

EFFECT OF HOT WATER AND SULPHURIC ACID PRE-TREATMENT ON TOTAL GERMINATION OF HORSE TAMARIND (*Leucaena leucocephala*) SEEDS AT DIFFERENT IMMERSION TIME

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ABSTRACT

A laboratory experiment was conducted to access the effect of immersion period in hot water and sulphuric acid pre-treatments on total germination of *Leucaena leucocephala* seeds. The experiment was arranged in a factorial combination of three (3) immersion time (for 2, 4 and 6 minutes) and pre-treatment methods (hot water at 80°C and diluted sulphuric acid at 10%) in a Completely Randomized Design with four (4) replicates. Results shows that immersing *Leucaena* seeds in hot water for 6 minutes recorded higher seed germination percentage (82.5%) followed by immersing seeds for 4 minutes (65%). The least seed germination percentage (35%) was recorded at 2 minutes. Total germination values increased as increasing immersion time up to 6 minutes. However among the immersion periods of the acid treatments, the highest germination percentage was recorded when seeds were soaked for 2 minutes (50%) followed by soaking in 4 minutes (25%) and 6 minutes (25%). It is therefore concluded that immersion of Immersing *Leucaena* seeds in hot water for 6 minutes was the best option to obtain rapid germination.

Keywords: *Leucaena*, germination, seeds, immersion

INTRODUCTION

Certain crops produce seeds with a characteristic thick wax layer covering the seed coat, thus preventing the easy penetration of moisture into the cotyledons, and hence inhibit germination, a phenomenon called seed dormancy. Seed dormancy refers to a state in which the viable seeds fail to germinate when provided with conditions normally favorable to germination such as adequate moisture, appropriate temperature regimes and light (Schmidt, 2000). Seeds of legumes such as *Leucaena leucocephala* are generally considered to have physical dormancy (Jayasuriya *et al.*, 2013). *Leucaena* is fast growing multi-purpose drought resistance tree species that is widely cultivated around the world for its highest wood production and wide ranges of uses which includes ruminants feed (Yige *et al.*, 2012). Supplementing animal fed with dried *Leucaena* leaves will lead to higher weight gain (Rubanza *et al.*, 2007). Notwithstanding, the planting and successful adoption of this drought tolerant forage is limited to some extent by water impermeability of the seed coat or 'hardseededness', caused by one or more water-impermeable layers of palisade cells in the seed or fruit coat (Baskin *et al.*, 2000). In nature, this seed coat dormancy may be overcome by abrasion, fire, drying, freezing/thawing, high or widely fluctuating soil temperatures and microbial activity (Baskin and Baskin, 1998). Thus several techniques to reduce the hard seed coat of forage seeds have been investigated over the years but little information is available on the immersion time to various seed treatment methods. Therefore, this study was conducted to evaluate the effect of hot water and sulphuric acid pre-treatment on total germination and germination period of *Leucaena leucocephala* seeds at different immersion time in Mando-Kaduna State.

MATERIALS AND METHOD

The laboratory trial was conducted in 2019 at the Entomology Laboratory of the College of Agric and Animal Science, Mando, Kaduna. Mature seeds of *Leucaena* were harvested from the The experiment was arranged in a factorial combinations of three (3) immersion time (for 2, 4 and 6 minutes) and pre-treatment methods (hot water at 80°C and diluted sulphuric acid at 10%) in a Completely Randomized Design with four (4) replicates. Ten seeds of *Leucaena* were placed in each petri dish (9cm diameter) lined with one layer of filter paper. The filter papers were moistened with addition of distilled water throughout the experimental period. The petri dishes were kept on laboratory table at room temperature of (30-36°C) and covered with lid to prevent moisture loss by evaporation. The seeds under hot water and sulfuric acid scarification were gently stirred periodically during the treatments,

then the seeds were washed repeatedly in running tap water until they were considered safe to handle. After that, the seeds were spread in a thin layer for shade drying. Total germination was measured as:

$$\text{Germination percentage} = \frac{\text{Number of germinated seeds}}{\text{Total number of seeds in petri dish}} \times 100$$

Data collected on were analysed using simple percentages.

RESULTS AND DISCUSSION

Immersing *Leucaena* seeds in hot water for 6 minutes recorded higher seed germination percentage (82.5%) followed by immersing seeds for 4 minutes (65%). The least seed germination percentage (35%) was recorded at 2 minutes. Total germination values increased as increasing immersion time up to 6 minutes. The unappreciable effects of immersing the seeds for lesser periods like the 2 and 4 minutes compared to the 6 minutes might be due to the low permeability or imbibitions of water and oxygen caused by short time exposure to hot water (Rincon *et al.*, 2003). However among the immersion periods of the acid treatments, the highest germination percentage was recorded when seeds were soaked for 2 minutes (50%) followed by soaking in 4 minutes (25%) and 6 minutes (25%). This indicates that immersion of seeds in sulphuric acid for 2 minutes quickly ruptured the seed coats, thereby resulted in high total germination (Bala, 2019). The author reported that, the harmful effect of immersing sulfuric acid for 4 and 6 minutes indicates that prolonged immersion of the seeds was injurious to seeds as the acid may damage the vital parts of the embryo.

Table 1. Effect of hot water and sulphuric acid pre-treatment on total germination and germination period of *Leucaena leucocephala* seeds at different immersion time

Immersion period	Immersion in 80°C H ₂ O	Immersion in 10% H ₂ SO ₄
	Total germination (%)	Total germination (%)
2 minutes	35.00	50.00
4 minutes	65.00	25.00
6 minutes	82.50	25.00

C= Centigrade, H₂O=Water, H₂SO₄= Hydrogen tetraoxosulphate (vi) acid

CONCLUSION

From the results obtained in this study, it was concluded that immersion of *Leucaena* seeds in hot water for 6 minutes was the best option to obtain rapid germination. It is therefore recommended that farmers should use hot water scarification to break the hard seed coat of *Leucaena* most especially where there is need for bulk pre-treatment.

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