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Effect of Storage Containers on Percent Seed Mycoflora, Seed Germination, and Vigour Index of Legumes after Three Months of Storage

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Abstract

The seed is an indispensable and foundational component in every agricultural production procedure. The significance of seed, particularly premium seed, cannot be overstated, as it functions as an essential foundation upon which every other input is predicated. As soon as they attain physiological maturation, seeds of a particular crop commence decomposition. Seed degeneration may be accompanied by various physiological alterations, including reduced susceptibility to adverse climatic conditions, an increased incidence of anomalous seedlings, a prolonged average germination time, and a progressive decline in germination ability. The effects of different storage containers and durations on the seed mycoflora, seed germination, and seedling development traits of legume seeds were investigated in an experiment. The storage containers used were a tin box, wooden box, polythene bag, gunny bag, polylined gunny bag, cellulose paper, butter paper and medium cloth. The storage duration was three months. After three months, seed mycoflora, germination, and vigor index were noted on blotter paper.

***Key words*:** Seed samples, Germination, Storage containers, Blotter papers, Seed mycoflora

The packaging or container in which seeds are stored is one of the most significant factors influencing their shelf life. Proper storage and handling practices are essential for preserving the viability of seeds. When large legume seeds are handled with excessive force, mechanical injury may result. Common legumes in this category are groundnut, pigeon pea, green gram, and black gram. Exercise caution when loading or unloading these commodities to mitigate the risk of seed coat and embryo damage by refraining from tossing or lowering the bags. According to scientific research, germination rates and seedling vitality are adversely affected by harsh handling. High relative humidity and temperatures have been observed to have a detrimental effect on the germination and vitality of seedlings. Avoid areas with excessive moisture (greater than 60%) or extremely high temperatures (greater than 70°F) when handling seeds. It is ideal to store seeds between 35 and 40 degrees Fahrenheit and with a relative humidity of less than 40 percent. The storage container substantially impacted the moisture content of wheat seed at different observation dates. Seeds stored in polythene bags had a greater chance of surviving over time, according to a study by [9] than seeds stored in jute or cotton bags. This was because the former effectively mitigated the Impact of moisture fluctuations and facilitated more resilient germination of the seeds. An investigation was conducted into the effects of various seed treatments and storage conditions on the viability and vigor of the ADT rice variety (*Oryza sativa* L.) [16]. The influence of various parameters associated with storage containers on the quality attributes of agricultural seeds, such as seed discoloration, germination, moisture content, and prevalence of seed-borne fungi, has been widely acknowledged for some time [2]. To mitigate both quantitative and qualitative losses induced by biotic and abiotic factors throughout the storage process, several strategies are implemented, including seed treatment with appropriate chemicals or plant products, storage in secure containers, and, above all else, maintaining a hygienic storage environment [3]. As the duration of storage increased, the criteria for seedling development and germination diminished due to the seed's dormancy. The primary determinant in ascertaining whether production objectives are achieved, according to [15] is the grade of the seed.

MATERIALS AND METHODS

Collection of seed samples (Cultivars)

The methodology employed to gather seed samples was predicated on the approach described by [15]. As a result, three equal-weight seeds were selected randomly from markets, oil mills, the Oil Seeds Research Station in Latur, and the Pulses Research Center in Badnapur, among other locations. Blotter paper and agar plates were initially employed in the domain of seed health management by [6-7], and the International Seed Testing Association [10].

Legume seed cultivars used in the present study are listed below:

a) Groundnut (*Arachis hypogea* L.): TLG - 45

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b) Gram (*Cicer arietinum* L.): N- 59
c) Pigeon pea **(***Cajanus cajan* L**.**): BSMR -736
d) Green gram (*Vigna radiate* L.): S- 8
e) Black gram (*Vign mungo* L.): S – 1 – 1

The study incorporated the utilization of plastic containers to segregate seedlings, which were subsequently preserved in a regulated setting devoid of fungicides and insecticides.

Effect of a storage container on seed mycoflora, seed germination, and vigour index

Seeds of different varieties, i.e., TLG–45, N – 59, BSMR – 736, S –8, and S – 1-1 of legumes, were stored at room temperature for three months in different containers. The containers used were a tin box, wooden box, polythene bag, gunny bag, polylined gunny bag, cellulose paper, butter paper, and medium cloth. After three months, seed mycoflora, germination, and vigour index were noted on blotter paper.

The vigour index was determined by multiplying the percent germination with the root and shoot length sum.

Vigour index = (Root length in cm + Shoot length in cm) × Germination (%)

RESULTS AND DISCUSSION

Percent seed mycoflora

The Legumes seeds were stored in containers like tin box, polythene bags, cellulose paper, butter paper, cloth medium, wooden boxes, and polylined gunny bags for three months. After three months, seed mycoflora of different varieties were observed and noted, as shown in (Table 1). From the results, it was found that the seed mycoflora was less in the polylined gunny bag in which different varieties, i.e., TLG-45, N-59, BSMR-736, S-8, and S-1-1 were stored and showed 10%, 9%, 8%, 9% and 10% of seed mycoflora. Polythene bags and gunny bag storage were also found to have less mycoflora. Other storage containers show maximum seed mycoflora compared to polylined, polythene, and gunny bags.

Percent seed germination

The effect of storage containers on percent seed germination was observed after three months. The results are given in (Table 2). The results indicate that the percent germination was found to be higher in the storage containers like polylined gunny bags, polythene bags, and gunny bags. Other containers, i.e., tin boxes, cellulose paper, butter paper, cloth medium, and wooden boxes, were found to have a lower percentage of germination. In polylined gunny bag, polythene bag, and gunny bag varieties i.e., TLG-45 has 63%, 60%, and 59% seed germination, respectively. N-59 has 61%, 58%, and 57%. BSMR-736 has 60%, 57%, and 62%. S-8 has 59%, 58%, and 57% seed germination, respectively. S-1-1 has 62%, 61%, and 60% seed germination, respectively.

Vigour index

The results in (Table 3) show that the storage containers, i.e., polylined gunny bag, polythene bag and gunny bag, had more vigor index than other storage containers. Polylined gunny bag gives the vigour index of different cultivars of TLG-45 – (2310), N-59 – (2670), BSMR-736 – (1780), S-8 – (2722), and S-1-1 – (2790). The vigour index of TLG-45, N-59, BSMR-736, S-8, and S-1-1 stored in polythene bags was 2310, 2350, 2209, 2500 and 2300 respectively. The vigour index of TLG-45, BSMR-736, S-8, and S-1-1 stored in gunny bag gives 2250, 2170, 2176, 2070, and 2220 respectively.

Table 1 Effect of storage containers on percent seed mycoflora of legumes after three months of storage

Storage container	Cultivars				
	TLG-45	N-59	BSMR-736	S-8	S-1-1
Tin box	13	14	15	12	15
Polythene bag	12	11	10	12	14
Gunny bag	11	10	9	11	12
Cellulose paper	13	14	15	12	13
Butter paper	15	13	15	11	16
Cloth medium	13	14	11	12	15
Wooden box	15	13	14	15	16
Polylined gunny bag	10	9	8	9	10
S.E ±	0.57	0.65	0.97	0.55	0.69
C.D. at 5%	1.35	1.54	2.29	1.30	1.63

Table 2 Effect of storage containers on percent seed germination of legumes after three months of storage

Storage container	Cultivars				
	TLG-45	N-59	BSMR-736	S-8	S-1-1
Tin box	45	47	50	48	49
Polythene bag	60	58	57	58	61
Gunny bag	59	57	62	57	60
Cellulose paper	48	49	1	49	47
Butter paper	47	48	53	47	45
Cloth medium	50	49	51	50	49
Wooden box	54	52	50	48	51
Polylined gunny bag	63	61	60	59	62
S.E ±	2.25	1.76	6.47	1.68	2.27
C.D. at 5%	5.33	4.17	15.33	3.98	5.37

Research was conducted by Doyer [7] on a manual for the determination of seed-borne diseases. The blotter technique was documented by De Tempe [6] as a method for determining the viability of seeds. An investigation was conducted by Abdul and Anderson [1] into the biochemical and physiological degradation of seeds. Neergaard [15] conducted research on seed pathology. Mallick and Nandi [11] state that rough rice degrades while it is stored. Alaker *et al.* [2] conducted a study

to examine the effects of temperature and humidity on the quality of wheat seeds while they were in storage. A study conducted by Bhanuprakash *et al*. [5] examined the effects of stimulation and storage conditions on the viability and vitality of Khirni (*Manilkara hexandral*) seeds. According to a study by Begum *et al*. [4], the development of storage fungus in groundnuts can deteriorate the quality of the seeds. The stability and germination of cowpea (*Vigna unguiculata* (L) Walp) seeds are impacted by seed storage methods [8]. The quality of seeds is influenced by storage methods and duration. Sultana [17] is the author of the research paper and examined the effect of various storage methods and durations on the quality of Boro rice seeds. An investigation conducted by Ali *et al*. [3] examined the Impact of different seed storage conditions on the viability and vitality of soybean seeds. Raja and Sasikala [16] conducted an investigation to compare the viability and vitality of rice (*Oryza sativa* L.) in relation to storage containers and seed treatments. The seed quality of sesame (*Sesamum indicum* L.) was examined in regard to different packaging materials and storage conditions in a study conducted by Nyo [9]. Gebeyaw [12] reviews the impact of seed storage containers on seed quality.

Table 3 Effect of storage containers on percent vigour index of legumes after three months of storage

Storage container	Cultivars				
	TLG-45	N-59	BSMR-736	S-8	S-1-1
Tin box	1600	1689	1650	1680	1890
Polythene bag	2310	2350	2209	2500	2300
Gunny bag	2250	2170	2070	2176	2220
Cellulose paper	1547	1750	1780	1682	1590
Butter paper	1960	1800	1940	1650	1700
Cloth medium	1650	1440	1564	1423	1738
Wooden box	1620	1562	1675	1720	1725
Polylined gunny bag	2310	2670	1780	2722	2790
S.E ±	113.35	140.97	73.68	164.16	135.99
C.D. at 5%	268.63	334.09	174.62	289.05	322.29

CONCLUSION

An attempt has been made to study the effect of different storage containers on seed mycoflora, seed germination and vigour index of legume. Among the used containers polylined gunny bag, polythene bag and gunny bag showed reduction in seed mycoflora and increase in seed germination and vigour index.

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