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## RESEARCH ARTICLE

**Development and standardization of Nursery techniques of *Meizotropis pellita*: A critically endangered plant of Himalayan region**

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**Abstract**

*Meizotropis pellita* (Wall. Ex Hook, F & Grew) is locally known as Patwa in Kumaun Himalaya of Uttarakhand. It is an endemic shrub species which is critically endangered. In the absence of sufficient natural regeneration and conservation measures it can be extinct from the existing forests. So the objective of the present investigation was to develop and standardize nursery techniques of *Meizotropis pellita* through seed and vegetative method. Therefore an experiment of seed sowing was carried out in different places (mist chamber, shade net, open beds), different mediums (sand, sand + compost, soil + compost) with pre sowing water treatments (normal water soaking for 12 hours, hot water soaking for 12 hours) and control. The results indicated that maximum 87 % seed germination was observed after normal water soaking for 12 hours in sand + compost medium in shade net followed by 82 % after normal water soaking for 12 hours in sand under shade net and 80 % after hot water soaking for 12 hours in sand under mist chamber. Vegetative propagation was conducted by root suckers observed 16% sprouting with soil medium in open beds.

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**INTRODUCTION**

*Meizotropis pellita* (Wall. Ex Hook, F & Grew.) Syn. *Butea pellita* is a perennial shrub of Fabaceae (Papilionaceae) family occurs at an altitude of 5000 feet in Patwadangar of Nainital and Kali Kumaun in eastern Almora in the state of Uttarakhand also reported in Doti district of Nepal. Plant has woody perennial rootstock with several erect shoots about 2 m in height. Corolla has bright red, keel changing to orange towards the base line, flowering occurs in May-June (A.E.Osmaston, 1926). It becomes dormant in winter season and new shoots reappear in April – May. *M. pellita* has very small population and grows in very specialized and sensitive habitats; therefore any further change and ecological disturbance are bound to cause their total extinction from this region. Population of this rare, endemic and endangered plant is on decline due to deforestation, habitat fragmentation, forest fire, human interference and ignorance of people (L.Tewari, 1998). Root system of this plant is very complex can be used in eroded and slip areas plantation for soil binding and minimizing soil run off in hill slopes. Recently many studies have been done on in-vitro propagation, antioxidant activities and Pharmacognostic evaluation of leaves. *M. pellita* leaves stem and root have been reported antioxidant properties. (A. Kerketta; V. Sirohi and R.K.Nailwal, 2014). Major factors like forest fire, climate change and anthropogenic pressure are causing degradation of its natural habitats. It is on the edge of extinction in the absence of sufficient natural regeneration and protection measures. So there was an immediate need to develop and standardize propagation techniques of this species for mass propagation and its conservation.

## Material and Methods

### Description of experimental area

The experiment was conducted in the Sadiatal nursery of Research wing of Uttarakhand Forest Department, Nainital from 2011 to 2013. The area is situated at N 29<sup>0</sup> 22.751' latitude and E 79<sup>0</sup> 25.955' longitude at an altitude of 1775 m. The climate of the area is temperate. Temperature ranging from 1<sup>0</sup> C to 30<sup>0</sup> C and receive 1800 mm annual rainfall. Frost occurs December to February and snowfall occasionally occurs in winter.

### Experimental material and design

*Meizotropis pellita* root suckers were collected from Patwadanger regions of Nainital in the month of February. 5 root suckers per replicate planted in open beds & shade net in sand medium. The seed pods of *M. pellita* were collected from Patwadanger region of Nainital, Uttarakhand during late September to October first week in 2011. Seed pods were dried in sun light for one week and seeds were removed from the pods. One single seed was found in one seed pod. 2400 seed weight was found in 2 kg. Seed sowing and germination studies were conducted in mist chamber, shade net and open beds. The different mediums sand, sand + compost (1:1) and soil + compost (1:1) were used for seed germination. Pre sowing treatments (normal water soaking for 12 hours, hot water soaking for 12 hours and control) were given to analyze the seed germination. Control treatment was used to compare seed germination with different water treatments. In mist chamber, humidity was maintained above 60 %, temperature 25<sup>0</sup>c to 35<sup>0</sup>c and fogging one minute at 30 minutes interval. 15 seed were taken for per treatment per medium per place per replication. The experiment consists of 27 treatments and each treatment was replicated thrice all data were analyzed and best results shown in Table 2.

## Result and Discussion

**Table 1.** Sprouting percentage by root suckers in shade net and open beds

Medium	Sprouting %	
	Shade net (P1)	Open beds (P2)
Soil (M)	-	16.67

**Table 2.** Seed germination percentage of *Meizotropis pellita* in different treatments, mediums & places.

Medium	Germination %		
	Mist chamber (P1)	Shade net (P2)	Open beds (P3)
<b>(T1) - Normal water soaking for 12 hours</b>			
Sand (M1)	62	82	27
Sand + Compost (M2)	76	87	60
Soil + Compost (M3)	56	80	76
<b>(T2) Hot water soaking for 12 hours</b>			
Sand (M1)	80	64	24
Sand + Compost (M2)	78	71	64
Soil + Compost (M3)	64	64	67
<b>(C) Control</b>			
Sand (M1)	33	62	13
Sand + Compost (M2)	58	67	53
Soil + Compost (M3)	56	69	58

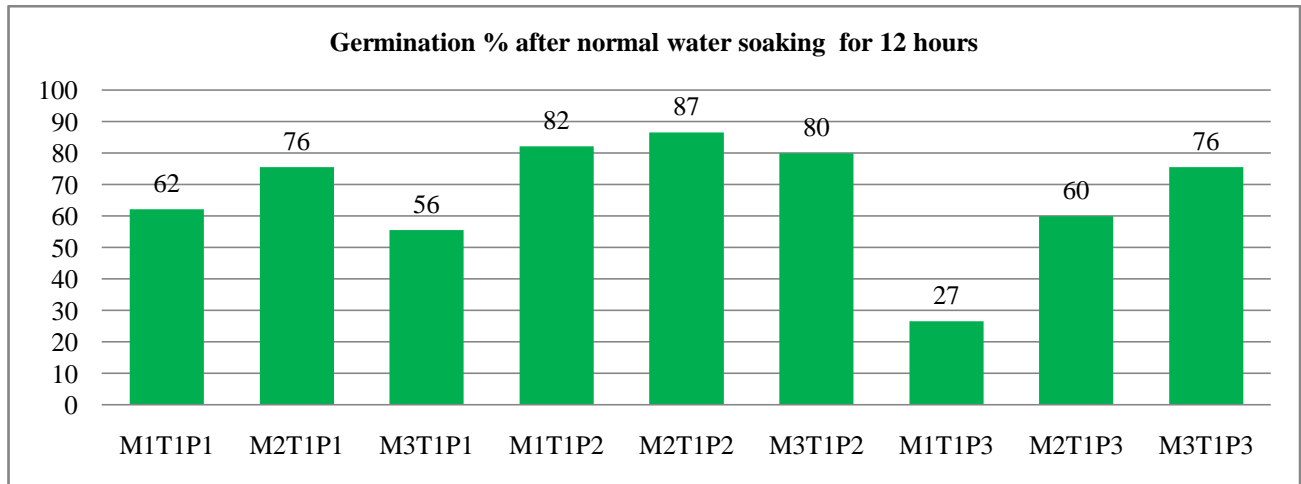


Figure 1. Effect of normal water soaking for 12 hours on seed germination in different mediums & different places.

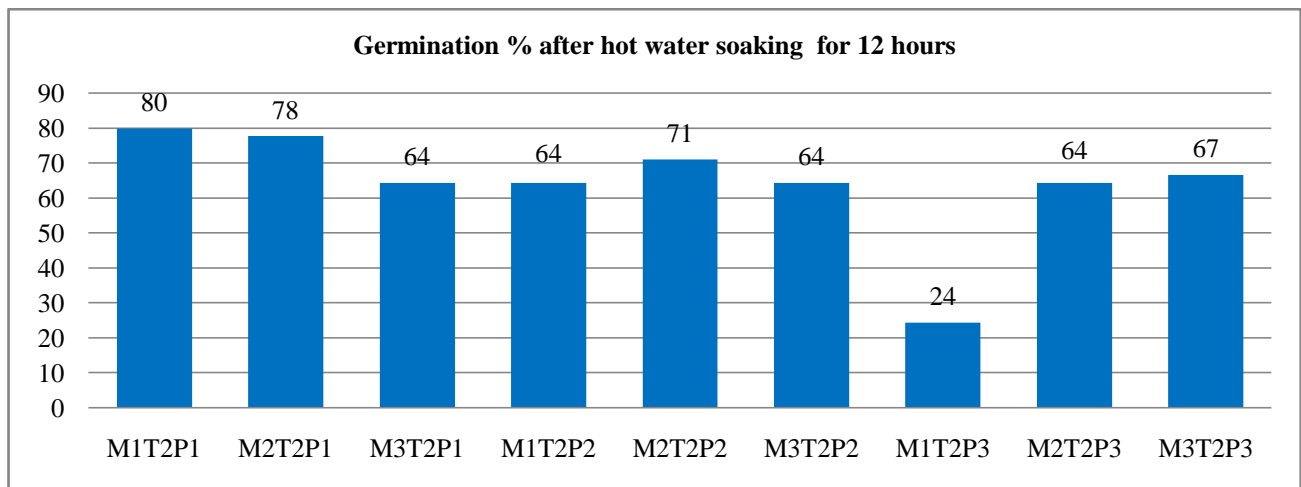


Figure 2. Effect of Hot water soaking for 12 hours on seed germination in different medium & different places.

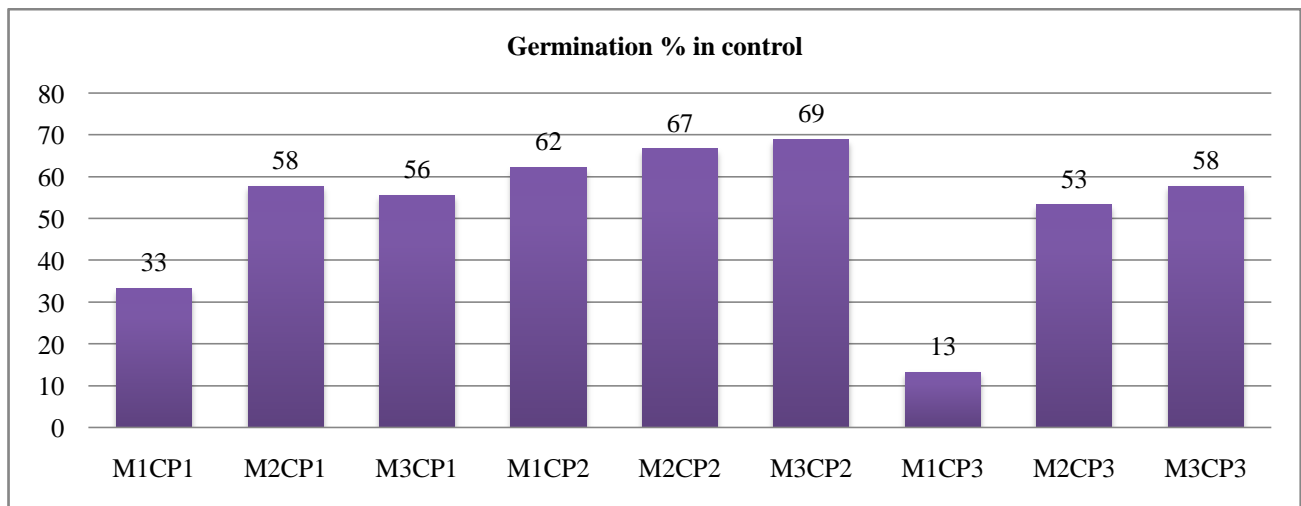
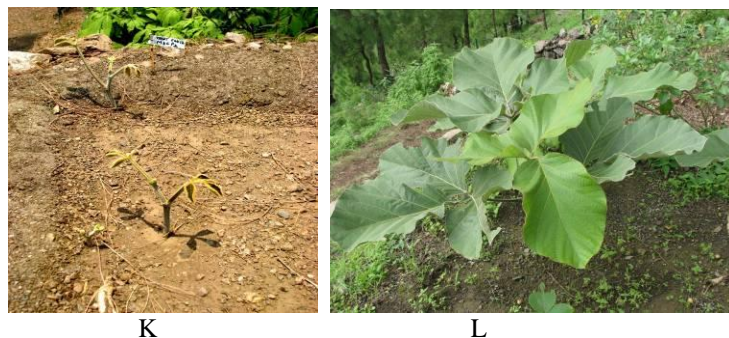


Figure 3. Control seed germination in different medium & different places.

Development and standardization of nursery techniques is very important in plant reproduction to raise desired planting stock in a short period and fulfilling the aim of enhancing the desired species population and conservation. No study has been found so far for development and standardization of nursery techniques of *M. pellita* at nursery level. In natural conditions, it propagates by its root stock in situ. In vitro system can be used for improvement, conservation and efficient mass multiplication of clones of *M. pellita* and (L. Singh et al., 2013). Vegetative propagation of *M.pellita* carried out by root sucker. Maximum sprouting observed 16.67 % in soil medium under open bed but no sprouting observed in shade net (Table. 1). Seeds were collected in late September to October first week and sown in the month of February after 5 months. Pre sowing water treatments, mediums and places were studied to analyze the seed germination. The data in Table 2 indicate that maximum 87 % seed germination was recorded in shade net (P2) with sand + compost (M2) after normal water soaking for 12 hours (T1) followed by 82 % germination in shade net (P2) with sand (M1) after normal water soaking for 12 hours (T1) and 80 % in mist chamber (P1) in sand (M1) after hot water soaking for 12 hours (T2; Table.2). Among the treatment normal water soaking for 12 h was recorded highest 87 % seed germination in shade net and lowest 27 % germination in open bed (Fig.1). Hot water soaking for 12 h was recorded 80 % highest germination in mist chamber and lowest 24 % germination in open bed (Fig.2). Control treatment was recorded 69 % highest germination in shade net and lowest 13 % in open bed (Fig.3). Among the mediums sand + compost was recorded highest germination percentage followed by sand and soil + compost. The overall result shows that highest seed germination found in normal water soaking for 12 hours with sand + compost in shade net and control treatment decreased germination percentage.







**Figure 4.** (A) Single seed of *M. pellita* (B) Cleaned seeds, (C) Seed sowing (D-E) Seed germination, (F) Transplanting in Polythene bags, (G-H) Flowering, (I-J) Fruiting, (K) Sprouting in root suckers, (L) A plant of *M. pellita*

### Conclusion:

This study shows that propagation of *M. pellita* through seed is very easy for nursery stock preparation and reproduction of healthy and vigorous seedling in a shorter period compare to vegetative methods viz; root suckers. Collection of root sucker is very difficult and may harm plants. We recommend seed sowing in spring season after 12 hours seed soaking in normal water under shade conditions for utmost results and maximum success. Seed germination can be effected by excess amount of water. Recent studies have been reported that *M. pellita* has medicinal properties. Hence it is imperative to reproduce and prepare planting stock of seedlings for large scale plantation in future beside its conservation (Fig. 4).

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