



Effect of Seeds Treatments and Planting Dates on Growth Characters of *Albizia lebeck*

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Abstract: This experiment was conducted to study the effect of planting dates and some treatments on germination of *Albizia* seeds there were three planting date along with seed treatment with cold water, hot water, sulfuric acid and scarification. The seed treatment with cold and hot water significantly, gave the highest values in the traits (number of leaves, fresh and dry weight of the total vegetative, root diameter. The cold water treatment excelled in the plant height and dry weight of the roots. The second date February 23 was significantly better in the traits of the fresh weight of total vegetative, the fresh weight of the roots and the root diameter. The third date April 23 had a significant effect on plant height, stem diameter and root length. The interaction treatment between the hot water and the second date February 23 significantly increased and gave the highest values for traits fresh and dry weight of the total vegetative. While the interaction treatment between the scarification and the third date April 23 gave the highest values in the traits of the number of leaves and the root length of the seedlings.

Keywords: *Albizia*, cultivation dates, Treatments seed, Sulfuric acid

Albizia lebeck L, a genus of the leguminous family includes about 150 species of deciduous trees and has a relationship with the *Rhizobium bacterium* that is nitrogen fixation, which is used in its growth and growth of the root zone (Qader and Mahmood 2005) distributed in Asia, Africa, Australia, Tropics and semi-tropical regions (Faisal et al 2012, Shirisha et al 2013). *Albizia* is considered a multi-purpose tree as it is used to produce paper and feed for livestock because its leaves contain proteins, calcium, phosphorous and amino acids (Mumun et al 2004). All parts of *Albizia* (flowers, leaves, roots, bark, fruits and stems) are used in the treatment of many diseases such as skin diseases and respiratory problems. (Singh and Khera 2005). The most important is the ethanol extracted from the seed pods, effective against some types of cancer (Tigabu and Oden 2001). Sexual reproduction by seeds is the most common way to *Albizia* propagation. However, the length of the dormancy period, the speed of loss of vitality, and the low germination rate were the obstacles to the natural germination of seeds (Perveen et al 2011). The present study was aimed at finding the best ways to increase the percentage of germination of the *Albizia* seeds and determine the best date for cultivation *Albizia* seeds.

MATERIAL AND METHODS

This experiment was conducted at Al- Mussaib Technical College during the autumn 2018 and spring season 2019, to study the effect of planting dates and some treatments on germination of *Albizia* seeds. The seeds that were collected a year ago were taken from the trees and

cultivation in black polyethylene bags of 2 kg, 10 cm in diameter and 20 cm high and were filled with river soils, placed under a tunnel covered with nylon and at the rate of 3 seeds per bag. Then the bags were irrigated with water. All service operations were conducted for weeding, hoeing and irrigation throughout the experiment period. All traits were taken after 3 months of the planting date. The treatments for the experiment were three planting date, (December 23, February 23 and April 23). The germination treatments were, seed purification process was performed from impurities represented by the remains of pods, small and atrophic seeds and the selection of good seeds and then treated according to Table 1. The experiment was conducted in completely randomized design (CRD), with three replicates. In each treatment included five bags in each replication, the averages were compared.

Studied traits: The plant height (cm), stem diameter (cm), number of leaves plant⁻¹, number of emergence seeds bag⁻¹, fresh weight and dry weight of the total vegetative (g), fresh and dry weight of the root system (g), root length (cm) and root diameter (mm).

RESULTS AND DISCUSSION

Plant height (cm): The treatment of seeds before cultivation had a significant effect on the plant height (Table 2). The treatment with cold water gave the maximum plant height (11.52 cm) compared to the scarification treatment, planting dates also showed significant differences in the plant height. the third dates (February 23) treatment gave the highest average of plant height 19.84 cm, as compared to the first

dates December 23, The interaction between the treatments and planting dates gave was also significant. Where the treatment hot water and the third date April 23 gave the maximum plant height (21.23 cm), while the treatment sulfuric acid gave the lowest (2.87 cm).

Stem diameter (cm): There were no significant differences for the seed treatments on the stem diameter (Table 3), while the results for the planting dates showed a significant effect on the stem diameter, the third date April 23 treatment gave

the highest value (2.17 cm), compared to the second date February 23 treatment (1.25 cm). The interaction treatment between the third date with cold water, hot water, sulfuric acid and the scarification treatment were (2.10, 2.20, 2.10 and 2.30) cm, respectively.

Leaves per plant: The seed treatments had a significant effect on the number of leaves per plant (Table 4), as its cold and hot water treatment gave the highest number of leaves (8.11 and 8.16) leaves. Plant⁻¹ compared to the sulfuric acid.

Table 1. Germination treatments used in the experiment

Treatments	Period	Experimental details
Cold water	24 hours	Tap water
Hot water	15 minutes	Water at a temperature of 100°C
Sulfuric acid	5 minutes	Seeds were removed after treatment with sulfuric acid and placed under running water until it was confirmed that the sulfuric acid residue had been removed.
Scarification		Seeds were scratched by a sharp tool

Table 2. Effect of planting dates and seed treatment on the height of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	7.57	6.63	20.37	11.52
Hot water	6.47	5.73	21.23	11.14
Sulfuric acid	2.87	6.77	19.47	9.7
Scarification	4	6.73	18.3	9.68
Average	5.23	6.47	19.84	
LSD 0.05	Treatments= 2.14		Planting dates=1.85	Interaction= 3.70

Table 3. Effect of cultivation dates and seed treatment on the stem diameter (cm) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	1.4	1.3	2.1	1.6
Hot water	1.56	1.23	2.2	1.66
Sulfuric acid	1.03	1.23	2.1	1.45
Scarification	1.06	1.26	2.3	1.54
Average	1.26	1.25	2.17	
LSD 0.05	Treatments= 0.41		Planting dates=0.36	Interaction= 0.72

Table 4. Effect of cultivation dates and seed treatment on the number of leaves (leaves per plant) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	8.67	6.73	8.93	8.11
Hot water	9.03	5.5	9.93	8.16
Sulfuric acid	4.1	6.3	8.77	6.39
Scarification	3.67	6.83	10.33	6.94
Average	6.37	6.34	9.49	
LSD 0.05	Treatments= 1.54		Planting dates= 1.78	Interaction= 3.08

As for the third date April 23, date gave the highest number of leaves on a plant of 9.49 leaves plant⁻¹ comparison with the second date February 23 gave the lowest values reached 6.34 leaves plant⁻¹, While the interaction between planting dates and seed treatments significantly affected the number of leaves, the third date April 23 treatment and scarification gave the stem diameter with and gave the highest values of 10.33 leaves plant⁻¹.

Number of emergence seed bag⁻¹: The seed treatments did not differ significantly between them in the effect on the number of emergence seed bag⁻¹ (Table 5), while the third April 23 and second date February 23 treatments gave the highest values 1.52, 1.78 seed, compared to for the First date December 23 treatment, As for the interaction between the seeds treatments and the planting dates, (the cold water + the third date April 23) and (sulfuric acid + the third date April 23) and without differences between them which gave 2.133, 2.00 seed, respectively, while the (cold water and first date December 23) treatment.

Fresh weight of the total vegetative (g): The treatment of hot water and cold water was significantly excelled and without significant differences between them and gave the highest fresh weight to the total vegetative (3.73, 3.26 g), compared to the scarification treatment gave 1.82 g, while The second date February 23 treatment gave the highest fresh weight for the total vegetative reached 4.25 g, and the third date April 23 treatment gave the lowest value 1.69 g, While the interaction planting dates and seed treatments, the interaction between

the hot water and the second date February 23 gave the highest value of 6.47 g, while the scarification treatment and the first date gave the lowest value of 0.33 g.

The dry weight of the total vegetative (g): Table 7 showed that the treatment of hot water and cold water was significantly excelled and without significant differences between them and gave the highest dry weight to the total vegetative 1.51 and 1.98 g, compared to the scarification treatment, while The second date February 23 gave the highest dry weight for the total vegetative reached 1.68 g, and the third date April 23 gave the lowest value, While the interaction between planting dates and treatments, the interaction between the hot water and the second date February 23 gave the highest value of 2.70 g, while the scarification treatment and the first date December 23 gave the lowest value of 0.07.

Fresh weight of the root system (g): The seed treatments had a significant effect on the fresh weight of the roots system (Table 8). The sulfuric acid treatment gave the highest fresh weight of 1 g, while the scarification treatment gave the lowest value, while the second date February 23 treatment gave the highest fresh weight of the root 1.74 g, while the third date gave the lowest value of 0.73 g, while the b-interaction between the sulfuric acid and the second date April 23 the gave 1.96 g, while the interaction between the scarification and the first date December 23 treatment.

Dry weight of the root system (g): The seed treatments had a significant effect on the dry weight of the roots (Table 9).

Table 5. Effect of planting dates and seed treatment on the number of emergence seed bag⁻¹ of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	1.16	1.63	2.13	1.64
Hot water	1.36	1.2	1.8	1.45
Sulfuric acid	0.43	1.86	2	1.43
Scarification	0.66	1.4	1.2	1.08
Average	0.9	1.52	1.78	
LSD 0.05	Treatments= 0.45		Planting dates= 0.39	Interaction= 0.78

Table 6. Effect of cultivation dates and seed treatments on the fresh weight of the total vegetative (g) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	5.30	3.27	1.20	3.26
Hot water	2.27	6.47	2.47	3.73
Sulfuric acid	0.6	3.90	1.33	1.94
Scarification	0.33	3.37	1.77	1.82
Average	2.13	4.25	1.69	
LSD 0.05	Treatments= 0.45		Planting dates= 0.39	Interaction= 0.78

The cold water treatment gave the highest fresh weight (0.92 g), while the scarification treatment gave the lowest (0.46 g). The, while the second date treatment gave the highest the dry weight of the root (o 0.96 g), while the third date gave the lowest. The interaction between the sulfuric acid and the second date, where the scarification and December 23 best combination gave 0.19g

Root length (cm): The seed treatments showed no significant differences in the root length of the seedlings (Table 10). While the third date April 23 treatment significantly increased the root length (18.74 cm). The scarification treatment and the third date April 23 gave significantly highest roots length (20.17 cm) while the scarification treatment and the first date December 23 gave the lowest (14.8 cm).

Root diameter (mm): Table 11 showed that the root

diameter in hot water and cold water treatments did not differ significantly while the scarification treatment gave the lowest. The second date February 23 treatment gave the highest root diameter (5.25 mm) and the first date December 23 treatment gave 3.07 mm. where the interaction between dates and treatments, was significant. The maximum diameter was sulfuric acid and the second date February 23 gave (5.63 mm) and was minimum in scarification treatment and the first date December 23 gave (1.60 mm).

The soaking in hot and cold water to speed and increasing the rate of imbibition as a result of soaking in water and may make the process of full Imbibition of seeds take a less time period to start germination or perhaps the reason is that these covers that prevent absorption of water and gas exchange may It contains in its composition some minor

Table 7. Effect of planting dates and seed treatments on the dry weight of the total vegetative (g) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	2.30	1.30	0.83	1.48
Hot water	0.90	2.70	0.93	1.51
Sulfuric acid	0.20	1.67	0.73	0.87
Scarification	0.07	1.03	0.90	0.67
Average	0.87	1.68	0.85	
LSD 0.05	Treatments= 0.59		Planting dates= 0.51	Interaction= 1.03

Table 8. Effect of cultivation dates and seed treatments on the fresh weight of the root system (g) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	2.63	1.58	0.56	1.58
Hot water	1.06	2.33	0.80	1.40
Sulfuric acid	0.26	1.96	0.76	1.00
Scarification	0.13	1.10	0.80	0.67
Average	1.02	1.74	0.73	
LSD 0.05	Treatments= 0.52		Planting dates= 0.45	Interaction= 0.90

Table 9. Effect of cultivation dates and some treatments on the dry weight of the root system(g) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	1.53	0.86	0.36	0.92
Hot water	0.56	1.23	0.53	0.77
Sulfuric acid	0.13	1.06	0.50	0.56
Scarification	0.19	0.70	0.50	0.46
Average	0.60	0.96	0.47	
LSD 0.05	Treatments= 0.30		Planting dates= 0.25	Interaction= 0.51

Table 10. Effect of planting dates and seed treatments on the root length (plant cm⁻¹) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	16.10	15.83	18.73	16.89
Hot water	15.20	15.93	17.33	16.16
Sulfuric acid	17.37	17.17	18.73	17.78
Scarification	14.80	16.67	20.17	17.21
Average	15.87	16.40	18.74	
LSD 0.05	Treatments= 2.06		Planting dates= 1.79	Interaction= 3.58

Table 11. Effect of planting dates and seed treatments on the root diameter (mm) of *Albizia* seedlings

Treatments	Planting dates			Average
	December 23	February 23	April 23	
Cold water	5.47	5.93	3.37	4.92
Hot water	3.63	5.50	3.20	4.11
Sulfuric acid	1.60	5.63	3.57	3.60
Scarification	1.60	3.93	3.47	3.00
Average	3.07	5.25	3.40	
LSD 0.05	Treatments= 0.67		Planting dates= 0.58	Interaction= 1.16

compounds such as tannins and alkaloids (Alamgir and Hossain 2005). The reason may be due to the fact that the high concentration of sulfuric acid gave a high efficacy in breaking the cover of the seed and speeding up the germination process, (Esen et al 2007) The reason may be that the presence of sulfuric acid in the medium of seed growth led to the supply of nitrogen to the medium. Where it enters with the water to the developing regions of the embryo, it contributes to the formation of the protoplasm of the new cells and in generating the energy needed for the various bioprocesses necessary to accelerate and increase the germination rate (Zindi and Hamad 2015) It also helps in its penetration and ductility of the wooden cover and its weakening, and it may lead to puncture, which helps in the penetration of moisture and oxygen to the embryo faster (Tigabu and Oden 2001). The second planting date on February 23 was the best suitable date for germination and growth seedling of *Albizia*, Which enables the seedlings to give good root and total vegetative growth leading to the formation of strong seedlings capable of tolerance the environmental conditions and thus the seedlings can survive and grow, As for the third date April 23, it gave the lowest average of traits, and this is due to the high temperature in the summer months due to drought stress for seedlings (Khera and Singh 2005).

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