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Full Length Research Paper

Seed storage evaluation, imbibition capacity assessment and seed pre-sowing treatment studies on *Newbouldia laevis* (P. Beauv) ex bureau

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A study was designed to evaluate seed storage, imbibition capacity and seed pre-sowing treatments on *Newbouldia laevis.* This was with a view to determining the optimum method(s) of seed storage, enhancement of imbibition capacity and the pre-sowing treatments. In the initial studies these were recognized as impediments to good seed germination. Significantly varied results ($P < 0.05$) were obtained during the period of storage (12 months). The control, 2 weeks after harvest had 100% viability, 1 month 95% viability while at 12 months 15% viability was obtained. Rapid imbibition was observed in the study; within 24 h moisture gain was 2.0% over the initial. It stabilized at 2.0% moisture gain up to 88 h. Soaking in water under room temperature for 24 h yielded the highest mean value of 60% germination while the control had 10%. Lowest mean value of 40% germination was obtained in hot water pre-sowing treatment. Evidence from the study showed that a maximum storage period of 1 month, imbibition period of 24 h and soaking in water under room temperature for 24 h are optimum for germinating and raising seedlings of *N. laevis*.

Key words: *Newbouldia laevis*, imbibition, pre-sowing treatment, seed storage.

INTRODUCTION

Newboldia laevis belongs to the family Bignoniaceae. It is a very well known plant species in Africa for its diverse uses. Most significantly, it is known as a symbol of unity, family symbol of authority and a shrine for ancestral worship. The plant species is known in English as tree of life, fertility tree. In Nigeria it is known in Yoruba as okoko, Hausa - aduruku, Tiv - Kontor, Benin - Ikhimi, Igbo-Ogirisi, Efik - obot, Urhoho - ogiriki (Gill, 1992).

The plant species plays a role in phytomedicine. The bark, leave and root are the parts used. The isolated chemical constituents of the plant as reported by Gill (1992) are alkaloids, tannins and saponins. The young leaves of the plant are crushed in little amount of water and the extract is used to treat eye inflamation and redness. It is also administered to stop vaginal bleeding in threatened abortion (Kargbo, 1982). Kargbo (1982) further reported that the species' leave and root are used in the treatment of round worm infection, elephantiasis, dysentery, malaria, stomachic, migraines, convulsions and the bark is chewed, swallowed to relieve headache.

This plant species of great cultural importance and diverse phytomedicinal uses should not be left in the wild. Information on its domestication and further research is vital. Against this back drop, a study was designed to investigate the parameters in materials and methods. This was with a view to determining optimum ways to regenerate and since it is not possible to domesticate all spices, this spices needs also to be protected in its natural area. Thus leading to its sustainable management and benefits to mankind in the right quantity and quality.

MATERIALS AND METHODS

Seed procurement

Mature and ripe fruits were collected from mother trees before dropping. Dry leaf colour of the fruits indicated that the fruits were ma-

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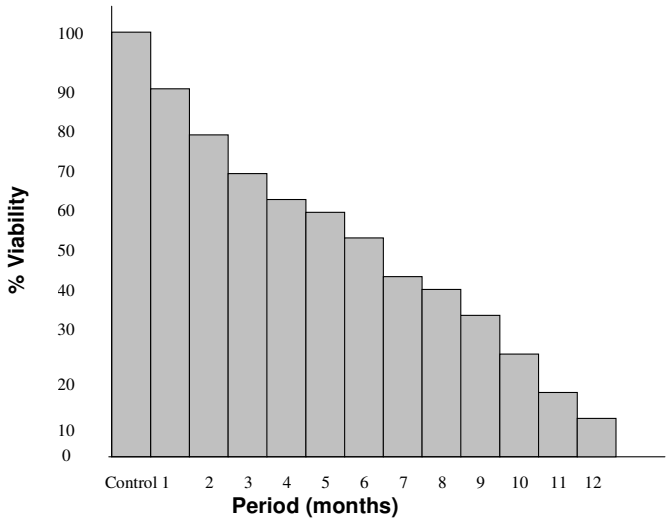

Figure 1. Effect of *Newboldia laevis* seed storage duration on viability.

mature and dry. The dried fruits were opened using a knife and seeds were extracted. The seeds were allowed to dry under room temperature for 1 week and thereafter, stored at 4°C.

Seed storage evaluation

12 storage regimes were evaluated in the study - 1 to 12 months period. The purpose was to determine how long the seeds of *N. laevis* can remain viable. Samples of seeds from each storage period were subjected to viability test using the method described by Peters (2000).

Water imbibition assessment

Samples (3 replicates) of the seeds were weighed to determine initial mean weight. The seeds were steeped into a (50 ml) beaker containing tap water. The seeds were allowed to imbibe water under room temperature 32°C ± 2. At regular intervals of 8 h the seeds were removed wiped with absorbent paper, weighed and weights recorded. This process was repeated until a constant weight was obtained and mean value calculated. The method is a modified method described by Kandari et al. (2008),

Seed pre-sowing treatment

Tropical tree seeds are mesophitic and exhibit a kind of dormancy. In view of this, pre-sowing treatments become necessary. In this study 2 pre-sowing methods were used- soaking in water for 1, 2, 24 h respectively, soaking in hot water (100°C) for 1, 2, 3, min. Experiments and controls (without treatment) were replicated 3 times.

Data analysis

Data obtained were statistically analyzed using analysis of variance and student T-test where the mean of 2 samples were involved.

RESULTS AND DISCUSSION

Seed storage evaluation

The result is shown in (Figure 1). A steady decrease in viability was observed within the period of storage. The control had 100% viability, this is probably due to the short period between harvest and viability test (2 weeks). The first month storage period had 95% viability while 12 months storage had 15% viability. The optimum period of storage was observed to be between 1 - 3 months (Figure 1). This finding agrees with Kandari (2005). Previous studies showed that tropical tree species loose viability easily under room temperature, this has been confirmed in this study.

Water imbibition assessment

Generally water imbibition is necessary to kick start the physiological process in the seed. With enough water imbibition the seed was swollen and a kind of pressure, imbibition pressure was established. As a result the seed ruptured leading to the emergence of the radicle. Thus at this stage the seed was said to have germinated.

Rapid moisture imbibition was noticed. In the 8, 16 and 24 h, moisture gain was 1.5, 1.8 and 2.0% respectively over initial weight. A maximum of 2.0% moisture gain was obtained at 24 h and remained so up to 88 h (Figure 2). The implication of this is that pre-soaking period in water under room temperature for 24 h can promote the activity of growth hormones. The results of this study confirmed those of Kandari (2005). However, while Kandari (2005) had 2.5% moisture gain at 24 h, in this study 2.0% moisture gain was obtained. Impermeable seed coats impose physical dormancy on the seed and this creates water gaps in seeds (Baskin, 2003).

However, Kaye (1997) is of the view that environmental conditions responsible for imbibition and seed germination in natural environment should be critically studied. This will make the process of seed germination properly understood.

From the study a soaking duration of 24 h in water yielded the highest mean value of 2.0% moisture gain. Thus representing the optimum imbibition period for the seeds of *N. laevis.*

Seed pre-sowing treatments

Initial trials (authors of this work) showed that not all viable seeds had good % seed germination. This led to the evaluation of pre-sowing treatments.

Soaking seeds in tap water for varying periods of 1, 2, 24 h respectively

Significantly varied ($P < 0.05$) response to the various soaking regime was observed (Figure 3). The soaking period that gave the highest germination value (60%) was 24 h. It was this period under which the highest imbibition was recorded. The control had the least value (10%) seed germination. This showed that not all viable seeds could germinate and that pre-sowing treatment is needed

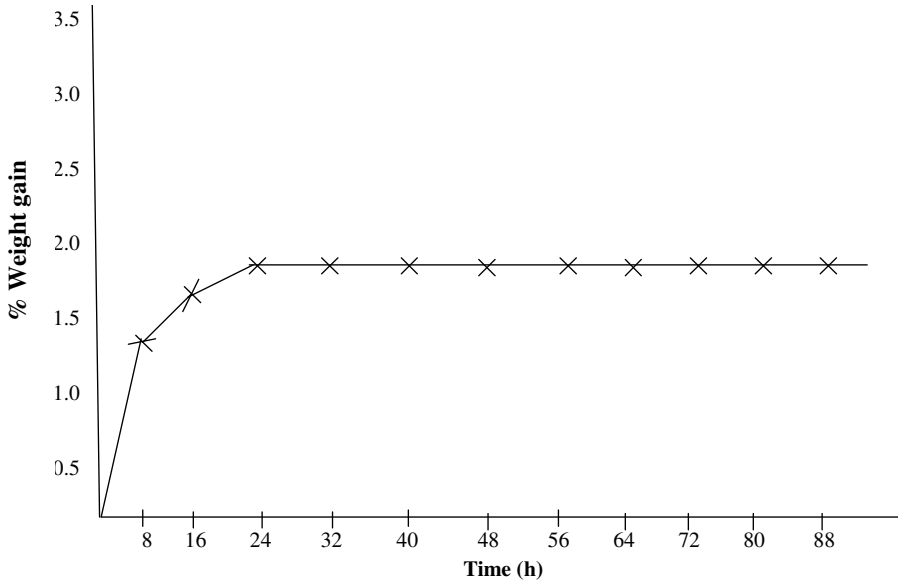

Figure 2. Water imbibition of *Newbouldia Laevis* seeds under room temperature.

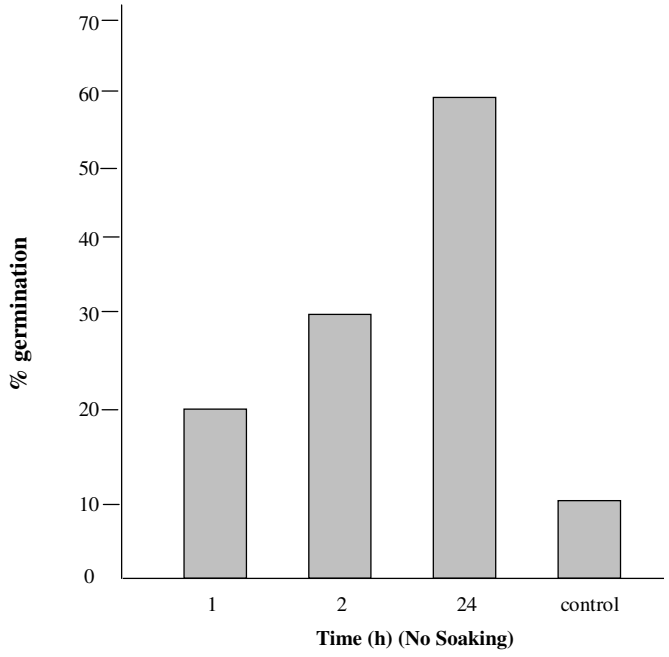

Figure 3. Effect of soaking in tap water on the seed germination of *Newbouldia Laevis.*

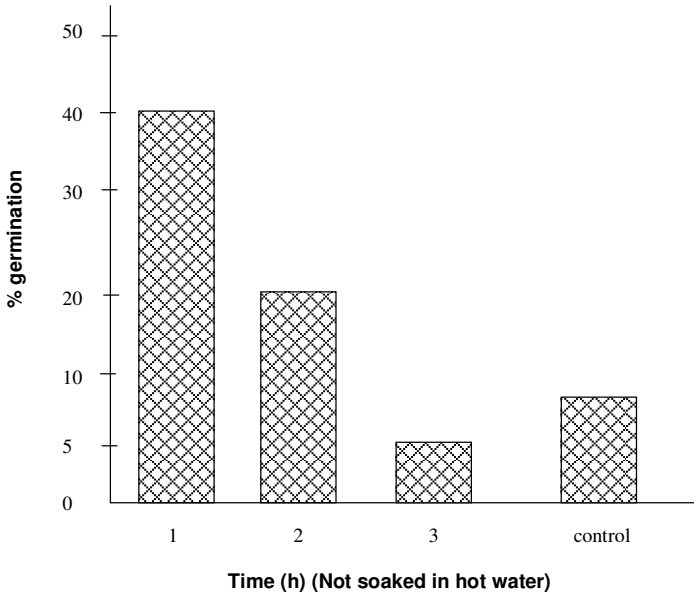

Figure 4. Effect of hot water on seed germination of *Newbouldia Laevis.*

to quicken the process of seed germination (Shivakumar et al., 2006). Ganai and Nawchoo (2002) are inconsonance with the result of this study for they observed that seeds exhibiting dormancy need pre-sowing treatment to enhance germination. Pre-sowing treatment enhanced seed germination in this study.

Soaking in hot water (100°C) for 1, 2 and 3 min respectively

The result of the effect of soaking *N. laevis* seeds in hot water is presented in (Figure 4). Significantly ($P < 0.05$) varying results were observed. A mean value of 40% was observed in the soaking duration of 1 min, 20% in 2 min, 5% in 3 min and 10% in the control. Hot water treatment

negatively affected the seed germination of *N. laevis*.

Beyond 1 min soaking duration mean values decreased. This result agrees with the findings of Masum et al. (2009). They reported lowest increase in seed germination in pre-sowing treatment using hot water to be 27.1% while 5% seed germination was the lowest in this study.

The implication of the variation in response to hot water could probably be species specific. Hannan (2005) observed that 90.0% fungi pathogens were reduced from the seeds when hot water was used as pre-sowing treatment. These fungi pathogens affect seed viability and thus seed germination capacity. However this was not observed in this study.

Conclusion

From the result of the study 1 - 3 months seed storage period, imbibition period of 24 h, soaking in tap water under room temperature for 24 h as pre-sowing treatment were observed as optimum. These are recommended for germinating and production of quality seedlings by tree propagators.

REFERENCES

Baskin CC (2003). Braking Physical dormancy in seeds-focusing on the lens. New phytol. 158: 227-238.

Ganai KA, Nawchoo AI (2002). In: vitro Seed germination studies on *Abembia benthamii*. India J. plant Physiol. 7: 252 -255.

Gill LS (1992). Ethnomedical Uses of plants in Nigeria. Uniben Press. University of Benin, Benin City, Nigeria. pp. 174-175.

Hannan MA (2005). Integrated Management of Foot Rot of Lentil, Chickpea and Graspea M.S. unpublished Thesis, Department of Plant Pathology, Agriculture university, Mymensingh, Bangladesh. p. 114.

Kandari L (2005). Ecophysiological and Socio Economic Studies of some Rhizomatus Medicinal and Aromatic plant species. Ph.D Thesis, H.N.B. Garthwal University, Sprinager (Garthwal), India.

Kandari LS, Raok S, Maikhuri RK, Chauhan K (2008). Effect of pre-sowing, temperature and light on the seed germination of *Arnebia benthanii* (Wall. RYG Don): An endangered Medicinal Plant of Central Himalaya, India. Afr. J. Plant Sci. 2(I): 005-011.

Kargbo TK (1982). Plant medicine. Nig. J. Pharm. 13: 22-26.

Kaye TNS (1997). Seed dormancy in high elevation plants: Implication for ecology and restoration. Vide Kandari LS, Roa KS, Maikhuri CK (2008). Effect of pre-sowing, temperature and light on seed germination of *Arnebia benthanii* (Wall. RXG. Don). Afr. J. Plant Sci. 2(1): 005-011.

Masum MMI, Islam SMM, Fakir MGA (2009). Effect of seed treatment practices in controlling of seed- borne fungi in Sorghum- Sci. Res. Essays. pp. 022- 027.

Peters P (2000). Tetrazolium Testing Handbook. Contribution No. 29. The Handbook on seed testing prepared by the Tetrazolium subcommittee of the Association of official seed Analysis. Part 2. Lincoln Nebraska USA.

Shivakumar V, Anandiakshmi R, Warrier RR, Tigabu M, Oden PC, Vijayachandran SN, Geetha S, Singh BG (2006). Effect of pre-sowing treatments, desiccation and storage conditions on germination of strychnos nux-vomica seeds, a valuable medicinal plants. New For. 32: 121-131.