EFFECT OF SEED ORIENTATION ON GERMINATION OF WILD MANGO SPONDIAS PINNATA

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Received 09-12-2016
Accepted 03-07-2017

ABSTRACT

***Spondias pinnata* (Amra) is a deciduous, glabrous tree with edible fruit, growing up to 25 m in height. The tree is found wild and cultivated throughout the tropical Indian subcontinent. A study on influence of seed orientation on seed germination of *S. pinnata* made by sowing the seeds at 2 cm depth in vertical (micropyle end upward), horizontal (micropylar end sideward) orientations. In the present study the vertical orientation performed better than horizontal orientation and total germination recorded was 92% in vertical orientation as compared to horizontal orientation (80%).**

Keywords: *Seed orientation, germination, vertical, horizontal*

INTRODUCTION

Scientific Classification

Kingdom: Plantae
Order: Sapindales
Family: Anacardiaceae
Subfamily: Spondioideae
Tribe: Spondiadeae
Genus: Spondias L.

Spondias pinnata L. F. Kurz (*S. mangifera* Willd.), belongs to family Anacardiaceae, commonly known as Amra is a small or medium sized, deciduous tree. Despite a valuable and threatened plant, Spondias pinnata is not cultivated on a large scale though its bears maximum pressure in natural habitat due to their higher demand for domestic consumption by locals. There is a problem in seed germination in S.pinnata due to its hard seed coat **(Badoni and Bisht, 2009)**. Seeds are also damaged because of the consumption of fruit by birds, monkey and other animals. The trees grow best in fertile, well-drained soils but can be grown satisfactorily in a variety of poorer soils if they are given adequate nutrition. The Spondias species are best adapted to areas which have a marked dry season. Mature trees are quite tolerant of drought and do not require supplemental irrigation. Some irrigation is desirable for establishment of young trees during the first year after planting.

The fruits are eaten ripe, or pickled or made into curries when green and tender. In some areas the fruit is dried in large quantity and shipped to distant markets. The flower - buds also make a very agreeable curry. The fruits are used as a vegetable when green and as a fruit when ripe and flavouring in curry **(Chadah and Patel, 2007)** and the leaves are aromatic and astringent. Fruits are very nutritious and rich in vitamin A, C, minerals and iron content. The bark has traditional medicinal properties **(Mondal and Dash 2009; Hazra *et al.* 2008)**. The bark is recommended for stomach ache, dysentery, rheumatism and swollen joints. The bark is also given to prevent vomiting. Bark is used as purgative and in local applications for leprosy **(Faiz, 2011)**.

The plant is reported to have anti-tubercular properties. The leaves are used for flavoring the infusion of the leaves is used as a treatment of eye inflammation, diarrhoea and venereal diseases **(Faiz, 2011)**. The flowers are sour and used in curry as a flavoring and also eaten raw. Through value addition of this wild edible fruit tree plant the local people make chutney, jam and pickle. By production and marketing of these products, the local people may increase their socio-economic status. The tree is also used as shade and living fence posts.

S. pinnata is also known for its common use in the treatment of infectious diseases like bronchitis, ulcer, diarrhea, dysentery and skin diseases **(Melendez and Capriles, 2006; Grosvenor *et al.*, 1995; Valsaraj *et al.*, 1997; Hout *et al.*, 2006)**. Its roots, bark, leaves are useful and its fruits are also used in traditional medicine **(Badoni and Bisht, 2009 ; Gardner *et al.*, 2000)**. Bark extract of *S. pinnata* has been reported to show antibacterial activity **(Bibitha *et al.*, 2002)**.

The timber is used for making interior furniture. Its wood is employed for packing cases, tea chests and match - splints. Wood is utilized in temporary construction, mouldings, interior finish, drawers, turnery articles, carvings, core stock of plywood and pulp. Because of its lightness and softness, the wood is more suitable in the manufacture of matchsticks, matchboxes, boxes and crates. When young leaves are used as ingredient in meat stew and filling for fish sinanglay, a Bicolano delicacy. Bicolanos also use dried young leaves in the preparation of "laing", a favorite and popular dish among the local people. Leaves are also used as feeds for cattle.

The trunk bark is used as refrigerant, tonic and for the treatment of muscular rheumatism and in dysentery and diarrhea. Dark brown coloured gum of the tree is used as a demulcent and also for fumigation. The leaves are aromatic, acidic and astringent used for flavouring while its juice is applied in ear ache. Bark paste with three bulb of garlic given twice a day for three days in stomach pain in majidi area of Hazaribag district, Jharkhand. The root bark powders have been recommended for regulation of menstruation. About 10g of tender fruit juice mixed with 50g of sugar candy and 8-10 grain of black pepper powder is popular home remedy for biliousness.

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METHODOLOGY

Seeds of Spondias pinnata were collected from sites situated between latitude 25007' to 25010'N and longitude 81054' to 81058' E and at 98 m elevation. Seeds were cleaned and soaked in water at ambient temperature. After 12 to 24 hours of soaking, water was drain completely. Seeds were rinsed and treated with mercuric chloride ($HgCl_2$) solution for removal of fungal infection. Seed germination test involved 4 replications of randomly selected 25 seeds each from the working sample. Results were expressed as germination percentage which is the percentage of live seeds that had germinated at the end of test. A study on influence of seed orientation on seed germination of S. pinnata made by sowing the seeds at 2 cm depth in vertical (micropyle end upward), horizontal (micropylar end sideward) orientations.

RESULTS

Perusal of the data presented in *table 1* reveals that the commencement of germination started at Vertical Orientation from 7th day onwards after sowing and continued up to 19 days. The total germination recorded was 92%. At Horizontal orientation germination started from 8th Day and continued till 20th day. Total germination recorded is 80%.

DISCUSSION

The vertical orientation performed better than horizontal orientation. This is supported by the reports as in *C. prasinus* maximum germination of 80% was recorded in seeds sown in inverted position **(Rama, 2011)** while minimum of 60% in seeds sown in horizontal position. In *C. stoloniferus* and *C. thwaitesii* maximum germination of 60% and 45% were obtained in seeds sown in vertical orientation respectively. **(Pandey and Khatoon, 1999)** reported the minimum percentage of germination of 20% in both horizontal and inverted positions in *C. stoloniferus* and in *C. thwaitesii* it was 30% in horizontal position. They recorded 80% germination in Sterculia urens seeds when sown in vertical position at 2 cm depth and horizontal position at 4 cm depth. On the other hand in forest trees like teak 100% seed germination reported at vertical position, whereas in *Gmelina arborea, Ceiba pentandra* and *Leuceana leucocephala* 100% germination was recorded in horizontal and vertical positions **(Agboola *et al.*, 1993)**. **(Masilamani *et. al.*, 1999)** reported that horizontal orientation at 1.5 cm depth recorded maximum germination of 81%, followed by 65% in inverted orientation. Horizontal oriented seeds showed early emergence followed by downward orientation.

Table 1: Influence of seed orientation (vertical and horizontal) on seed germination of S. pinnata

Orientation	After 7days	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	Total germination %	Period of Germination
Vertical	8	-		5	-	4	-	-	3	-	2	-	1	-	23	92	7-19 days
Horizontal	-	5	6	1	-	5	-	-	2	-	-	-	-	1	20	80	8-21 days

Fig. i Green fruits of S. pinnata

Fig. iii Sowing in nursery

Fig. ii Ripe fruit s of S. pinnata

Fig. iv Germination in nursery

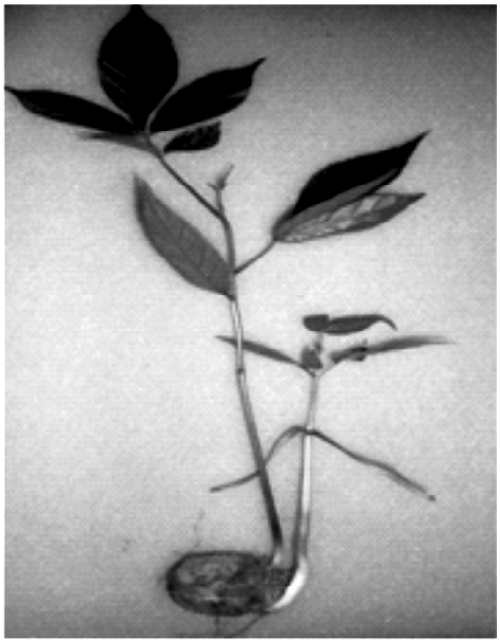

Fig. v. Uprooted germinated seedling

CONCLUSION

In the present study the vertical orientation performed better than horizontal orientation and total germination recorded was 92% in vertical orientation as compared to horizontal orientation (80%). The rate of germination varied with respect to seed orientation in S. pinnata.

ACKNOWLEDGEMENTS

This work was financially supported by Indian Council of Forestry Research and Education (ICFRE), Dehradun, India.

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