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Original Article

EFFECT OF DIFFERENT PRE-TREATMENT ON SEED GERMINATION OF *PONGAMIA PINNATA* L

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ABSTRACT

Pongamia pinnata L is a important tree leguminous species belongs to family leguminoceae sub family : papilionaceae which is a good source of bio – fuel and has medicinal value similarly. The present studies summarizes the effect of different treatments on seed germination of plant species suffer from germination and storage problems , the seeds shows dormancy, low germination percentage and longer time taken to germinate. The seeds given different treatments such as soaking in boiling water for 1 min, 2 min & 3 min and KNO3 1% thiourea 1%, sulphuric acid 1 min and 2 min. gibberellic acid 250 p.p.m enhance the germination . It is evident from the observation that the seeds given gibberellic acid 250 p.p.m, mechanical scarification as well as treatment with thiram, captan showed better germination percentage as compared to control.

Keywords:
Seed germination, hot water Pongamia pinnata L. GA3, Ethephon, Thiourea. KNO3, Scarification. Thiram, Captan, Sodium hypochlorite, Mechanical Scarification

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1.Introduction

Pongamia Pinnata L A medium sized 10 to 18 m tall, with spreading crown. Bark grayish green or brown. Leaves-compound, imparipinnate, 20 or 35 cm long, leaflets – 5 or 7, ovate 5 to 10 cm long with acuminate apex. Flowers-bluish white or pinkish white, fragrant, in axillary recemes. Fruits-thick, woody, smooth, compressed pod with a curved beak. Seeds – 1 to 2 per pod, reniform to nearly roundish smooth or wrinkled, reddish-brown coloured. Occurs throughout India. Cultivated often as an avenue tree. The roots, bark, leaves flowers, seeds and oil are used in medicine. The root juice is useful in fistulous sores, foul ulcers, cleaning teeth and strengthening gums. It is given with equal volume of coconut milk and lime water in gonorrhea. Juice of bark is used internally in bleeding piles. Seeds contains 30% oil which is of great value in coetaneous affections, herps, scabies and also used in rheumatism.

Pongamia Pinnata L leaves are used as a good source of green manure and being leguminous they enrich the soil and nitrogen. The seeds of P. *Pinnata* contain around 30 to 40% oil which has medicinal value and used as bio fuel also. The plant is cultivated from seeds facing problem in germination and storage. The storage of seeds were depend upon climatic conditions. The seeds extracted from the pods shows dormancy and poor germination percentage Seeds are larger in size rich in food which makes the seeds vulnerable for fungal infection.

To overcome these problem different seeds treatments were tried in different laboratories to improve the germination. The present investigation percentages of thin valuable plant were designed to improve the germination percentage of seeds.

The present investigation has been carried out and different experiments were therefore designed to improve the germination percentage

and to break the seed dormancy of both the plants i.e. Pongamia pinnata L. without damaging seed viability.

Materials and methods

The seeds of the plants *Pongamia pinnata* L were collected from the forest department (forest research garden Pune). The seeds were stored in gunny bags and stored under shade at a dry place, two years old seeds shows dormancy. The hard seeds coats were remove mechanically. The seeds were surface sterilized by using 0.1% mercuric chloride for 10 minutes followed by cleaning with distilled water for another three to four times for control the seeds were kept in petriplates at room temperature 28oC ±2o C for thirty Petri dishes lined with a circle of Filler paper (Whatman no. 4). The emergence of 2mm redicle is treated as index for germination. The germination percentage were recorded (Anonymous 1976 and 1978). The germination counts were taken every 6th days intervals up to 30th days till the final count. The seeds of *Pongamia pinnata* L were stored in gunny bags at room temperature 28oc + 2oc. A set of seeds without treatments was used as control various seed treatments were attempted for improving the germination of seeds. The treatment given soaking the seeds with hot water at 800c for 1,2 & 3 min dipping seeds in boiling hot water for 1, 2 & 3 minute and in sulphuric acid for 1 min minutes; care should be taken to avoid injury treatment with potassium nitrate 1 percent ethaphon (2 chloroethyl phosphoric acid) 1000 ppm gibberellic acid 250 p.p.m each. Dry seeds sown in normal way served as control. The seeds which showed emergence radical were considered as germinated.

The seeds under chemical scarification and hot water treatment were stirred periodically and after the pre – treatment durations, seeds were washed thoroughly under running tap water to remove acid residual and other chemicals. The pre- treated seeds were air – dried for 24 hrs before sowing. Sterilized river sand was used as the sowing media for the pre – treated seeds. One seed per treatment was sown at a depth of 0.5 1 cm in a small well labeled germination trays and they were watered manually once a day. Germination study was observed for 6 weeks and the number of seeds germinated in each treatment was recorded in every alternate day. Germination was observed in the seeds when the first leaf emerges as well as the radical. At the end of the germination period, the germination percentage and germination rate (Maguire, 1962) was calculated using the following equations:

Germination percentage=(Number of seeds germinated)/(Number of seeds on tray)×100

Results and discussions

Soaking of *Pongamia pinnata* L seeds in water for 24 hr improved the germination percentage by 20 percent as compared to control more or less same observation were made in case of this was possibly due to stimulating effect of imbibitions subsequent seed germination caused by increased water absorbing capacity resulting in increased enzyme activity. The low germination in control was possible due to reduced permeability of seed coat to water and dissolved the inhibitory substances (crocker 1953) in a similar study (Shyam and Soni 1974) recorded improvement in germination in guava seeds soaked in water for twelve hrs. dipping the seeds in boiling water for three minute shortened the germination period 5-10 days along with uniformity of germination. It is evident from (Table – 1) that pre soaking of seeds was more effective in improving of germination. Soaking of seeds in one percent potassium nitrate for one minute resulted in significant increased in germination percentage as compared to control treatment of seeds with 1% thiourea lead to significant increased in germination as compared to the seeds treated with one percent thiourea. The total germination percentage was recorded higher as compared to control treatment with ethaphon 1000 p.p.m and sulphuric acid for one minute resulted in significant increased in overall germination percentage as compared to control. (Christiansen et al, 1959 and 1960 and 1963)

It is evident from table – 1 that soaking of seeds in 250 p.p.m gibberellic acid and mechanical as well as chemical scarification were showed almost higher germination as compared to control. These results are in accordance with Randhawa and Negi (1964). The seeds germination was higher as compared to control.(Hanckel 964)

Table I Effect of different Pre-treatments on Seed germination of *Pongamia pinnata* L

Sr.no.	Name of the species	Treatments	Days after treatment and % Germination 6	12	18	24	30
1.	*Pongamia pinnata* L.	Control	17 ± 0.2	28 ± 0.6	30 ± 0.47	38 ± 0.2	44 ± 0.6
	Pongamia pinnata L	Hot Water 1 min	22 ± 0.2	32 ± 0.2	50 ± 0.47	55 ± 0.6	62 ± 0.8
	Pongamia pinnata L	Hot Water 2 min	25 ± 0.2	35 ± 0.47	52 ± 0.8	66 ± 0.2	65 ± 0.2
	Pongamia pinnata L.	Hot Water 3 min	31 ± 0.2	42 ± 0.47	57 ± 0.6	61 ± 0.8	70 ± 0.2
2.	*Pongamia pinnata* L.	Soaking in water in 24 hrs normal water & scarification	30 ± 0.2	40 ± 0.47	56 ± 0.6	60 ± 0.8	68 ± 0.2
3.	*Pongamia pinnata* L.	Ethaphon 1000 p.p.m	32 ± 0.2	42 ±0.47	56 ± 0.6	60 ± 0.8	68 ± 0.2
4.	*Pongamia pinnata* L.	Thiram 1.0%	42 ± 0.2	62 ±0.47	73 ± 0.6	83 ± 0.47	90 ± 0.8
5.	*Pongamia pinnata* L.	Captan 1%	40 ± 0.2	60 ± 0.2	70 ± 0.6	80 ± 0.8	85 ± 1.27
6.	*Pongamia pinnata* L.	Sulphuric acid 1 min	27 ± 0.6	38 ± 0.8	57 ± 0.6	67 ± 0.47	78 ± 0.2
7.	*Pongamia pinnata* L.	$KN0_3$ 1%	36 ± 0.2	58 ± 0.2	65 ± 0.47	72 ± 0.6	78 ± 0.8
8.	*Pongamia pinnata* L.	Thiourea 1%	32 ± 0.6	52 ± 0.6	60 ± 0.8	67 ± 0.2	75 ± 0.6
9.	*Pongamia pinnata* L.	GA_3 250 p.p.m	38 ± 0.2	60 ± 0.6	56 ± 0.8	78 ± 0.2	80 ± 0.8
	Pongamia pinnata L.	Sodium hypochlorite(for 2 min)	35 ± 0.2	53 ± 0.47	62 ± 0.8	70 ± 1.27	80 ± 0.2
10.	*Pongamia pinnata* L.	Mechanical scarification	27 ± 0.2	48 ± 0.4	57 ± 0.2	60 ± 0.47	65 ± 0.47

N.B : 1. Each Value is mean of five Replicates 2. ± Indicate for standard deviation

Different approaches of breaking seed dormancy in order to enhance the germination rate and to increase germination process were argued by many authors. (Yadav, 1992, Alamgir and Hossain 2005) Among the method used in breaking seed dormancy include physical scarification of seed coat, in addition, methods such as acid treatment (Kobmoo and Hellum, 1984) or hot water treatment can be used to overcome physical dormancy Hossain et al (2005) reported that seeds coat were noted to establish germination after pre – sowing treatments . However, breaking of seed dormancy varies from species to species. Therefore it is very important to determine which method is important to enhance the germination.(Doyle et al, 1952, Barton 1965, Berrie et al 1971) In this study *Pongamia pinnata* L. seeds treated with concentrated sulphuric acid about 75% seeds were germinated as against control 44% followed by those seeds treated with thiourea 1%, KNO3 1%, 75 to 80% seeds were germinated which is significantly higher than control. The significant results were also noticed when seeds were treated with GA3 250 p.p.m, sodium hypochlorite for 2 minutes, Ethaphon 1000 p.p.m and hot water for 1, 2 and 3 minutes. Mechanical scarification of seeds also resulted significantly as compared to control. The considerable germination percentage of 80 with sodium hypochlorite and sulphuric acid 78% obtained. The scarification secured as a result of the ability of the acid to degrade the seed coat thereby reactivating the physiological and biochemical activities needed for seed germination. The effect of H2SO4, KNO3, GA3, sodium hypochlorite might be due to highly of significant effect of the acid on the seed coat thereby allowing easier

water uptake and oxygen diffusion (Rolston, 1978). From the results it was evident that seed germination percentage enhanced by different pre – treatments.

Conclusion:

Hence the experiment concludes that the treatments given with hot water thiram, cpatan gibbrellic acid 250 p.p.m sulphuric acid, KNO3, Thiourea, sodium hypochlorite, mechanical scarification were quite satisfactory in improving the overall germination percentage.

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