International Journal of Scientific Research in Biological Sciences **Research Paper**
Vol.5, Issue.2, pp.34-37, April (2018) **E-ISSN:** 2347-7520

Effect of Storage condition and period on seed germination of some leguminous seeds

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Available online at: www.isroset.org

Received: 13/Mar/2018, Revised: 24/Mar/2018, Accepted: 20/Apr/2018, Online: 30/Apr/ 2018

Abstract-If 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 atmosphere ic 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 Content, Temperature, equilibrium, durations, atmospheric humidity & Condition

I. INTRODUCTION

Seeds are not always used 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 :

Moisture content is one of the most important factor in maintaining germinability of seed in storage. Seeds stored for long periods should be kept at temperatures above freezing as the level of moisture content in stored seed determines to a large degree the respiration rates.

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.

RELATIVE HUMIDITY :

Relative humidity of the storage atmosphere plays an important role in regulating the activity of micro-organisms. It has been found that all storage fungi become completely incative 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 relationship with relative humidity increasing above 75 percent. As regards the activity of bacteria, it has been found that storage bacteria require at least 90 percent relative humidity for growth.

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

(1) Only high quality, clean seeds showing high germination percentage and vigour should be stored.
(2) Before the seeds are put into storage, they should be dried to safe-moisture level and pre-treated with chemical to protect them against diseases and pests.
(3) Storage condition should be dry and cool.
(4) Proper sanitation of stores should be maintained.

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II. MATERIAL AND METHODS

Seeds were collected in polythene bags and stored at also stored in sealed desiccators, 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 drawn 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 temperature of $90(\pm1)^0$C for 24 hours, colled in desicator and reweighed. Moisture content was calculated and expressed as follows :

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

III. RESULT

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

Seeds of all the four species were stored in four storage lots namely, 6 months, 12 and 24 months each at 10°C, effects of storage on germination and plant survival are recorded in Table 1 to 4 through, and figures through .

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°C showed the maximum germination decreased in the 12 month and 18 month 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°C and 20±1°C from the 24 month lot exhibited germination as well as plant survival, though much less than the 6, 12 and 18 months seeds lots.

Results similar to those of A. precatorius were recorded for Butea monosperma. Among the temperature treatments maximum germinability and survival was recorded at 30±1°C for 6 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°C exhibited germination adn 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°C of D.paniculata viability only in the 10±1°C and 20±1°C. The maximum was recorded for the seeds of 6 month lot stored at 30±1°C, the rate of germination declining with increasing storage period at higher temperatures. In P. marsupium no seed month seed lot stored at 10±1°C and 20±1°C showed low temperatures did not exhibitant seed viability. Only 6 month lot stored at 40±1°C showed viability. The others stored at this temperature failed to germinate.

Table-1 Effect of storage condition and period on seed germination of A.precatorius.
G=Germination percent, P= Plant survival

Storage Condition	Storage period (Month)									
	Fresh Seeds		6		12		18		24	
	G%	P%	G%	P%	G%	P%	G%	P%	G%	P%
10(±1)°C	-	-	37.2	29.8	28.0	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	-	-	-	-

Fig. 1
Seed germination of four forest plant species as affected by different storage periods at $10(\pm1)C$.

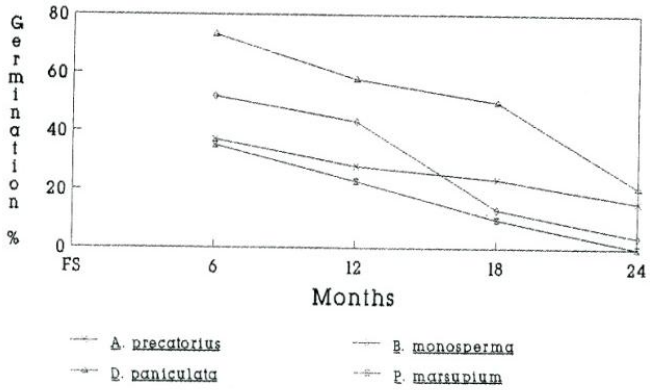

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Table-2 Effect of storage condition and period on seed germination of B.monosperma
G=Germination percent, P= Plant survival

Storage Condition	Storage period (Month)									
	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	-	-	-	-

Fig. 2
Seed germination of four forest plant species as affected by different storage periods at $20(\pm1)C.$

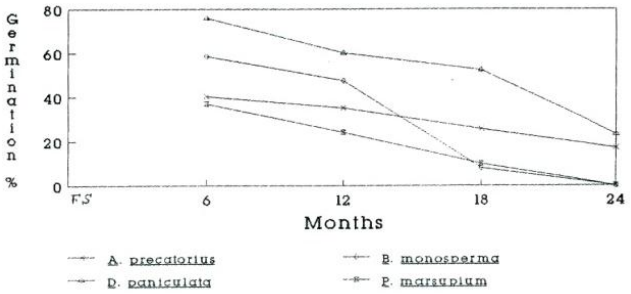

Table-3 Effect of storage condition and period on seed germination of D.paniculata.
G=Germination percent, P= Plant survival

Storage Condition	Storage period (Month)									
	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	-	-

Fig. 3
Seed germination of four forest plant species as affected by different storage periods at $30(\pm1)C.$

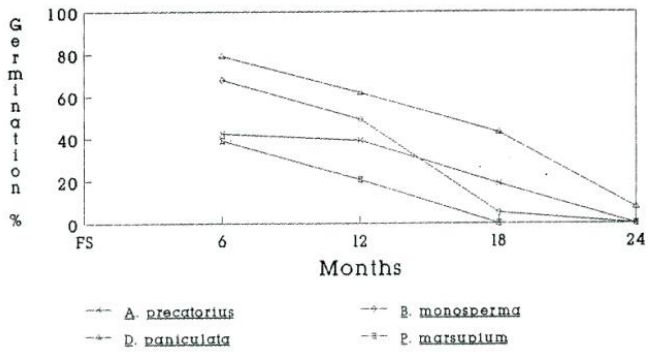

Table-4 Effect of storage condition and period on seed germination of P.marsupium.
G=Germination percent, P= Plant survival

Storage Condition	Storage period (Month)									
	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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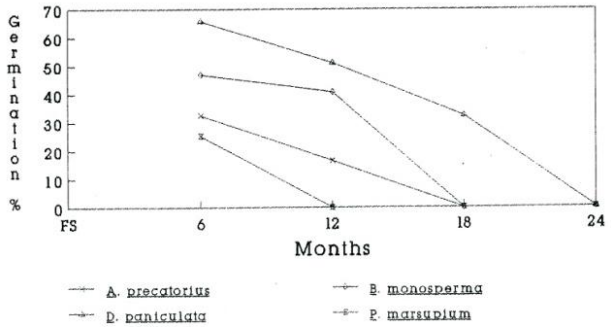
Fig. 4

Seed germination of four forest plant species as affected by different storage periods at

$$40(\pm 1)C.$$



IV DISCUSSION

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

Seed longevity is considered to be a genetic character. Therefore, improved performance after a long term storage can be achieved through mutation breeding. Observed that induced variation in soyabean and sucequent selection resulted in improved storage potential.

The seeds stored in glass bottles showed reduced germinability.

The present study indicated 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.marsupium lost their germinability nearly by 18 month of storage.

Retention of germinability by the seeds of all the four species at low temperatures is in agreement with the observations.

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