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Effect of storage condition and period on seed germination of four plant species.

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Abstract : The seeds are not to be used immediately they can be stored for long durations, if optimum suitable conditions of moisture temperature, aeration, light etc. are provided to the seeds. Beyond the atmospheric humidity, moisture of the seeds is also an important factor as seeds are normally hygroscopic and loosing or gaining of the moisture content depends upon the equilibrium between the moisture status of both the atmosphere and the seeds. Such moisture level is called the equilibrium moisture content. Which differs from species to species.

Keywords : Moisture, Equilibrium, Aeration, Atmosphere and Seeds.

Introduction: Seeds are not always immediately after collection. Thus they are required to be stored for some time. The period of storage may vary from a few days to a few years depending upon their need.

During storage the seeds may change their qualities i.e. vitality, viability, vigour and health. Seeds of all the 4 plant species have been tested for their properties immediately after collection (fresh) and 6,12,18 and 24 months of storage.

Moisture Content: In general, fluctuation in seed moisture content during storage reduces seed longevity. Dry climate favours prolonged storage of seeds, whereas humid environmenty shortens seed life. Hence, open in tropical areas is not desirable.

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The seed should be dried to safe moisture content before they are put in storage. Storage in sealed, moisture resistant containers is necessary to maintain the viability of seeds.

Temperature: Storage temperature plays an important role in regulating the viability of seeds. Reduced temperature results in lengthening the storage life of seeds, and can offset the adverse effect of high moisture content.

A Combination of sealed containers, low seed moisture content and low storage temperature provides ideal conditions for storage of most kinds of seeds, especially for short lived seeds.

Relative humidity of the storage atmosphere plays an important role in regulating the activity of micro-organisma. It has been found that all storage fungi become completely inactive below 62 percent relative humidity and that there is little activity of fungi below 75 percent relative humidity. However, the fungal activity shows an exponential percent. As regards the activity of bacteria. it has been relative humidity for growth.

In view of the various factors affecting the storability of seeds, the following points should be taken into consideration before seeds are placed in storage.

Material and methods: Seeds were collected in polythene and stored at $10(\pm1)^{o}C$, $20(\pm1)^{o}C$, $30(\pm1)^{o}C$, and $40(\pm1)^{o}C$, also stored in sealed desicators, observations were taken at on interval of six months.

Seed moisture content was determined soon after seed collection. Determination was carried out in triplicate on three independently draw samples (1 gram seeds) for each species (As the seed size and weight was extremely small). The seed weight was determined by analytical balance. Seeds were kept inside the paper packets in an oven at constant

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temperature of 90(±1)^{o}C for 24 months, cooled in desicator and reweighed. Moisture content was calculated and expressed as follows :

$$\text{Moisture content (\%)} = \frac{\text{Fresh Weight} - \text{Oven dry weight}}{\text{Fresh Weight}} \times 100$$

Results : The data of average moisture content of seeds of four tree spp. Stored upto 24 months period, and in Polythene bags (PL), at different temperatures (given in Table 1 to 4).

Seeds of all the four species were stored in four storage lots namely, 12 and 24 months each at 10^{0}C, 20^{0}C, 30^{0}C and 40^{0}C in polythene bags. Results of the effects of storage on germination and plant survival are recorded in Table - 1 through - 4 and Figures - 1 through - 4

The seeds of all the four species show a general tendency of germinability with increasing age under storage. Maximum rate of germination and plant survival for all the species was recorded for the seeds of 6 month storage lot. The seeds of abrus precatorius (Table - 1) from the 6 month lot stored at 30+1^{0}C showed the maximum germination percentage (42.4%) and plant survival (39.7%) These rates decreased in the 12 month and 18 lots of seeds. The 24 month seed lot stored at this temperature did not show any germination at all however seeds stored at 10+1^{0}C and 20+1^{0}C from the 24 month lot exhibited germination as well as plant survival though much less than the 6, 12 and 18 month sees lots.

Results similar to those of A. precatorius were recorded for Butes monosperma. Among the temperature treatments maximum germinability and survival was recorded at 30+1^{0}C for 8 month lot (67.8% and 56.7% respectively) of the 18 month seed lot at this temperature the germination percentage recorded was 5.00% but no plant survival. 24 month old seeds stored at 10+1^{0}C exhibited

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germination and plant survival. At higher temperature this seed lot did not show any viability.

Among the stored seeds of Dalbergia paniculata and Pterocarpus marsupium, those stored at 30+1^{0}C of D.paniculata retain their germinability fairly well up to percentage of viability only in the 10+1^{0}C and 20+1^{0}C The maximum percentage of germination (79.2%) and plant survival (63.0%) was recorded for the seeds of 6 month lot stored at 30+1^{0}C the rate of germination declining with increasing storage period at higher temperatures. In P. marsupoium no seed viability was recorded for 24 month old seed lot. The 18 month seed lot stored as 10+1^{0}C and 20+1^{0}C showed low germination However the seeds of this age stored at higher temperatures did not exhibitant seed viability only 6 month lot stored at 40+1^{0}C showed viability. The others stored at this temperature failied to germinate.

DISCUSSION :

In the present study the seeds were stored in polythene bags in such a way that the amount of air space was kept at minimum. The polythene bags were then sealed. These bags were preferred so that the ambient temperature did not affect seed moisture.

Seed longevity is considered to be a genetic character Therafore, improved performance after a long term storage can be achieved through mutation breeding. He observed that induced in soybean and subsequent selection resulted in improved storoved storage potential. The Sees stored in glass bottles showed reduced germinability

The present study indicates that the storage potential differs from species to species while the seeds of a precatorius and D paniculata could retain viability even after two years under storage, the seeds of P. marsuium lost their germinability nearly by 18 months of storage.

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Retention of germinability by the seeds of all the four species at low temperatures is in agreement with the observations He observed that the viability of seeds of tobacco stored at very low temperature, could be maintained up to 25 years. When stored in seeled continers under refrigeration viability was retained even upto 25 years.

King and Roberts (1980) and King et. Al. (1981), while working on Citrus species reports that seeds can be dried to low moisture content without without much damage to seed viability. Chin (1988) recommends cold storage like permafrost of Antarcatica (According to him seeds with low moisture content stored at low temperatures can remain viable for many years. The present work derives support from these observations.

Table 1 : Effect of storage condition and period on seed germination of A. Precatorius.

G= Germination percent, P= Plant Survival

Storage period (Month)										
Storage condition	Fresh Seeds		6		12		18		24	
	G%	P%	G%	P%	G%	P%	G%	P%	G%	P%
10(±1)°C	-	-	37.2	29.8	28.00	26.3	23.5	20.3	15.6	11.3
20(±1)°C	-	-	40.3	35.8	35.2	31.1	25.6	21.7	17.0	10.2
30(±1)°C	-	-	42.4	39.7	39.2	30.4	18.7	15.2	-	-
40(±1)°C	-	-	32.4	25.2	16.4	11.7	-	-	-	-

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Fig. 1 : Seed Germination of of four forest plant species as effected by different storage period at 10(±1)C

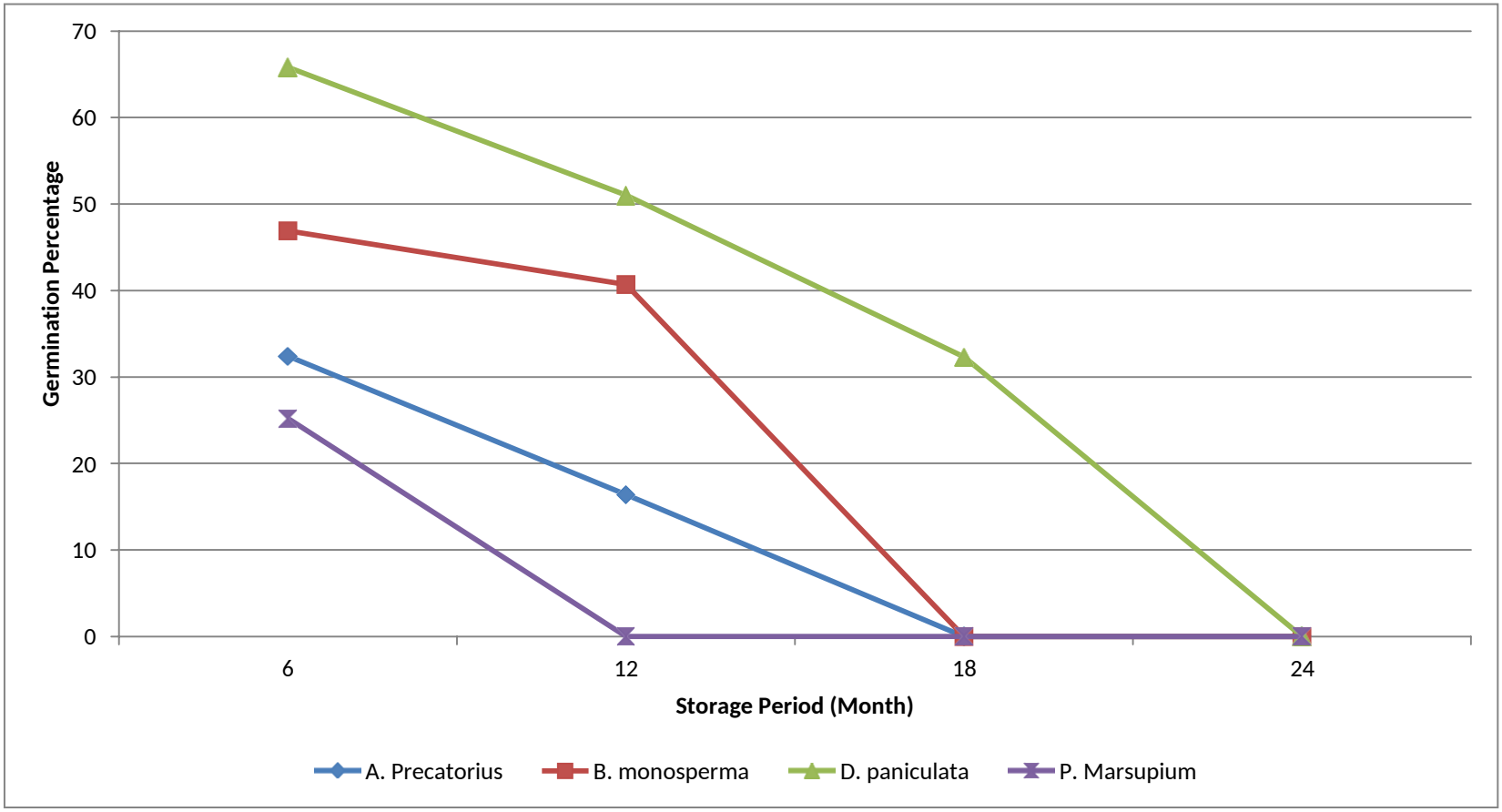

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Table 2 : Effect of storage condition and period on seed germination of B. monosperma.

G= Germination percent, P= Plant Survival

Storage period (Month)										
Storage condition	Fresh Seeds		6		12		18		24	
	G%	P%	G%	P%	G%	P%	G%	P%	G%	P%
10(±1)°C	-	-	52.0	42.0	43.3	30.0	13.2	9.6	3.75	2.25
20(±1)°C	-	-	58.6	45.8	47.5	33.2	8.0	3.7	-	-
30(±1)°C	-	-	67.8	56.7	49.2	35.0	5.0	-	-	-
40(±1)°C	-	-	46.9	39.3	40.7	31.1	-	-	-	-

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Fig. 2 : Seed Germination of of four forest plant species as effected by different storage period at 20(±1)C

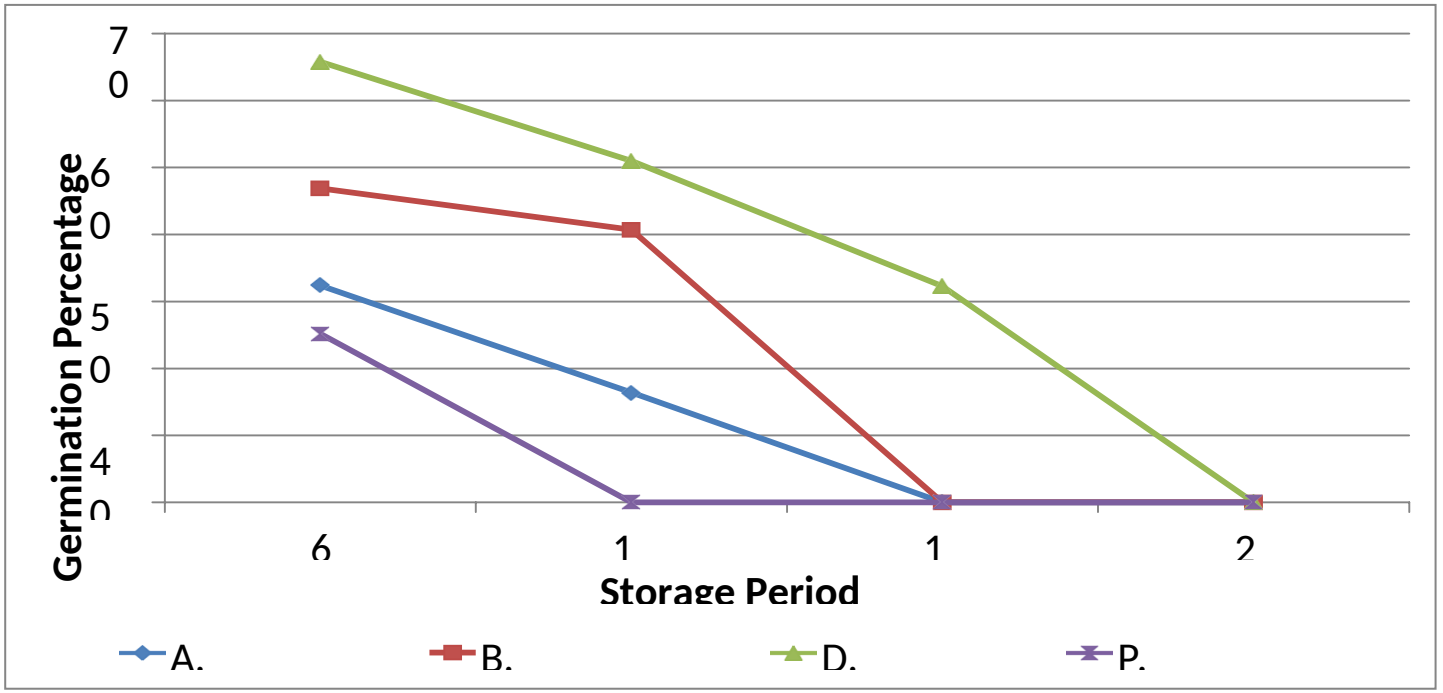

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Table 3 : Effect of storage condition and period on seed germination of D. paniculata.

G= Germination percent, P= Plant Survival

Storage period (Month)										
Storage condition	Fresh Seeds		6		12		18		24	
	G%	P%	G%	P%	G%	P%	G%	P%	G%	P%
10(±1)°C	-	-	73.2	59.8	58.0	55.2	50.0	35.7	20.7	9.2
20(±1)°C	-	-	76.0	61.2	60.2	57.9	52.3	39.2	23.2	4.5
30(±1)°C	-	-	79.2	63.0	61.7	58.0	42.9	30.0	7.5	-
40(±1)°C	-	-	65.8	51.2	51.0	42.8	32.3	27.8	-	-

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Fig. 3 : Seed Germination of of four forest plant species as effected by different storage period at 30(±1)C

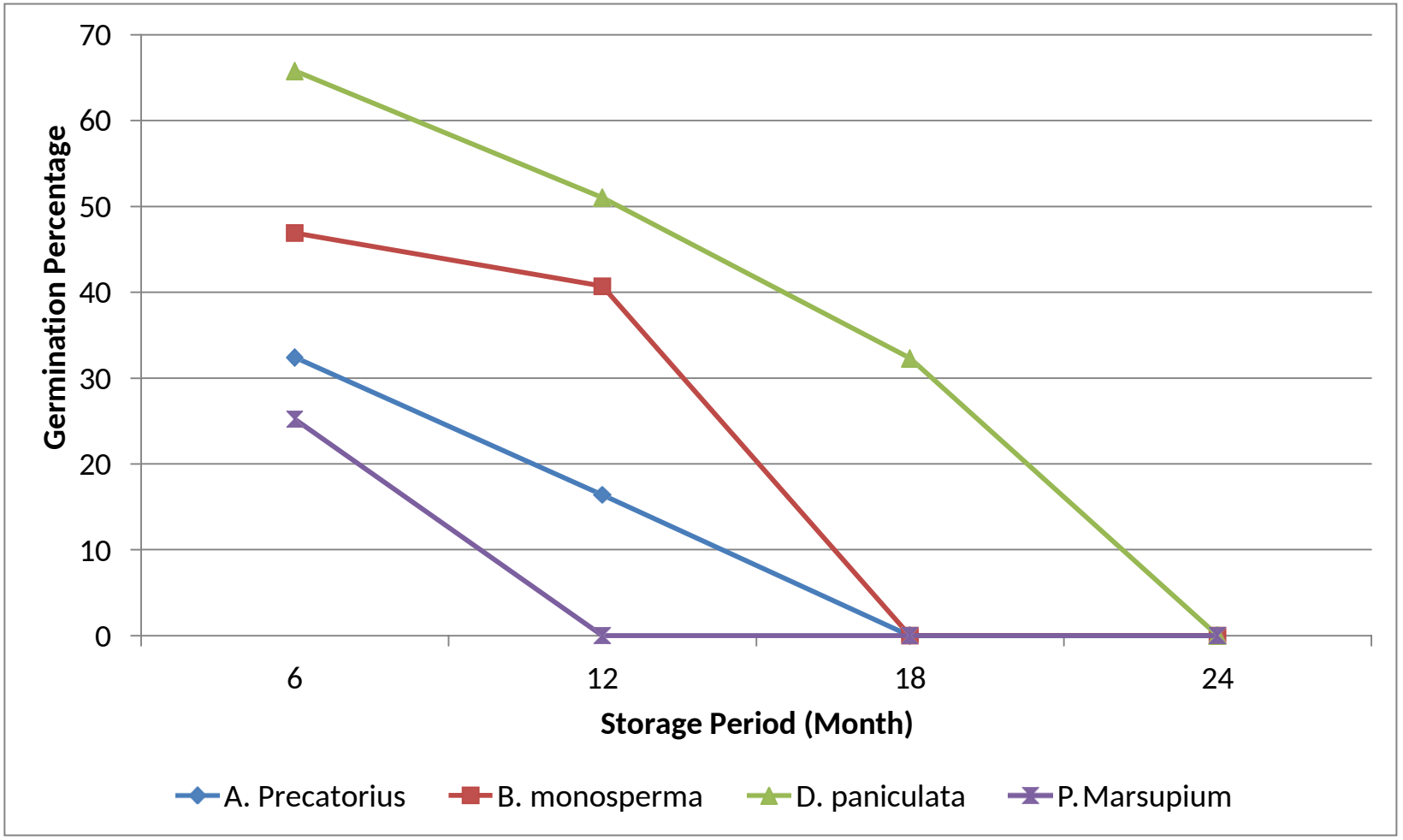

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Table 4 : Effect of storage condition and period on seed germination of P. Marsupium

G= Germination percent, P= Plant Survival

Storage period (Month)										
Storage condition	Fresh Seeds		6		12		18		24	
	G%	P%	G%	P%	G%	P%	G%	P%	G%	P%
10(±1)°C	-	-	35.2	20.1	22.9	10.9	9.8	5.7	-	-
20(±1)°C	-	-	37.0	20.5	24.2	14.0	10.0	6.8	-	-
30(±1)°C	-	-	39.0	21.0	20.7	8.7	-	-	-	-
40(±1)°C	-	-	25.2	15.9	-	-	-		-	-

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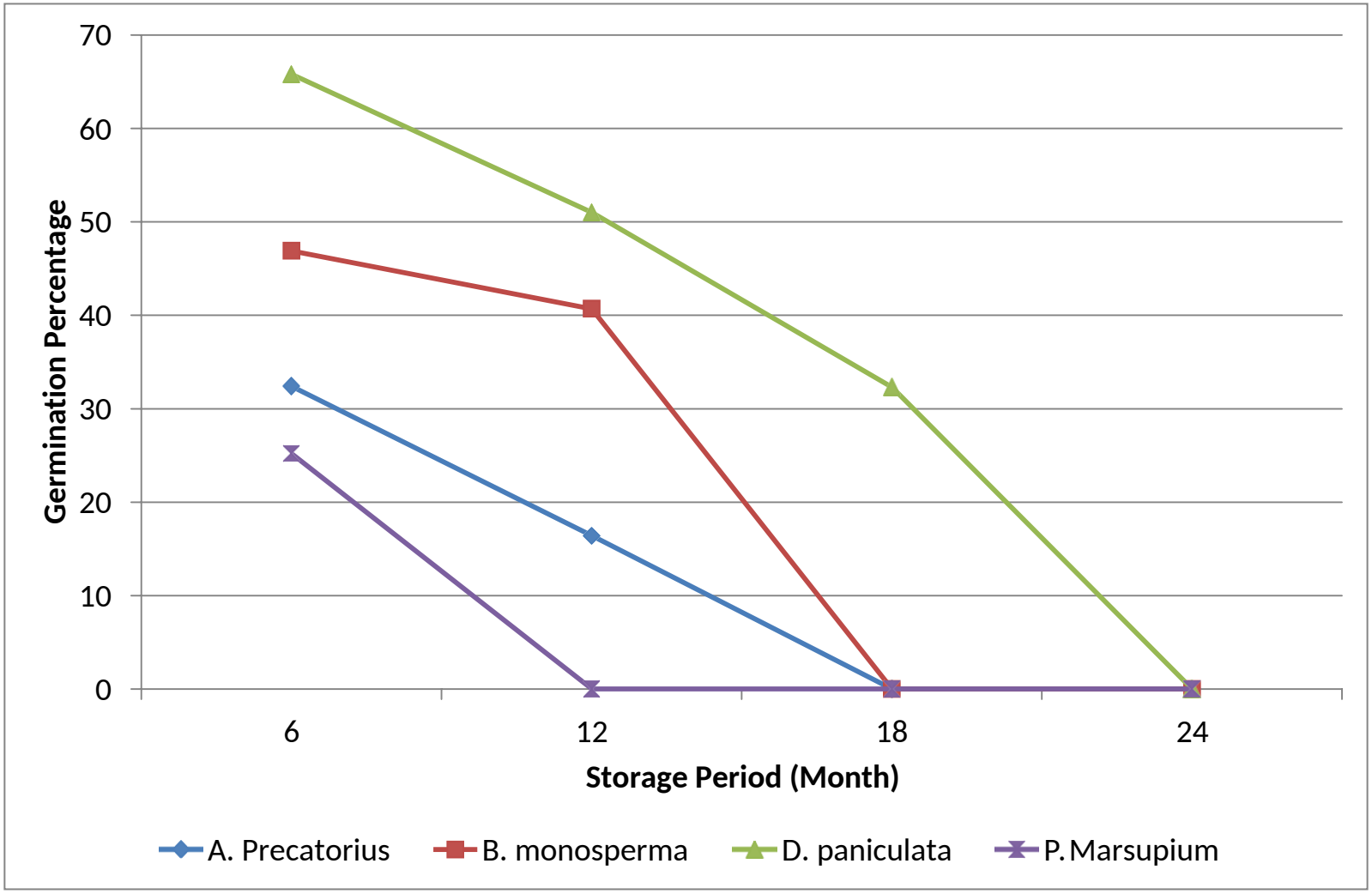
Fig. 4 : Seed Germination of of four forest plant species as effected by different storage period at 40(±1)C



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