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Effect of storage period, container and temperature on germination in *Albizia lebbek*

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Abstract

Albizia lebbek is a multi-purpose, fast-growing, medium-sized deciduous tree with a spreading crown. It is a valuable timber species which is used for furniture, flooring, veneer, paneling, carving, posts, and a variety of agricultural implements. Its leaves are used as fodder, mulch and green manure. Due to insect attacks, its seeds get damaged during storage in ordinary conditions. Hence, the present study was carried out to study the effect of storage containers and temperature on seed germination in laboratory and nursery condition at different intervals. The different treatments were comprised of storage container and temperature viz., B₁T₁- Poly bag - Room temperature (15-40^oC), B₁T₂ - Poly bag-BOD(25^o C), B₁T₃ - Poly bag- Refrigerator (5^o C), B₂T₁ - Paper bag-Room temperature(15-40^o C), B₂T₂ - Paper bag- BOD(25^oC), B₂T₃ - Paper bag-Refrigerator, B₃T₁ - Cloth bag-Room temperature (15-40^oC), B₃T₂ - Cloth bag- BOD (25^oC) and Cloth bag- Refrigerator (5^o C). Seed germination tests were conducted at various intervals viz., 15 days after seed collection and thereafter at 60 days interval up to 600 days. Results revealed that 72 % of seed germination was recorded in fresh seeds and thereafter seeds germination decreased in all the storage treatments. However, after 600 days of storage period, the maximum seed germination percent (40.0±2.54) was recorded in B₁T₃ (Poly bag-Refrigerator) followed by B₂T₃ - Paper bag-Refrigerator. The present study concludes that the seeds of *Albizia lebbek* can be stored for longer period in polybag or paper bag at 5^o C.

Keywords: Germination, *Albizia lebbek*

Introduction

Albizia lebbek (L.) Benth, belong to family Leguminosae is a multi-purpose, fast-growing, medium-sized deciduous tree with a spreading crown. It is a valuable timber species which is used for furniture, flooring, veneer, paneling, carving, posts, and a variety of agricultural implements. Its leaves are used as fodder, mulch and green manure. *Albizia lebbek* is one of the most promising fodder trees for semi-arid regions. It has leaves during a large part of the rainy season and digestibility of the twigs is considerably higher than that of most fodder trees. The concentration of crude protein is about 20% for green leaves, 13% for leaf litter and 10% for twigs. In vitro digestibility is about 45% for mature leaves, 70% for young leaves and 40% for twigs. It is an excellent fuel wood and charcoal species and the wood is suitable for construction, furniture and veneer. The shallow root system makes it a good soil binder and recommendable for soil conservation and erosion control. Being a leguminous multipurpose tree species, it is preferred in different plantation programmes. It is a tree of the mixed deciduous in both dry and moist type or of semi-ever green and evergreen forest usually occurring sporadically and not gregariously. This tree is capable of fixing nitrogen in soil and its nitrogen rich leaves are valuable as mulch and green manure.

Hence, the present study was carried out to study the effect of storage containers and temperature on seed germination in lab and nursery conditions at different intervals.

Material & Method

The study area (Western Uttar Pradesh) lies between 27^o 10' N to 26^o '4 N' latitude and 78^o 02' E to 79^o 7'E longitude between elevation 165 and 179.8 m above m.s.l. The seeds were collected from Agra and adjoining areas viz., Mathura and Hathrus. The seeds collected from different sites were mixed together and used for study.

Before storage of seed in different containers viz., poly bag, paper bag cloth bag at different temperature i.e. room temperature (15-40^oC), BOD (25^o C) and refrigerator (3-5^oC), the seeds were treated with Thiram 75 DS and Leaf of Neem. The detail of the treatments is given in Table 1.

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Table 1: Detail of the treatments and their description

S. No.	Treatment	Treatment description
1)	B ₁ T ₁	Poly bag -Room temperature
2)	B ₁ T ₂	Poly bag-BOD
3)	B ₁ T ₃	Poly bag- Refrigerator
4)	B ₂ T ₁	Paper bag-Room temperature
5	B ₂ T ₂	Paper bag- BOD
6	B ₂ T ₃	Paper bag-Refrigerator
7	B ₃ T ₁	Cloth bag-Room temperature
8.	B ₃ T ₂	Cloth bag-BOD
9.	B ₃ T ₃	Cloth bag-Refrigerator

After 15 days of seed collection, they were tested to know the germination percent and thereafter the germination tests were conducted in lab and nursery condition at the interval of 60 days up to 600 days.

For lab study, three replication of 50 seeds, each was used. The germination was carried out in petri dishes. Germination percent was counted when visible radicle emerged.

Under Nursery conditions, three replications of 100 seeds each from different storage treatment were sown in line in nursery beds.

After every 15 days seed sowing, germination (%) was counted by the following formula:

$$\text{Germination (\%)} = \frac{\text{Number of germinated seed (visible radicle of seeds)}}{\text{Total number of seeds put in petridish}} \times 100$$

Standard error was calculated by using the given formula (Chandel, 1998) [5]. Standard deviation was calculated by using the given formula (Chandel, 1998) [5].

Results and discussion

Seed germination under laboratory conditions

The data presented in Table 2 showed that maximum germination was recorded when seeds were sown after 15 days of harvesting in laboratory conditions. In treatment B₁T₁, 55.0±1.21 % germination was recorded after 15 days of seed collection. Data also revealed that with the increase in storage period the germination percent decreased. After 60, 120, 240 and 480 days, germination was recorded 53.4±3.12, 51.2±3.12, 49.0±2.86 and 36.5±2.06 %, respectively. Further, germination decreased to 18.0±4.90 % at 600 days of storage. Similarly, in B₁T₂ germination decreased from 63.9±0.66 % (after 15 days) to 34.2±3.26 % (after 600 days), In B₁T₃ germination decreased from 69.0±1.15% (after 15 days) to 40.0±2.54% (after 600 days), In B₂T₁ germination decreased from 56.2±1.80% (after 15 days) to 20.0±1.15% (after 600 days), In B₂T₂ germination decreased from 63.0±2.24% (after 15 days) to 27.0±1.72% (after 600 days), In B₂T₃ germination decreased from 65.0±1.33 % (after 15 days) to 39.0±1.40 % (after 600 days), In B₃T₁ germination decreased from 56.0±0.75 % (after 15 days) to 23.0±1.28 (after 600 days), in B₃T₂ germination decreased from 56.8±3.33 (after 15 days) to 29.0±0.76 (after 600 days) and in B₃T₃ germination decreased from 61.0±0.29 (after 15 days) to 32.0±1.71 (after 600 days) From these results it has been observed that in all storage conditions the germination decreased with the advancement of storage period. However, the germination loss was minimum in B₁T₃ and after 600 days 40.0±2.54 % germination was recorded. Next best storage treatment was B₂T₃, In which 39.0±1.40 % germination was recorded.

This study have supported by observation, made in *Shorea robusta* seeds (Purohit, Sharma and Thapliyal (1982) [32], in *Toona ciliata* (Nautiyal land Thapliyal, 1993) [11] in *Fagus*

sylytica seed (Lepper *et al.*, 1994) [10], in *Populus ciliata* seeds (Shah *et al.* 1995) [15], in *Azadirachta indica* seed Singh *et al.* 1997 [16], in *Dendrocalamus brandisii* seeds (Boonarutee and Samboon 1995) and *Grevia optiva* seeds (Nayal, 2000) [12]

Seed germination under nursery conditions

The data presented in Table 3 showed that maximum germination was recorded when seeds were sown after 15 days of harvesting in nursery conditions. In treatment B₁T₁, 45.5±0.76 % germination was recorded after 15 days of seed collection. Data also revealed that with the increase in storage period the germination percent decreased. After 60, 120, 240 and 480 days, germination was recorded 44.8±1.05, 43.5±1.78, 38.2±0.70 and 24.7±0.29%, respectively. Further, germination decreased to 9.66±1.16 % at 600 days of storage. Similarly, in B₁T₂ germination decreased from 65.4±2.04 % (after 15 days) to 38.2±2.26 % (after 600 days), In B₁T₃ germination decreased from 69.0±1.15% (after 15 days) to 39.1±2.10% (after 600 days), In B₂T₁ germination decreased from 43.8±2.12 % (after 15 days) to 11.8±0.75 % (after 600 days), In B₂T₂ germination decreased from 55.6±0.57% (after 15 days) to 25.4±2.09% (after 600 days), In B₂T₃ germination decreased from 59.6±1.38% (after 15 days) to 38.5±1.88% (after 600 days), In B₃T₁ germination decreased from 51.2±1.22% (after 15 days) to 13.5±1.55 (after 600 days), in B₃T₂ germination decreased from 52.0±0.67 (after 15 days) to 20.4±2.40 (after 600 days) and in B₃T₃ germination decreased from 54.3±0.78 (after 15 days) to 26.4±0.59 (after 600 days)

From these results it has been observed that in all storage conditions the germination decreased with the advancement of storage period. However, the germination loss was minimum in B₁T₃ and after 600 days 39.1±2.10 % germination was recorded. Next best storage treatment was B₂T₃, In which 38.5±1.88 % germination was recorded. Its seeds are heavily attacked by insects; we have required most appropriate container and temperature for long storage. Temperature substratum play a very significant role during the process of seed germination. Seed of some species germinate better at constant temperature while other alternate temperature (Anon 1966, Bonner 1972, Kumar and Gopal 1974) [1, 9]. Storage may be defined as the preservation of viable seeds from the time of collection until they are required for sowing. General knowledge of good storage methods is of great economic importance on properly applied, it can be ensure the availability of seed for regular and early distribution and enable seed stocks to be built up in good seed year. (Holmes and Buszewicz, 1958) [8]. Container form an integral part of storage facilities, container provide insulation against moisture and prevent the seed form equibrating with the ambient relative humidity (Willan, 1985) [20].

This present study was supported by Joshi 2002 [8] in *Dalbergia sissoo*, Thapliyal *et al.* 1991 [17] in *Bambusa tulda*, Arjuman *et al.* 1966 [2] in *Erythiana strieta*, Aswathanarayan *et al.* (1996) [3] in *Prosopis juliflora*, *Dalbergia sissoo*, and *Casuriana equisetifolia*. Sharma, Archana and Agrawal sunil (2002) [15] in *Albizia lebbek*. Bank of streams (Venkataramaly 1968a) [18].

Conclusion

The germination percent of seeds decreased with advancement of storage period. However, minimum loss of germination percent was recorded when seeds were stored in B₁T₃. Poly bag- Refrigerator, & B₂T₃ . Paper bag-Refrigerator. Hence poly and paper bags can be used for storage of seeds at 5 °C.

Table 2: Germination of *Albizia lebbek* seeds under laboratory conditions

S.N.	Storage period	Germination (%)								
		B ₁ T ₁	B ₁ T ₂	B ₁ T ₃	B ₂ T ₁	B ₂ T ₂	B ₂ T ₃	B ₃ T ₁	B ₃ T ₂	B ₃ T ₃
1	15	55.0±1.21	63.9±0.66	69.0±1.15	56.2±1.80	63.0±2.24	65.0±1.33	56.0±0.75	56.8±3.33	61.0±0.29
2	60	53.4±3.12	60.7±2.74	67.8±1.33	53.8±0.88	61.5±3.40	63.5±0.99	53.8±1.76	55.9±0.60	58.7±0.42
3	120	51.2±3.12	58.4±3.13	64.1±0.78	48.2±2.64	59.0±1.65	62.2±1.66	52.5±0.70	54.0±2.01	56.2±0.60
4	180	49.7±2.60	56.1±1.86	62.8±2.25	46.5±0.87	58.1±0.25	60.2±0.61	51.9±0.90	52.1±1.36	55.1±2.71
5	240	49.0±2.86	54.7±1.04	61.5±3.03	43.1±0.66	56.8±1.28	58.5±1.06	50.2±1.07	51.5±0.59	53.2±5.08
6	300	47.0±0.85	51.1±3.19	58.5±1.39	39.0±0.91	54.5±2.90	56.0±0.74	49.0±1.01	49.7±0.87	49.0±2.01
7	360	44.2±0.40	48.1±1.72	55.4±2.17	37.3±0.75	52.4±1.28	54.1±2.35	46.0±0.96	46.2±2.92	47.0±0.61
8	420	40.1±0.76	46.2±1.60	53.1±1.32	36.2±5.20	49.2±0.82	53.6±2.28	42.0±2.72	44.8±1.32	46.3±1.84
9	480	36.5±2.06	40.4±3.20	46.7±1.33	30.5±1.39	47.5±0.92	52.5±1.73	34.0±2.44	40.8±1.99	45.0±0.45
10	540	27.2±1.29	38.2±1.32	43.0±2.95	27.4±0.26	42.5±1.88	46.7±1.37	28.0±1.94	32.0±1.90	40.8±1.69
11	600	18.0±4.90	34.2±3.26	40.0±2.54	20.0±1.15	27.0±1.72	39.0±1.40	23.0±1.28	29.0±0.76	32.0±1.71

Table 3: Germination of *Albizia lebbek* seeds under nursery conditions

S.N.	Storage period	Germination (%)								
		B ₁ T ₁	B ₁ T ₂	B ₁ T ₃	B ₂ T ₁	B ₂ T ₂	B ₂ T ₃	B ₃ T ₁	B ₃ T ₂	B ₃ T ₃
1	15	45.5±0.76	56.0±0.76	65.4±2.04	43.8±2.12	55.6±0.57	59.6±1.38	51.2±1.22	52.0±0.67	54.3±0.78
2	60	44.8±1.05	54.2±0.44	64.8±0.75	41.4±1.00	53.9±0.78	58.6±2.08	50.0±1.37	50.8±1.76	53.0±1.56
3	120	43.5±1.78	51.4±1.47	62.8±2.48	38.7±1.05	50.3±0.87	54.6±1.83	46.8±1.24	48.2±0.66	50.9±1.20
4	180	41.1±1.96	49.2±2.55	60.8±1.35	37.5±1.20	48.2±0.31	52.8±1.20	44.7±2.65	47.2±1.76	50.2±1.88
5	240	38.2±0.70	46.5±0.98	59.2±1.33	34.4±4.01	45.1±1.66	51.7±1.18	41.4±1.45	45.2±0.93	48.2±1.87
6	300	36.7±1.01	44.5±0.78	58.2±0.94	31.8±0.96	38.2±0.47	49.2±1.14	38.2±0.93	43.1±0.65	47.5±2.71
7	360	35.0±2.82	42.5±0.78	52.4±0.68	29.5±2.12	34.2±1.28	47.5±2.73	32.3±0.72	40.2±1.12	44.2±1.17
8	420	32.2±0.88	41.2±2.68	51.9±1.03	24.3±0.89	32.8±1.25	46.1±5.03	30.7±0.82	36.1±1.46	42.5±2.76
9	480	24.7±0.29	40.1±0.47	44.6±1.66	18.2±0.64	29.1±0.70	44.3±3.23	27.4±1.54	34.0±0.55	40.3±0.87
10	540	16.2±2.25	39.2±2.19	40.2±1.85	14.8±0.28	27.2±0.46	42.3±2.21	24.1±1.78	27.6±1.28	35.4±0.89
11	600	9.66±1.16	38.2±2.26	39.1±2.10	11.8±0.75	25.4±2.09	38.5±1.88	13.5±1.55	20.4±2.40	26.4±0.59

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