

Assessment of Highest Germination Rate of Native Legume Tree Species

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Abstract:

*Keeping in view the present condition of deforestation and climate change in Pothwar, the study was conducted to evaluate fastest germinating seeds. This area receives a rainfall of 350-500 mm, annually. The temperature range of this locality ranges from 4° to 25° in winter, while in summer it rises to a range of 15° to 40°. The aim of the study focused on the germinating tree out of *Acacia nilotica*, *Acacia modesta*, *Albizia lebbek* and *Dalbergia sissoo*, the species which gave maximum germinations is *Acacia nilotica*, followed by this *Acacia modesta* and *Albizia lebbek* also showed good response to both controlled and pretreatment of seeds. *Dalbergia sissoo* seeds showed a slow germinating response as compared to the other three species.*

Key words: Seed germination improvement, legume tree species, Pothwar.

Introduction:

Vegetation, especially trees, is becoming Eldorado of times in Pothwar region due to high level of deterioration in forests. This scenario is bringing up a climatic drift but moreover it requires the attention to conserve this vegetation in a sustainable manner as this provides fuel wood for livelihoods

and also forage for livestock. Utilization of trees is of high demand in this modern age for fuel purpose, as well as for food security issue. The best possible way to overcome this dilemma is to plant new ones before the cutting of the mature trees, so that it could be made a renewable source in actual. Growing a nursery in less time is challenging as the seeds may take long time to germinate. Growing the new trees from seeds require a lot of attention because almost 50% of the seeds does not germinate when planted i.e. they remain dormant.

The study revolves around the seed germination improvement of some top legume species of Pothwar region, in Pakistan. Seed germination improvement of legumes were kept under study during the months of May and June, before the onset of the rainy season to evaluate the best suitable, fast germinating and fast growing species of Pothwar. *Four legume species seeds, Acacia nilotica, Acacia modesta, Albizia lebbeck and Dalbergia sissoo were selected on the basis of utilization and their growth.* Seeds were taken in two equivalent amounts for the comparison between natural germinations and germination with application of pretreatments to seed, of all species. Pretreatments, given to seeds of different species, were selected according to the suitability reported by different scientists. Acid treatment was applied to *Acacia nilotica* and *Acacia modesta* seeds; nicking treatment was applied to *Albizia lebbeck*, while *Dalbergia sissoo* seeds were soaked into water at room temperature, because of the delegacy of the seed. Study was held to evaluate the best species to be able to introduce in Pothwar region, for reforestation.

Materials and Methods:

Experiment was conducted during the months of May and June, before the onset of Monsoon season. 240 seeds of each species were taken, out of which 120 (each) were given a pretreatment. Seeds were bought form National Agricultural

Research Centre, Islamabad. Seeds of *Acacia nilotica* were given acid treatment i.e. soaking seeds into conc. sulfuric acid (98.07 %) for 30 minutes, in a petri dish. After 30 minutes, seeds were taken out of the acid with the help of spatula and were placed in a beaker full of cold water. Then seeds were taken out of the beaker and rinsed under the running water for 10 minutes using a sieve. Then seeds were soaked in cool water for 12 hours, to ensure that there is no acid remaining in the seeds, as the acid could burn seeds. Similarly in the case of *Acacia modesta* seeds were also given acid scarification treatment, similar procedure was adopted as that of *Acacia nilotica*, but the time of soaking seeds in acid was reduced to 20 minutes (Roshetko. 1995). *Albizia lebbek* seeds were given nicking treatment, manually, i.e. breaking the seed coat from distillery end of seeds with the help of sharp edged cutter and then they were soaked in water for 24 hours. *Dalbergia sissoo* seeds were given a treatment of soaking in tap water at room temperature for 24 hours. Petri dishes were selected to carry out the experiment. Whatman's no. 42 filter paper was used to place inside the petri dishes. There were three replications for each test, containing 30 seeds per replication of pretreatment as well as the controlled one. After pretreating the seeds of all the four species, set of 30 seeds each was placed in the petri dishes. Rests of the seeds, of each species, were washed with water and were placed in petri dishes, set up for experiment before. First, the filter paper in petri dishes was moistened with distilled water and then seeds were placed in them. After placing seeds, petri dishes were covered with lids to prevent experiment from any microbial activity to affect it. Data was collected on daily basis. Seeds were provided moisture using distilled water.

Results and discussions:

The results were carried out through using statistix 8.1. Null hypothesis of the study was that all the treatment means are equal whereas the alterative hypothesis of the study was that all the four treatment means are not equal. It was revealed from the results thar F-Statistic are highly significantly different at 1% (Annex 1) level of significance. Which shows that the treatment means are significantly different from each other. The highest mean was shown for Manual nicking treatment of *Albizia lebbeck* Seed (4.6667) followed by Acid Treatment on *Acacia nilotica* for 30 Minutes (4.4722). *Acacia modesta* seed (3.8333) showed third largest mean and lastly *Dalbergia sissoo* seed with simple water treatment showed germination mean (2.4583) as shown in Table 1.

Table 1: Mean values of pre-treated seeds of legume tree species

Treatment	Seed	N	Mean	SE
Acid treatment 30 minutes	<i>Acacia nilotica</i>	36	4.4722	.3825
Acid treatment 20 minutes	<i>Acacia modesta</i>	18	3.8333	.5409
Manual nicking treatment	<i>Albizia lebbeck</i>	18	4.6667	.5409
Soaking in tap water	<i>Dalbergia sissoo</i>	72	2.4583	.2705

*HS at 1 percent

The lowest mean was shown up by *Dalbergia sissoo* (2.4583) while the highest mean was shown by *Albizia lebbeck* (5.6000). Similarly, the mean score of *Acacia modesta* and *Acacia nilotica* were 3.8333 and 4.4722 respectively. The highest mean was shown for Manual nicking treatment of *Albizia lebbeck* Seed (4.6667) followed by Acid Treatment on *Acacia nilotica* for 30 Minutes (4.4722). Third largest mean was shown by *Acacia modesta* seed (3.8333) and lastly *Dalbergia sissoo* seed with simple water treatment showed germination mean (2.4583) as shown in Table 1.

From the results shown below in table 2, it was revealed that, F-Statistic is highly significantly different at 1% level of significance (Annex 2). Which shows that the treatment means are also significantly different from each other in this treatment as well.

Table 2: Mean values of seeds of legume tree species in controlled condition

Treatment	Seed	N	Mean	SE
Acid treatment 30 minutes	<i>Acacia nilotica</i>	36	4.4722	.3655
Acid treatment 20 minutes	<i>Acacia modesta</i>	18	3.8333	.5169
Manual nicking treatment	<i>Albizia lebeck</i>	15	5.6000	.5663
Soaking in tap water	<i>Dalbergia sissoo</i>	72	2.4583	.2585

*HS at 1 Percent

Conclusion:

The pre-treatments showed the high germination rate that is ultimately enhancing the quantity of seeds to germinate with increased number of plants to develop. This can bring the higher amount of yield in less time than that of the more than 50 % loss of the seeds with their dormancy. This could provide the opportunity to maintain ground cover in less time by establishing the nurseries with proper management of the plants.

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Annex. 1

Completely Randomized ANOVA for Germination

Source	DF	SS	MS	F	P
Treatment	3	137.479	45.8264	8.70**	0.0000
Error	140	737.347	5.2668		
Total	143	874.826			

Grand Mean 3.4097

Annex.2

Completely Randomized ANOVA for Germination

Source	DF	SS	MS	F	P
Treatment	3	180.258	60.0862	12.5**	.0000
Error	137	658.947	4.8098		
Total	140	839.206			

Grand Mean 3.4823