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Effect of Pre-Sowing Seed Treatments on Germination of *Cinnamomum tamala*-A Medicinally Important Tree Species

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A B S T R A C T

Cinnamomum tamala, commonly known as the Tejpat, Malabar leaf or Indian bay leaf is a promising medicinal tree species of India. Being aromatic and having immense medicinal benefits, its leaves are widely used in culinary preparations as well as ayurvedic medicines. The exhaustive collection methods of this tree for various purposes have imposed a serious threat on the natural occurrence of this species. So to conserve this species through quality nursery production, the present study was planned with the objective to standardize the method of pre sowing seed treatments in *Cinnamomum tamala.* It was observed that soaking of the *C. tamala* seeds for twenty four hours in water resulted in highest per cent germination (77.6%), which was significantly higher than all the other treatments. This was followed by treatment of seeds with warm water at 80º C (62.4 %). The other growth parameters such as root length (9.5 cm), shoot length (10.8 cm), collar diameter (1.9 cm) and plant weight (1.26 g) were also found to be highest in the plants germinated from the seeds soaked in water for 24 hours.

Introduction

Cinnamomum tamala, an evergreen monoecious species tree of the Lauraceae family, is a promising medicinal tree species. It is commonly known as the Tejpat, Malabar leaf or Indian bay leaf in India. Its leaves are aromatic and are widely used in culinary preparations throughout the world since ancient times. *Cinnamomum tamala* is used in Indian system of traditional medicines in various Ayurvedic formulations e.g. Sudarshanchoorna and Chandraprabhavati. Its leaves and bark have aromatic, astringent, stimulant and carminative qualities and used in rheumatism, cardiac disorders, colic, diarrhea, nausea and vomiting (Sharma and Nautiyal, 2011). The leaves of this tree have a clove like taste and a faintly pepper like odour and is used extensively as spice in the food industry (Grover *et al.*, 2002).The leaf oil obtained by distillation is used for flavoring liquors and confections, and has

immense pharmaceutical applications (Rema, 2005). *C. tamala* has been used as a natural food preservative for pineapple juice (Kapoor *et al.*, 2008). The leaves extract are used as clarifiers in dyeing procedures with myrobalans or kamala. Traditionally green dye has been extracted from its leaves (Gaur, 2008). This tree is used as food, fodder, medicine, and timber in Uttarakhand Himalayan region (Nautiyal and Kaechele, 2007).

Cinnamomum tamala is listed as a threatened species as the plant population is declining day by day due to over exploitation and habitat destruction in India (Kumar, 1997). Due to high medicinal value and being a source of different spices, *Cinnamomum tamala* has entered in vulnerable category in entire Himalayan region and endangered in Jammu & Kashmir, India (Ved *et al.*, 2003). According to the report by Samant *et al.*, (2001), considering the economic potential and dwindling natural populations of *C. tamala* in several ranges Himalayan states of India, this species has been recommended for *in-situ* as well as *ex-situ* conservation. The exhaustive and non-sustainable harvesting practices have posed a serious threat to the survival and availability of this highly useful tree, so, its conservation and propagation has become an immediate need.

Cinnamomum tamala is generally propagated through seeds (Patel, 2015), however, seed germination in *Cinnamomum tamala* is a critical phenomenon as the seeds are recalcitrant by nature (Deb *et al.*, 2014). The seed pulp acts as an inhibiting factor in the germination of its seeds. The de-pulped seeds also experience a decline in germination with time and must be sown immediately after harvesting and depulping (Mayura & Idris, 2019; Kuniyal *et al.*, 2013; Deb *et al.*, 2012). Proper nursery growing techniques are not available for this species and its cultivation is also not being followed at a large scale by farmers as well as by government agencies.

So, with an objective to produce good quality nursery stock of *Cinnamomum tamala*, the present study was conducted to test the effect of different pre owing seed treatments on germination of its seeds.

Materials and Methods

The research experiments were carried out in the Himalayan Forest Research Institute Nursery, Bir Palasi, Nalagarh, Distt Solan (H.P.), India. The fruits of *Cinnamomum tamala* were collected from Jogindernagar, District Mandi, Himachal Pradesh. Healthy mother trees were selected for seed collection and the fruits were collected when ripe, i.e. when the fruit colour changes to blackish purple. De-pulping was done to extract the seeds from the fruits and these seeds (Figure 1) were then sown in the nursery after carrying out different pre sowing treatments as mentioned below:

T1 - Control i.e. no treatment

T2 - Soaking of seeds in water for 24 hours

T3 - Seeds kept in warm water @ 80ºC till the water reaches room temperature

T4 - Boiling water treatment for 2 minutes

T5 - Boiling water treatment for 5 minutes

The experiment was laid out in completely randomised block design (CRD) and comprised of five treatments with four replications having 50 seeds each and the data were recorded.

The germination percentage (%) of the seeds was calculated using the formula given below:

$$\text{Germination percentage (\%)} = \frac{\text{No. of seeds germinated}}{\text{No. of seed sown}} \times 100$$

The number of days taken from sowing to start of emergence in all the treatments was also recorded. In addition to this, observations on other growth

parameters such as root length (cm), shoot length (cm), collar diameter (mm), and plant weight (g) were also recorded. These growth performance parameters were studied by taking ten seedlings from each replication of all the treatments after three months of sowing. The data thus obtained were subjected to analysis of variance and the critical difference (CD) was calculated at significance level of P=0.05.

Results and Discussion

Maximum germination percent (77.62 %) was observed in T2 i.e. overnight soaking of the seeds in water for twenty four hours. The number of days taken by the seeds to start of emergence was also least in T2 (12 days). The results are presented in Table 1.The mean root length, shoot length, collar diameter and plant weight of the seedlings were found to be maximum in T2 with the value of 9.56 cm, 10.88 cm, 1.92 mm and 1.26 g, respectively. The detailed data on growth parameters of all the treatments are presented in table 2.

The present investigation revealed that different treatments to which the seeds were subjected, affected the germination performance of the seeds. The overnight soaking of the seeds in water for twenty four hours (T2) resulted in 77.62 % germination, which was found to be significantly higher than the control as well as all the other treatments. This was followed by the treatment T3, i.e. soaking of the seeds in warm water having temperature of 80ºC till the water reaches room temperature, which resulted in 62.41 % germination. Least germination percent was found to be in the seeds treated with boiling water for five minutes i.e. T5 (15.62%), which may be because of the damage of the embryo due to exposure to boiling water for long time. It was also observed that the number of days taken by the seeds to start of emergence were also least in T2 (12 days), thus making it the best suitable treatment for fast and higher germination. This may be attributed to the softening of the seed coat due to soaking of seeds in water, which ultimately enhances the germination. The untreated seeds i.e. control (T1) took the longest time (18 days) to the start of emergence. Similar results were obtained by various workers in many species such as *Berberis aristata* (Thakur *et al.,* 2005), *Spartium junceum* (Travlos *et al.,* 2007) and *Terminalia chebula* (Hossain *et al.,* 2005), where pre soaking of seeds in water resulted in improved germination over the control. The mean root length of the seedlings was found to be maximum in T2 (9.56 cm), followed by T3 (8.42 cm). The shoot length, collar diameter and plant weight were also recorded to be maximum in T2 among all the treatments, which were significantly higher than the control. The minimum value for all the growth parameters were recorded in T5 i.e. treatment of seeds with boiling water for 5 minutes.

Table.1 Effect of seed treatment on germination of *Cinnamomum tamala* seeds

Treatments	Days to first emergence	Germination percentage (%)
T1 (Control)	**18**	**56.38**
T2 (Overnight soaking in water)	**12**	**77.62**
T3 (Seeds kept in warm water @ 80ºC)	**15**	**62.41**
T4 (Boiling water treatment for 2 min.)	**14**	**55.12**
T5 (Boiling water treatment for 5 min.)	**15**	**15.62**
S/NS	**NS**	**S**
CD (0.05)	**-**	**14.806**

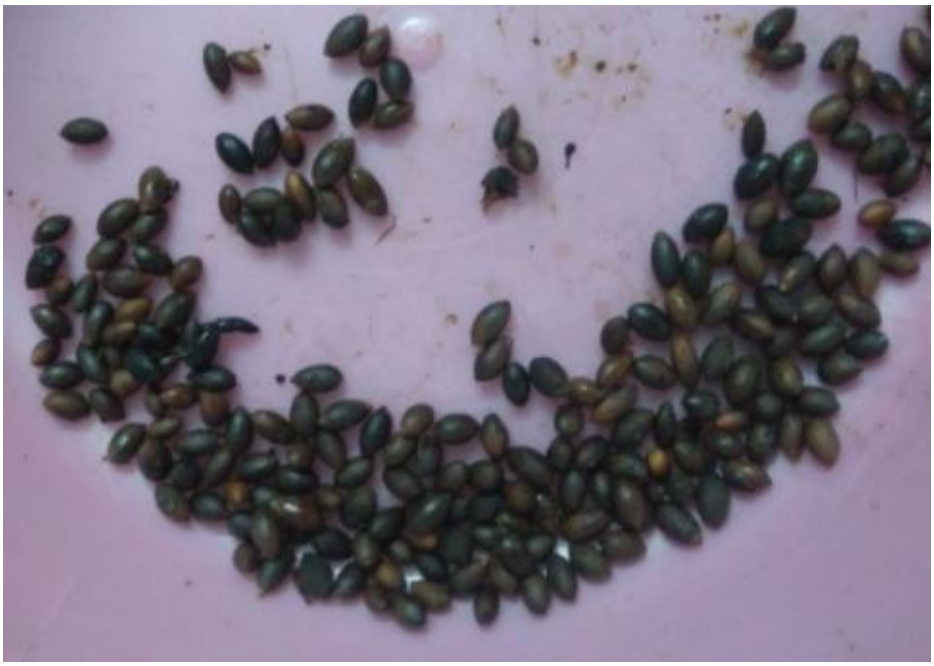
* S= Significant, NS= Non significant

Table.2 Effect of seed treatment on growth parameters of *Cinnamomum tamala* seedlings

Treatments	Root length (cm)	Shoot Length (cm)	Collar diameter (mm)	Plant wt (g)
T1	**8.22**	**7.31**	**1.21**	**0.54**
T2	**9.56**	**10.88**	**1.92**	**1.26**
T3	**8.42**	**8.19**	**1.68**	**0.99**
T4	**7.34**	**7.28**	**1.46**	**0.47**
T5	**4.15**	**3.70**	**0.92**	**0.49**
S/NS	**S**	**S**	**S**	**S**
CD (0.05)	**2.61**	**3.55**	**0.70**	**0.43**

* S= Significant, NS= Non significant

Fig.1 De-pulped seeds of *Cinnamomum tamala*



From the current study it can be inferred that soaking of the de-pulped *Cinnamomum tamala* seeds in water for twenty four hours not only results in faster as well as higher germination than the control, but also results in growth of healthy and vigorous seedlings. Apart from this treatment, soaking of seeds of this species in warm water also enhances the seed germination and growth performance. These treatments can thus be used in large scale production of good quality nursery stock of *Cinnamomum tamala* species, which can ultimately help in its conservation.

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