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EFFECT OF PRE-SOWING TREATMENT ON SEED GERMINATION OF LOHAKATH (*XYLIA KERRII* CRAIB & HUTCH.)

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Abstract: *Lohakath* (*Xylia kerrii* Craib & Hutch.), a valuable timber species in Bangladesh, belongs to the family Leguminosae. Morphology of fruits, seeds and the effect pre-sowing treatments of seeds were studied. The average length, breath and thickness of fruits were found 13.3, 5.3 and 0.8 cm respectively and those of seeds were 1.4, 0.3 and 0.3 cm respectively. Number of seeds per kilogram was 5000-5400. The germination test was done by sowing the seeds in polybags (4 cm x 6 cm) filled with a mixture of topsoil, coconut husk compost, coarse sand and fine sand in the ratio of 3:4:1:1. The highest germination percentage (98%) was found in scarification with sand paper. The lowest germination percentage (53%) was found in control. About 87% was found in hot water (80 °C) immersion (10 minutes), 84% was found in 80% concentrated H_2SO_4, 63% was found in immersion in cold water (4 °C) for 12 hours. As the use of sulphuric acid and scarification techniques are somewhat risky and trouble some, therefore, pre-sowing treatment of Lohakath seed for germination in rural Bangladesh could be hot water immersion method.

Keywords: Seed, germination, *Lohakath*, *Xylia kerrii*, sowing

Introduction

Lohakath (*Xylia kerrii* Craib & Hutch.) is a large deciduous tree species. It is an exotic species in Bangladesh and native species of Myanmar (Das and Alam, 2001). The tree reaches a height of 40 m and a girth of 4 m or more under favorable conditions but on poor soil it is stunted (Troup, 1986).

Wood of this species is reddish brown, very hard, heavy and durable, extensively used for house and bridge construction and for railway sleepers (Troup, 1986). In Bangladesh use of this species as timber is increasing and new plantations are being raised in different forest areas. For raising new plantations, a lot of seedlings are needed. The average seed germination success of the seeds of this species is 48% in Bangladesh (Padma *et al*., 1994). An attempt has therefore been taken to study seed germination success of the species under different pre-sowing treatments.

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Materials and Methods

The seeds of *X. kerrii* were collected from about 30 years old healthy trees from National Botanical Garden at Mirpur, Dhaka, Bangladesh. After collection the seeds were dried for 4 to 5 days in open sun to reduce the moisture. Fresh and dried seeds were used for the experiment. The germination test was done by sowing the seeds in poly-bags (4 cm x 6 cm). The media of the poly-bags was topsoil, coconut husk compost, coarse sand and fine sand in the ratio of 3:4:1:1. There were five treatments in the experiment, i.e., treatment 1 (T1): control, treatment 2 (T2): immersion in cold water (4 °C) for 12 hours, treatment 3 (T3): immersion in hot water (80 °C) for 10 minutes, treatment 4 (T4): scarification with sand paper, treatment 5: immersion in concentrated H_2SO_4 (80%) for 20 minutes. One seed was sown in each polybag. Polybags were kept in shade throughout the experiment. The seeds were sown at a depth of 0.5-1.5 cm and watering was done manually one time at noon everyday. Randomized Block Design (RBD) was used for the experiment. For each treatment, number of replications was four and sample size was twenty. The total number of polybag used was 5 x 4 x 20 = 400. For each treatment 80 polybags were used. Variance analysis and Duncan Multiple Range Test (DMRT) were carried out to analyze the data. The experiment was done in April 2005 and the temperature and humidity was recorded 33.42 °C and 88.60% respectively in the polybags. The number of seeds germinated in each treatment was recorded every alternate day. The starting and finishing dates of germination were also recorded.

Results

***Fruits*:** The fruits are pod, flat, broadly falcate-lanceolate, grayish brown, elastically 2-valved, 6-10 seeds per fruit. The seeds are compressed into the pods (Das and Alam, 2001). The average length, breath and thickness of the fruits were 13.3±0.2, 5.3±0.3 and 0.8±0.04 cm respectively.

Seeds: The seeds of *X. kerrii* were dark reddish brown in color and elliptical in shape. The average length, breath and thickness were of 1.4±0.08, 0.3±0.04 and 0.28±0.04 cm respectively. Number of seeds per kilogram was 5000-5400.

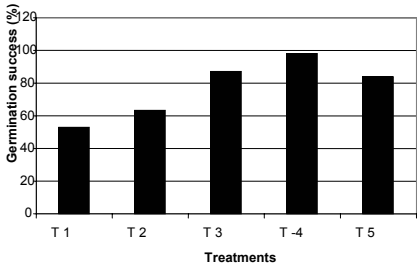

Fig. 1. Germination success (%) of seeds of *X. kerrii* under five pre-sowing treatments in polybag.

Table 1. Duncan Multiple Range Test (DMRT) of seed germination of *X. kerrii* under five pre-sowing treatments in polybag.

T 1	T 3	T 5	T 2	T 1
24.50	21.75	21.00	18.75	15.75

Seed germination: The highest germination percentage (98%) was found in scarification with sand paper. The lowest germination percentage (53%) was found in control. About 87% was found in hot water (80 °C) immersion (10 minutes), 84% was found in 80% concentrated H_2SO_4, 63% was found in immersion in cold water (4 °C) for 12 hours. Germination started within 2 days in immersion in

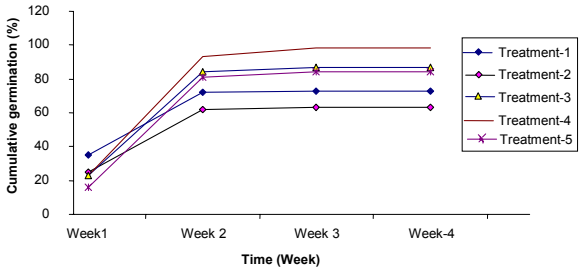

Fig. 2. Cumulative germination (%) through out the germination period of *X. kerrii* under five pre-sowing treatments in polybag.

concentrated H_2SO_4 and within 4 days in immersion in hot water whereas germination started within 3 days in control, immersion in cold water and scarification with sand paper. In all cases germination ceased within 16 days.

Analysis of Variance showed significant difference (F = 5.192) at df = 4,12 and $p = 0.05$ in germination success (%) among the treatments. By DMRT no significant differences were found among treatment 4, treatment 3 and treatment 5 (Table 1). But there were significant differences between treatment 4 and treatment 2, treatment 4 and treatment 1. But there were no significant differences among treatment 3, treatment 5 and treatment 2. But there is significant difference between treatment 3 and treatment 1. Again there is no significant difference between treatment 2 and treatment 1.

Discussion

Among the five pre-sowing treatments of seed, scarified (scarification with sand paper) seeds showed the best germination (98%). The second highest germination (87%) was found in hot water (80 °C) immersion (10 minuets). The third highest germination (84%) was found in 80% concentrate H_2SO_4. The fourth highest germination (63%) was found in immersion in cold water (4 °C) for 12 hours. In addition, the lowest germination (53%) was found in normal condition. The highest percentage of germination (98%) was found in scarified seeds may be due to the outer coat of the seeds were easily thinned and cracked so that germination of seeds took place easily. Padma *et al*. (1994) carried out an experiment on the effect of scarification on the pre-sawing treatments of *Samanea saman* seeds and found similar result (100%). Mannan (2000) carried out an experiment on the pre-sowing treatment of *X. kerrii* under the treatment of cold water for 12 hours and found 70% success. However, in the present experiment, in cold water immersion for 12 hours of the same species showed 63% success. Similar experiment was carried out by Ali *et al*. (1997) with *Albizia procera* seed belongs to the same family of *X. dolabriformis* having 43% success in hot water treatment (50 °C and boiling) for three minutes. But in the present experiment, the seeds were immersed in hot water for 10 minutes (80 °C) and showed 87% success.

Conclusion

Among the five pre-sowing treatments scarification (98%), hot water immersion (87%) and concentrated sulphuric acid (84%) showed the first, second and third position in germination performance. Statistically no significant differences in germination percentage were found among them. However, the use of sulphuric acid and scarification techniques are somewhat risky and trouble some. Therefore, the best method of pre-sowing treatment of Lohakath seed for germination in rural Bangladesh is hot water immersion.

References

Ali, M.; Akhter, S. and Kamaluddin, M. 1997. Study on the bearing of water treatment on seed germination and seedling growth study of Albizia procera. *Indian Forester,* 123(8): 764-768.

Das, D.K. and Alam, M.K. 2001. *Trees of Bangladesh.* Bangladesh Forest Research Institute, Chittagong, pp. 294-295.

Kamaluddin, M. 1979. Pyinkado: An exotic hard wood species in the sal forests of Bangladesh. *Bano Biggyan Potrica,* 8(1&2): 9-12.

Mannan, M.A. 2000. Studies on seed production, germination and storage of some plantation species in Bangladesh. *Bangladesh Journal of Forest Science,* 29(1): 61-66.

Azad, M.S.; Matin, M.A.; Islam, M.W. and Musa, Z.A. 2006. Effect of pre-sowing treatment on seed germination of *lohakath* (*Xylia kerrii* Craib & Hutch.). *Khulna University Studies*, 7(2): 33-36.

Padma, V.; Satyanarayana, G. and Raddy, B.M. 1994. Effect of scarification treatments on the germination of *Leucaena leucocephala*, *Albizia lebbek* and *Samanea saman (Albizia saman)*. *Seed Research,* 22(1):54-57.

Troup, R.S. 1986. *The Silviculture of Indian Trees.* Vol. 1, 2nd edn., International Book Distributors, Dehra Dun, India, pp. 402-413.