations

Dongre Utpal J[1] and Virendra G. Meshram[1]

[1]Department of Biochemistry, Dr. Ambedkar College, Nagpur 440010.
[2]Department of Biochemistry, RTM Nagpur University, Nagpur 440033.

ABSTRACT
Mitochondria are the dynamic organelles in living cells and considered a main site for the ATP (Adenosine Triphosphate) synthesis via oxidative phosphorylation. Human mitochondrial DNA (Deoxyribose Nucleic Acid) is a maternally inherited genome consisting of 16,569 base pair circular double stranded DNA molecule that encodes 13 polypeptides of the respiratory chains, 22 transfer RNAs, and 2 ribosomal RNAs. Each mitochondrion contains 2 to 10 mitochondrial DNA molecules. The number of mitochondrial DNA copies in a cell ranges from several 100 to more than 10,000 copies, depending on a cell type. More than 100 mitochondrial DNA mutations have been reported. C1310T, A1382C, G1438A, A1202G, A3252G, A3256T, A3264C, A3271C, T3290C, C3303T, G3316A, T3394C, A8296G, A8344G, G11778A, A12026G, C12258A, T14577C, T14709C, T16189C are the few mutations identified in mitochondrial DNA, which may responsible for various diseases like Aging, Diabetes Mellitus, Mitochondrial Encephalopathy Lactic Acidosis and Stroke like Syndrome (MELAS), Mitochondrial Myopathy (MM), Neurogenic Muscle Weakness Ataxia and Retinitis Pigmentosa (NARP) and Leber's Hereditory Optic Neuropathy (LHON) etc.

Key words: Mitochondria, MELAS, NARP, LHON, tRNA, rRNA.

*****

BC-123.No.131-2014

Use of adsorbent for the sustainable use of water

Bobade VA, Burange VS and Ingole SP

Department of Environmental science, Shri Shivaji Science College, Amravati.

ABSTRACT
Water scarcity and its pollution is the burning problem of the present era and it is our responsibility to save water and treat the polluted water without spoiling the nearby environment. So it became necessary to take the efforts to control water pollution in a sustainable manner. The constituents responsible for the deterioration of water are of the two types i.e. organic and inorganic. In the present study we are going to reduce the waste water quality parameter by using some natural material they are called as 'adsorbent'. The adsorbent is an insoluble materials or mixture of materials used to recover liquid through the mechanism of absorption or adsorption or both. They are use to reduce organic load from the sewage sample and to change some parameters. The adsorbents are used to recover the waste water quality parameters such as color, pH, conductivity, turbidity, nitrate, chlorides, phosphate, sulphate, COD (chemical oxygen demand). In this study parameters of waste water are analyzed before and after the treatment. The adsorbents used are brick powder, powder of neem (*Azadirachta indica*) leaf, Coconut husk powder, *Moringa (Moringa oleifera)* leaf powder,etc

Key words: adsorbents, waste water, parameter analysis.

*****

BC-126.No.133-2014

Ichthyofaunal diversity of chandpur lake with reference to physico-chemical characteristics Distt. Bhandara (M.S.)

Khune CJ[1] and Thakur PP[2]

[1]P.G.Department of Zoology, M. B. Patel College,Sakoli ,

[2]J.M.Patel College,Bhandara[1]

ABSTRACT

Chandpur lake is is perennial lake located in Tumsar Tahsil about 55 km from Bhandara Dist. ,lies at the eastern edge of the Ambagad range on it's northern slope, it is also famous for its green valley. Its water level remains more or less constant except summer season at the time the level decreases slightly. In this lake fishes are abundant. The water is used for drinking, fishing and irrigation. Several parameters such as water temperature, pH, turbidity ,dissolved oxygen, CO_2, total alkalinity, BOD, COD chlorides, and nitrites have been studied. The above parameters were studied for a period of six months from January 2014 to June 2014.The present study undertaken to monitor the base line data on the suitability of water for fish and fisheries practices, so that changes if any in the future could be evaluated.

Key Words :*Chandpur lake,Green valley,Monitor,perennial,Parameters.*

*****

BC-127.No.134-2014

A study of physico-chemical properties in contaminated soils by wastes at Amravati city(M.S.)

Deshmukh VV, Bonde PB and Gawai KJ

Dept of Environmental Science, Shri. Shivaji Science College, Amravati.

ABSTRACT

Due to increasing population, industrialization, and urbanization a huge amount of waste is generated daily in cities and towns. Open dumping is the most commonly used method in India. This is responsible to create the soil, ground water pollution in addition to the odor and nuisance. Also responsible to disturb the beauty of nature and hence the aesthetic value of Indian countries are decreasing. Waste disposal techniques have created serious environmental problem. Solid waste management is a worldwide phenomenon & big challenge all over the world for human beings. Agricultural application of municipal solid waste as nutrient source for plants and as soil conditioner, which is found as the most cost effective option of MSW management The study considered the impact of waste dumping on soil quality and environment. The study involved the collection and laboratory analyses of soil samples from different locations of different solid waste dump site of Amravati city, Amravati. The present investigation study will revealed a data of physico-chemical analysis about the amount of contamination level and analyzed various nutrients of soil which latter use as compost. This may bring the social awareness amongst the people.

Key words: waste generation, open dumping, physico-chemical analysis, solid waste management.

*****

BC-129.No.136-2014

Analysis of drinking water of Municipal Corporation schools in Amravati City, Maharashtra

Bonde PB, Deshmukh VV, Kakde AU and Ingole SP

Department of Environmental science, Shri Shivaji Science College, Amravati

ABSTRACT

Water and life are two sides of the same coin, since water sustains all life processes. Quality of water is of vital concern for mankind as it is directly linked with human health and environmental protection. Due to its outstanding significance to the consumer its parameters must follow the permissible limits set by national and international regulating agencies. Assurance of

drinking water safety is a foundation for the prevention and control of waterborne diseases. The main aim of this study is to check the suitability of the water for drinking purpose. Adequate supply of fresh and clean drinking water is a basic need for all the inhabitants, yet it has been observed that freshwater resources are threatened not only by over exploitation and poor management, but also by ecological degradation. According to the World Health Organization, chemical and microbial contaminants in drinking water affect the health of consumer. The practical approach shows its unsuitability for drinking without treatment. The study was carried out by collection of water samples from different Municipal Corporation Schools of Amravati city. Physico- chemical and bacteriological characteristics are studied of water sample was studied.

Key words: Municipal corporation schools, Drinking water analysis, Physicochemical, & bacteriological parameter.

*****

BC-135.No.142-2014

Pollen analysis of some honey samples from Gadchiroli District.

Katgaye AM, Kalkar SA.

Department of Botany , Institute of Science , Nagpur. 440001-(M.S) India

ABSTRACT

Pollen in honey helps in identification of honey sources and analysis of the bee pollen loads. The information may be used to develop analytical standards for pollen, contributing to quality control of a product offered for export or for the home market. A pollen analysis of some honey samples were carried out in which pollen grains of *Bombax ceiba,, Alternanthera, Coriandrum sativum*, *Ageratum, Brassica spp., Woodfordia fruticosa, Cajanus cajan*, *Syzygium, Chenopodiaceae, Ocimum spp, Poaceae*, were recorded during January-May 2013 from bee hives. The data reflects the floral situation of the place where particular honey was produced. At the same time identification of geographical origin based on the presence of pollen types of that particular area and also importance of honey bees in the forest and agriculture ecosystem can also be traced

Key words: pollen, pollen load, honey bee, pollen analysis**.**

*****

BC-138.No.145-2014

Green methods of wastewater treatment using microalgae

Mahakalkar AS

Sevadal Mahila Mahavidyalaya, Sakkaradara, Nagpur-009

ABSTRACT

Water covers 71% of the Earth's surface, and is vital for all known forms of life. But only 2.5% of the Earth's water is fresh water. Due to industrialization and Urbanization it is becoming more polluted and risk of this polluted water consumption and its sanitation problem is increasing day to day in most of the developing countries, so it has become an essential need for today's environment to protect water from getting polluted or develop its cost effective remedial method for its protection. Study was done to find out the new, low-cost waste water treatment methods in which we had found that Microalgae has the natural wastewater treatment properties. It has the self-cleansing power due to which it abstracts Nitrate 80%, sulphate 65% and Phosphate 52% for its growth and development. During their growth they trap sun light and CO_2 from the environment for their photosynthesis. During study we had found that waste water treatment using microalgae has number of positive applications over the conventional methods as it is useful in Wastewater treatment, CO2 sequestration, Cost effective, Sanitation and also in the production of renewable sources of energy such as Biodiesel, Biofuel, Glycerol, Methane gas, Hydrogen gas, Biofertilizers etc. This Green technical method for treatment of municipal waste water using microalgae should be applied in all developing and developed countries for wastewater treatment so as to protect the environmental pollution causing due to waste water from industrial and Societies effluents.

*****

BC-140.No.147-2014

Fungus, *Botryodiplodia deccanii* from Mohgaonkalan Cherts, M.P.

Puranik SD

Shri Shivaji Science College, Nagpur

ABSTRACT

Present paper deals with fungi imperfecti from Deccan Intertrappean beds of Mohgaonkalan Cherts. The microscopic studies of fossil material revealed prevalence of pycnidia. The Pycnidia were found black coloured and compact, round, halfmoon or semicircular in shape. Semicircular pycnidia opened to exterior by ostiole. The hyphae branched septate and multicellular forming pseudoparenchymatous fungal tissue. The conidiophores branched, conidia bicelled, dark coloured, elongate to ovoid. These characteristics of fossil material from Deccan Intertrappean beds of Mohgaonkalan Cherts resembled with pycnidia of fungal genera *Botryodiplodia*

*****

BC-144.N0.151-2014

Analysis of SPM(suspended particulate matter) level in Amravati city

Jane Manisha and Ingole Sangita

Department of Environmental Science, Shri Shivaji Science College Amravati.

ABSTRACT

The health effects of air pollution have been subject to intense study in recent years. Exposure to pollutants such as airborne particulate matter has been associated with increases in mortality and hospital admissions due to respiratory and cardiovascular disease. Suspended particulates matter in ambient air of three stations in Amravati city was collected using a high volume sampling technique. Attention was focused on the roadside, street-level concentration. The sampling was conducted two days in a week. selected location for sampling as MIDC Amravati, Raja Kamal square, Amravati, shri shivaji science college Amravati. This will create awareness within society about health effect.

Key words: Air Pollution, , SPM level, Analysis, health, awareness

*****

BC-145.No.152-2014

Monitoring and analysis of noise level in Amravati City

Thakre AD, Mundwaik GP, Kakde AU and Mankar RN

Dept. of Environmental Sci. Shri Shivaji Science College, Amravati

ABSTRACT

Noise generally is known as unwanted and unwelcome sound. Due to increasing motorization, construction of flyovers and growth in transport network, the noise level has exceeded the prescribed limits in many Indian cities. During the present study the noise levels were measured with the help of noise level meter. The Noise Pollution is increasing considerably. By using sound level meter noise levels are measured at different locations particularly during festivals days, the observation were made twice a day during Ganesh festival, Navratri and Diwali. It was understood clearly from our study that noise level elevated the main sources of noise pollution are loud speakers D.J., drum.s Major effects of noise pollution include interference with communication, sleeplessness, and reduced efficiency Public education appears to be the best method as suggested by the respondents. However, government and NGOs can play a significant role to avoid it. The present paper deals with monitoring of Noise Pollution at different places of Amravati City.

Keywords: Noise level meter, dB (A) decibel, Amravati.

*****

BC-146.No.153-2014

Solar Water Disinfection in Akola District : study for change in mpn, mpn reduction efficiency and properties of water

Tale SS, Gaikawad VB and Ingole SP

Dept. of Environmental Science, Shri Shivaji Science College, Amravati

ABSTRACT

To get clean and hygienic drinking water is global challenge .Contaminated water causes gastrointestinal illness. The majority of these cases occur in rural areas of developing nations where the water supply is polluted with a variety of pathogenic and non pathogenic organism as adequate sanitation is not available. The present research paper attempts to identify and characterize the inactivation process in operation when drinking water is contaminated, is stored in transparent plastic bottles that were exposed to sunlight. The role of sunlight in activation mechanics were studied in details by measuring water temperature, light intensity, pH, turbidity and MPN which were recorded during a series of solar disinfection procedure carried out at Akola city. The highest light intensity and temperature are responsible for the change in physicochemical property of water as well as MPN and MPN reduction efficiency. The result shown the maximum efficiency of 66.67% with the temperature of the water 46.07^{o} C and time of solar exposure of 5 hrs.

*****

BC-147.No.154-2014

Traditionally used Medicinal plants to cure cuts & wounds in Yavatmal district, Maharashtra, India.

Metkar Varsha P and Tarar JL

Department of Botany, Institute of Science, Nagpur.

ABSTRACT

Yavatmal District is rich in ethnobotanical plants. In present paper 28 plant species belonging to 26 families used to cure cuts & wounds have been documented. The aim of the present research is to record the indigenous knowledge about medicinal plants. The botanical name, local name, family, plant parts used & traditional practice of 28 species are discussed here for the treatment of various ailments.

*****

BC-152.No.158-2014

Studies on Isolation and Identification of AM fungi in *Zingiber officinale* Rosc

Khodke SP[1], Maggirwar RC[2], Deotare PW[2] and Hedawoo GB[2]

[1]*Vinayak Vidynan Mahavidyalaya,Nandgaon(Kh.)*
[2]*Post Graduate Department of Botany,Shri Shivaji Science College, Amravati, India.*

ABSTRACT

A study was conducted to identify arbuscular mycorrhial association in *Zingiber officinale* Rosc.from Tapovan,Amravati. *Zingiber officinale* Rosc. (ginger) belonging to Zingiberaceae family is one of the important plants in Ayurvedic and herbal medicine. During the present study, rhizosphere soil samples and rhizomes were collected. The physico-chemical characteristics of soil sample was analyzed and showed pH(7.94);Ec (0.27^{-dsm}); Organic Carbon (1.92%); N(860.16 Kg/ha);P(25.27 Kg/ha) and K(1042.7 Kg/ha). Result revealed prevalence of 86.25% root colonization with high density of vesicles and mycelia. AM fungal propagules ranged from 252 to 525/100g of soil. Spores of 10 morphotypes belonging to two genera (*Glomus* and *Acaulospora*) were isolated and identified. AM structure was reported in scaly leaves of rhizome. This study confirmed colonization of rhizome by AM fungi.

Key words: Mycorrhiza, AMF, ginger

*****

BC-153.No.159-2014

Deforestation on human scale results in decline biodiversity truth in Vidarbha: A Reveiw

Meshram Pramod and Meshram CB

Department of Zoology,Shri Shivaji Science College, Amravati, Amravati – 444603. India

ABSTRACT:
Deforestation on human scale results decline the biodiversity and on natural global scale is known to cause the extinction of many species . The destruction or removal of areas of forest cover has resulted in a degraded environment with reduce biodiversity. Vidarbha (Maharashtra) occupied 17%Area cover of dense forest in Amravati, Buldhana, Akola, Bhandara, Chandrapur, Yavatmal and majorly Gadchiroli district of Maharashtra state but due to illegal forest cutting the biodiversity decline may accurse at fast rate.Gadchiroli district is one of the major district in forest cover and about 78% forest land occupied by forest area. It has been estimated that we are losing 137 plants, animal and insect species every single day due to rain forest deforestation Forest support biodiversity providing habitat for wild life moreover forest foster medicinal conservation. In recent trends in decline biodiversity due to forest cutting in the study of conclusion of International conferences by different scientist and experts who works on biodiversity at national and international level.

Key Words –Biodiversity, Decline, Deforestation

AUTHOR INDEX (Research Articles)

AUTHOR INDEX (Abstracts)

AUTHOR GUIDELINE

INSTRUCTION FOR PREPARING THE MANUSCRIPT:

International Journal of Life Sciences publish research papers, case studies and short communications containing original research work of good standard and review papers of contemporary relevance from all over the world. Following types of contributions are considered for publication:

RESEARCH PAPERS (Full Length - Maximum of 12 pages-A/4 size).
CASE STUDIES
SHORT COMMUNICATIONS
REVIEW PAPERS including Mini Reviews

Author can send manuscript as an attachment on email to editorilsci@gmail.com.

Manuscript format should be in MS word only. Charts, Tables and Diagrams should be in MS Excel or MS Word and images in JPG format using maximum possible 150 dpi resolution. All the matter should be typed in Times New Roman Font size - 12 point with single spacing.

AUTHORISATION AND DECLARATION

Authors must accept full responsibility for the content of their articles. The Members of the Editorial Board and the Publisher of the journal are not responsible for the statements and opinions expressed by the authors in their articles/write-up published in the journal. To use the copyrighted material (for example table, figure etc.), the author/s must seek the permission from the Author/s and Publisher of the material and send the copy of the permission letters via e-mail to the Administrative Editor for records. In case, if it is not possible than do not use that material.

While submitting the paper the author (s) must give a declaration that "the article has not been published or sent for publication elsewhere".

INSTRUCTIONS FOR MANUSCRIPT-FORMAT

a) Page Layout: A4 (21cm × 28 cm) leaving 2 cm margin on all sides of the text. All the text Should be single spaced and the pages should be numbered consecutively.

b) Use MS word (2003-2007) for text and TIFF, JPEG or Paint for figures.

c) The first page should contain:

Title-bold, 16 point size

Name/s of author/s-bold, 10 point size (Surname or Family name first in bold) Affiliation/s-address of all the author/s followed by *email of corresponding author in 10 point size*,

Abstract: up to 200 words in 10 point size

Keywords- at least 5 keywords in 10 point size

d) Main Text-The paper should be divided into the following sections:

Introduction, Material and Methods, Results and Discussion, Conclusion, Acknowledgement and References.

Tables and Figures of good resolution (150 dpi) should be numbered consecutively and given alphabetically by surname or family name in the order of their appearance in the text.

e) Reference style

Text: All citations in the text should refer to:

1. Single author: the author's name (without initials, unless there is ambiguity) and the year of publication;

2. Two authors: both authors' names and the year of publication;

3. Three or more authors: first author's name followed by "et al." and the year of publication.

Citations may be made directly (or parenthetically).

Groups of references should be listed first alphabetically, then chronologically.

Examples: "as demonstrated (Baig, 2004a, 2004b, 2010; Chavhan and Pawar, 2011). Jadhao et al., (2000) have recently shown…

Reference to a journal publication:

Chavhan AB, Pawar SS, Jadhao RG and Patil KG (2013) Distribution of CC-chemokine receptor-5-Δ32 allele among the tribal and caste population of Vidarbha region of Maharashtra state, *Indian J Hum Genet*., 19 (1) 65-70.

A Book:

Durbin R, Eddy SR, Krogh A, Mitchison G (1999) Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids. Cambridge University Press.

A Chapter in a Book:

Leach J (1993) Impacts of the zebra mussel (Dreissena polymorpha) on water quality and fish spawning reefs of Western Lake Erie. In Zebra mussels: biology, impacts and control, Eds., Nalepa, T. and D. Schloesser. Ann Arbor, MI: Lewis Publishers. pp: 381-397.

Report:

Makarewicz JC, Lewis T, Bertram (1995) Epilimnetic phytoplankton and zooplankton biomass and species composition in Lake Michigan, 1983-1992. U.S. EPA Great Lakes National Program, Chicago, IL. EPA 905-R-95-009.

Conference Proceedings:

Chavhan AB (2012) Biomedical Waste Management: Awareness and Practices among Healthcare Providers in Amravati". Proceeding of national conference on *Recent Trends and Innovative Development in the Frontiers of Life Science*. pp-148-153. (ISBN-978-93-81733-04-2).

A Thesis:

Chavhan AB (2012) Genetic polymorphism of Chemokine receptors in some tribes of Vidarbha, Maharashtra. Ph. D. Thesis, RTM University, Nagpur, M.S., India;.

Web references:

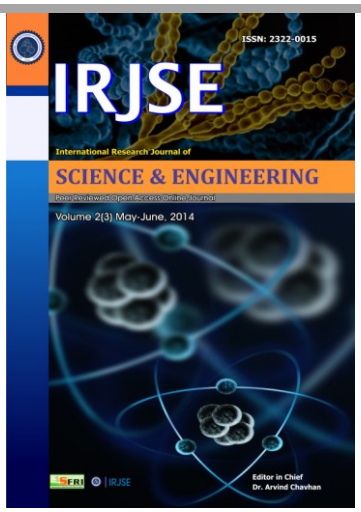
As a minimum, the full URL should be given and the date when the reference was last accessed.

PROOFS

Proofs will be sent to the corresponding author via e-mail as an Acrobat PDF (Portable Document Format) which should be returned to the Editorial office within 2 working days. Acrobat Reader will be required in order to read the PDF.

PROCESSING FEES

Please send the Membership subscription or processing fees. Processing fees (Rs. 2000/- for India & US$ 120/- for Overseas) has to be paid every time when one submits the manuscript. Life members need not pay processing fees. If one is Annual member, then one can submit two manuscripts during the annual membership. If one submits more than three manuscripts in a year, one has to pay processing fees from fourth manuscript onwards



ISSN: 2322-0015

INTERNATIONAL RESEARCH JOURNAL OF

SCIENCE & ENGINEERING

An International Peer Reviewed Open Access Bi-Monthly Online Journal
ISSN: 2322-0015
http://www.irjse.in
Published in: February, April, June, August,
October & December

EDITOR-IN-CHIEF:
Dr. Arvind Chavhan

Email: editorirjse@gmail.com

ISSN: 2320-7817 (Print) ISSN: 2320-964X (Online)
Journal home page : www.ijlsci.in

Contact : +91-997 055 9438
+91-942 077 5527

INTERNATIONAL JOURNAL OF LIFE SCIENCES

An International Peer Review Open Access Journal

G-3 Dattamandir, Vinayak nagar, Nagpur Road,
Amravati- 444603, India

MEMBERSHIP FORM

The Editor,

I wish to be a member of **International Journal of Life Sciences (IJLSCI)** and agree to abide by the rules setup by you. The filled in proforma is:

(1) Full Name (in block letters) :

(2) Gender :

(3) Nationality :

(4) Working status and Department :

(5) Field of Research :

(6) Mailing Address :

(7) City : State :

Country : Pin :

(8) Phone (O):..... (R): ..... (M): .....

(9) E-mail :

(10) Nature of Subscription: Annual Membership / Life Membership / Fellow Membership

MEMBERSHIP	ANNUAL		LIFE		FELLOW	
	Indian	Overseas	Indian	Overseas	Indian	Overseas
Individual :	INR. 2,500/-	US $ 150	INR. 10,000/-	US $ 550	INR. 15,000/-	US $ 850
Institutional :	INR. 3,500/-	US $ 250	INR. 15,000/-	US $ 850	INR. 25,000/-	US $ 1700

Mode of Payment

INRs./US$/Euro can be remitted by online payment/E-Money Transfer/Wester Union Money Transfer/Bank Demand Draft/Cheques (at par only)/Cash mentioning Receipt No. and date.
Detail of transfer process is as follows:

A/c No.	:	31033988127
MICR Code.	:	444002976
Branch Code	:	003866
IFS Code	:	SBIN0003866
Branch Address	:	State Bank of India, Old Biyani College Road Tapowan Road Distt Amravati Maharashtra 444602
Full Name of Receiver	:	**ARVIND BHIMRAO CHAVHAN**
Full Address (Including City, Street & Postal Code)	:	G-3 Dattamandir, Vinayak nagar, Nagpur Road, Amravati- 444603, India.

Date .....

Signature.....

Name .....

Email this Membership form along with Scan copy of Fees deposit receipt to editorijlsci@gmail.com / editor@ijlsci.in