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Physiological status of selected seeds under the influence of *Terminalia arjuna* gum

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ABSTRACT

The present study was impact of different time period of *Terminalia arjuna* plant gum concentration on incidence of seed germination of cereals, pulses and oil seeds. The *Terminalia arjuna* commonly known as *arjuna*, belongs to the family of Combretaceae. Its bark decoction is being used in the Indian subcontinent for anginal pain, hypertension, congestive heart failure, and dyslipidemia, based on the observations of ancient physicians for centuries. Gum is naturally occurring chemical compounds in the plant. Gums are natural exudates part of stems or from the wounds of the plants. Physical, chemical and Biological Antimicrobial properties of gum change as per the eco-climatic condition of the plant. There is different name of plants based on their locality. Gum is a substance which exudates naturally from the stem or from the wounds of trees. Gums are colloidal in nature soluble in water but completely insoluble in alcohol and ether. Impact of different time period of select plant gum concentration on incidence of seed germination of cereals, pulses and oil seeds like wheat, jowar, cowpea, gram, safflower and soybean. Percent germination or percent inhibition of germination, root and shoot length of seedlings was measured after 7 days of incubation at room temperature. were studied and results shows the impact of *Terminalia arjuna* gum was found to enhance the germination of wheat, jowar, cowpea, and soybean at 10 hour treatment.

Keywords: Gum, *Terminalia* Seed Germination.

INTRODUCTION

The plant gum is graded according to its flavour, colour, shape and size. In India, the States of Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh, Jharkhand and Chhattisgarh are the main source of the plant gum. The gum-resin of commercial importance collected from the forest are gum gum karaya, gum ghatti, salai gum, guggul and gums from various

species of *Acacia*, including Indian gum arabic from *Acacia nilotica* and true gum Arabic from A, Senegal. The importance of commercial resin are obtained from Pinaceae (rosin, amber) Leguminosae (copal) and Dipterocarpaceae (dammar) Families. (Babu and Murugan, 1998). The application of natural gums and resins in food, medicines and in varnishes or as protective coatings go back to very early times. The present day uses of natural gums and resins are numerous and they are employed by a large number of manufacturing industries including food and various pharmaceutical industries. The *Terminalia arjuna* gum extract as a source of reducing and stabilizing compounds (Naivf *et al.,* 2016).

Gums are a group of plant product resembling carbohydrates and widely distributed in vegetable kingdom. The vegetable gum constitute an important group of economic plant product and are utilize in several ways. It is very commonly used by human being from ancient time. Nowadays in modern industry large quantity of gum have been used for manufacture of pharmaceutical products. The Terminalia gum have important drugs. It is very much necessary that the drugs should be properly identification no other substitute should be used (Misra *et al.,* 2018). Gums are characterized by ability to dissolve in water forming viscid solution by absorbing water to form jelly gelatinous paste. When this jelly exposed to air this gelatinous paste loose the water and dry to hard clear or with different colour Gums are characterized by ability to dissolve in water forming viscid solution by absorbing water to form gelatinous paste. In some cases the production of gum has been attributed to fungi attacking the plant, these fungi being responsible for enzymes that penetrate the tissues and transform the celluloses and hemicelluloses of the cell wall into gum. (Zalucki and Malcollum 1999).

The polysaccharides extracted from Terminalia gum were evaluated for its safety and potency towards pre formulation studies as a pharmaceutical excipient. The study was undertaken with an objective polysaccharide has shown the contents of carbon, hydrogen and nitrogen contents to be 39.31, 5.56 and 0.18 (w/w %) respectively to expound the physicochemical, thermal and functional properties of polysaccharide obtained from Terminalia gum. A purified component of polysaccharide was isolated from Terminalia gum (Das *et al.,* 2014).

Malcolm (1936) concluded that the production of gum in Sudan gum Arabic trees is due to bacterial agency. The real cause of production of gum in many trees is uncertain. The best use of gum is to prepare sticky substance for pasting the paper and other things. Treatment of gums to seeds has positive effect on seed germination. *Acacia* gum is being widely used as an experimental vehicle for drugs in physiological and pharmacological experiments, and it is supposed to be an inert substance, recent reports have confirmed that it has some biological properties as an antioxidant (Trommer and Neubert, 2005; Ali and Al Moundhri, 2006, Hinson *et al.,* 2004) on the metabolism of lipids (Tiss *et al.,* 2001, Evans *et al.,* 1992), positive contribution in treating kidney, (Matsumoto *et al.,* 2006; Bliss *et al.,* 1996, Ali *et al.,* 2008), cardiovascular (Glover *et al.,* 2009) and gastrointestinal diseases (Wapnir *et al.,* 2008, Rehman *et al.,* 2003). *Acacia* gum is usually referred as Gum Arabic (GA). It is an edible biopolymer obtained as exudates of mature trees of *Acacia* spp. The exudates is a non-viscous liquid, rich in soluble fibbers, and its emanation from the stems and branches usually occurs under stress conditions such as drought, poor soil fertility, and injury (Williams and Phillips, 1990).

Gums are to be found in a greater or less degree in most plant families. The gum occurs in about 44 families covering 1,900 genera and 21,000 species. Various organs of the plant may produce or secrete them. They may be produced only in very small quantity and not be readily discernible or they may be produced very copiously forming large, conspicuous incrustations on the surface, as with most of the commercial gums, particularly the tree gums. Certain families of flowering plants are notable for the number of species they contain that are free gum yielders. Among them notable is the Leguminosae, in which a hundred or more species of *Acacia* alone are known to yield gum, including those that are commercially important for gum arabic. Several species of *Astragalus* are also free gum yielders and are the source of gum tragacanth. Some additional notable gum yielding genera in the family are *Albiszia, Bauhinia, Caesalpinia, Ceratonia* and *Pithecolobium*. Other important gum yielding families are Anacardiaceae, Meliaceae, Rosaceae Rutaceae and combretaceae.

MATERIAL AND METHODS

Collection of Gum samples:

Plant gums were regularly collected in all the seasons. It was done by using axe, sterilized blade. Fine cut was made at different parts of the plant, like root, stem, leaves, flower and fruits. Later on at 30, 45 and 60 days exudates gums where collected in presterlized plastic bags, kept in laboratory condition until it was used (Badar, 2011).

Preparation of fine powder of Gum:

The fine powder of collected dry gums was prepared by using mixer grinder and kept in clean glass pots at 4-6^{0}C temperature.

Application of gum on seed germination:

The effect of different time period (1 hr, 3 hr, 5hr, 10hr) of plant gum on seed germination and the impact of different concentration like 1%, 2%, 3% and 4% on cereal, pulses and oil seeds of seed germination effect has been studied. The impact of different time period of percent gum concentration of were studied *Terminalia arjuna* the germination of cereals, pulses and oil seeds like wheat, jowar, cowpea, gram, safflower, soybean and the results are summarized in Table. *Terminalia arjuna*gum was applied on germinating seeds for 1-to-10-hour treatments. The results were recorded at different time intervals by measuring shoot length and root length by vigour formula (Abdul and Anderson,1975).

RESULTS AND DISCUSSION

It is clear from the table no. 01 that 1 % concentration of *Terminalia arjuna* gum was found to promote the germination of wheat, jowar and gram at 10-hour treatment. 1 hour treatment was also found to promote the germination of jowar, gram and safflower. The 1-hour gum treatment was also found to promote the shoot and root length of jowar, safflower and soybean. The percentage of germination is similar at 3- and 5-hour treatment. All seeds except cowpea and soybean increased their shoot and root length as compared to control at 3-, 5- and 10-hour treatment.

Table 1: Effect of different time period of *Terminalia arjuna* gum on seed germination.

(1% gum concentration)

Sr. No.	Seed plant Name	1 hr			3 hrs			5 hrs			10 hrs			Control		
		% germ	Shoot length (mm)	Root length (mm)	% germ	Shoot length (mm)	Root length (mm)	% germ	Shoot length (mm)	Root length (mm)	% germ	Shoot length (mm)	Root length (mm)	% germ	Shoot length (mm)	Root length (mm)
1.	Wheat	80	4.1	2.2	80	4.2	3.1	80	5.4	2.7	90	6.1	4.3	80	4.1	2,4
2.	Jowar	80	4.3	5.0	70	4.5	3.6	80	5.3	3.8	90	5.7	4.1	70	4.0	3.1
3.	Cowpea	70	3.2	2..9	70	4.2	2.7	90	4,7	3.1	80	4.5	3.5	80	4.3	3,0
4.	Gram	80	2.9	2.1	80	4.0	3.1	80	3.9	2.8	80	4.3	2.9	70	3.2	2.9
5.	Safflower	80	3.5	2.6	80	4.7	2.5	70	3.3	3.1	70	4.2	3.8	70	3.3	3.4
6.	Soyabean	80	3.6	2.9	80	3.8	2.9	80	4.0	3.6	80	4.9	3.6	80	3.5	3.6

Conflicts of interest: The authors stated that no conflicts of interest.

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