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ORIGINAL ARTICLE **OPEN ACCESS**

Effect of Chemical Treatment, Method and Time of Sowing on Seed Germination of Ornamental Trees

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ABSTRACT
An Experiment was conducted in Research Farm of the Department of Floriculture and Landscaping, Punjab Agricultural University, Ludhiana during June 2016-March 2017 to investigate the best method on seed germination of ornamental trees. Germination is the process by which an organism grows from a seed or similar structure. The most common example of germination is the sprouting of a seedling from a seed of an angiosperm or gymnosperm. Ten trees were selected this research with water soaking, mechanical and chemical scarification treatments. Chemical scarification was given by H_2SO_4 (50%), KNO_3 (0.3%) and thiourea (0.5%). Sowing was done in polythene bags and raised bed in June and March. Three replications were followed under factorial randomized block design. Maximum germination under mechanical scarification was noted in Delonix regia, Melia azedarch in March and Cedrella toona and Chukrasia tabularis in June while under chemical scarification in Mimusops elengi, Peltophorum ferrugineum and Putranjiva roxburghii with H_2SO_4 treatment better over mechanical and control. KNO_3 treatment resulted in higher germination percentage in Alstonia scholaris and Jacranda acutifolia than other treatments. However, the treatment of Koelreuteria paniculata seeds failed to initiate germination in both the seasons in polythene bags as well as on raised bed. The maximum seedling height was observed in June as compared to March. Numbers of leaves were more in June in polythene bags as compared to March on raised beds. Maximum leaf area was recorded in Alstonia scholaris in KNO_3 treatment but in Mimusops elengi, Peltophorum ferrugineum and Putranjiva roxburghii maximum leaf area was recorded H_2SO_4 treatment.
Key words : *Germination, Seed, Chemical scarification, Mechanical scarification, polythene bags and June*

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INTRODUCTION

Trees are perennial plants mainly valued for shade, flowers, fruits, fuel and timber etc. and for improve living environment on earth. Trees are structural elements in any landscape design due to their height, shape, foliage colors and flowers. They are mainly propagated through seeds (sexually) and very few trees by vegetative method.

In landscaping trees are used for road side plantation, as specimen plants in parks, industries, airports, schools etc. to improve aesthetic value, reducing air and noise pollution. As cities are expanding, the forest land and rural lands are also being cleared for development. So there is need for planting more trees in urban areas like villas, infront of shopping malls, public and corporate buildings and green belts to increase the green cover and to lower temperature. They purify city air by absorbing carbon dioxide and releasing oxygen. *Cedrella toona, Putranjiva roxburghii* and *Chukrasia tabularis* are amongst the fast growing trees and their dense canopy.

Major problem in propagation of ornamental tree seeds is seed dormancy. It is due to combination of environmental and endogenous factors. Integuments restrict water imbibition, embryo development, and gas penetrability, leaching of inhibitors, chemical factors like ethylene, lack of growth regulators etc., and morphological characters like small and immature embryos. Seeds are mechanically scarified by sandpaper, hot water, acid, warm moist environment. In chemically dormant seeds they are washed in running water, soaked in GA_3 or stored in chilling temperature. In *Hyphaene dichotoma, the* maximum germination was obtained in sulphuric acid treatment for 24 hours by sowing in a mixture of sand and

soil at 1:1 ratio [4].

General chemicals for treatment of ornamental tree seeds are thiourea, potassium nitrate, sulphuric acid. It has been proven, that KNO_3 can improve the nitrite/nitric oxide in the presence of enzyme nitrate reductase [6]. The highest activity of NR observed in tomato seeds treated with KNO3 improved germination rate [2]. Dormancy in seeds is controlled by exogenous (e.g., light, temperature, air, humidity and moisture) and endogenous factors like ABA hormone, but also contain small molecules of reactive hydrogen cyanide, nitric oxide, and alcohols. Dormancy is broken artificially through stratification [1]. The research results of Rehman [5] undoubtedly showed that seeds had both exogenous and endogenous dormancy in *Koelreuteria paniculata*. H_2SO_4 for 20 and 40 minutes treatment in *Mimusops elengi* showed maximum germination Gami *et al* [3].

Keeping in view the difficulty in propagation of some trees, the aim of the present investigation was to determine the effect of chemical treatment and scarification on seeds germination and plant growth, sowing season and method of sowing.

MATERIALS AND METHODS

The study was conducted at the Research Farm of the Department of Floriculture and Landscaping, Punjab Agricultural University, Ludhiana is located between 30.90°N latitude and 75.81°E logititude has an average elevation of 812 feet above mean sea level. Ten trees were selected for the experiment were *Alstonia scholaris*, *Cedrella toona*, *Chukrasia tabularis, Delonix regia*, *Jacaranda acutifolia, Koelreuteria paniculata, Melia azedarach, Mimusops elengi, Peltophorum ferrugineum and Putranjiva roxburghii*

Experimental Design

FRBD (Factorial Randomized Block Design) was followed.

Treatments:

T1: Control: soaked in water for 24hrs

T2: Mechanical scarification: sand paper rubbing

T3: Sulphuric acid treatment: 50% concenctrated H_2SO_4 for 15minutes.

T4: Potassium Nitrate: 0.3% KNO_3 for 24Hrs.

T5: **Thiourea**: 0.5% thiourea for 24Hrs.

Following observations were recorded

Germination percentage
Days taken for germination
Height of the seedling
Root length
Number of roots
Number of leaves
Leaf area
Survival percentage

Analysis of Data

For statistical analysis of the data factorial randomized block design was used and data was analysed by following cpcs1.

RESULTS AND DISCUSSION

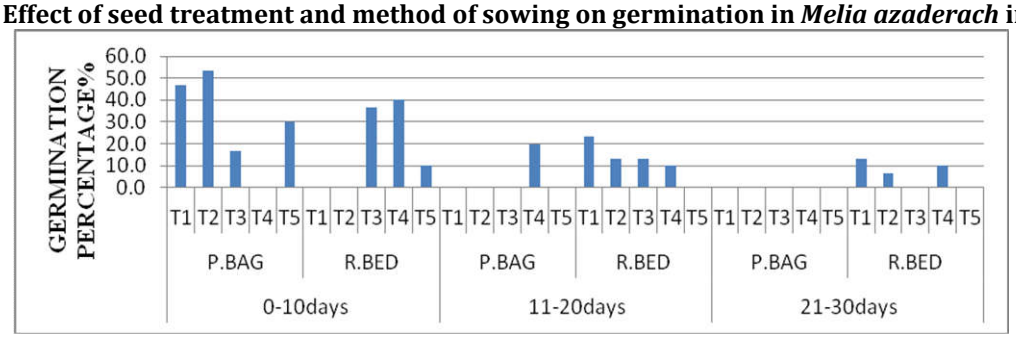
In all the ten species of ornamental trees studied, higher germination was observed in June as compared to March. The germination was observed maximum between 0-10 days in *Cedrella toona, Delonix regia, Melia azedarch, Peltophorum ferrugineum.* The maximum germination in *Alstonia scholaris, Chukrasia tabularis, Jacranda acutifolia, Mimusops elengi, Putranjiva roxburghii* was observed between 11-20 days. Mechanical scarification improved germination between 21-30 days in *Mimusops elengi* but totally failed between 0-20 days. The maximum germination in mechanically scarified seeds was observed in *Delonix regia, Alstonia scholaris* and *Chukrasia tabularis in* March and in *Melia azedarch* in June. In *Delonix regia, Mimusops elengi, Peltophorum ferrugineum* and *Putranjiva roxburghii* H_2SO_4 (50%; for 15 minutes) increased germination percentage to a great extent. In *Alstonia scholaris* and *Jacranda acutifolia* KNO_3 (0.3%; for 24hours) resulted in higher germination percentage than other treatments. However, there was total failure of all treatments to initiate germination in *Koelreuteria paniculata* in both seasons in polythene bags as well as on raised bed.

Days taken for germination: H_2SO_4 treated seeds of *Delonix regia* and *Mimusops elengi* took minimum days for germination. In *Alstonia scholaris, Jacranda acutifolia* and *Cedrella toona* KNO_3 treated seeds took minimum days. In *Peltophorum ferrugineum* and *Putranjiva roxburghii* thiourea treated seeds took minimum days for germination. For *Cedrella toona* and *Chukrasia tabularis* it minimum days for

germination were recorded on raised bed.

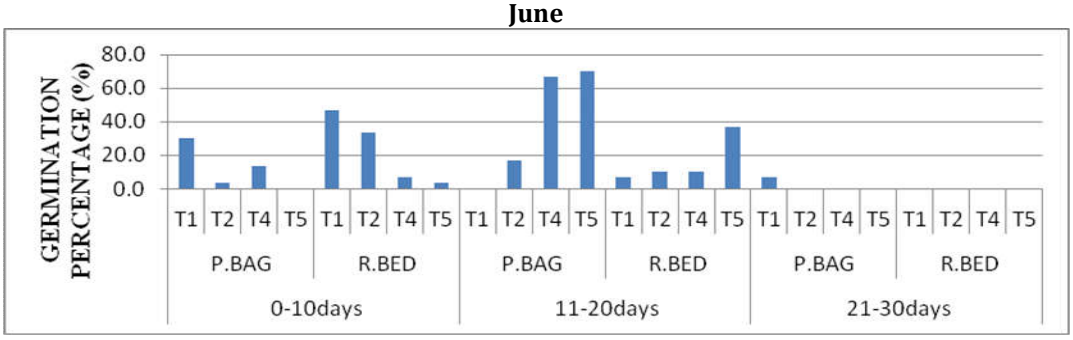
Seedling height: Seedling height was observed maximum in June as compared to March. In *Delonix regia, Peltophorum ferrugineum* and *Putranjiva roxburghii* H_2SO_4 treatment gave maximum seedling height. In *Alstonia scholaris* KNO_3 treatment gave maximum seedling height. In *Mimusops elengi* KNO_3 treated seeds gave maximum height in June but in March H_2SO_4 gave maximum seedling height. In polythene bags maximum height was observed in all species except *Chukrasia tabularis* and *Cedrella toona.* In *Melia azedarch* maximum seedling height was observed in water soaked seeds in June. Thiourea treated seeds showed maximum seedling height in *Jacranda acutifolia.* Mechanical scarification gave maximum seedling height in *Alstonia scholaris, Delonix regia and Chukrasia tabularis* in March.

Fig 1: Effect of seed treatment and method of sowing on germination in *Melia azaderach* in June



Number of leaves: Mechanical scarified seeds exhibited more number of leaves in *Cedrella toona* and *Melia azedarch* in June. In March *Alstonia scholaris, Chukrasia tabularis* and *Delonix regia* exhibited more number of leaves, however, in in June H_2SO_4 treated seeds of *Delonix regia, Mimusops elengi, Peltophorum ferrugineum* and *Putranjiva roxburghii* showed more number of leaves. In March H_2SO_4 treated seeds of *Melia azedarch* exhibited more number of leaves. In case of *Alstonia scholaris,* seeds treated with KNO_3 exhibited more number of leaves. Thiourea improved number of leaves in *Jacranda acutifolia.* The maximum numbers of leaves was observed in June as compared to March due to more humidity.

Fig 2: Effect of seed treatment and method of sowing on germination in *Jacaranda acutifolia* in June



Number of roots: H_2SO_4 treated seeds of *Mimusops elengi* and *Peltophorum ferrugineum* gave maximum number of roots *in* June on raised bed and in case of *Putranjiva roxburghii,* in polythene bags. Water soaked seeds of *Cedrella toona* produced maximum number of roots. Mechanically scarified seeds produced more number of roots in *Alstonia scholaris* and *Chukrasia tabularis* in March, but in June, *Delonix regia, Melia azedarch* and *Jacranda acutifolia* produced maximum number of roots. Potassium nitrate treated seeds of *Alstonia scholaris* and *Putranjiva roxburghii* exhibited more number of roots in June. The numbers of roots were observed to be maximum in polythene bags in June.

Fig 3: Effect of seed treatment and method of sowing on germination in *Mimusopus elengi* in June

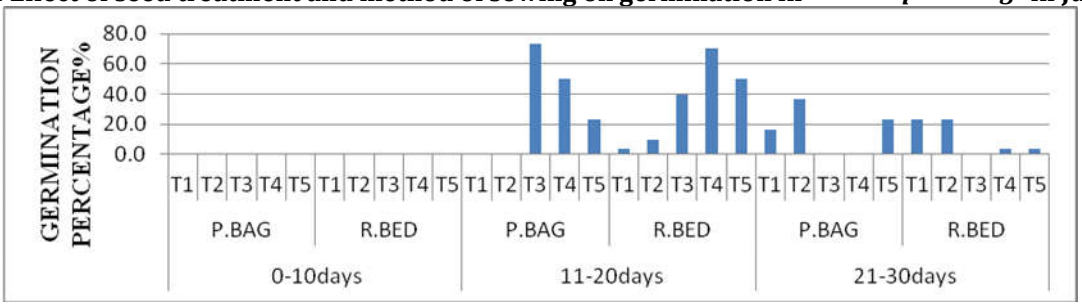
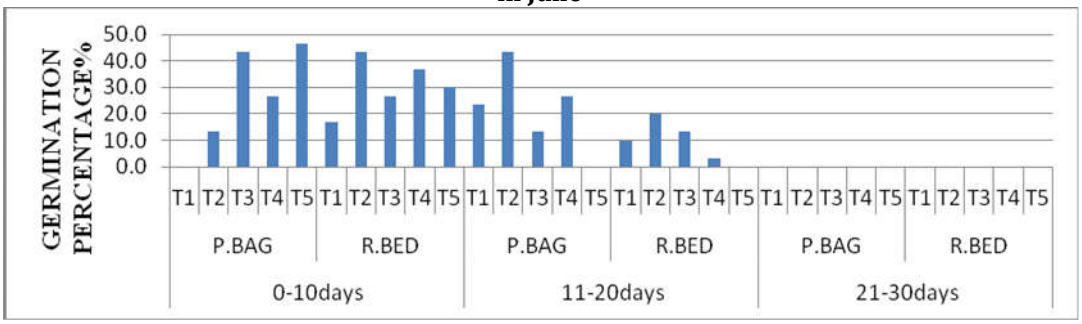


Fig 4: Effect of seed treatment and method of sowing on germination in *Peltophorum ferrugineum* in June



CONCLUSION

It was concluded that seeds sown in June resulted in maximum germination, plant characters and survival percentage as compared to March sowing due to high humidity and favourable temperature. The germination of papery nature seeds like *Alstonia scholaris, Cedrella toona and Chukrasia tabularis* was better on raised bed. Mechanical scarification improved germination in *Delonix regia, Melia azedarch* in March and *Cedrella toona* and *Chukrasia tabularis* in June. The survival percentage, leaf area, number of leaves, seedling height, and number of roots were recorded more in polythene bags in June than on raised bed.

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