

Analyzing the mycoflora associated with the mungbean(*Vigna radiata* L.)seeds under various storage circumstances

Abstract:

Mung bean (*Vigna radiata* L.) is a popular pulse consumed throughout the world. It has a balanced nutritional profile containing considerable levels of bioactive compounds, proteins, dietary fiber, minerals and vitamins. As a result, it becomes important to produce and store it. This study looked at the test weight of the seeds, their ability to germinate, and the fungus that was present. Under various storage conditions (using ten containers for storage) the percentage of gained 1000 seed weight was maximum in gunny bags (10.76%) while the lowest weight was gained in glass pots (5.25%). The germination percentage of seed under different storage conditions revealed that maximum was observed in Glass pot (94.69%) over 120 days while, minimum of gunny bag (91.31%) and the germination percentage gradually decreased from 30 DAS to 120 DAS. *A. flavus*, *A.niger*, *Rhizopus* spp., *Penicillium* spp. under storage condition increased from 30 DAS to 120 DAS while *Alternaria* spp., *Macrophomina* spp., *Fusarium* spp. and *Trichoderma* spp. gradually decreased under different periods of the interval of storage.

Keywords: Storage condition, storage fungi, field fungi, germination and moisture percentage

1. Introduction:

Mungbean is produced primarily for its protein content (25%). It is Fabaceous and dicotyledonous crop.Mungbean is consumed as a sprouts&pulse to obtain protein-rich food, hence along with production, its storage is also very important as good maintenance maintains the quality of the seeds.Its protein content and germination capacity remain intact.A bad or unfavorable climate for seed growth has an impact on the amount and quality of seeds produced, which in turn has an impact on the seeds' ability for storage. One issue that lowers mung bean productivity and yield quality is a poorly designed storage system (Mutungi *et al.*, 2014).One of the factors affecting the viability and potency of seeds during

storage is the fungus that survives in the seeds. The presence of fungus in seeds depends on the storage container, storage time and method of storage. Seed-borne mycoflora associated with mung beans reported recently include *Aspergillus sp*, *Alternaria sp*, *Curvulariasp*, *Fusarium sp*, *Macrophomina sp.*, *Penicillium sp.*, *Rhizopus sp*, and *Trichoderma sp*. These fungi reduce the germination percentage, viability and vigour of seeds. Because of seed-borne infections, there is a reduction in production and incapable to satisfy the requirements for mungbean seeds.

2. Material and Methods:

2.1 Experimental material

Mungbean seeds of the MH 421 variety, created by Chaudhary Charan Singh Haryana Agricultural University (CCSHAU) Hisar, were employed in the study. MH-421 is a high-yielding mungbean cultivar that is also resistant to the mungbean yellow mosaic virus. AICRP on MULLaRP, Department of Genetics and Plant Breeding, College of Agriculture, Raipur, provided the mungbean seed

2.2 Experimental treatments

The experiment was carried out in two factors, viz. (A) ten storage containers named i) Kaolinite pot, ii) Plastic pot, iii) Glass pot iv) Steel pot v) Earthen pot vi) Raw Earthen pot vii) PP bag viii) Fertilizer bag ix) Gunny bag x) Cloth bag and (B) four storage periods of i) 30 days, ii) 60 days, iii) 90 days and iv) 120 days

2.3 Storage method

For this study, 100 gm seeds of MH 421 variety of mungbean under investigation were stored in 10 different types of storage containers i.e. Kaolinite pot, Plastic pot, Glass pot Steel pot, Earthen pot, Raw Earthen pot, PP bag, Fertilizer bag, Gunny bag and Cloth bag under normal room temperature according to the methods suggested by ISTA (1964, a). The presence and prevalence of different fungi associated with seeds were noted at the intervals of each month up to six months viz 30 DAS, 60 DAS, 90 DAS and 120 DAS. 100 seeds of each sample were surface sterilized with 0.1% mercuric chloride ($HgCl_2$) solution for one minute and were plated on a moist blotter plate (standard blotter method) at the same rate per petri plate as in other studies.

2.4 Identification of seed mycoflora

A stereoscopic binocular microscope was used to identify the fungus growing on each seed in the plates based on their mycelial development and fruiting structure over the seeds. Preparing slides of fungal growth and examining them under a compound microscope allowed for the identification and confirmation of seed-borne fungus. With the aid of manuals, the microscopic view of mycoflora was recognized.

2.5 Seed germination

For the germination test, 400 seeds were chosen at random from each working sample. On germination petri plates, three layers of wet blotter paper were inserted. Twenty-five seeds were inserted in each petri dish and allowed to germinate for 12 days at a temperature of 25°C. Seeds were inspected every day for the next 12 days until germination was complete. Only normal seedlings were counted after germination to determine the germination percentage (ISTA, 1996).

2.6 Determination of 1000 seed weight

For weight determination, a thousand seeds of mungbean were randomly counted from each working sample and kept in ten different storage containers. Then their weight was measured in an electronic balance. These observations were carried out for up to five months at the interval of one month.

3. Results and Discussion:

3.1 Effect of containers and storage periods on the 1000-seed weight of mungbean

Table 1 shows the results of 1000-seed weight mungbean storage containers and storage periods. All containers had a 1000-seed weight of 33.36 g immediately before storage. For all storage periods, the weight of 1000 seeds varied greatly from container to container, and the weight increased as the storage period prolonged. At 30, 60, 90, and 120 days after storage (DAS), the highest 1000-seed weight (34.14, 35.12, 35.32 and 36.95 g) was recorded in the Gunny bag, while the lowest 1000-seed weight (33.36, 33.6, 34.56 and 35.11 g) was recorded in Glass pot. Data presented Air-tied storage containers (Steel pot, Plastic pot and Glass pot) have gained low percentage of weight and another storage container has gained a high percentage of weight. Mungbean stored in Gunny bag has the highest

percentage (10.76%) of weight and lowest percentage (5.25%) in Glass pot gained. The result obtained is in line with Khalequzzaman *et al.* (2012), who proposed that within the duration of duration of storage the weight of 1000-seed weight of french beans increases. Gunny bag acquired more moisture in 1000 seed weight throughout storage.

Table 1 Effect of containers and storage periods on the 1000-seed weight of mungbean

S. No.	Containers	1000-seed weight (g) at					Total weight gained	% of gained weight
		Before storage	30 DAS	60 DAS	90 DAS	120 DAS		
1.	Kaolinite pot	33.36	33.96	34.60	35.12	35.37	2.01	6.03
2.	Plastic pot	33.36	33.98	34.65	34.99	35.85	2.49	7.46
3.	Glass pot	33.36	33.60	34.30	34.56	35.11	1.75	5.25
4.	Steel pot	33.36	33.65	33.95	34.01	35.19	1.83	5.49
5.	Earthen pot	33.36	33.90	34.85	35.02	36.12	2.76	8.27
6.	Raw Earthen pot	33.36	34.22	34.87	35.06	36.33	2.97	8.90
7.	PP bag	33.36	33.94	34.75	34.96	36.06	2.70	8.09
8.	Fertilizer bag	33.36	33.79	34.67	35.04	36.09	2.73	8.18
9.	Gunny bag	33.36	34.14	35.12	35.32	36.95	3.59	10.76
10.	Cloth bag	33.36	34.1	35.23	35.99	36.50	3.14	9.41

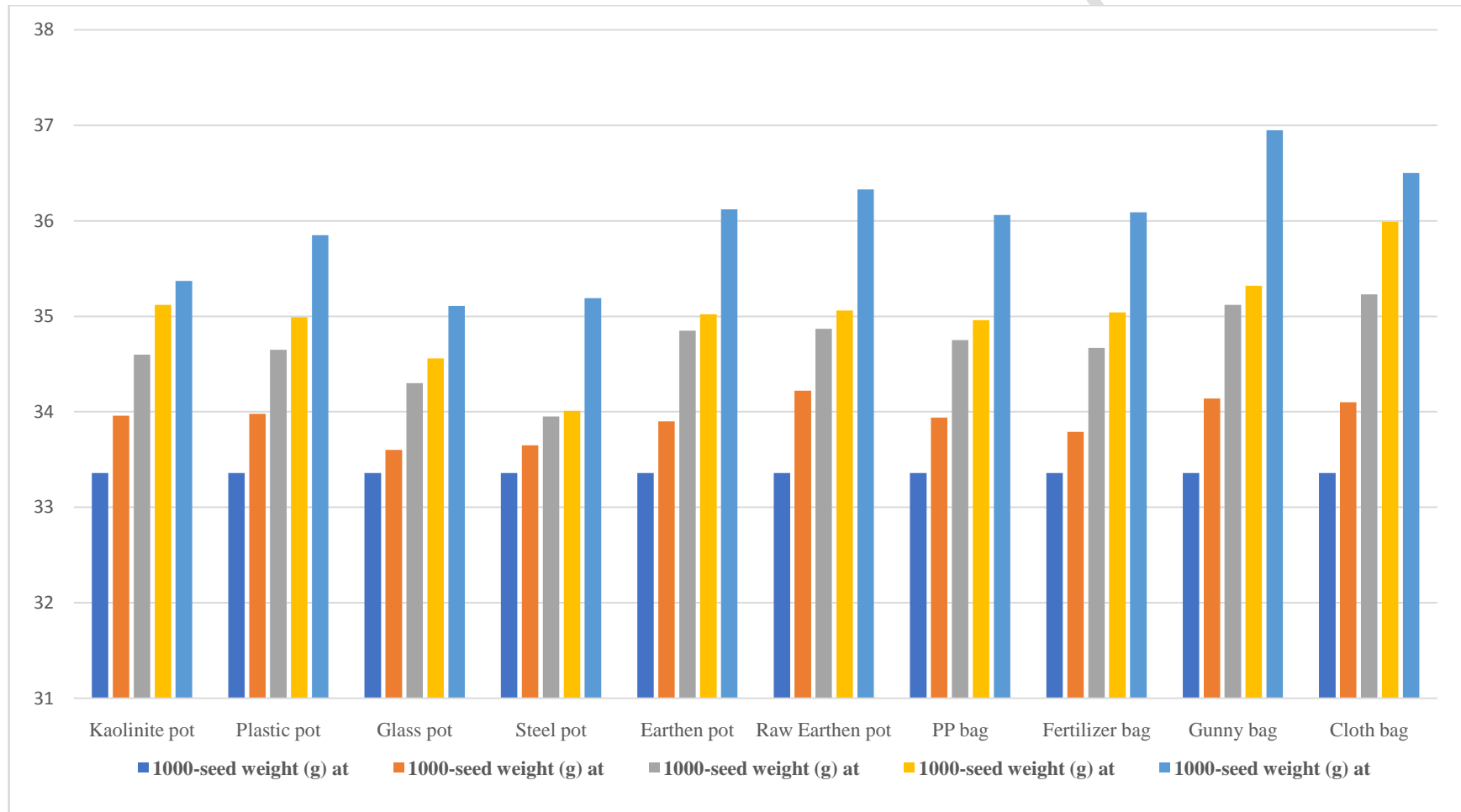


Fig.1 Effect of containers and storage periods on the 1000-seed weight of mungbean

3.2 Germination percentage and mycoflora incidence at 30 days after storage

Table 2 shows that after 30 days of storage of mungbean seeds germination percentage were high (96.25%) in Glass pot, Earthen pot, Raw Earthen pot and PP bag followed by Cloth bag, Gunny bag, Steel pot, Plastic pot, Kaolinite pot and low (94.25%) in fertilizer bag. The frequency of seed mycoflora was maximum in Gunny bag (43.50%) which includes *Aspergillus niger* (10.25%), *Aspergillus flavus* (7.50%), *Alternaria* sp. (6.25%) *Macrophomina* sp. (2.50%), *Rhizopus* sp. (6.50%), *Fusarium* sp. (8.25%) and *Penicillium* sp. (2.25%) and followed by Fertilizer bag (42.25%), Cloth bag (41.75%), Raw Earthen pot (41.75%), Plastic pot (40.75%) while minimum in Glass pot (32.50%) and next was Steel pot (33.50%).

Various mycoflora were detected from mungbean seeds at different storage containers, in which *Aspergillus flavus* (92.50%) was recorded maximum and followed by *A. niger* (91.50%), *Rhizopus* sp. (71.00%), *Fusarium* sp. (59.75%), *Alternaria* sp. (29.75%), *Penicillium* sp. (21.75%), *Macrophomina* sp. (16.50%) and *Trichoderma* sp. (3.77%) was found the minimum. *Trichoderma* sp. was observed in only two containers *i.e.*, Kaolinite pot (2.27%) and Earthen pot (1.50%).

Table 2 Germination percentage and mycoflora incidence at 30 days after storage

S. No.	Containers	Germination %	Frequency of mycoflora associated (%)							Total Frequency %	
			Relative abundance (%)								
			<i>Aspergillus niger</i>	<i>Aspergillus flavus</i>	<i>Alternaria</i> sp.	<i>Macrophomina</i> sp.	<i>Rhizopus</i> sp.	<i>Fusarium</i> sp.	<i>Penicillium</i> sp.	<i>Trichoderma</i> sp.	
1.	Kaolinite pot	95.25	6.25	11.25	2.25	-	6.25	2.25	3.50	2.27	34.02
2.	Plastic pot	95.25	8.75	10.25	3.25	3.25	6.50	4.25	4.50	-	40.75
3.	Glass pot	96.25	9.25	8.25	-	2.75	8.50	3.75	-	-	32.50
4.	Steel pot	95.50	9.75	9.25	1.50	-	8.50	3.00	1.50	-	33.50
5.	Earthen pot	96.25	10.25	8.25	1.25	2.25	6.25	6.25	2.00	1.50	38.00
6.	Raw Earthen pot	96.25	10.50	11.25	-	3.25	7.75	5.75	3.25	-	41.75
7.	PP bag	96.25	7.50	9.75	4.25	-	8.50	8.25	-	-	38.25
8.	Fertilizer bag	94.25	9.25	8.25	5.50	-	5.25	9.25	4.75	-	42.25
9.	Gunny bag	95.75	10.25	7.50	6.25	2.50	6.50	8.25	2.25	-	43.50
10.	Cloth bag	96.00	9.50	8.50	5.50	2.50	7.00	8.75	-	-	41.75
Total mycoflora			91.25	92.50	29.75	16.50	71.00	59.75	21.75	3.77	

3.3 Germination percentage and mycoflora incidence at 60 days after storage

Data presented in Table 3 germination percentage was highest (95.50%) in both containers Glass pot and steel pot and followed by PP bag (95.25%), Raw Earthen pot (94.75%), Earthen pot (94.50%) but the lowest percentage of germination found in both containers Gunny bag (93.25%) and Fertilizer bag (93.25%). The observed seed mycoflora on the various types of storage containers, which Gunny bag (45.50%) has a high frequency of mycoflora which includes *Aspergillus niger* (10.25%), *Aspergillus flavus* (8.75%), *Alternaria* sp. (5.25%), *Macrophomina* sp. (3.00%), *Rhizopus* sp. (7.75%), *Fusarium* sp. (6.75%) and *Penicillium* sp. (3.75%) and followed by Cloth bag (44.75%), Fertilizer bag (44.25%), Raw Earthen pot (43.75%) while a low frequency of seed mycoflora was observed in Glass pot (34.50%) and next was Kaolinite pot (35.75%).

Among the different mycoflora, *Aspergillus flavus* (102.00%) was having the highest relative abundance followed by *Aspergillus niger* (96.5%), *Rhizopus* sp. (79.25%), *Fusarium* sp. (58.75%) while *Macrophomina* sp. (14.5%) were having the lowest relative abundance and next was *Penicillium* sp. (28.00%).

Table 3 Germination percentage and mycoflora incidence at 60 days after storage

S. No.	Containers	Germination %	Frequency of mycoflora associated (%) /							Total Frequency %
			Relative abundance (%)							
			<i>Aspergillus niger</i>	<i>Aspergillus flavus</i>	<i>Alternaria</i> sp.	<i>Macrophomina</i> sp.	<i>Rhizopus</i> sp.	<i>Fusarium</i> sp.	<i>Penicillium</i> sp.	
1.	Kaolinite pot	94.00	7.75	13.25	2.75	-	6.25	2.25	3.50	35.75
2.	Plastic pot	93.75	8.75	10.25	4.25	3.25	7.50	4.25	4.50	42.75
3.	Glass pot	95.50	8.25	10.25	-	2.75	9.25	4.25	-	34.75
4.	Steel pot	95.50	11.25	9.25	1.50	-	8.25	3.75	2.50	36.50
5.	Earthen pot	94.50	10.25	9.25	2.50	1.75	8.75	7.00	2.75	42.25
6.	Raw Earthen pot	94.75	9.50	10.75	3.50	2.25	7.75	6.75	3.25	43.75
7.	PP bag	95.25	10.25	9.75	4.25	-	6.50	9.25	1.50	41.50
8.	Fertilizer bag	93.25	9.25	10.00	4.25	-	7.75	8.25	4.75	44.25
9.	Gunny bag	93.25	10.25	8.75	5.25	3.00	7.75	6.75	3.75	45.50
10.	Cloth bag	94.25	11.00	10.50	4.50	1.50	9.50	6.25	1.50	44.75
Total mycoflora			96.50	102.00	32.75	14.50	79.25	58.75	28.00	

3.4 Germination percentage and mycoflora incidence at 90 days after storage

Table 4 shows that the Glass pot had the highest germination percentage (94.50%) and followed by the PP bag (93.50%), steel pot (93.25%), Plastic pot (92.75%) but the Cloth bag had the lowest (90.75%) and next was Fertilizer bag (91.75%) and Raw Earthen pot (91.75%). Seed mycoflora was discovered on several types of storage containers, with Gunny bag (43.00%) having a high frequency of mycoflora and followed by Cloth bag (42.00%), Fertilizer bag (40.50%), Earthen pot (97.75%) but PP bag having a low frequency (33.50%) and next was Glass pot (34.75%).

Aspergillus flavus (110.75%) was predominant all over the storage containers which have the highest relative abundance and followed by *A. niger* (101.20%), *Rhizopus* sp. (88.50%), *Fusarium* sp. (37.00%) while *Macrophomina* sp. (1.50%) was having the least relative abundance which was observed in only Plastic pot and next was *penicillium* sp. (10.95%).

3.5 Germination percentage and mycoflora incidence at 120 days after storage

The Glass pot (92.50 %) had the highest germination percentage and followed by the PP bag (92.25%), Steel pot (91.75%), Earthen pot (91.75%), Raw Earthen pot (91.25%) but the Gunny bag (88.50%) had the lowest and next was Fertilizer bag (89.25%) shown in Table 5 Seed mycoflora was found on a range of different containers, with Gunny bags (45.50%) having the highest frequency of all associated mycoflora on the mungbean seed and followed by Cloth bag (43.00%), Earthen pot (41.50%), Fertilizer bag (42.25%) while Glass pot (35.25%) was having the lowest frequency and next was Steel pot (38.25%).

Among the different mycoflora, *Aspergillus flavus* (116.00%) was maximum frequent on all storage containers and followed by *A. niger* (115.50%), *Rhizopus* sp. (86.00%), *Fusarium* sp. (36.75%) and *Alternaria* sp. (23.00%) had the least frequent but next was *Penicillium* sp. (24.00%).

Table 4 Germination percentage and mycoflora incidence at 90 days after storage

S. No.	Containers	Germination %	Frequency of mycoflora associated (%)/ Relative abundance (%)							Total Frequency %
			<i>Aspergillus niger</i>	<i>Aspergillus flavus</i>	<i>Alternaria</i> sp.	<i>Macrophomina</i> sp.	<i>Rhizopus</i> sp.	<i>Fusarium</i> sp.	<i>Penicillium</i> sp.	
1.	Kaolinite pot	92.25	9.25	11.25	1.25	-	8.25	4.50	1.20	35.70
2.	Plastic pot	92.75	10.50	8.25	3.25	1.50	9.75	1.50	-	34.75
3.	Glass pot	94.50	11.25	10.25	1.25	-	9.25	2.50	-	34.50
4.	Steel pot	93.25	9.75	11.25	0.75	-	9.75	3.25	-	34.75
5.	Earthen pot	92.25	8.25	12.50	1.75	-	10.50	4.75	-	37.75
6.	Raw Earthen pot	91.75	10.20	11.50	3.50	-	7.75	3.25	1.25	37.45
7.	PP bag	93.50	9.25	11.75	3.25	-	5.75	2.75	0.75	33.50
8.	Fertilizer bag	91.75	10.75	11.50	2.75	-	8.75	4.25	2.50	40.50
9.	Gunny bag	92.25	11.25	9.75	3.25	-	10.25	5.75	2.75	43.00
10.	Cloth bag	90.75	10.75	12.75	3.00	-	8.50	4.50	2.50	42.00
Total mycoflora			101.20	110.75	24.00	1.50	88.50	37.00	10.95	

Table 5 Germination percentage and mycoflora incidence at 120 days after storage

S. No.	Containers	Germination %	Frequency of mycoflora associated (%) /					Total Frequency %	
			Relative abundance (%)						
			<i>Aspergillus niger</i>	<i>Aspergillus flavus</i>	<i>Alternaria</i> sp.	<i>Rhizopus</i> sp.	<i>Fusarium</i> sp.		<i>Penicillium</i> sp.
1.	Kaolinite pot	90.5	10.25	11.25	3.25	9.25	3.25	2.50	39.75
2.	Plastic pot	90.5	10.50	11.75	2.5	9.75	3.75	-	38.25
3.	Glass pot	92.5	13.25	10.25	1.5	8.75	1.50	-	35.25
4.	Steel pot	91.75	11.50	13.25	0.75	6.25	2.75	3.75	38.25
5.	Earthen pot	91.5	10.75	11.25	2.75	9.50	3.75	3.50	41.50
6.	Raw Earthen pot	91.25	11.00	13.25	3.5	6.25	3.50	2.50	40.00
7.	PP bag	92.25	9.75	12.25	0.75	7.50	6.50	1.75	38.50
8.	Fertilizer bag	89.25	12.75	9.25	1.75	9.75	3.25	4.50	41.25
9.	Gunny bag	84.00	14.25	10.75	3.75	8.75	5.25	2.75	45.50
10.	Cloth bag	89.50	11.50	12.75	2.5	10.25	3.25	2.75	43.00
Total mycoflora			115.50	116.00	23.00	86.00	36.75	24.00	

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3.6 Comparative amount of germination percentages on storage periods and storage containers

Table 6 data shows that the average means germination percent has a maximum in Glass pots (94.69%) and a minimum in gunny bag (91.31%). With time, the germination percentage of mungbean seeds was found to decline from the preliminary germination percentage. The high moisture content of the seeds was closely associated with the decrease in germination percentage. Because of the high moisture level in the Gunny bag, the seeds lost their germination capacity more quickly than the seeds in the Glass pot container, which had a lower moisture content over the storage period. According to Agrawal (2007), the loss of seed quality due to lower germination percentages increased as the moisture content of the seed increased. Patel and Sonalki (2017) reported that the percent seed germination was found to decrease during the increase with storage periods of seeds.

Table 6 Comparative amount of germination percentages on storage periods and storage containers

S. No.	Containers	Germination %				Mean
		30 DAS	60 DAS	90 DAS	120 DAS	
1.	Kaolinite pot	95.25	94.00	92.25	90.50	93.00
2.	Plastic pot	95.25	93.75	92.75	90.50	93.06
3.	Glass pot	96.25	95.50	94.50	92.50	94.69
4.	Steel pot	95.50	95.50	93.25	91.75	94.00
5.	Earthen pot	96.25	94.50	92.25	91.50	93.63
6.	Raw Earthen pot	96.25	94.75	91.75	91.25	93.50
7.	PP bag	96.75	95.25	93.50	92.25	94.44
8.	Fertilizer bag	94.25	93.25	91.75	89.25	92.13
9.	Gunny bag	95.75	93.25	92.25	84.00	91.31

10.	Cloth bag	96.00	94.25	90.75	89.50	92.63
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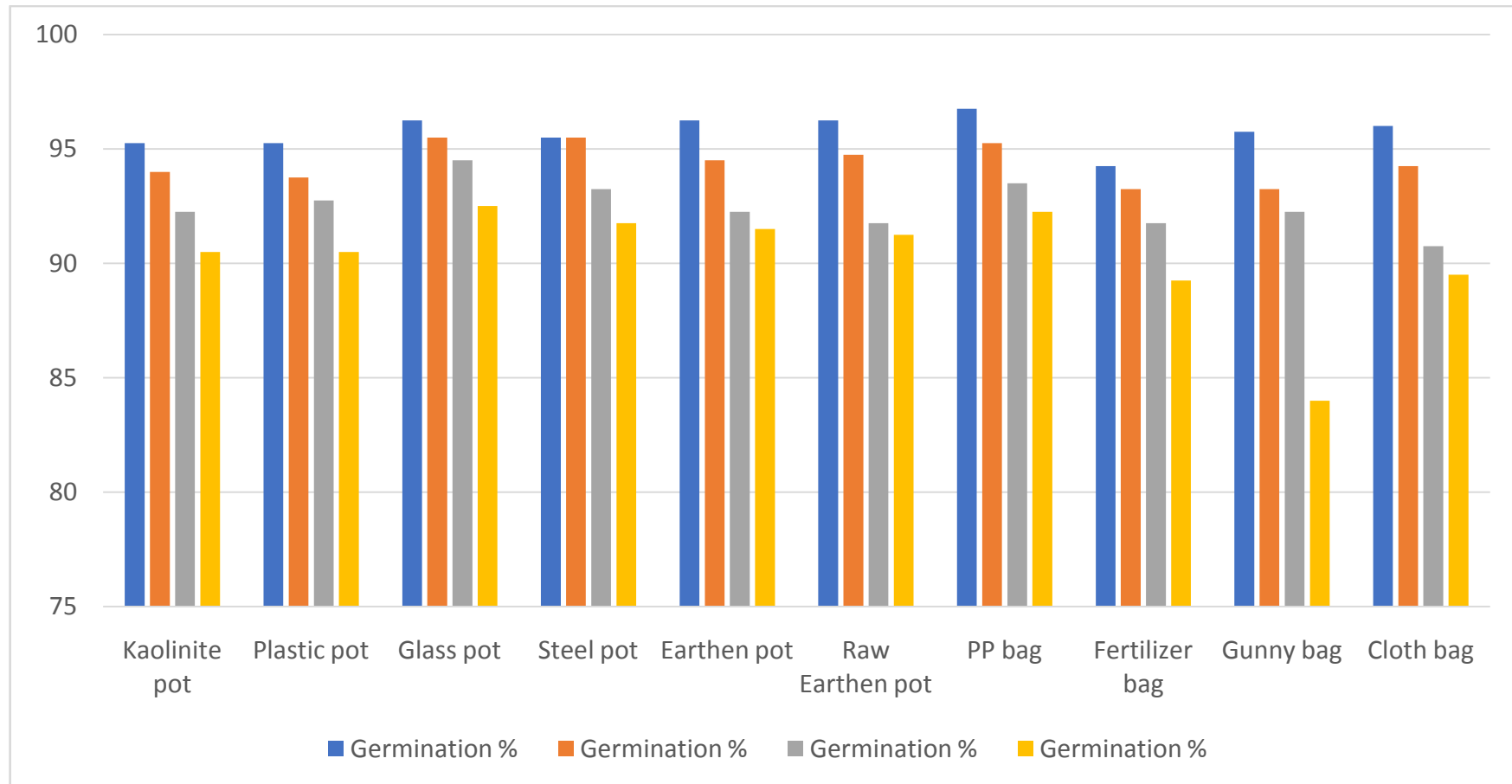


Fig. 2 Comparative amount of germination percentages on storage periods and storage containers

3.7 Comparison of incidence of mycoflora on storage periods

Data presented in Table 7 shows to increase the storage periods i.e., 30 DAS, 60 DAS, 90 DAS, and 120 DAS during the frequency of *Aspergillus flavus* (92.5, 102, 110.75, and 116), *A. niger* (91.25, 96.5, 101.20, and 115.50) *Rhizopus* sp. (71, 79.25, 88.50, and 86) and *Penicillium* sp. (21.75, 28, 10.95, and 24) were increased and *Alternaria* sp. (29.75, 32.75, 24.00, and 23.00) and *Fusarium* sp. (59.75, 58.75, 37.00, and 36.75) decreased with increase with periods of storage. *Trichoderma* sp. and *Macrophomina* sp. were suddenly reduced 30 and 90 days after storage respectively. *Aspergillus* sp. has dominated fungi in the stored condition of mungbean seeds and other fungi have slowly declined with prolonged storage periods of seeds. With the advance of the storage period, the storage fungi increased rapidly in their percentage of incidence.

Earlier reports were in agreement with the present findings (Christensen, 1970; Kaur *et al.*, 1990). The incidence of storage fungi (*Aspergillus* sp., *Penicillium* sp., *Rhizopus* sp. and *Chaetomium* sp.) was found to increase with the increase of storage time while the pathogenic fungi (*Bipolaris oryzae*, *Curvularia* sp., *Fusarium moniliforme*, *Microdochium oryzae* and *Alternaria* sp.) decreased with the increase of storage time. Christensen (1973), Srivastava and Gupta (1980) have reported an increase in the percentage of storage fungi followed by loss in the field fungi under storage. During isolation and characterization of filamentous fungi in different stages of harvest, fermentation, drying and storage of coffee beans, *Aspergillus* species found predominant during storage period (Silva *et al.* 2008).

Table 7 Comparison of incidence of mycoflora on storage periods

S. No.	Storage periods	Frequency % of							
		<i>Aspergillus niger</i>	<i>Aspergillus flavus</i>	<i>Alternariasp.</i>	<i>Macrophomina sp.</i>	<i>Rhizopus sp.</i>	<i>Fusariumsp.</i>	<i>Penicillium sp.</i>	<i>Trichoderma sp.</i>
1.	30 DAS	91.25	92.5	29.75	16.5	71.00	59.75	21.75	3.77
2.	60 DAS	96.50	102.00	32.75	14.5	79.25	58.75	28.00	-
3.	90 DAS	101.20	110.75	24.00	1.50	88.50	37.00	10.95	-
4.	120 DAS	115.50	116.00	23.00	-	86.00	36.75	24.00	-

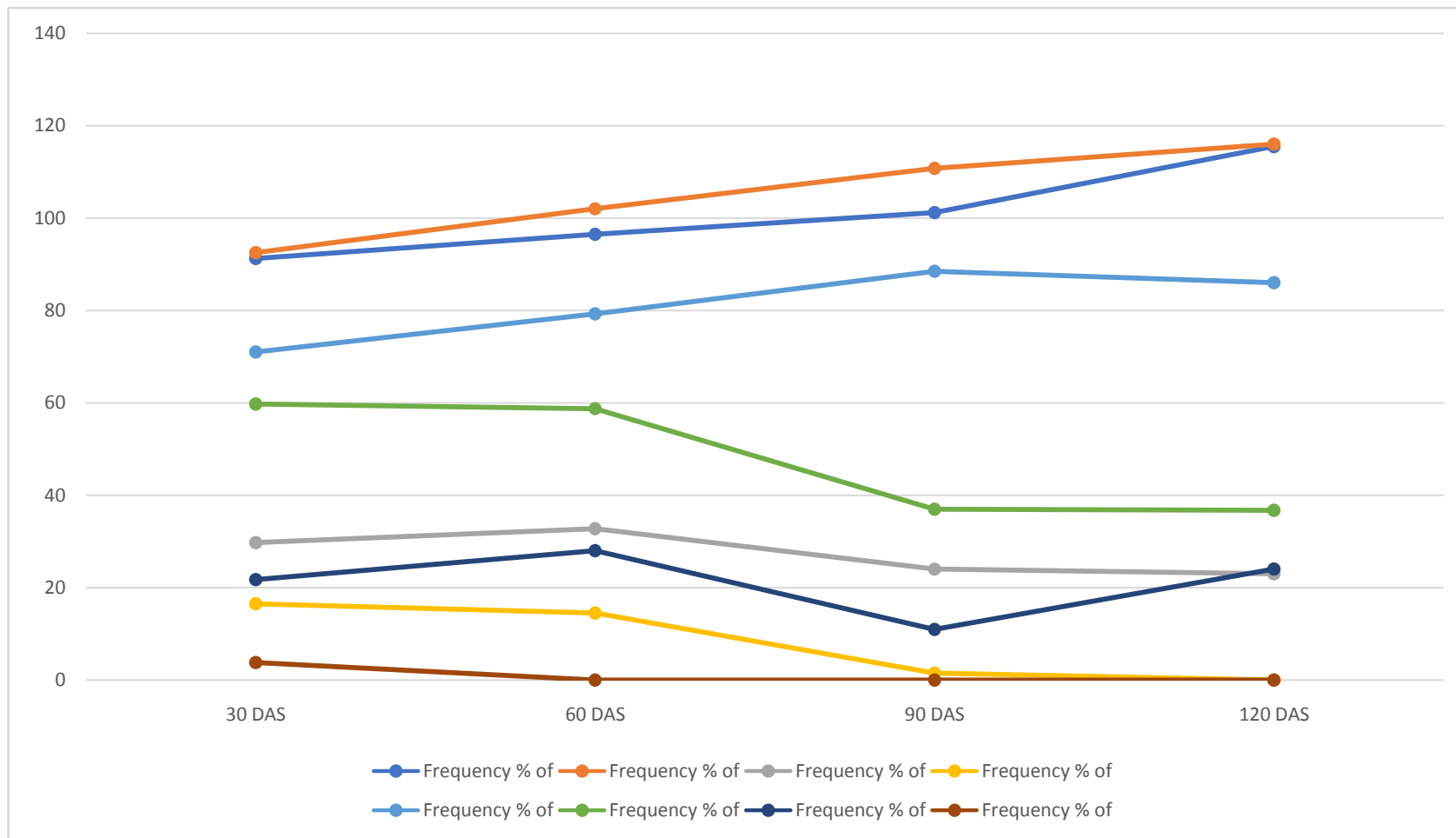


Fig. 3 Comparison of incidence of mycoflora on storage periods

3.8 Comparison of frequency of mycoflora on different storage containers

The experiment used ten various types of storage containers and different storage times to investigate the quality of seeds in terms of germination and the prevalence of seed-borne fungus (table 8). The findings imply that seed germination and seed-borne mycoflora infection are influenced by storage containers, seed moisture levels, and storage conditions. When seeds were stored in sealed containers such as Glass pots, Steel pots, Kaolinite pots, and PP bags, germination loss and seed-borne fungal infection were decreased. On the other hand, Seeds placed in a Gunny bag had a higher rate of fungal infection (44.48 %) and low germination. Airtight containers performed better in ambient conditions than purported containers, with Glass pot (34.25 percent) leading the way, followed by Steel pot (35.75 percent), Kaolinite pot (36.31 percent), PP bag (37.94 percent), and Plastic pot (39.13 percent). On the other hand, Gunny bag performed poorly in terms of germination percentage and seed-borne fungus when used as a supposed container under ambient conditions. During seed storage, this sort of container impacts moisture absorbance and degrades seed quality. Other authors have reported higher germination and lower fungus prevalence in sealed containers (Rahman *et al.*, 1999; Roknuzzaman *et al.*, 2008; Khalequzzaman *et al.*, 2012; Lambat *et al.*, 2015; Mollah *et al.*, 2016; Sultana *et al.*, 2016).

Table 8 Comparison of frequency of mycoflora on different storage containers

S. No.	Containers	Frequency of total mycoflora %				Mean
		30 DAS	60 DAS	90 DAS	120 DAS	
1.	Kaolinite pot	34.02	35.75	35.70	39.75	36.31
2.	Plastic pot	40.75	42.75	34.75	38.25	39.13
3.	Glass pot	32.50	34.75	34.50	35.25	34.25
4.	Steel pot	33.50	36.50	34.75	38.25	35.75
5.	Earthen pot	38.00	42.25	37.75	41.50	39.88
6.	Raw Earthen pot	41.75	43.75	37.45	40.00	40.74
7.	PP bag	38.25	41.50	33.50	38.50	37.94
8.	Fertilizer bag	42.25	44.25	40.50	41.25	42.06
9.	Gunny bag	43.50	45.50	43.00	45.50	44.38
10.	Cloth bag	41.75	44.75	42.00	43.00	42.88

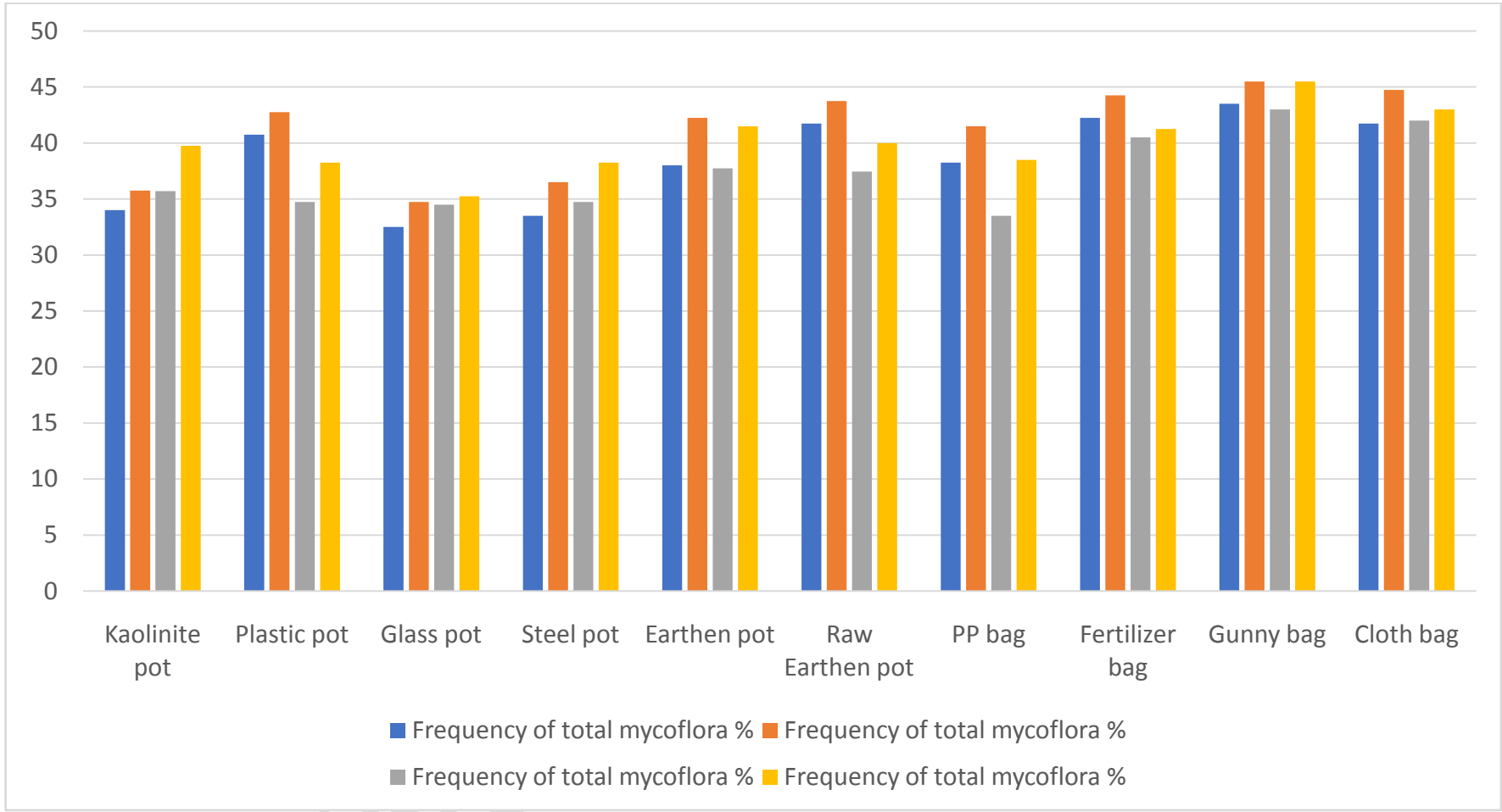


Fig. 4 Comparison of frequency of mycoflora on different storage containers

Conclusion

The effect of different containers over the storage period revealed that 1000 seed weight increases over time which resulted in decreased germination percentage with the simultaneous increase in association of storage mycoflora. The 1000 seed weight in Gunny bag increased over the storage period while the Glass pot resulted in less moisture gain. Thus, glass pots being air-tight is less amenable to storage of mycoflora.

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