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PHYSIOLOGICAL STUDY ON INDIAN MUSTARD SEED QUALITY IN STORAGE CONTAINERS

Sagar Satibawane[1*], Rajesh Gadewar[2]

[1]Department of Botany R.T.M. Nagpur University Nagpur - 440033 (M.S.) India

[2]Department of Biology (Botany), Sevadal Mahila Mahavidyalaya Nagpur - 440024 (M.S.) India

***Corresponding author:** Sagar R. Satibawane

***Corresponding author email:** sagarsatibawane123@gmail.com

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ABSTRACT: The present study was conducted to evaluate the mustard seed quality under different storage conditions. Indian mustard (*Brassica juncea* L.) variety TAM-108-1 seed stored for eighteen months in tin container, aluminium foil, polythene bag and cloth bag at room temperature. The initial field emergence germination percentage of seed was 95.77 % but after eighteen months (540 days) in tin container, aluminium foil, polythene bag, cloth bag it was decreased with period to 44.23 %, 38.77 %, 32.00 %, and 25.00 %. The initial length of seedling (cm) in seed was 36.66 cm however, after storage for eighteen months in tin container, aluminium foil, polythene bag and cloth bag it was declined to 24.80 cm, 20.45 cm, 18.23 cm, 16.80 cm. The initial seedling dry matter (gm) in seed was 1.67 gm however, after storage for eighteen months in tin container, aluminium foil, polythene bag and cloth bag it was declined to 1.12 gm, 0.99 gm, 0.88 gm and 0.82 gm respectively. Storage condition affects the moisture content and normal germination. The study revealed that for seed storage tin container was better significant than aluminium foil, polythene bag, and cloth bag for mustard seeds.

Keywords: Indian Mustard, Field, Seed quality, Storage, Tin

INTRODUCTION:

The Indian musturd plant (*Brassica juncea*) belongs to the family of Cruciferae (Brassicaceae). The family Brassicaceae are containing about 350 genera and 3500 species. It is one of the ten most economically important plant families with a wide range in agriculture production. Basically, Brassica is the important oilseed plant. The oilseed plant of Brassica species is also called as rapeseed-mustard, which is the most important Rabi oilseed crop in agriculture. In India Brassica species have been cultivated since Vedic times. This seeds are being used for

many purposes, that is, edible oil, vegetable, condiments, medicine, fodder preparation and seasoning of food articles, and so forth. They have also been used as medicine and condiments (Suma A. et al., 2013). Seed quality is mainly determined by its genetic, physical purity, germination and vigour. Therefore, germination and purity decide its planting value. The seed quality is determined by different factors including seed viability and vigour which imparts inherent capacity to grow under favourable and unfavourable conditions (Ahmad, 2001).

Seed quality is necessary to enhance the production and productivity. These properties are inturn influenced by the agriculture ecological conditions in the production of seed, field, seed handling and processing, storage conditions and storage period (Shelar et. al., 2008). Kulik (1977) stated that the measure of area and laboratory germination. He noticed that decreased field emergence of high germinating seeds in the area can be caused by range of things like negative moisture and temperature situations, presence of micro-organism, destruction by using insects. If those elements in the subject are controlled and are stored favourable, that is if issue apart from seeds do no longer affect germination, laboratory germination and area emergence may be expected to be vital equal. Parrish and Leopold (1978) observed that decreased root length and axis weight with declined in vigour in soybean. Gregori et al. (2013) even as running with cereal seeds located that field emergence have been decrease than laboratory germination. The laboratory test a look at achieved in wheat (20 %) oat (15 %), barley (14 %) and rye (17 %) confirmed higher germination than field emergence. Stahl (1931) said that the standard laboratory system has been to provide perfect for the germination of seed even though such situations seldom, exists in subject planting and field stands had been commonly decrease than laboratory germination such display changed into particularly great with plenty having medium or low viability.

Ali et al. (2014) observed that seedling dry matter decreased initial seed moisture content irrespective of storage containers used. Highest seedling dry matter of soybean seed was in polythene bag at 8%initial moisture content as compared to those stored in cloth bag at 12% initial moisture Jaiswal et al. (2018) studied on packaging materials, storage duration on seed viability and seed health in soybean seeds and recorded higher seedling dry weight seeds stored in vacuum polythene bag compared to non-vacuum polythene bag, and Cloth bag after 6 months of storage. The quality of seed required safe storage due to the temporal gap of six months or longer, between harvesting and subsequent sowing. The quality of seed and preservation during storage is play crucial role for maintaining acceptable levels of seed germination and vigour until sowing. The study of revealed that the influence of storage containers on quality of seed over time (Bortey et al., 2016; Moharana et al., 2017).

The maintenance of seed quality during storage period is important not only or crop production in throughout the year but also for the maintenance integrity of the seeds because of their constant threat and of genetic erosion. Types of containers also regulate temperature, relative humidity and seed moisture contents. High temperature, relative humidity and moisture in the storage environment appear to be key factors involved in deterioration of seed quality. Loss of germination capacity is the final manifestation of seed deterioration. Therefore, the present study was undertaken to identify the best storage container for storing mustard seed (*Brassica juncea* L.) variety TAM-108-1.

MATERIAL AND METHODS:

The experiment was conducted at the laboratories of Department of Botany, RTMNU, Nagpur and Govt. seed testing lab, Nagpur. This experiment was conducted during the period from Jan 2023 to June 2024 and evaluate the mustard seed quality under different storage conditions. The seed of Indian mustard (*Brassica juncea* L.*)* variety TAM-108-1, which was stored in four different storage condition i.e. tin container (C1), aluminium foil (C2), polythene bag (C3), and cloth bag (C4) and period of storage T1 (0 day), T2 (90 days), T3 (180 days), T4 (270 days),

T5 (360 days), T6 (450 days) and T7 (540 days) at the room temperature for 18 months (540 days) at room temperature. Seeds were collected from P.K.V, Nagpur. Seeds were used for the determination of field emergence germination, length of seedling and seedling dry matter. The experiment was statistically analyzed by using factorial design CRD (Completely Randomized Design). During the storage period, seed samples were taken after three months (90 days) from each container for physiological observation of three parameters as field emergence germination, length of seedling and seedling dry matter.

Determination of Field Emergence Germination Test (%):

When sufficient moisture was not present in the soil, the fields were irrigated before sowing. The field germination trials were grown with interval of three months between consecutive field tests. The first sowing was done after completion of standard laboratory germination test. Before sowing, every sample was mixed and divided in three parts, considering one part for one replication. The sowing was done in the line keeping one feet distance apart from each other. 100 seeds one inch deep by dibbling method planted in each line. Only one seed was sown per hill. The distance between two hills was six inches. From fourth day onwards during seedling emergence, plant protection measures were taken to avoid the attack of pests and diseases on crops. On the fourteenth day of sowing, every hill of each line was inspected and the number of seedling emerged were counted. After one month of sowing the final field germination count was taken. The percentage field germination was calculated based on seeds planted in respective lines (By ISTA rule, 1985).

Length of Seedling (cm):

Twenty-five seedlings were taken randomly for seedling length measurement. Seedling length (sum of root and shoot) was measured in cm, as well as average length was calculated (By ISTA rule, 1985).

Seedling Dry Matter (gm):

The seedlings used for seedling length measurement were dried in hot air oven, maintained at 85 °C for 24 hours. It was then cooled in desiccator and later their final weight was recorded in gm (By ISTA rule, 1985).

RESULT AND DISCUSSION:

In the present study of field emergence germination of mustard seed stored in different containers have presented in table 1. In mustard variety TAM-108-1, the field emergence germination percentage significantly decreased with increase in storage period. The rate of loss in germination varied with the type of container used. The initial field emergence germination of the seed was (95.77 %) but after the storage 18 months (540 days) in tin container, aluminium foil, polythene bag, cloth bag it was declined. Seeds stored in Tin showed significantly higher field emergence germination percentage (44.23 %) as compared to those stored in Aluminium foil (38.77 %), Polythene bag (32.00 %) and Cloth bag (25.00 %) up to 540 days (T7) days of the storage. Among the containers, Tin showed significantly higher mean of field emergence germination percentage (72.89 %) as compared to Aluminium foil (67.25 %), Polythene bag (58.36 %) and Cloth bag (53.60 %) throughout the storage period. Similarly, Arulnandhy and Sananayake (1988) observed that subject sand germination and field emergence of soybean seeds declined with improved storage duration, but, the charge of loss in germination and field emergence numerous with the kind of field.

The length of seedling (cm) of mustard seed stored in different containers have presented in table 2. In mustard variety TAM-108-1, the length of seedling significantly decreased with increase in storage period. The rate of loss in length of seedling varied with the type of container used. The initial length of seedling of the seed was (36.66 gm) but after the storage 18 months (540 days) in tin container, aluminium foil, polythene bag, cloth bag it was declined. Seeds

stored in Tin showed significantly higher length of seedling (24.80 gm) as compared to those stored in Aluminium foil (20.45 gm), Polythene bag (18.23 gm) and Cloth bag (16.80 gm) up to 540 days (T7) days of the storage. Among the containers, Tin showed significantly higher mean of length of seedling (32.13 gm) as compared to Aluminium foil (29.59 gm), Polythene bag (27.80 gm) and Cloth bag (27.70 gm) throughout the storage period. Similar findings were observed by Venge et al. (2016) in soybean seeds during storage.

The seedling dry matter (cm) of mustard seed stored in different containers have presented in table 3. In mustard variety TAM-108-1, the seedling dry matter significantly decreased with increase in storage period. The rate of loss in seedling dry matter varied with the type of container used. The initial seedling dry matter of the seed was (1.67 cm) but after the storage 18 months (540 days) in tin container, aluminium foil, polythene bag, cloth bag it was declined. Seeds stored in Tin showed significantly higher seedling dry matter (1.12 cm) as compared to those stored in Aluminium foil (0.99 cm), Polythene bag (0.88 cm) and Cloth bag (0.82 cm) up to 540 days (T7) days of the storage. Among the containers, Tin showed significantly higher mean of seedling dry matter (1.43 cm) as compared to Aluminium foil (1.37 cm), Polythene bag (1.31 cm) and Cloth bag (1.24 cm) throughout the storage period. Moshtaghi et al. (2015) reported that seedling dry weight reduced (5.77 to 3.62 mg) in cloth bags compared to polythene bags (5.88 to 3.91 mg) after period of storageof 18 months in soybean. So, the present study was revealed that tin container better storage for storing seeds as compared to aluminium foil, polythene bag and cloth bag.

Table 1. Field Emergence Germination (%) of mustard seeds stored in different Containers.

Storage Period	Different Containers			
	Tin container	Aluminium foil	Polythene bag	Cloth bag
T1	95.77	95.77	95.77	95.77
T2	89.23	87.00	80.77	77.23
T3	84.00	75.00	69.00	60.77
T4	78.23	68.23	51.23	49.23
T5	68.00	59.00	41.77	38.23
T6	50.77	47.00	38.00	29.00
T7	44.23	38.77	32.00	25.00
Mean	72.89	67.25	58.36	53.60
SE (m)	1.039	1.157	1.098	1.056
CD (P=5%)	3.148	3.512	3.330	3.206

Storage Period	Different Containers			
	Tin container	Aluminium foil	Polythene bag	Cloth bag
T1	36.66	36.66	36.66	36.66
T2	35.23	34.44	33.80	32.40
T3	34.77	32.80	31.10	31.80
T4	32.56	31.50	28.01	29.66
T5	31.23	26.30	23.55	24.33

T6	29.70	24.99	23.25	22.23
T7	24.80	20.45	18.23	16.80
Mean	32.13	29.59	27.80	27.70
SE (m)	1.256	1.275	1.276	1.182
CD (P=5%)	3.810	3.869	3.869	3.585

Table 2. Length of Seedling (cm) mustard seeds stored in different containers.

Table 3. Seedling dry matter (gm) of mustard seeds stored in different containers.

Storage Period	**Different Containers**			
	Tin container	**Aluminium foil**	**Polythene bag**	**Cloth bag**
T1	1.67	1.67	1.67	1.67
T2	1.62	1.59	1.56	1.52
T3	1.51	1.48	1.43	1.38
T4	1.46	1.41	1.35	1.22
T5	1.38	1.31	1.16	1.13
T6	1.28	1.13	1.11	0.98
T7	1.12	0.99	0.88	0.82
Mean	1.43	1.37	1.31	1.24
SE (m)	0.026	0.041	0.035	0.031
CD (P=5%)	0.079	0.126	0.106	0.095

CONCLUSION:

The present study was concluded that the field emergence germination, length of seedling and seedling dry matter were better significant in seeds stored in air tight tin container as compared to aluminium foil, polythene bag and cloth bag. Storage condition affects the production of normal germination, dead seedlings, field emergence germination, length of seedling, seedling dry matter and the study revealed that seed storage in tin container was better storage container than aluminium foil, polythene bag, and cloth bag for mustard seed.

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CONFLICT OF INTEREST:

There are no conflict of interest.

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