Impact of pretreatments and magnetized water application on seeds of *Acacia nilotica* and *Albizia saman*

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**Abstract**

In view of the carbon sequestration potential of *Albizia saman*, commonly known as Trembesi tree. Increase in land cover and carbon trading were key objectives. Seeds of trembesi tree were tested for viability and sustainability for sub-tropical broad leave evergreen forest environment of Pakistan in comparison with *Acacia nilotica*. The seeds were applied pretreatments to enhance the growing process and testing of the viability in the respective environment. Secondly the effect of magnetic water was also recorded. Both the species were given similar treatment and growing environment. Acid scarification method (conc.$\text{H}_2\text{SO}_4$) and controlled treatments were applied to both the species. The observed results were not much deviated from each other. However the *Acacia nilotica* was evaluated more susceptible than that of the trembesi tree.

**Keywords:** *Albizia saman*, *Acacia nilotica*, seed pretreatments, magnetic water, germination.

**INTRODUCTION**

In line with the Reducing Emissions from Deforestation and forest Degradation in developing countries (REDD+) initiatives in Pakistan, the carbon sequestration potential of trembesi tree was reported to the maximum of 28.5 tC/annum (The Jakarta Post, 2011). Introducing trembesi tree was supposed to increase the carbon sequestration levels and providing the opportunity to the agro farmers for trading the carbon credits with establishment of this species in their farms. Study was conducted to observe the sustainability of the species in the sub-tropical broad leave evergreen environment and comparison with the *Acacia nilotica*, the climax species of the region. Moreover, establishment of trembesi stand will definitely contribute to deplete the grey cloud on the sub-continent and act as filter for the environment.

A study revealed the carbon sequestration index of *Acacia nilotica* is 4.412tC/annum (Dubal et al., 2013). The difference in between the carbon fixation index of both the species shows a huge gap. *Albizia saman* with an objective to overcome the parts per million carbons, seed germination in the respective environment was tested in comparison with *Acacia nilotica*. *Acacia nilotica* showed best germination results with acid scarification (Hashmi and Kanwal, 2014). The seed coat may also be
damaged by immersing the seeds in concentrated sulphuric acid for 7–20 minutes (depending on the species and thickness of the seed coat) followed by washing and drying. However, different species have dissimilar degrees of resistance against the acid and this treatment can damage the seeds, if not taken proper handling. Generally this is an expensive and perilous method and therefore considered unsuitable for field use (Tarawali et al., 1995). The study will also evaluate the response of Albizia saman seeds towards the acid scarification pretreatment and the effect of magnetic water towards the germinations. As revealed earlier by Ibrahim, (2013) that there were differential effects of magnetic treatments of diverse irrigation water types on yield based on both root fresh weight and shoot dry weight. The effects of magnetic treatment on saline irrigation water indicated significant increase in shoots and roots, therefore, probably influences the plant growth at cell level. Magnetic treatment of water may affect phyto-hormone production leading to improved cell activity and plant growth.

MATERIALS AND METHODOLOGY

Albizia saman and Acacia nilotica seeds were tested for the best germination results. Two treatments were compared with four replications, each comprising of the 10 seeds per replication. Albizia saman seeds were provided by the Indonesian embassy in Pakistan and Acacia nilotica seeds were bought from the Rangeland Research Institute, National Agricultural Research Centre, Pakistan. The experiment was conducted at Forestry and Range Management Laboratories, Pir Mehr Ali Shah- Arid Agriculture University Rawalpindi.

Seeds were planted in the germination trays after pretreatments application in the growing media of soil and manure mixture with the composition of 1:1:1 soil, organic manure and sand, respectively. Acid scarification treatment and controlled treatment were applied to seed before sowing.

A study depicted the procedure for acid pretreatment that comprised the seed soaking in concentrated (95%-97%) sulfuric acid which followed periodic gentle stirring for the time duration of immersion in acid for 0, 20, 40, and 60 minutes and then seeds were removed from the acid, washed thoroughly under running water (Pipinis et al, 2011). Acid scarification procedure followed the treatment of seeds with concentrated sulfuric acid i.e. conc. H₂SO₄ (98.07 %). Seeds of both the species were soaked in the acid for 30 minutes in the petri dishes. After soaking in acid, seeds were brought out with the help of a laboratory spatula and were placed in the sieve to wash them under the running tap water to make sure that all the acid is flushed off from the seeds otherwise there remains a vulnerability of embryo getting damaged by the acid residues.

Later on, seeds were placed in the beaker, filled with distilled water, for 30 minutes. Then seeds were sown in the germination tray, 10 seeds per replication, with distillery end of the seed downwards.

On the other side, seeds of both the species were given the controlled treatment that comprised of soaking the seeds in water for 24 hours before sowing. These were sown with the same method as of other treatment.

Sown seeds were given five milliliters of distilled magnetic water with the help of the diffusion bottle at 24 hours interval. Distilled water was passed through the magnetic funnel, consecutively, 3 times to magnetize the water. Data was recorded on daily basis for two week up to the maximum germinations. Data were analyzed using two sample t- test with MINITAB software version 16.

RESULTS AND DISCUSSIONS

The conducted research has been adapted by the new technique of giving seeds with pre-treatments as well as the magnetic water. Results showed that magnetic water had significant effect on both the species. Acacia nilotica showed more significance with pretreatment and magnetic water application to the seed germination followed by the Albizia saman. Magnetic water provided to the seeds reduced the germination time to greater extent i.e. germination initiated in 48 hours following the pre-treatment and magnetized water application.

Secondly, the viability and susceptibility of rain tree was observed to be less favorable than that of Acacia nilotica. Moreover it was also observed that the rain tree is frost tender and on resilience to the cold climate of Pakistan. Besides the seeds germination viability, some plants were developed in in-situ to assess the adaptability of mature plant in open weather. The results were not favorable. It is suggested to provide the plants with shelter during the harsh season to avoid frost issues in individual plants.

The two samples T- test is summarized in Table 1 above. The results of t-statistic (-4.07) revealed that the two varieties means are statistically significant at 1 percent level of significance as p value is less than 0.01.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Means</th>
<th>T-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Var 1</td>
<td>4.38</td>
<td>-4.07</td>
<td>0.002</td>
</tr>
<tr>
<td>Var 2</td>
<td>7.63</td>
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</tbody>
</table>

Table 1. Two sample T- test for variety 1 vs variety 2
The highest mean was shown for variety 2 (7.63) as compared to variety 1 (4.38).

REFERENCES
