International Journal of Plant & Soil Science

Volume 36, Issue 5, Page 412-424, 2024; Article no.IJPSS.114335
ISSN: 2320-7035

Analyzing the Mycoflora Associated with the Mungbean (*Vigna radiata* L.) Seeds under Various Storage Circumstances

Ajay Kumar Patel [a*], Monika Naik [a], Kiran Netam [a], Gote Sachin Shankar [a] and Aradhana Singh Paikra [a]

[a] Department of Plant Pathology, College of Agriculture, Raipur Indira Gandhi Krishi Vishwavidyalaya Raipur 492012, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJPSS/2024/v36i54538

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/114335

Original Research Article

Received: 18/01/2024
Accepted: 25/03/2024
Published: 29/03/2024

ABSTRACT

Mungbean (*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. The primary goal of this study is to determine the losses caused by seed storage and to select appropriate alternatives that will minimize those losses. To determine the optimal solution through this investigation, a variety of containers have been employed to preserve seeds against mycoflora. This study looked at the test weight of the seeds, their ability to germinate, and the fungus that was present. The major finding of this investigation under various storage conditions (using ten containers for storage) the percentage of 1000 seed weight was maximum in gunny bags (10.76%)

**Corresponding author: E-mail: ajaypatel4official@gmail.com;*

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 a 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 Mungbean productivity and yield quality is a poorly designed storage system [1]. 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. 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. To avoid these problems, by keeping the seeds in different containers, their quality has been checked at different storage times based on mycoflora present in them, test weight, Germination percentage, etc., so that it can be known that there is a suitable option for storing the seeds. Who is it? One of the factors affecting the viability and potency of seeds during storage is the fungus that survives in the seeds. Seed-borne mycoflora associated with mung beans reported recently include *Aspergillus sp, Alternaria* sp*, Curvularia* sp*, Fusarium* sp*, Macrophomina* sp*., Penicillium* sp*., Rhizopus* sp*,* and *Trichoderma* sp. In this way, through this research, we will be able to identify the harmful mycoflora and take precautions to prevent it and the seeds can be stored on time and can be used for a long time. These fungi reduce the germination percentage, viability and vigour of seeds. Because of seed-borne infections, there is a reduction in production and the inability to satisfy the requirements for mungbean seeds [2,3].

2. MATERIALS AND METHODS

2.1 Experimental Material

Mungbean seeds of the MH 421 variety, created by Chaudhary Charan Singh Haryana Agricultural University (CCSHAU) Hisar, were used in the study. MH-421 is a high-yielding mungbean cultivar that is also resistant to the mungbean yellow mosaic virus. AICRP on MULLaRP(All India Coordinated Research Project on Mungbean, Urdbean, Lentil, Lathyrus, Rajma & Pea), 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.* first factor is ten storage containers named Kaolinite pot, Plastic pot, Glass pot, Steel pot, Earthen pot, Raw Earthen pot, PP bag, Fertilizer bag, Gunny bag & Cloth bag and the second factor is four storage periods of 30 days, 60 days, 90 days &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 (Day After Storage), 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 bags has the highest percentage (10.76%) of weight and the lowest percentage (5.25%) in glass pot gained. The result obtained is in line with Khalequzzaman et al. [4] who proposed that within the duration of storage, the weight of the 1000-seed weight of french beans increases. Gunny bag acquired more moisture in 1000 seed weight throughout storage.

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 percentages 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%).

3.3 Germination Percentage and Mycoflora Incidence at 60 Days After Storage

Data presented in Table 3 shows that the 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 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

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

S. No.	Containers	Germination %	Frequency of mycoflora associated (%)/ Relative abundance (%)								Total Frequency %
			Aspergillus niger	*Aspergillus flavus*	*Alternaria* sp.	*Macrophomina* sp.	*Rhizopus* sp.	*Fusarium* sp.	*Penicillium* sp.	*Tricoderma* 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	

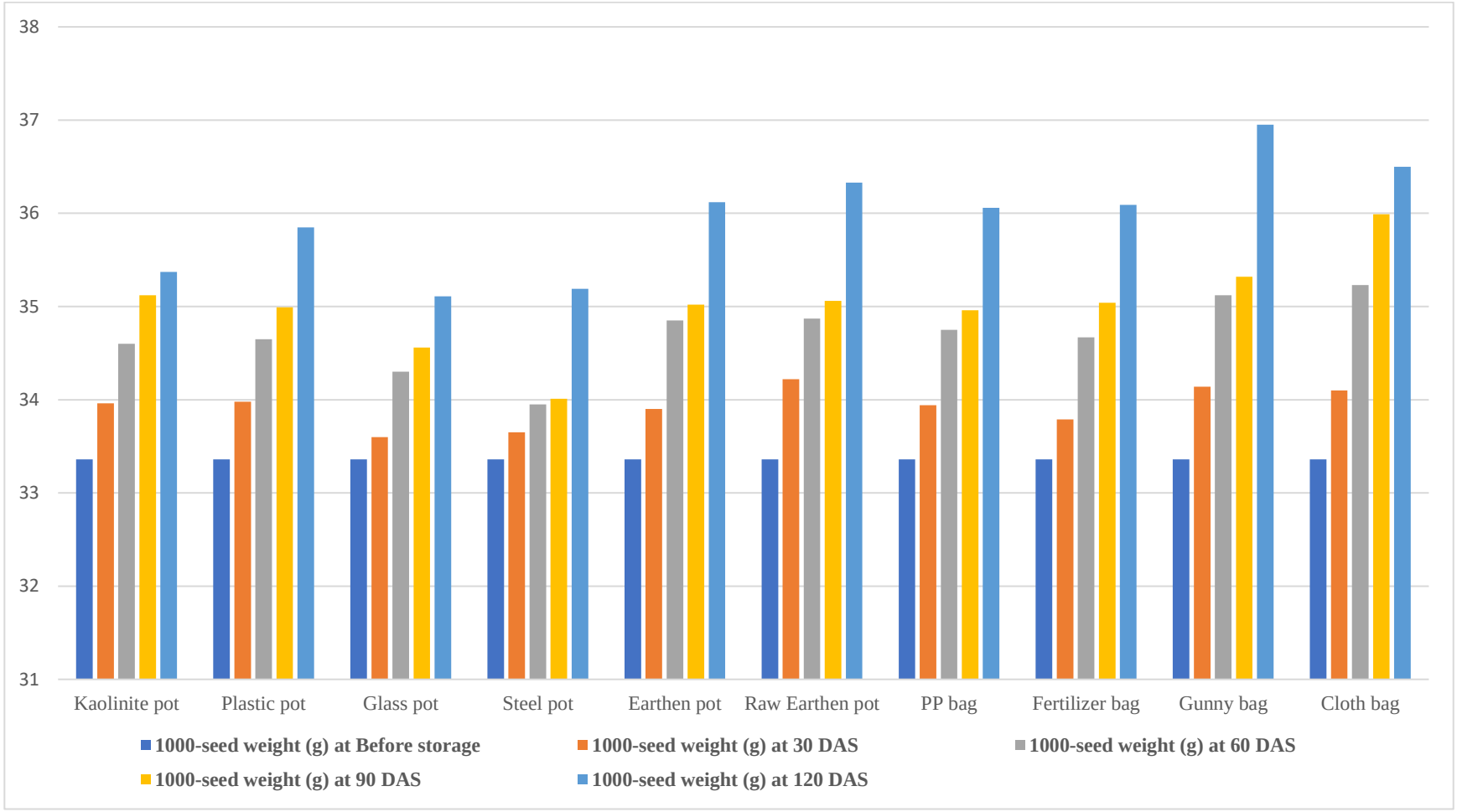

Fig. 1. Effect of containers and storage periods on the 1000-seed weight of mungbean

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

S. No.	Containers	Germination %	Frequency of mycoflora associated (%)/ Relative abundance (%)							Total Frequency %
			Aspergillus niger	*Aspergillus flavus*	*Alternaria* sp.	*Macrophomina* sp.	*Rhizopus* sp.	*Fusarium* sp.	*Penicillium* 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%). Various types of storage containers were found to harbor seed mycoflora. Among them, gunny bags (43.00%) had the highest frequency of mycoflora, followed by cloth bags (42.00%), fertilizer bags (40.50%), earthen pots (97.75%), and glass pots (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

As can be seen in Table 5, seed mycoflora was found on a variety of different containers. Gunny bags (45.50%) had the highest frequency of all associated mycoflora on the mungbean seed, followed by cloth bags (43.00%), earthen pots (41.50%), fertilizer bags (42.25%), and glass pots (35.25%). The PP bag (92.25%), steel pot (91.75%), earthen pots (91.75%), and raw earthen pots (91.25%) had the highest germination percentage, but the gunny bag (88.50%) had the lowest and fertilizer bag (89.25%) had the highest.

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%).

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 [5] the loss of seed quality due to lower germination percentages increased as the moisture content of the seed increased. Patel and Sonalki (2017) revealed that as seed storage times increased, the percentage of germination of the seeds decreased [6,7].

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

S. No.	Containers	Germination %	Frequency of mycoflora associated (%)/ Relative abundance (%)							Total Frequency %
			Aspergillus niger	*Aspergillus flavus*	*Alternaria* sp.	*Macrophomina* sp.	*Rhizopus* sp.	*Fusarium* sp.	*Penicillium* 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 (%)/ Relative abundance (%)						Total Frequency %
			Aspergillus niger	*Aspergillus flavus*	*Alternaria* sp.	*Rhizopus* sp.	*Fusarium* sp.	*Penicillium* 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	

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

3.7 Comparison of Incidence of Mycoflora on Storage Periods

The data in Table 7 indicates that longer storage periods 30, 60, 90, and 120 days are associated with higher frequencies 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). Conversely, Alternaria sp. (29.75, 32.75, 24.00, and 23.00) and Fusarium sp. (59.75, 58.75, 37.00, and 36.75) decreased as storage periods increased. There was an abrupt decrease in Macrophomina sp. and Trichoderma sp. 30 and 90 days after storage, respectively. When mungbean seeds are preserved, Aspergillus sp. predominates among the fungi, and other fungi gradually decrease when the seeds are stored for longer periods of time. The percentage of incidence of the storage fungus increased quickly as the storage duration went on [8].

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 in storage time while the pathogenic fungi (*Bipolaris oryzae, Curvularia* sp.*, Fusarium moniliforme, Microdochium oryzae and Alternaria* sp.) decreased with the increase in 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 the isolation and characterization of filamentous fungi in different stages of harvest, fermentation, drying and storage of coffee beans, *Aspergillus* species were found predominant during the storage period [9].

3.8 Comparison of Frequency of Mycoflora on different Storage Containers

The investigation examined the quality of seeds in terms of germination and the frequency of seed-borne fungus using 10 different kinds of storage containers and varied storage times (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., [10] Roknuzzaman et al., 2008; Khalequzzaman et al., 2012; Lambat et al., [11] Mollah et al., [12] Sultana et al., [13].

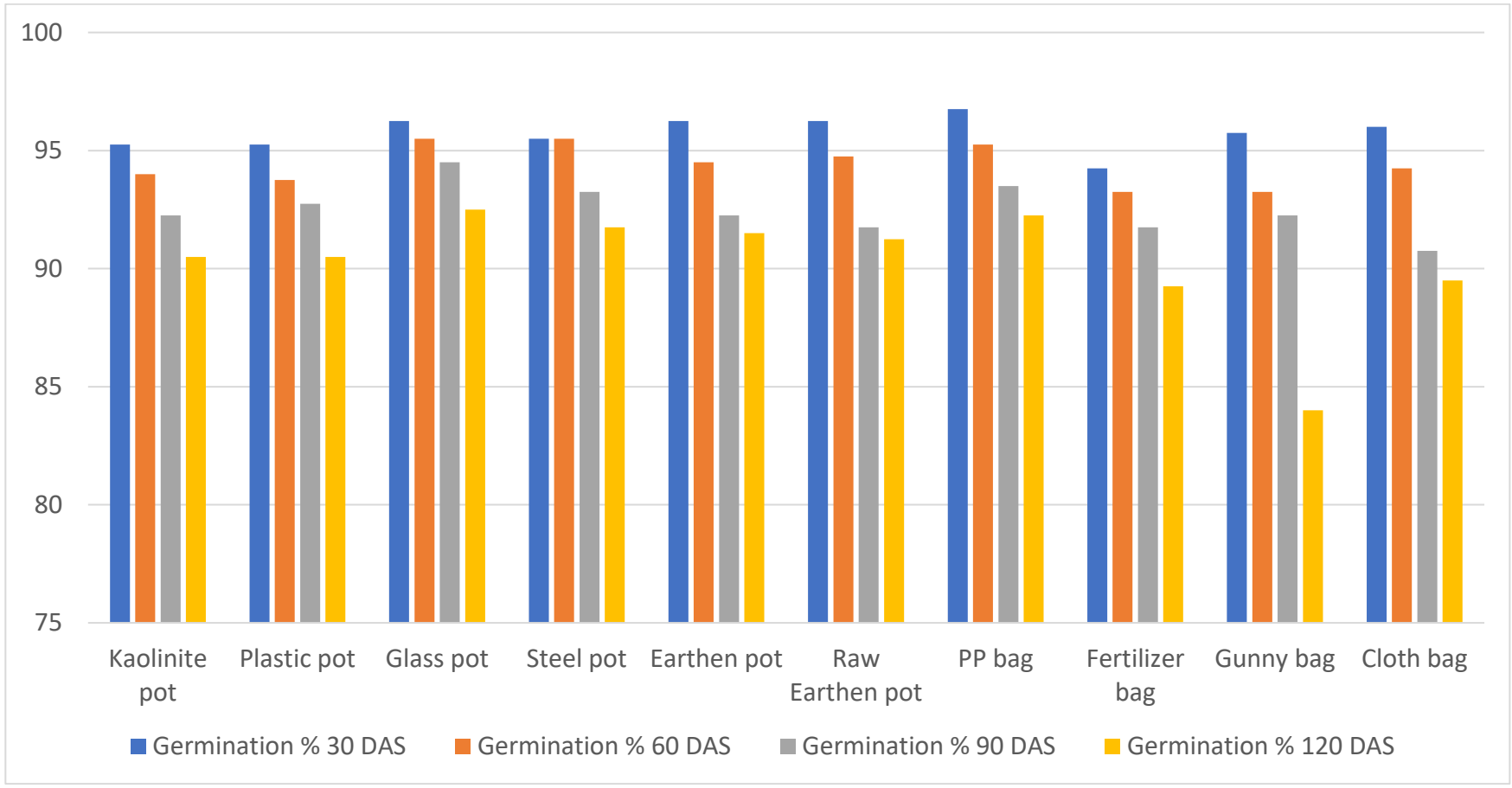

Fig. 2. Comparative amount of germination percentages on storage periods and storage containers

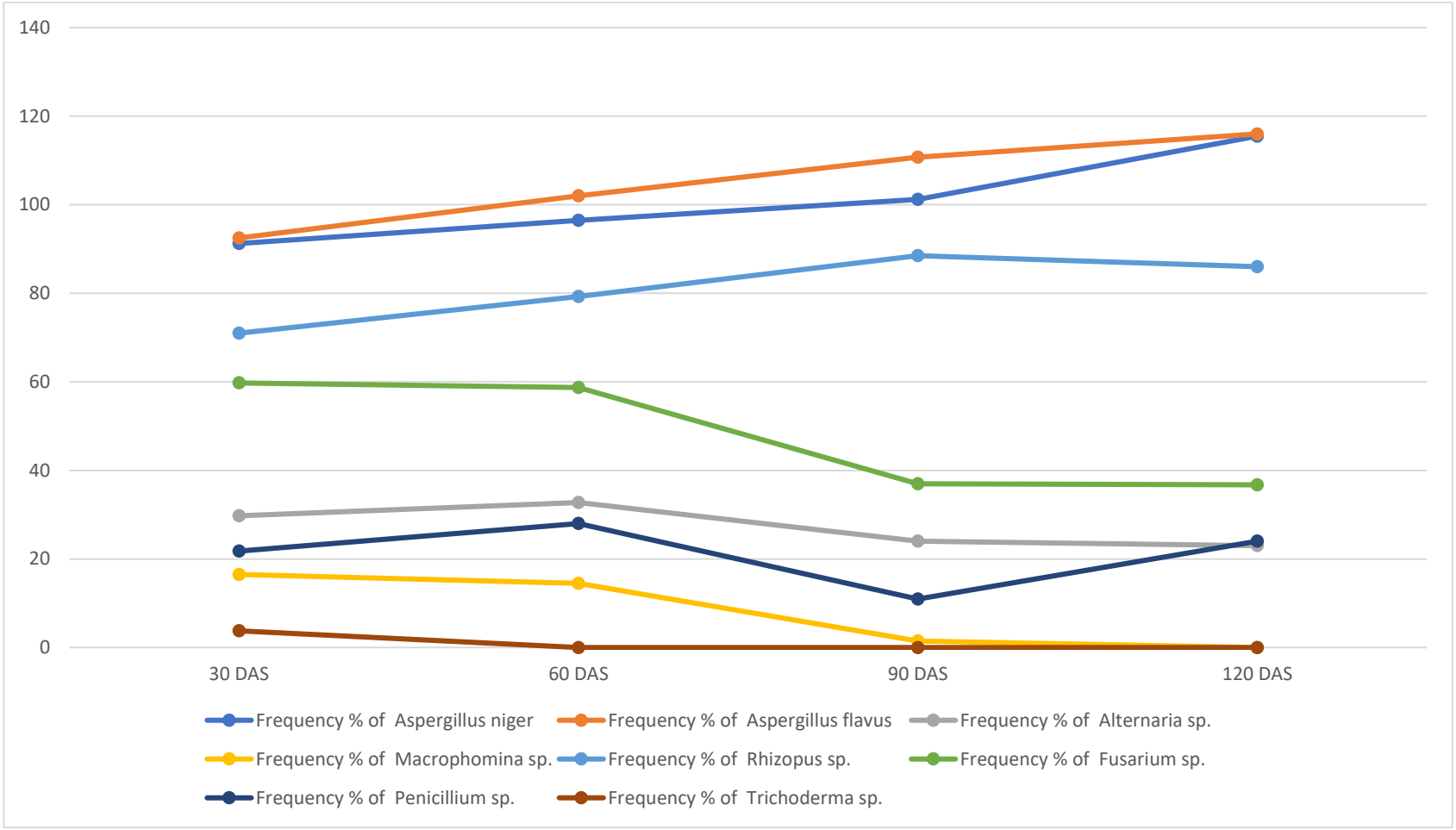

Fig. 3. Comparison of incidence of mycoflora on storage periods

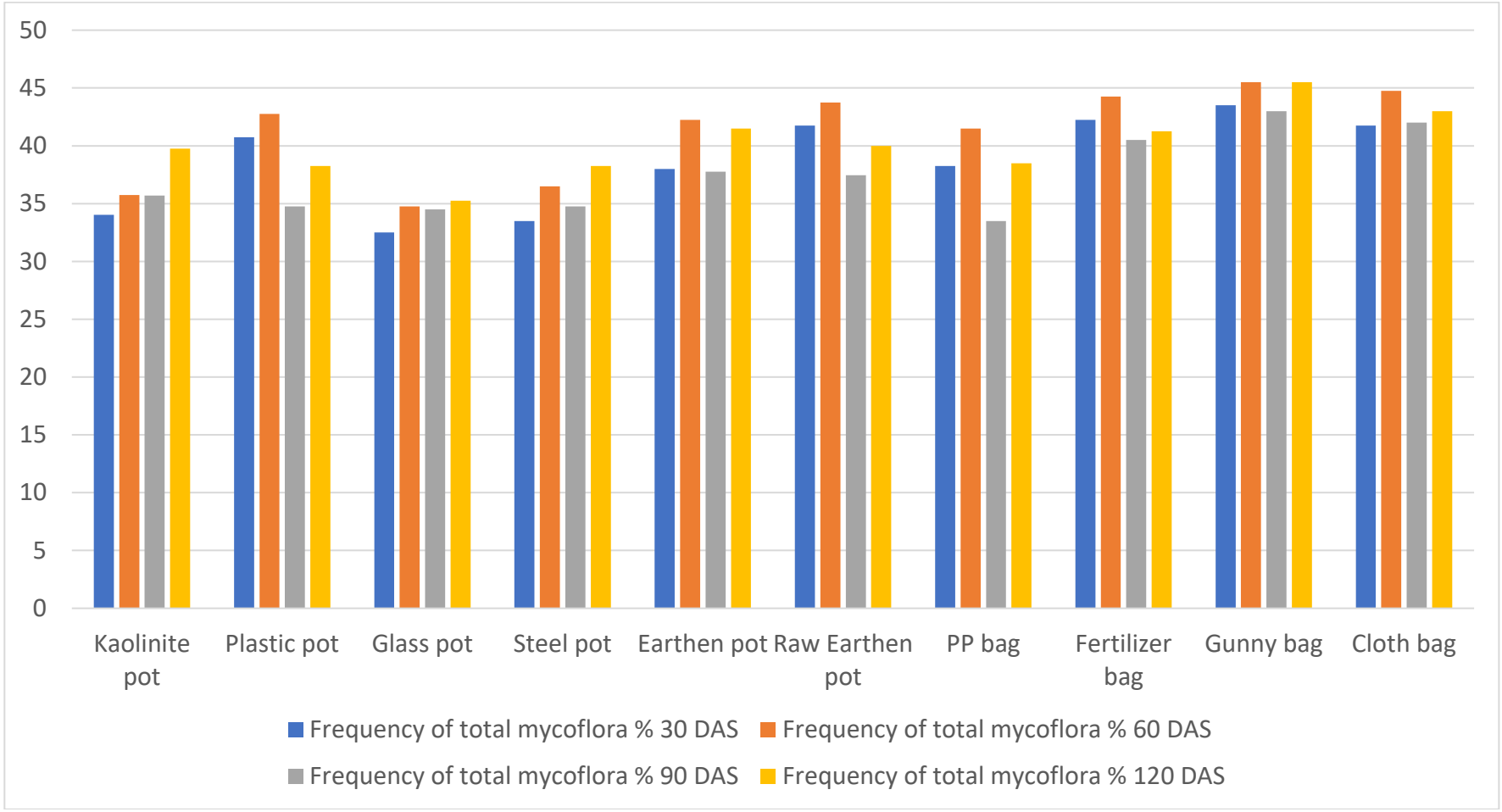

Fig. 4. Comparison of frequency of mycoflora on different storage containers

Table 7. Comparison of incidence of mycoflora on storage periods

S. No.	Storage periods	Frequency % of							
		Aspergillus niger	*Aspergillus flavus*	*Alternaria* sp.	*Macrophomina* sp.	*Rhizopus* sp.	*Fusarium* sp.	*Penicillium* sp.	*Trichoderma* sp.
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	-

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

4. 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.

ACKNOWLEDGEMENT

I thank my principal advisor Dr. G. K. Awadhiya and Department of Plant Pathology, CoA IGKVV, Raipur (C.G.) for their guidance and help in my research work.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Mutungi CM, H. Affognon, AW. Njoroge D. Baributsa LL. Murdock. Storage of mung bean (Vigna radiata [L.] Wilczek) and pigeonpea grains (*Cajanus cajan* [L.] Millsp) in hermetic triple-layer bags stops losses caused by Callosobruchus maculatus (F.)(Coleoptera: Bruchidae). Journal of Stored Products Research. 2014;58:39-47.
2. ISTA. Seed health testing. International rules for seed testing. Seed Sci. and Technol. 1976;4: 31-34.
3. ISTA. International Rules for Seed Testing. International Seed Testing Association, Switzerland; 2006.
4. Khalequzzaman KM, MM. Rashid, MA. Hasan, MMA. Reza. Effect of storage containers and storage periods on the seed quality of French bean (Phaseolus vulgaris). 2012;195-205.
5. Agarwal VK. Techniques for the detection of seed borne fungi. Seed Research. 2007;4:24-31.

6. ISTA. Rules; International rules for seed testing. Seed Sci. and Technol. 1985; 13:307-502.
7. ISTA. Rules; International Seed Testing Association, Bassersdorf, Switzerland; 1999.
8. ICRISAT. A pictorial guide to the identification of seed borne fungi of sorghum, pearl millet, chickpea, pigeonpea and groundnut. International crops research institute for the semi-arid tropics. Info Bulletin. 1978;34.
9. Silva, Cristina Ferreira, Luis Roberto Batista, and Rosane Freitas Schwan. Incidence and distribution of filamentous fungi during fermentation, drying and storage of coffee (*Coffea arabica* L.) beans. Brazilian Journal of Microbiology. 2008;39:521-526.
10. Rahman, Shamsur, Suchada Vearasilp, and Sombat Srichuwong. Detection of seed borne fungi in mungbean and blackgram seeds. Sustainable technology development in crop production. 1999; 1-3.
11. Lambat A, P. Lambat R. Gadewar S. Charjan PN. Charde. Effect of storage containers on mycoflora and germinability of til. International Journal Research in Bioscience Agriculture Technology. 2015;2(3):10-12.
12. Mollah MRA, MA. Ali, MZH. Prodhan MM. Rahman MJ. Alam. Effect of containers on storability of true seeds of onion. European Journal of Biomedical and Pharmaceutical Sciences. 2016;3 (1):1-4.
13. Razia Sultana, Razia Sultana, M. Salahuddin M. Chowdhury, Md Rafiqul Islam, and Khadija Akhter Khadija Akhter. Effects of container and duration of storage on the quality of okra (Abelmoschus esculentus) seeds. 2016;63-72.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/114335