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EFFECT OF PRE-TREATMENT OF SEEDS OF KALO KOROI [*ALBIZIA LEBBECK* (L.) BENTH.] ON GERMINATION AND SEEDLING GROWTH

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Abstract: An experiment was conducted to observe the effect of pre-treatment of seeds of Kalokori [*Albizia lebbeck* (L.) Benth.] on germination and seedling growth at the Postgraduate Laboratory, Department of Agroforestry, Bangladesh Agricultural University, Mymensingh. Four media viz., soil, sand, sawdust and blotting paper along with ten pre- treatment methods viz., boiling water for 1 minute, boiling water for 2 minutes, boiling water for 3 minutes, sand paper scrapping for 3 minutes, sand paper scrapping for 5 minutes, sand paper scrapping for 7 minutes, conc. H_2SO_4 treatment for 3 minutes, conc. H_2SO_4 treatment for 5 minutes and conc. H_2SO_4 treatment for 7 minutes were involved in the experiment. The two factor experiment was laid out in Completely Randomized Design (CRD) with three replications. Seed germination, seedling height, seedling fresh and dry weights were significantly influenced by the methods of pre-treatment as well as media used in the experiment. The highest germination was recorded in boiling water for 1 minute with blotting paper media. Maximum seedling height was obtained in sawdust and conc. H_2SO_4 treatment for 3 minutes both individually and combinedly. Sawdust with boiling water for 1 minute gave maximum fresh and dry weights. However, sawdust and seed pre-treatment in boiling water showed the best performance for seed germination and seedling growth of the *Albizia lebbeck.*

Key words: Seeds, Pre-treatment, *Albizia lebbeck,* Germination, Seedling growth.

Introduction

Kalokoroi [*Albizia lebbeck* (L.) Benth.] is fast growing leguminous deciduous tree species with spreading crown. Its root system is superficial and becomes leafless during winter season. It can withstand periodical flooding and salinity. It coppices well and can be pollarded and lopped. The seeds of some species of Albizia like *Albizia lebbeck*, *Albizia procera*, *Albizia saman* unfortunately, show hard seededness (Ghai *et al.*,1985). Seed has been considered as the basis of plant regeneration, conservation and dissemination of the species. To achieve this purpose it must germinate when conditions are suitable for the maintenance of seedling growth and subsequent plant development, but during this period germination is prevented by various dormancy mechanisms (Quinlivan, 1971). Seeds of leguminosae normally exhibit delayed germination because their seed coats are thick and hard and impermeable to water. Sometimes sound and uninjured seeds do not germinate with maximum speed on completeness in absence of seed treatment before sowing. So pre-sowing treatment of these seeds are important for better germination and seedling growth (Rolston, 1978). Besides, this seed treatment helps to shorten the germination periods. In addition, seed treatment reduces the risk of seeds being destroyed by pathogens, insects and other destructive agents and also results in reduced inter plant competition for nutrients and environmental requirements. Although these species are popular and common for their multipurpose uses, farmers know very little about their suitable method of propagation to be used in their farms. Especially first-hand information on .the time and methods of seed collection, cleaning drying and also on viability, dormancy, pre-sowing treatment, sowing time, sowing process, germination capacity, rate of germination, seedling growth and development are not known thoroughly. The knowledge on these aspects would help in easy establishment of this tree in their farms. Most of the farmers do not know how to break seed dormancy, what kind of pre-sowing treatment is suitable for their condition and finally the management system of the seedling in the field. There are different method of pre-treatments, such as, acid scarification, boiling water, cold water, moist chilling etc. Therefore, the present experiment was conducted to evaluate germinability of seeds as affected by different dormancy breaking treatments as well as the suitable growing media for *Albizia lebbeck* seedlings.

Materials and Methods

The experiment was conducted in the post graduate laboratory, Department of the Agroforestry, Bangladesh Agricultural University, Mymensingh during 2007. The experiment was consisted of two factor, seed germinating media viz. Soil (M_1); Sand (M_2); Sawdust (M_3); Blotting paper (M_4) and different seed treatment methods viz. S_1, S_2 and S_3 represent boiling water treatment for 1, 2 and 3 minutes respectively; S_4, S_5 and S_6 represent seed scrapping with sand paper for 3, 5 and 7 minutes; S_7, S_8 and S_9 represent seed treated with conc. H_2SO_4 for 3, 5 and 7 minutes. The treatments were arranged in Complete Randomized design with three replications. Data were taken on numbers of germinated seeds at 7, 14 and 21days after sowing (DAS). Seedling height (cm), seedling fresh weight (g) and seedling dry weigh (g) were recorded at 21 DAS. Data were analyzed statistically using MSTAT package program. The means of the parameter were separated by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

Results and Discussion

Germination: Effect different germinating media and methods of seed treatments was significant. Germination increased with the increase of time i.e. days after sowing (DAS). The maximum germination percentages (10, 38.5 and 57.5) were recorded at 7, 14 and 21 DAS, respectively and blotting paper (M_4) was found as best germinating medium. The minimum germination (2.5% and 39.0%) was found at 7 and 14 DAS respectively in sand (M_2) and soil (M_1) media (Table 1). Maximum seed germination (10% 41.25% and 62.5%) was found at 7, 14 and 21 DAS respectively in S_6 treatment. Minimum germination (2.5% and 17.5% at 7, 14 DAS respectively) was found in S_7 treatment (Table 2). At 7,

14 and 21 DAS, maximum germination (25.0%, 65.0% and 85.0%) was found in M_4S_1 (boiling water for 1 minute with blotting paper) treatment and minimum germination (5%, 5% and 20%) were obtained in M_1S_9, M_1S_7 and M_1S_4 treatment (Table 3). Therefore, germination percentage was the better in boiling water treated seeds with saw dust and blotting paper media. The present finding on seed germination as affected by different media and seed treatment methods is in agreement with Teles e*t al.* (2000) who found that *Leucaena leucocephala* seeds when subjected to chemical and mechanical scarification and hot water treatment to over come the seed coat dormancy, highest germination was obtained in hot water treatment for 5 minutes. Chock and Pillai (1996) also reported similar results in *Acacia mangium* seeds where the seeds were subjected to 60 seconds pre-sowing treatment in hot and boiling water that result maximum germination; while Sarker (1996) reported that steeping seeds of sesbania rostrata in hot water increased seed germination upto 74%.

Seedling height: The effect of different media influenced significantly on the seedling height. (Table1). Sawdust ($M_{3)}$ produced higher seedling height (13.48 cm) compare to other media. The lowest seedling height (12.38 cm) was found in sand media. The highest seedling height was recorded as 12.3cm; while the lowest seedling height was 9.18 cm (Table 2). Combined effect of different media and treatments were highly significant (Table 3). The highest seedling height was found in M_3S_7 (Conc. H_2SO_4 for 3 minutes with sawdust) treatment and the lowest was found in M_2S_9 (Conc. H_2SO_4 treatment for 7 minutes using sand medium) treatment. Karthikeyan *et al*. (2006) observed similar results when used sand as germinating media. According to them germination and seedling growth were best when seeds soaked in water and germinated in sand with vermicompost which gave maximum seedling height (58.33 cm), stem girth (5.52 cm), number of leaves (4.61), number of roots (7.67), root length (32.01 cm) and percentage of germination (93.70). Pela *et al.* (2000) also reported similar result.

Table1. Effect of different media on the germination and growth parameter of *Albizia lebbeck*

Media	Germination (%)			Seedling height (cm)	Seedling fresh weight (g)	Seedling dry weight (g)
	7 DAS	14 DAS	21 DAS			
Soil	3.000	24.500	39.00	12.490	2.900	0.375
Sand	2.500	15.500	41.500	12.385	2.570	0.435
Sawdust	3.500	27.500	48.500	13.488	3.450	0.531
Blotting paper	10.000	38.500	57.500	0.000	0.000	0.000
Level of significance	**	**	**	**	**	**
CV(%)	14.51	3.58	2.03	7.39	29.32	20.63

** Significant at 1% level of probability; DAS = Days after sowing
M_1 = Soil; M_2 = Sand; M_3 = Sawdust; M_4 = Blotting paper

Table2. Effect of different seed treatments on the germination and growth parameter of *Albizia lebbeck*

Treatments	Germination (%)			Seedling height (cm)	Seedling fresh weight (g)	Seedling dry weight (g)
	7 DAS	14 DAS	21 DAS			
S_0	0.000	0.000	0.000	0.000	0.000	0.000
S_1	6.250	28.750	57.500	10.200	3.250	0.513
S_2	5.000	36.250	56.250	11.070	2.750	0.517
S_3	2.500	30.000	57.500	9.170	2.875	0.518
S_4	3.750	22.500	48.750	9.750	2.500	0.360
S_5	7.500	36.250	61.250	10.225	2.750	0.387
S_6	10.000	41.250	62.500	10.075	2.125	0.360
S_7	2.500	17.500	36.250	12.300	2.125	0.238
S_8	5.000	32.500	57.500	11.850	2.125	0.293
S_9	5.000	20.000	28.750	10.263	1.800	0.170
Level of significance	**	**	**	**	**	**
CV(%)	14.51	3.58	2.03	7.39	29.32	20.63

** Significant at 1% level of probability; DAS = Days after sowing
Treatments :

S_0 = without treatment for control; s_1 = Boiling water for 1 minute; S_2 = Boiling water for 2 minutes;S_3 = Boiling water for 3 minutes; S_4 = Sand paper scrapping for 3 minutes; S_5 = Sand paper scrapping for 5 minutes; S_6 = Sand paper scrapping for 7 minutes; S_7 = Seed treated with conc. H_2SO_4 for 3 minutes; S_8 = Seed treated with conc. H_2SO_4 for 5 minutes; S_9 = Seed treated with conc. H_2SO_4 for 7 minutes.

Table 3. Interaction effect of different media and seed treatments on seedling height, seedling fresh and dry weights of *Albizia lebbeck* seed

Treatment combination	Germination (%)			Seedling height (cm)	Seedling fresh weight (g)	Seedling dry weight (g)
	7 DAS	14 DAS	21 DAS			
M_1S_1	0.0 e	25.0 g	35.0 i	13.300 f-h	4.500 ab	0.700 a-c
M_1S_2	0.0 e	50.0 b	70.0 b	14.300 e-g	4.500 ab	0.780 a
M_1S_3	0.0 e	30.0 f	50.0 f	12.400 h	4.000 a-c	0.700 a-c
M_1S_4	0.0 e	10.0 j	20.0 a	10.000 i	2.500 cd	0.040 ij
M_1S_5	15.0 b	40.0 d	60.0 d	12.500 h	3.500 a-d	0.300 gh
M_1S_6	10.0 c	35.0 e	50.0 a	15.000 c-f	2.500 cd	0.300 gh
M_1S_7	0.0 e	5.0 a	20.0 k	15.400 a-e	2.500 cd	0.400 fg
M_1S_8	0.0 e	35.0 e	65.0 c	15.400 a-e	3.000 bc	0.500 d-f
M_1S_9	5.0 d	15.0 i	20.0 k	16.600 a-c	2.000 de	0.030 j
M_1S_0	0.0 e	0.0 l	0.0 l	0.000 j	0.000 f	0.000 j
M_2S_1	0.0 e	5.0 k	60.0 d	12.700 gh	3.500 a-d	0.650 a-d
M_2S_2	0.0 e	15.0 i	50.0 f	15.400 a-e	2.500 c-e	0.590 b-e
M_2S_3	0.0 e	15.0 i	45.0 g	10.000 i	3.500 a-d	0.660 a-d
M_2S_4	0.0 e	20.0 h	60.0 d	14.400 e-g	3.500 a-d	0.750 ab
M_2S_5	10.0 c	30.0 f	60.0 d	14.200 e-g	4.000 a-c	0.700 a-c
M_2S_6	15.0 b	40.0 d	60.0 d	15.100 a-e	3.500 a-d	0.590 b-e
M_2S_7	0.0 e	10.0 j	30.0 j	16.800 ab	2.000 de	0.050 ij
M_2S_8	0.0 e	10.0 j	30.0 j	15.800 a-e	1.500 ef	0.070 hi
M_2S_9	0.0 e	10.0 j	20.0 k	9.250 i	1.700 e	0.200 j
M_2S_0	0.0 e	0.0 l	0.0 l	0.000 j	0.000 f	0.000 j
M_3S_1	0.0 e	20.0 h	50.0 f	14.800 d-f	5.000 a	0.800 a
M_3S_2	5.0 d	40.0 d	50.0 f	14.580 d-f	4.000 a-c	0.700 a-c
M_3S_3	5.0 d	50.0 b	70.0 b	14.300 e-g	4.000 a-c	0.710 a-c
M_3S_4	0.0 e	10.0 j	45.0 g	14.600 d-a	4.000 a-c	0.650 a-d
M_3S_5	0.0 e	25.0 g	60.0 d	14.200 e-g	3.500 a-d	0.450 e-g
M_3S_6	5.0 d	50.0 b	70.0 b	14.200 e-g	2.500 c-e	0.550 c-f
M_3S_7	0.0 e	10.0 a	30.0 j	17.000 a	4.000 a-c	0.500 d-f
M_3S_8	10.0 c	40.0 d	70.0 b	16.200 a-d	4.000 a-c	0.600 b-e
M_3S_9	10.0 c	30.0 f	40.0 h	15.200 b-e	3.500 a-d	0.450 e-g
M_3S_0	0.0 e	0.0 l	0.0 l	0.000 j	0.000 f	0.000 j
M_4S_1	25.0 a	65.0 a	85.0 a	0.000 j	0.000 f	0.000 j
M_4S_2	15.0 b	40.0 d	55.0 e	0.000 j	0.000 f	0.000 j
M_4S_3	5.0 d	25.0 g	65.0 c	0.000 j	0.000 f	0.000 j
M_4S_4	15.0 b	50.0 b	70.0 b	0.000 j	0.000 f	0.000 j
M_4S_5	5.0 d	50.0 b	65.0 c	0.000 j	0.000 f	0.000 j
M_4S_6	10.0 c	40.0 d	70.0 b	0.000 j	0.000 f	0.000 j
M_4S_7	10.0 c	45.0 c	65.0 c	0.000 j	0.000 f	0.000 j
M_3S_8	10.0 c	45.0 c	65.0 c	0.000 j	0.000 f	0.000 j
M_4S_9	5.0 d	25.0 g	35.0 i	0.000 j	0.000 f	0.000 j
M_4S_0	0.0 e	0.0 l	0.0 l	0.000 j	0.000 f	0.000 j
Level of significance	**	**	**	**	**	**
CV(%)	14.51	3.58	2.03	7.39	29.32	20.63

** Significant at 1% level of probability; DAS = Days After Sowing
In a column, figures with same letters did not differ significantly as per DMRT.
Media: M_1 = Soil; M_2 = Sand; M_3 = Sawdust; M_4 = Blotting paper

Treatments: S_0 = without treatment for control; s_1 = Boiling water for 1 minute; S_2 = Boiling water for 2 minutes;S_3 = Boiling water for 3 minutes; S_4 = Sand paper scrapping for 3 minutes; S_5 = Sand paper scrapping for 5 minutes; S_6 = Sand paper scrapping for 7 minutes; S_7 = Seed treated with conc. H_2SO_4 for 3 minutes; S_8 = Seed treated with conc. H_2SO_4 for 5 minutes; S_9 = Seed treated with conc. H_2SO_4 for 7 minutes.

Seedling fresh weight: Effect of different media was highly significant in case of fresh weight of seedling (Table 1). Sawdust (M_3) media produced the maximum fresh weight 3.45 (g) and the lowest fresh weight of seedling was found (2.57g) in sand (M_2) media followed by 1.8g in S_9 (conc. H_2SO_4 for 7minutes) treatment. The highest fresh weight (3.25g) was found in S_3 (boiling water for 1 minute) treatment (Table2). Seedling fresh weight varied significantly due to the combined effect of media and treatment in growth stage (Table 3). The highest seedling fresh weight was found in M_3S_8 and M_1S_9 treatments. This result was inconsistent with the observation of Handa *et al.* (2005) who recorded that seedling fresh weight are maximum in sawdust when seeds are treated with boiling water. According to them 1:1:2 ratio of sand, soil and FYM significantly influenced the seed germination of *Albizia procera* but the seedlings raised under 1:2:1 and 1:1:2 ratio of sand, soil and FYM recorded higher shoot length, root length and number of leaves as well as higher biomass of individual seedlings.

Seedling dry weight: Seedling dry weight was significantly influenced by different media. Maximum dry weight was found in sawdust media (0.532g) and minimum dry weight (0.375g) was recorded in soil media (Table 1). The highest seedling dry weight (0.518g) was found in S_3 (boiling water for 3 minutes) treatment and the lowest seedling dry weight was obtained in S_9 (Conc. H_2SO_4 7 minutes) treatment (Table 2). Table 3 revealed that seedling dry weight had significantly

influenced by the interaction of media and treatment. The highest seedling dry weight (0.80g) was recorded from the M_3S_1 treatment combination. The lowest seedling dry weight (0.03g) was recorded from the treatment combination of M_2S_8 and M_1S_9. This result was similar to Handa *et al.* (2005) who recorded that seedling dry weight is maximum in sawdust with boiling water treatment. From the above results it was conducted that the highest germination percentage was recorded in blotting paper media and boiling water for 1 minute (S_1) at 7, 14 and 21DAS. Seedling height, seedling fresh and dry weight were significantly influenced by media, treatment and treatment combination. Maximum seedling fresh and dry weights were recorded in sawdust media and M_3S_1 treatment combination. The findings of the present investigation indicated that *Albizia lebbeck* seed treated with boiling water for 1 minute and sawdust media gave maximum germination and seedling growth.

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