International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
Coden: IJARQG(USA)

Research Article

Effect of pre-sowing treatments on seed germination of *Adansonia digitata* L. in field condition

Mulani R. M*. and Kharate M. S.

DST-FIST and UGC-SAP Sponsored School of life Sciences, Department of Botany,
Swami Ramanand Teerth Marathawada University, Nanded, (Maharashtra) India.
*Corresponding author: *mulani1961@gmail.com*

Abstract

The *Adansonia digitata* L. a large deciduous tree naturally occur in few places both in forest and in cities in Maharashtra State. It has broad tree trunk at the base and narrows at the apex so looks like a natural bonsai. It produced fruit which is large and elongated commonly called as *Gorkh chinch*. In English it is called as Baobab. It is native of Africa and exotic plant for India. In India it is reported from Maharashtra, Gujarat, Karnataka, Andhra Pradesh and in Maharashtra it is reported at Elphistent College and Jogeshwari (Mumbai); near auditorium Dr. Babasaheb Ambedkar Marathwada University (Aurangabad); near Shirwal (Pune); on East and West side Purna railway station (Nanded).The fruit is medicinally important for curing malaria, diarrhoea and microbial infections. Presently its density is low in forest so present investigation were undertaken to check the germination percentage of this species. The effect of pre-sowing treatment on seed germinated was tested by performing field methods. In present investigation the seeds of *Adansonia digitata* L. were pre-treated with cold and hot water for different time duration and without removed of seed pulp directly. The germination percentage was significantly increased (83.33%) in hot water pre-treated seeds with 40^{o}C for 24hrs and lowest were (9.33%) when seeds were pre-treated with cold water at low temperature (- 4^{o}C) for 48hrs.

Keywords: *Adansonia digitata* L., seed treatment, seed germination.

Introduction

The *Adansonia digitata* L. is the one of the important tree species of deciduous forest type and commonly called Baobab in English and Gorkh chinch locally in Marathwada. The plant look like a natural Bonsai, It is native in Africa and reported from Angola, Botswana, Burkina Faso, Cameroon, Chad, Congo, Eritrea, Ethiopia, Gambia, Ghana, Kenya, Mali, Mozambique, Namibia, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan Tanzania, Togo, Zambia, Zimbabwe and Exotic in India and 39 different countries (Orwa et al., 2009). In India *Adansonia digitata* Linn. local name is *Gorkh Chinch*.It is a large, round canopied tree with large trunk about 12-24 m in height, bark is soft, smooth, fibrous, reddish brown and flowers is waxy white having diameter 15-20 cm. Generally this plant bearing bisexual flowers and Fruit shape is Ovoid with hard coat and Seed enclose with whitish pulp. Seed is very small 1.3 cm, aprox.100-150 seeds present in one fruit (Orwa et al., 2009).

The number of this species is less in Maharashtra state This plant species plays an important role in nutrition, vitamins, minerals and energy requirement for the diet of Africa. The leaves of *A. digitata* are used either fresh or dry and used for preparation of vegetablesoup (Sidibe and Williams, 2002).The plant population of baobab was reducing day by day in different region of India because of its heavy extraction and high demand of its fruits and seeds and even due to low germination percentage (Joker, 2000; Ugese et al., 2007) and because of that in the present investigation we focused on the objective of pre-sowing treatments to improve seed germination

Materials and Methods

The study was conducted at the Botanical garden at School of Life Sciences, Swami Ramanand Teerth Marathawada University, Nanded, Maharashtra. Garden is located between latitude 19º06'01.63''N and longitude 77°17'03.58''E at an elevation of 381m above sea level, 05 km from Nanded city. For present investigation the material was collected in month of June 2014 from Purna in Nanded district located at GPS reading°N19°53'43.71'', °E 75°18'36.18''.Seed viability test was performed for each fruits and the embryo were treated in a beaker containing 1% T.T.C. (2, 3, 5-triphenyl tetrazolium chloride) (Misra, 1968; Mishra et al., 1981). The observations were made after 4 hours. The viability of seeds was also tested by floaters and sinkers test. In this experiment 50 seeds were soaked separately in tap water(28ºC), cold water (-4ºC) and hot water (40ºC) for 24 hours and for 48 hours (Table 1) in three replicates. The treated seeds were then sown in pots along with untreated seeds separately. The observations were made from first day to thirty days after sowing. The data generated were used to calculate germination percentage by using following formula (Maguire, 1962):

$$\text{Germination}\,\% = \frac{\text{Number of seeds germinated}}{\text{Number of seeds in pots}} \times 100$$

Results and Discussion

In the present investigation the pre-soaking treatment of water at various temperatures is given for dormant seeds of *Adansonia digitata* L. collected from Purna in Nanded district. It was observed that highest percentage of germination (84.33%) was reported in the seed treated with hot water at 40°C for 24 hrs. followed by the seeds treated for 48 hrs. (76.66%) while very low germination percentage was reported when seeds were pre-treated with cold water (-4°C) for 48 hrs. as compared to other treatments. Similar observations were made by Rafiqul *et al*. (2014) in *Acacia catechu* were the maximum seed germination was observed when seeds were treated with hot water for 30 seconds and in *Albizia lebbeck* were the germination percentage was enhanced when the seed were treated with hot water as compared to cold water. Edward *et al*. (2013). Naidu and Mastan, (2001) reported 84%germination in *Pterocarpus santalinus* when seeds are treated with hot water for 24 hrs followed by the seeds treated for 48 hrs where the germination percentage is (76.66%). It was also recorded by Hartman *et al*. (2007) and Falemara *et al*. (2013) where the hot water treatment improves the seed germination in *Adansonia digitata* L. when seed are treated with boiling hot water for 7 min.

Table 1.Effects of different treatments on germination percentage of *Adansonia digitata* L.

Sr. No.	Treatment	Soaking Time (hrs.)	No. of seed sown / pot	No. seed germinated/ pot	Germination (%)
1	Tap water treatment(28ºC)	24 hours	50	13	26.00
		48 hours	50	16	32.00
2	Cold water treatment (-4ºC)	24 hours	50	9	18.00
		48 hours	50	4	9.33
3	Hot water treatment (40ºC)	24 hours	50	42	84.33
		48 hours	50	38	76.66
4	Untreated	48 hours	50	6	12.66

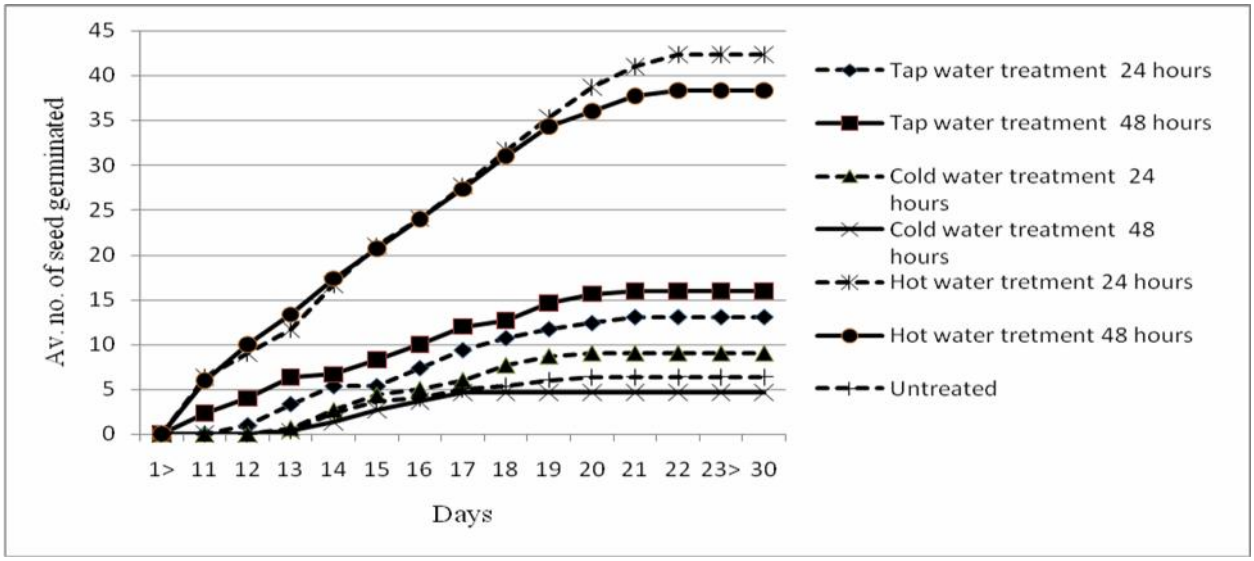

Fig. 1 Seed Germination percentage pattern in *Adansonia digitata* L. treated with tap water (28°C), cold water (-4°C), hot water (40°C) and untreated for 24 and 48 hours

The seed soaked in hot water for 24 hours, showed highest germination (84%) and occurred between 11-22 DAS. Seeds soaked for 48 hours in hot water showed second highest germination (76%) between the periods of 11-22 DAS. Seeds soaking in cold water for 24 hrs showed 18% germination between 13-20 DAS. Seeds soaked for 48 hrs in cold water showed 9.33 % germination whereas the untreated seeds also given low germination (12.66) percentage (Fig. 2). Some researcher found that in plant *Albizia lebbeck* germination percentage increased by hot water treatment as compare to cold water treatment (Edward et al., 2013). The imbibitions of water by seed help to enlarge the embryo which leads to increase in fresh weight of seed. Better germination (79-81%) was observed when seeds were soaked in water for six days or placed in running water against control (17%) in *Pterocarpus santalinus* seeds (Naidu and Mastan, 2001). Seeds pre-soaked in hot water for 24 hours recorded highest germination percentage (84 %) which was higher than untreated seeds, seeds treated with tap, cold and hot water. Seeds pre-soaked in hot water for 48 hours also recorded second highest germination (76.66%) which was sufficiently higher than other treatments. Soaking the seeds in hot water at room temperature helps in softening the seed coats, removal of inhibitors and reduces the time required for germination and increases germination percentage (Hartman et al., 2007).

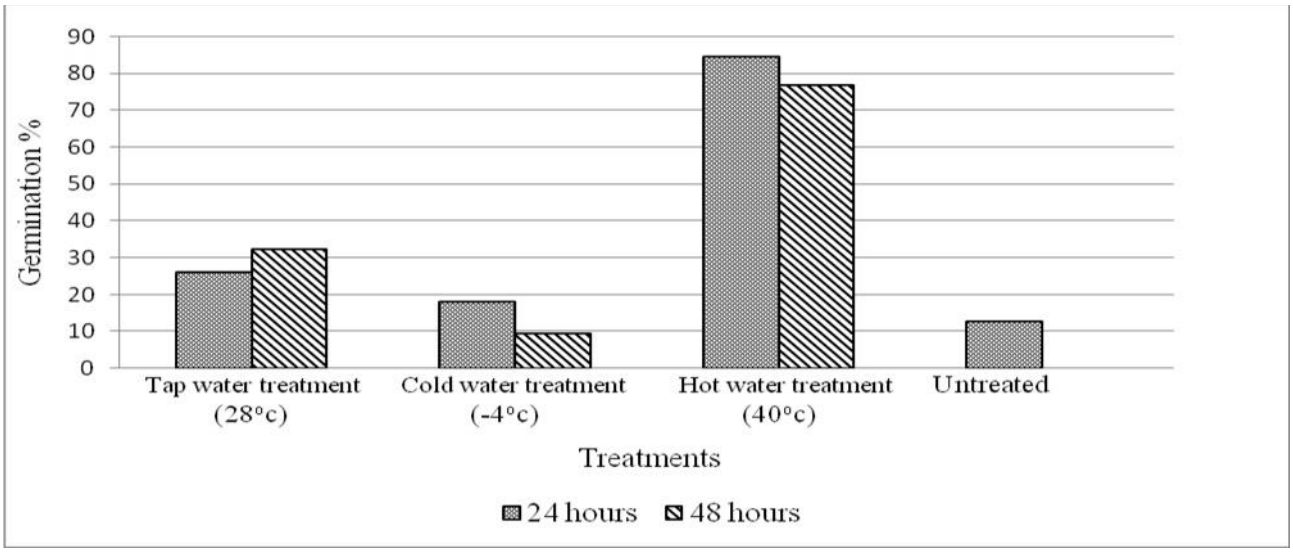

Fig. 2 Percentage seed germination of *Adansonia digitata* L. with tap water (28°C), cold water (-4°C), hot water (40°C) and untreated for 24 and 48 hours.

Conclusion

Pre-sowing treatments with hot water enhanced germination percentage in *Adansonia digitata* L. The maximum germination percentage was observed when seeds were treated with hot water for 24 hrs as compared to other treatments.

Acknowledgments

The acknowledgement are due to the Director, DST-FIST and UGC-SAP Sponsored School of Life Sciences, Swami Ramanand Teerth Marathwada University, Nanded and Rajiv Gandhi Science and Technology Commission, Government of Maharashtra Mumbai for providing financial assistance.

References

Charade, F. J., Linnemann, J. D., Hounhouiganm, J. D., Nout, M., J. R., and Boekel, M. A. J. S. 2009.Baobab food products: a review on their composition and nutritional value. Crit. Rev. food Sci. Nutr. 49:254-274.

Edward, M., Chikumbutso, M., Dackious, K., Hannah, B., and Gift, K. T. 2013. Effect of seed size and pretreatment methods on germination of *Albizia lebbeck*. Hindawi Publishing Corporation, ISRN Botany. 4 pages.

Falemara B.C., Nwadike C., Obashola E O. 2013. Germination response of boabab seeds (*Adansonia digitata* L.) as influenced by three pre-treatment techniques. European Journal of Agriculture and Forestry Research Vo1.3, No.4, pp.51-61.

Hartman, T., Kester,E.,Davies, T., and Geneve,R. L. 2007. Plant propagation principle and practice. Prentice Hall of India Private Limited, New Delhi, India. pp. 216-220, 2007.

Joker, D., 2000. *Vitellaria paradoxa* Gaertn. F. Danida Forest Seed Centre, Seed Leaflet No.50.

Maguire, J., D., 1962. Speed of germination in selection of evaluation for seedling vigour. Crop Sci.2:176-177.

Mishra, S. S., Mishra, S., Chaudhari, N. K., and Ray, P. K. 1981.Optimum seed size and planting rate for cultivation of *Amorphophallus campanulatus* in Bihar.(Res. New Delhi) 9(2):167-171.

Misra, R., 1968. Ecology work book. Oxford and IBH Publication.

Naidu, C.V.,and Mastan, M., 2001. Seed pre-treatment methods to improve germination in *Pterocarpus santalinus* Linn. Indian J. For. 24(3): 342-343.

Nordeide, M. B., Hatloy, A., Folling, M., Lied, E., and Oshaug, A. 1996. Nutrient composition and nutritional importance of green leaves and wild food resources in an agricultural district, Koutila, in Southern Mali. Int. J. Food Sci. Nutr. 47(6): 455-468.

Omokhua, G. E., Aigbe, H.I., and Ndulue, N. B. 2015. Effects of pre germination treatments on the germination and early seedling growth of *Tetrapleura tetraptera* (Schum. & Thonn.) Int. J. of Sci. & Tech. Res. 4(03):2277-8616.

Orwa, C., Mutua, A., Kindt, R., Jamnadass, R., and Anthony, S. 2009. Agroforestry database: a tree reference and selection guide version 4:01-08.

Rafiqul, M., Haider., Sah AlamMd., and Akhter, HossainM. 2014.Effect of pre-sowing treatment on seed germination and seedlings growth attributes of *acacia catechu* willd. in nursery and field conditions. Int. J. of Latest Res. in Sci. and Tech.4(3): 2278-5299.

Sidibe, M., and Williams, J. T. 2002. Baobab: International centre for underutilised crops, Southampton.

Ugese, F.D., Ojo, A.A., and Adedzwa, D.K. 2007. Effect of sowing depth and seed size on emergence and seedling growth of seeds of Shea butter tree (*Vitellaria paradoxa*). Nig. J. Bot.20: 93-102.