OVERCOMING SEED DORMANCY OF *ALBIZIA LEBBECK* (L.) BENTH

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Abstract

*Albizia lebbeck* (L) Benth. is a tree of the family Fabaceae - Mimosoideae, native to tropical Asia and is characterized by having rapid growth, ability to fix nitrogen and improve soil structure. The seeds show dormancy and methods of overcoming dormancy of seeds of *Albizia lebbeck* were evaluated in two experiments. In the first experiment the effect of mechanical scarification was evaluated in completely randomized in a 2x4 factorial design (with and without soaking the seed in water combined with a) without scarification, b) scraping opposite the hilum of the seed side, c) scarification on one side and d) scraping on both sides) of five replicates of 20 seeds. In the second experiment the effect of physical scarification was evaluated in experimental design randomized with four treatments: a) the seeds of *Albizia lebbeck* were immersed in water in a state of boiling (100 °C) for one minute, b) two minutes, c) three minutes and d) four minutes with five replicates of 20 seeds. Seeds immersed in water after scarification in opposite the hilum and adjacent to the hilum showed the largest percentage of emergence (86.6%). *Albizia lebbeck* seeds that have cutaneous numbness can be overcome with mechanical seed scarification opposite the hilum or immersion in water at 100°C for one minute.

Key words: *albizia*, scarification, temperature, germination.

INTRODUCTION

*Albizia lebbeck* (L) Benth. is an arboreal species of the Fabaceae - Mimosoideae, native to tropical Asia and is characterized by having rapid growth, ability to fix nitrogen and improve soil structure[1]. For this reason it is particularly used to recover degraded areas, and even has multiple uses and ease of intercropped with agricultural crops [2].

Seeds of some species exhibit dormancy strategy under the evolutionary point of view are an adaptive feature that ensures the survival of the species in different ecosystems [3]. The cultivation of species with dormant seeds becomes a problem due to the lengthy time which delays germination seedling development and mainly the fact that, after sowing, the seeds are susceptible to fungal attacks, which can result in harm, both in production and economic [4].

The seed coat impermeable to water is a very common type of dormancy in seeds of the Leguminosae family. Species of this family present in the seed coat layers of a fabric called osteosclereids, which prevents the entry of water and delay germination for several years. The methods to overcome cutaneous dormancy of seeds are acid scarification, mechanical scarification and immersion in water [5].

The mechanical scarification has proved quite effective for breaking dormancy of some forest species, especially legumes [6, 7, 8]. The procedure basically consists of subjecting the seeds to abrasion through rotating cylinders, internally lined with sandpaper which will wear its integument, providing conditions to absorb water and start the germination process[5]. Satisfactory with the use of hot water immersion results were obtained in *Caesalpinia pyramidales*[9], *Acacia mangium*[10] and *Leucaena diversifolia*[11]. However, it was not effective for breaking dormancy in seeds of *Albizia lebbeck*[12], *Mimosa caesalpinifolia*[13] and *Schizolobium zamifolium*[14]. The exposure time of the seeds in hot water can be a decisive factor in the results obtained in these species, may have been insufficient or too excessive, may have caused
physiological damage to the internal structure of the seed. This study aimed to evaluate methods of physical and mechanical scarification to break dormancy in seeds of *Albizialebbeck*.

**MATERIALS AND METHODS**

The research was conducted at the University of International Integration Lusophone African-Brazilian (UNILAB), Redenção–CE, Brazil. *Albizialebbeck* seeds were collected from mature plants located margins CE - 060, in November 2012. Mechanical scarification was the first experiment in completely randomized in a 2x4 factorial design with three replications of 20 seeds. The treatments were with and without soaking the seed in water combined with a) without scarification, b) scarification opposite the hilum of the seed side, c) scarification on one side and d) scarification on both sides). The scarification was made with No. 120 sandpaper and seed treatments were immersion for 24 hours in distilled water.

The characteristics evaluated were the percentage of emergence, speed of emergence index, shoot length and seedling taproot. The measurements were made with the aid of a digital caliper.

In the second experiment the effect of physical scarification was evaluated in experimental design randomized with four treatments: a) the seeds of *Albizialebbeck* were immersed in water in a state of boiling (100 °C) for one minute, b) two minutes, c) three minutes and d) four minutes with five replicates of 20 seeds.

The characteristics evaluated were the percentage of emergence, speed of emergence index, shoot length and seedling taproot, measures also with the aid of digital calipers. Statistical analyzes were performed in SISVAR Program and means were compared by Tukey test [15].

**RESULTS AND DISCUSSION**

In the first experiment there was a significant interaction \( p \geq 0.95 \) for percentage and emergence rate index (Figure 1). When the seeds were immersed in water after scarification the largest percentage of emergence occurred in the chiseling opposite the hilum and adjacent to the hilum (86.6%) (Figure 1A).

![Figure 1. Emergency(A) and emergence rate index(B) of *Albizialebbeck* with different pre-treatments to overcome dormancy. Redenção, CE, Brazil. UNILAB, 2013.](http://mutagens.co.in)
In a similar study conducted with *Caesalpinia ferrea*, mechanical scarification on the opposite and to the hilum, or close to this region provides break dormancy in seeds of this species[16], while in *Bauhinia divaricata* L. the highest percentage of seedling emergence when used scarification through cutting in the opposite to the micropyle region[17]. In a study of the *Albizia lebbeck*[18] found that the most efficient pre-germination treatments were cutting in the opposite region to the embryonic axis + 24 hours of soaking in distilled water and immersion in sulfuric acid for 10 to 20 minutes. The emergence percentage was very low when the seeds were not scarified independent of immersion in water, confirming the cutaneous numbness. The index of germination speed was lower in non-scarified seeds and dipped in water after scarification of the two sides adjacent to the hilum was higher emergence rate(Figure 1B) seeds. Possibly this treatment allowed greater water absorption and caused no damage to the embryo of the seed.

Seeds of *Spondias lutea* L. scarified with the aid of pruning shears, the proximal and distal regions and in both regions in relation to the embryonic axis was observed that treatments in which seeds been scarified in the proximal region of the embryos showed a high rate of emergency, such as occurred in the present study[19].

The length of the main root (Figure 2A) was lower when seeds were scarified opposite the hilum side, independent of immersion in water. The shoot length (Figure 2B) again was not affected by the method of scarifying the seeds without soaking, but the seeds with water immersion this characteristic largest value when there was chiseling the side opposite to the hilum.

![Figure 2](image-url) Length of root (A) and shoots (B) of seedlings of *Albizia lebbeck* with different pre-treatments to overcome dormancy. Redenção, CE, Brazil. UNILAB, 2013.

Greater length of seedlings of *Mimosa caesalpiniaefolia* Benth was checked when used mechanical scarification[20]. This method was also effective to increase the length of the main root *Apeibatibourbou* Aubl. [8].
In the second experiment we found that there was significant difference for time soaking seeds in water at 100 °C for emergence percentage, emergence rate index and the main root. The percentage of emergence (Figure 3A) and emergence rate index (Figure 3B) were higher in the treatment of immersion in water at 100 °C for one minute (76.6% and 1.97 respectively).

Figure 3.Germination percentage (A) and emergence rate index (B) of seedlings of *Albizialebbeck* in different treatments to overcome dormancy. Redenção, CE, Brazil. UNILAB, 2013.

Moist heat was effective as a method of breaking dormancy in seeds of *Caesalpiniaferrea* [21, 22] and *Piptadeniastipulacea* [23]. However, immersion in water at temperatures of 80 °C during 6 and 9 minutes and 100 °C during 1 to 2 minutes of *Bauhinia divaricata* L. seeds resulted in the death of all the seeds as in the treatment of immersion in water at 80 °C during 6 minutes, the lowest values of percentages of emergence and vigor occurred [17].

In a study of *Albizialebbeck* was found that in hot water (85 °C for two hours) was lower germination percentage [12]. Comparing this work with present study it is evident that the physical scarification is important the combination of immersion time and water temperature. Even using the higher water temperature (100 °C), the results of this research show that the immersion time is reduced to a minute, the germination of *Albizialebbeck* is favored.

The shoot length was lower in immersion in water for two minutes, and increased in the control and immersion for four minutes (Figure 4A). On the other hand the length of the main root was lower when seeds were immersed in water for two to three minutes and most other treatments (Figure 4B).
No effect of treatments on seedling length of *Bauhinia divaricata* was found [17] and no differences between the treatment emerges, sulfuric acid and emersion in water at 100 °C for 1, 2 and 3 minutes was found for *Piptadeniastipulacea* seeds [23]. In a study of *Caesalpinia pyramidalis* that the highest averages for the shoot length of seedlings was achieved when we used the dipping in water at 80 °C, although it did not differ significantly from the treatments of scarification with sandpaper, soaking in sulfuric acid for 6 minutes in water at 60 to 70 °C and soaking in cold water for 48 hours [9].

**CONCLUSIONS**

Albizialebbeck seeds that have cutaneous numbness can be overcome with mechanical seed scarification opposite the hilum or immersion in water at 100°C for one minute.

**REFERENCES**


