International Journal of Life Sciences
International Peer Reviewed Open Access Journal

Special Issue A 14, July, 2020
ISSN:2320-7817(p) 2320-964X(0)

Original Article Open Access

Banking for future: An initiative for developing seed bank

Deshmukh RS

Department of Botany, B. Raghunath Arts, Commerce & Science College, Parbhani
Email: rsdeshmukh19@gmail.com

Manuscript details:

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

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

Cite this article as:
Deshmukh RS (2020) Banking for future: An initiative for developing seed bank, *Int. J. of. Life Sciences*, Special Issue, A14: 11-16.

Article published in Special issue of National e-Conference on Recent Aspects in Biosciences-2020" organized by Departmentt of Botany Rashtramata Indira Gandhi College, Jalna, Maharashtra, India date, June 29, 2020.

ABSTRACT

Natural plant populations serve as repositories of genetic diversity. Seed collection is one of the most practical and effective ways for the preservation of wild populations of native plants. It is evident that plant species are already endangered by habitat loss, and the additional threats posed by climate make plant conservation even more challenging. It is an urgent need to initiate collection and conservation of plant genetic resources. Taking this into consideration, the present research work was undertaken to study seed diversity of some native wild plant species of the study region and their conservation through seed bank. For this purpose regular excursions were arranged in the study area to collect seeds of native wild plant species. In all 16 different type of seeds were collected, identified with help of floras and their economic importance was studied through literature and were preserved in seed bank of Department of Botany, B. Raghunath Arts, Commerce & Science College, Parbhani for further studies.

Key words: Biodiversity, Seed bank, Conservation, Flora.

INTRODUCTION

Many plant species are capable of surviving as seed for many years in different climatic conditions (dry/cold) which enables plants to withstand extreme environmental conditions and allows seed dispersal time to time increasing the probability of seed survival, development and establishment of new plants (Pedro Leon-Lobos *et al.*, 2012). The ability of seeds to survive in storage has been successfully applied by gene banks worldwide for the preservation and exchange of plant genetic resources (FAO, 2010). A seed bank is a type of gene bank where seeds of different crop plants and non-crop plant species are stored for future use. Seed banks are created to maintain and protect biodiversity. Seed banks are valuable for the preservation of genetic diversity of non-crop plants threatened by ecosystem and land use changes, over exploitation, pollution and climate change (Millennium Ecosystem Assessment, 2005). Thus seed banking is a necessary and cost effective method of *in situ* conservation of seeds of wild plant species and it provides a vital source of material to help in ecological restoration of wild plant species (Maunder *et al.,* 2004).

MATERIALS AND METHODS

I) Study area

Marathwada region comprising of eight districts viz. Aurangabad, Beed, Osmanabad, Jalna, Latur, Nanded, Hingoli and Parbhani which forms the part of the vast Deccan plateau of India and its located at 70° 5'-78° 5' E longitude and 17° 5'-20° 5' N longitude.

II) Collection methods

In general, dry fruits are harvested into paper envelopes or bags while moist fruits are collected in plastic bags, buckets, etc. Fruits can be hand plucked or knocked from the parent plant, whole plants can be harvested, inflorescences with ripe or ripening seed can be cut and placed into collection bags, or ripe seed can be shaken directly into baskets, sheeting, or bags placed under the plant. Cloth bags can be securely placed around ripening fruits to catch the seed during their natural dispersal period. This method is helpful for those species that are dehiscent. Cloth bags come in a variety of sizes up to 8" x 12".

III) Identification of plants/seeds:

A flowering twig along with fruits and seeds were brought to laboratory and identified on the basis of their natural characters with the help of identification keys and floras (Naik, 1998; Yadav and Sardesai, 2002).

IV) Processing: To improve seed purity and decrease the percent of empty or less viable seed, weed seeds, the seeds of other plants and empty seeds were removed. Dirt, leaves, stems and chaff from the seeds was removed to reduce the bulk for handling and storage. To remove moisture seeds were sun dried or oven dried in order to prevent mold formation in storage (Vallentine, 1971). Many insects attack stored seeds and spoil seed collection. For this, a 20% solution of Malathion in water followed by a drying period was done. As an alternative to fungicides, seeds were surface sterilized before storage. (Dumroese *et al*., 1988).

V) Storage: Storage conditions are critical in order to maintain seed viability over an extended period of time. Collected and processed seeds were stored in air tight plastic containers with detailed label information about the seed. Such seeds are kept in Seed Bank of Department of Botany, B. Raghunath Arts, Commerce & Science College, Parbhani.

RESULTS AND DISCUSSION

During the present research work visits to different parts of Marathwada region during different seasons were done and in all, seeds of 16 different plants were collected, identified and preserved in laboratory. The details of collected seeds are mentioned in this part.

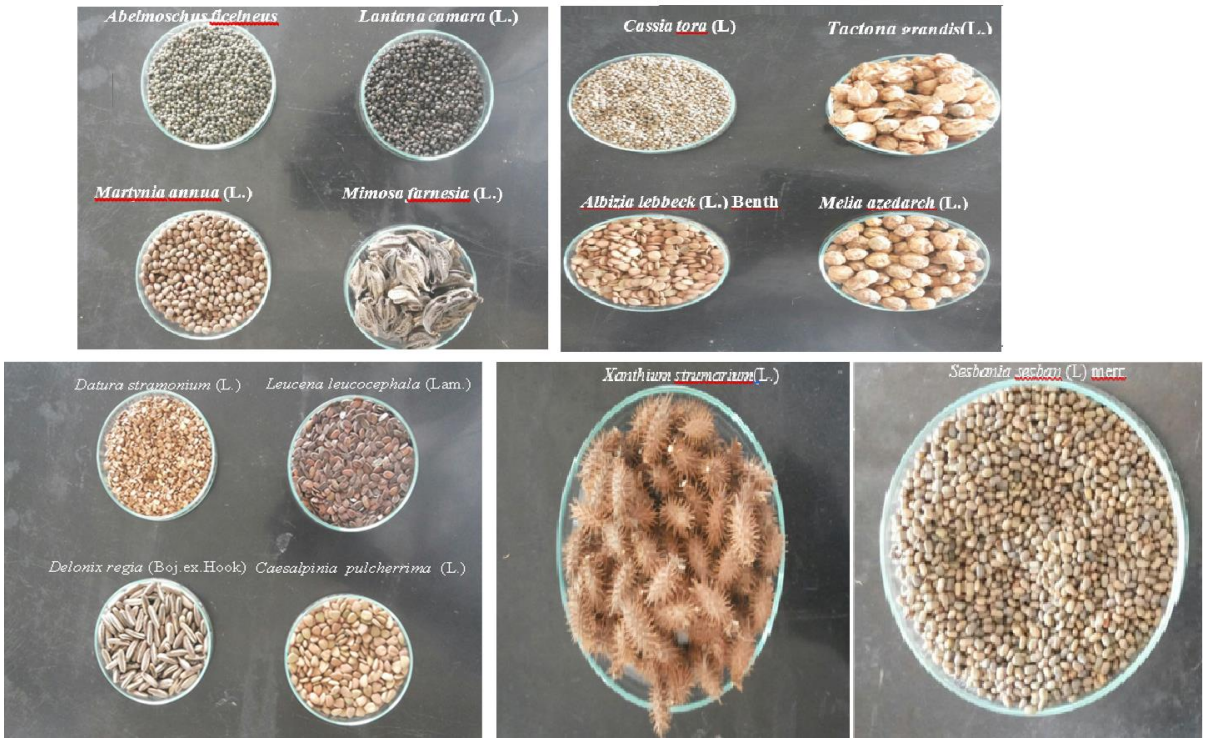

Photo Plate 1: Collected Seeds of Wild Plants

I) Collection of seeds from different localities:

For this regular excursions were arranged in study area to collect seeds of different wild plant species. In general, dry fruits are harvested into paper envelopes or bags while moist fruits are collected in plastic bags, buckets, etc. Fruits can be hand plucked or knocked from the parent plant, whole plants can be harvested, inflorescences with ripe or ripening seed can be cut and placed into collection bags, or ripe seed can be shaken directly into baskets, sheeting, or bags placed under the plant. Cloth bags can be securely placed around ripening fruits to catch the seed during their natural dispersal period. This method is helpful for those species that are dehiscent.

II) Identification of seed plants

A flowering twig along with fruits and seeds were brought to laboratory and identified on the basis of their natural characters with the help of identification keys and floras (Naik, 1998). The identified plants are mentioned in Table: 1.

III) Economic importance of collected seed plants

The economic importance of collected seed plants and their seeds was studied by using floras and online search and mentioned in table no. 2

Table 1: List of Collected Seeds of Wild Plants.

Sr. No.	Name of Plant source	Common Name	Family
1	*Caesalpinia pulcherrima* (L.)	Shankasur	Fabaceae
2	*Leucena leucocephala* (Lam.)	Hawaijant	Fabaceae
3	*Delonix regia* (Boj. ex Hook)	Gulmohor	Fabaceae
4	*Datura stramonium* (L.)	Dhotra	Solanaceae
5	*Tactona grandis* (L.F.)	Sagwan	Lamiaceae
6	*Cassia tora* (L.)	Tarota	Caesalpinaceae
7	*Melia azedarch* (L.)	Bakan limb	Meliaceae
8	*Albizia lebbeck* (L.) Benth.	Shiras	Fabaceae
9	*Martynia annua* (L.)	Waghnakhya	Martyniaceae
10	*Lantana camara* (L.)	Ghaneri	Verbenaceae
11	*Abelmoschus ficelneus* (L.)	Ranbhendi	Malvaceae
12	*Mimosa farnesia* (L.)	Gukikar	Fabaceae
13	*Abutilon indicum* (Link)	Petari	Malvaceae
14	*Xanthium strumarium* (L.)	Landga	Asteraceae
15	*Sesbania sesban* (L) merr.	Shevari	Fabaceae
16	*Citrullus colosynthis* (L.) Schard	Waluk	Cucurbitaceae

Table 2: Economic importance of collected seed plants

SN	Name of Plant	Economic importance of plant
1	*Caesalpinia pulcherrima* (L.)	• The root is also said to induce abortion in the first trimester of pregnancy. • Used as food in Mexico • Ailments treated include gastritis and intestinal inflammation, diarrhoea and dysentery. • Seeds of *Caesalpinia* are poisonous. However the seeds of some species are edible before they reach maturity (e.g. immature seeds of *C. pulcherrima*) or after treatment (e.g. *C. bonduc* after roasting).

2	*Leucena leucocephala* (Lam.)	• *Leucaena* has long been used as shade in tropical plantation crops and as a live support for climbing crops; for this low seed producing types are preferred. • It is also a useful source of poles, timber and firewood. • Recently it has been recommended for contour planting in small scale tropical farming systems as a means of soil conservation and fertility maintenance. • High seeding types are a nuisance because of the many seedlings that germinate and compete with the crop as well as invading elsewhere, sometimes ousting the indigenous vegetation. • The seeds contain mimosine, an amino acid known to be toxic to nonruminant vertebrates.
3	*Leucena leucocephala (Lam.)*	• Flowers are reputed to produce bee forage. • The large pods as well as the wood are used for fuel. • The sapwood is light yellow, and the heartwood is yellowish to light brown. Bark has medicinal properties. • The seeds contain gum that may find use in textile and food industries.
4	*Datura stramonium* (L.)	• Datura has been used in traditional medicine to relieve asthma symptoms and as an analgesic during surgery or bone setting. • It is also a powerful hallucinogen and deliriant, which is used entheogenically for the intense visions it produces. However, the tropane alkaloids responsible for both the medicinal and hallucinogenic properties are fatally toxic in only slightly higher amounts than the medicinal dosage, and careless use often results in hospitalizations and deaths. • In Ayurveda, datura has long been used for asthma symptoms. The active agent is atropine. The leaves are generally smoked either in a cigarette or a pipe. An individual *Datura* seed contains about 0.1 mg of atropine, and the approximate fatal dose for adult humans is >10 mg atropine or >2–4 mg scopolamine. (Arnett, 1995)
5	*Tactona grandis* (L.F.)	• Teak has been used as a boatbuilding material for over 2000 years • Teak has the unusual properties of being both an excellent structural timber for framing, planking, etc.
6	*Cassia tora* (L.)	• The edible part of the plant varies from 30 to 40 percent. • Young leaves can be cooked as a vegetable while the roasted seeds are a good substitute for coffee. • It is used as a natural pesticide in organic farms and its powder is most commonly used in the pet food industry. • Alternatively, it is mixed with guar gum for use in mining and other industrial applications. • The plant and seeds are edible. The seeds and leaves are also used to treat skin disease and its seeds can be utilized as a laxative.
7	*Melia azedarch* (L.)	• Leaves are lopped for fodder and are highly nutritious. • Fuel wood is a major use of *M. azedarach*. It has a calorific value is 5100 kcal/kg. • Oil suitable for illumination has been extracted experimentally from berries. • The hard, five-grooved seeds were widely used for making rosaries and other products requiring beads; however, the seeds were later replaced by plastics.
8	*Albizia lebbeck* (L.) Benth	• Widely planted for shade in gardens, and as a roadside tree in India. • Due to its extensive, fairly shallow root system, *A. lebbeck* is a good soil binder and is recommended for soil conservation and erosion control. The nitrogen-rich leaves are valuable as mulch and green manure and in Kerala, India, it is grown specifically for this use in paddy fields. • Extracts from the seed, flowers, fruit, bark and leaves have been used medicinally. • The nutritional value of *A. lebbeck* seed as human food has been studied.

9	*Martynia annua* (L.)	• The plant has medicinal values. In tribal pockets of Chhindwara and Betul Districts, Madhya Pradesh, root decoction is administered for snakebite. In Marudhamalai hills, tribes use the juice of leaf for epilepsy, tuberculosis and sore throat.
10	*Lantana camara* (L.)	• Studies conducted in India have found that *Lantana* leaves can display antimicrobial, fungicidal and insecticidal properties. • *L. camara* has also been used in traditional herbal medicines for treating a variety of ailments, including cancer, skin itches, leprosy, rabies, chicken pox, measles, asthma and ulcers. • The ripe seeds are put through a press to make oil for cooking. • Nonetheless, an anecdotal report has been made that in Brazil some people use the seeds of *V. farnesiana* to eliminate rabid dogs. This is attributed to an unnamed toxic alkaloid • The concentration of tannin in the seed pods is about 23%.
11	*Abelmoschus ficelneus* (L.)	• The stem yields a white fibre used for twine and light chordate. • It is cultivated as vegetables. In India a decoction of the crushed fresh root is taken to case of calcium deficiency. In case of scorpion bite the root is cultivated in a glass of water and drunk while root pest is applied on the area of the sting. • Seed are used in Arebia to improve the test of coffee, leaves crushed with salted water are used in Indonesia against diarrhea.
12	*Mimosa farnesia* (L.)	• The bark is used for its tannin content. Highly tannic barks are common in general to acacias, extracts of many being are used in medicine for this reason. • The leaves are used as a tamarind flavoring for chutneys and the pods are roasted to be used in sweet and sour dishes. • The flowers are processed through distillation to produce a perfume called **Cassie**. It is widely used in the perfume industry in Europe. Flowers of the plant provide the perfume essence from which the biologically important sesqui terpenoid farnesol is named. • Scented ointments from Cassie are made in India. • The concentration of tannin in the seed pods is about 23%. • The ripe seeds are put through a press to make oil for cooking. Nonetheless, an anecdotal report has been made that in Brazil some people use the seeds of *V. farnesiana* to eliminate rabid dogs. This is attributed to an unnamed toxic alkaloid.
13	*Abutilon indicum* (Link.)	• Used as a demulcent, aphrodisiac, laxative, diuretic, sedative, astringent, expectorant, tonic, anti-inflammatory, anthelmintic, and analgesic and to treat leprosy, ulcers, headaches, gonorrhea, and bladder infection. The whole plant is uprooted, dried and is powdered. In ancient days, maidens were made to consume a spoonful of this powder with a spoonful of honey, once in a day, for 6 months until the day of marriage, for safe and quick pregnancy. • The plant is very much used in Siddha medicines. The root, bark, flowers, leaves and seeds are all used for medicinal purposes by Tamils. • The leaves are used as adjunct to medicines used for pile complaints. The flowers are used to increase semen in men. • It is digestive, laxative, expectorant, diuretic, astringent, analgesic, anti-inflammatory, anthelmintic, demulcent and aphrodisiac. • This plant is useful in gout, tuberculosis, ulcers, bleeding disorders, and worms. It cures burning sensation. • Decoction used in toothache and tender gums. Leaves are locally applied to boils and ulcers. Roots are used in fever, chest affection and urethrities.
14	*Xanthium strumarium* (L.)	• It has many medicinal properties like cooling, laxative fattening, anthelmintic, tonic, digestive, antipyretic, improves appetite, voice complexion anodyne, Antirheumatic,

		appetizer, diaphoretic, diuretic, emollient and sedative. • The plant is considered to be useful in treating long-standing cases of malaria, rheumatism, diseased kidneys, tuberculosis. • The fruits and seeds of *Xanthium strumarium* has the properties like anodyne antibacterial, antifungal, antimalarial, Antirheumatic, antispasmodic, antitussive, cytotoxic, hypoglucemic and stomachic. • They are used internally in the treatment of allergic rhinitis, sinusitis, catarrh, rheumatism, rheumatoid arthritis, constipation, diarrhea, lumbago, leprosy and pruritus.
15	*Sesbania sesban* (L) merr.	• The origins of *S. sesban* are unclear but it is widely distributed and cultivated throughout tropical Africa and Asia. Until recently, the use of perennial *Sesbania* species has largely been restricted to south and southeast Asia. In India, these crops have had a long history of agricultural use, primarily as green manures and as sources of forage. Most of the early research on the use of perennial *Sesbania* for forage production was conducted in India. • Seed storage behaviour is orthodox. Viability can be maintained for 2 years in open storage at room temperature. The saponin, stigmasta-galactopyranoside, which is isolated from the seeds, has glucuronide derivatives of oleanolic acid, which has molluscicidal activity against Biophalaria glabrata, one of the known snail vectors of schistosomiasis. The saponin also shows spermicidal and haemolytic activity. Using S. sesban leaf meal in poultry diets (as 10% of the diet) is fatal to young chicks, and the provision of either cholesterol or sitosterol with the diet significantly improves chick survival.
16	*Citrullus colosynthis* (L.) Schard	• The ripe fruit and seed are used as a medicine. Despite serious safety concerns, colocynth is used for diabetes, high cholesterol and blood fats called triglycerides, constipation, and tuberculosis. It is also used in combination products for treating liver and gallbladder ailments.

Suggestions For further/future studies

- Seed collections from different localities is a hard task so upcoming students should contribute to collect and conserve seeds through seed bank.
- This activity will increase the knowledge of students about seed saving.
- Thus seed bank contribute to diversifying and sustainably improving livelihoods.

REFERENCES:

Arnett AM (1995). Jimson Weed (*Datura stramonium*) poisoning. *Clinical Toxicology Review*. 18 (3).

Dumroese RK, James RL, Weeny DL and Gilligan CJ (1988). Douglas-fir seed treatments:effects on seed germination and seed-borne organisms. *Proceedings Combined Meeting of the Western Forest Nursery Council and Intermountain Nurseryman's Association*, USDA Forest Service Forest and Range Experiment Station RM -167. Fort Collins, CO. 155.

FAO (2010). The second report on the state of the world's plant genetic resources. *Food and Agriculture Organization. United Nations. Rome (Italy).*

Maunder M, Guerrant EO, Havens K, Dixon KW (2004). Realizing the full potential of ex situ contributions to global plant conservation. In: Guerrant Jr, Havens K, Maunder M, editors. Ex situ plant conservation: supporting species survival in the wild. *Society for Ecological Restoration International. Center for Plant Conservation. Washington: Island Press*.389–418.

Millennium Ecosystem Assessment (2005). Ecosystems and human well-being: synthesis. *World Health Organization. Washington, DC: Island Press.*

Naik VN (1998). Flora of Marathwada, Vol.I-II.AmrutPrakashan, Aurangabad, M.S. (India).

Pedro León-Lobosa,b, Michael Wayc , Patricia D. Arandad and Manuel Lima-Juniore (2012). The role of ex situ seed banks in the conservation of plant diversity and in ecological restoration in Latin America. *Plant Ecology & Diversity,* iFirst, 1–14.

Vallentine JF (1971). Range Development and Improvements. *2nd ed. Brigham Young University Press. Provo*, UT. 281-289.

Yadav SR and Sardesai MM (2002). Flora of Kolhapur District, Shivaji University, Kolhapur (India). 1-680.