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Comparative Study of Germination Characters for Different Forest Trees under Laboratory Condition and Open Field Condition

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ABSTRACT: *The experiment was conducted at School of Forestry and Environment, Sam Higginbottom Institute of Agricultural, Technology and Sciences, Deemed University, Allahabad, under laboratory and open field conditions during 2012-2013. The current study is carried out to observe the effect of laboratory and open field conditions on germination characters of seeds of some common trees so as to determine the optimum conditions for maximizing the output quantitatively as well as qualitatively. The characters taken into consideration for the study include germination percentage, mean daily germination (MDG), peak value (PV) and germination speed. Among the species,* Bauhinia variegate *was found to have highest values of all parameters under laboratory conditions.*

Keywords: *Germination percentage, mean daily germination, peak value, germination speed,*

INTRODUCTION

Good forestry projects start with good seeds. Lacking good genetic material to start with, investments in pruning, fertilizing, or other silvicultural treatments will have little result. In forestry as well as in agriculture, time and effort invested in procuring better quality seeds pay back in higher rates of survival, higher yields, and better quality of wood and other products. Seed sources studies are desired to screen out the natural genetic variation to utilize the best materials for maximum productivity and for further breeding works. Most successful tree improvement programs are those in which proper seed sources are used **(Zobal and Talbert, 1984)**. Under the present scenario, there is urgent need to undertake massive afforestation programs to meet the demand of forest produce and to achieve the stipulated 33 percent forest cover. Such large scale plantation programs will demand a large amount of planting material and for this demand superior quality of seeds make the plantation more productive.

MATERIAL AND METHODS

The experiment was conducted at School of Forestry and Environment, Sam Higginbottom Institute of Agricultural, Technology and Sciences, Deemed University, Allahabad, under laboratory and open field conditions during 2012-2013. The place is situated at 28.87° North latitude and 81.15° East longitudes at an elevation of 78 meters above mean sea level on Northern aspects. The seed from trees of *Bauhinia variegata, Delonix regia, Pongamaia pinnata, Tamarindus indica, Albizia lebbeck, Cassia siamea, Leucaena leucocephala, Tectona grandis, Bixa oriliana* and *Zizypus mauritiana* were collected from different parts of Allahabad. The experiment was laid out in completely randomized design and randomized block design, having 10 seeds of each plant in each block with 3 replications under laboratory and open field conditions respectively.

Germination Percentage

Germination percentage was calculated as the number of seeds germinated out of total number of seeds sown and expressed in percentage.

$$Germination\ Percentage = \frac{Number\ of\ seeds\ germinated}{Total\ seeds\ sown} \times 100$$

Mean Daily Germination (MDG)

MDG was calculated as the cumulative percentage of total seed geminated at the end of the test, divided

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by the number of days from sowing to the end of the test or the total per cent germination divided by total days in the test.

Peak Value (PV)

Peak value was calculated as the maximum mean daily germination reached at any time during the entire period of the test as per Czabator (1962).

Germination Speed

It was worked out as per method prescribed by Maguire (1962).

$$GS = \sum \frac{n}{t}$$

Where,

n = Number of daily germinated seeds
t = Total number of days from sowing to germinations

RESULTS AND DISCUSSION

Under Laboratory Condition

Data appended in table 1 revealed that under controlled conditions maximum germination percentage (100.0%), final mean daily germination (7.72 plants day^{-1}), peak value (11.48), germination value (77.70) and germination speed (0.79day^{-1}) were recorded in *Bauhinia variegate* (Wani A M and Chauhan K C.2007 also found similar results); followed by *Leucaena leucocephala*, whereas minimum germination percentage (26.67%), final mean daily germination (0.93 plants day^{-1}), peak value (1.02), germination value (0.98) and germination speed (0.09day^{-1}) were recorded in *Tectona grandis.*

Under Open Field Condition

Data appended in table 2 revealed that under open field condition *Tamarindus indica* showed maximum

Table 1
Germination characters for different forest tree progenies under laboratory condition.

Traits Species	*Germination percentage (%)*	*Final mean daily germination (plants day^{-1})*	*Peak value*	*Germination value*	*Germination speed (day^{-1})*
Bauhinia variegata	100.00	7.72	11.48	77.70	0.79
Delonix regia	56.67	3.58	6.02	22.22	0.35
Pongamia pinnata	63.33	3.42	4.13	14.57	0.39
Tamarindus indica	60.00	2.80	4.28	12.55	0.30
Albizia lebbeck	70.00	3.39	5.04	17.41	0.36
Cassia siamea	56.67	3.86	5.23	20.25	0.32
Leucaena leucocephala	71.00	3.90	5.02	19.87	0.42
Tectona grandis	26.67	0.93	1.02	0.98	0.09
Bixa oriliana	33.33	1.37	1.63	2.26	0.13
Zizypus mauritiana	40.00	2.02	2.50	5.18	0.22
SE+-	4.380	0.224	0.511	3.271	0.018
CD5%	**9.286**	**0.474**	**1.083**	**6.936**	**0.037**

Table 2
Germination characters for different forest tree progenies under open field condition.

Traits Species	*Germination percentage (%)*	*Final mean daily germination (plants day^{-1})*	*Peak value*	*Germination value*	*Germination speed (day^{-1})*
Bauhinia variegata	60.00	2.97	3.82	11.88	0.46
Delonix regia	43.33	1.49	1.50	2.41	0.26
Pongamia pinnata	51.67	1.43	1.28	1.83	0.35
Tamarindus indica	66.67	2.46	2.82	6.61	0.42
Albizia lebbeck	65.00	3.03	3.60	11.61	0.33
Cassia siamea	45.00	2.04	2.09	5.13	0.33
Leucaena leucocephala	48.33	2.66	3.63	9.86	0.45
Tectona grandis	35.00	1.20	1.34	1.62	0.19
Bixa oriliana	41.67	1.45	1.61	2.40	0.23
Zizypus mauritiana	28.33	1.26	1.51	1.91	0.20
SE	5.553	0.183	0.271	1.142	0.044
CD5%	**11.772**	**0.388**	**0.574**	**2.422**	**0.093**

germination percentage (66.67%),whereas *Albizia lebbeck* showed maximum final mean daily germination (3.03plants day^{-1}). *Bauhinia variegate* showed maximum peak value(3.82), germination value (11.88) as well as maximum germination speed (0.46day^{-1}). However, minimum germination percentage (29.33%) was recorded in *Zizypus mauritiana* and minimum final mean daily germination (1.20 plants day^{-1}), germination value (1.62) and germination speed (0.19day^{-1}) were recorded in *Tectona grandis.*

CONCLUSION

Germination characters of different forest tree progenies, significantly affected by laboratory and open field conditions. Controlled condition maximized germination characters of forest seeds; therefore, it can be preferred for nursery raising from seeds.

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