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EFFECT OF STORAGE CONTAINERS ON STORABILITY IN ONION SEEDS

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Abstract: An experiment was conducted on the seedling performance of onion seeds stored in different containers. Seeds of three onion varieties viz. Taherpuri, Kalashnagari and Faridpuri Bhati were used. It was found that the variety Kalashnagari was best among the three varieties in respect of germination percentage (49.33%) and length of the seedlings (5.428 cm). Moderately less number of abnormal seedlings (3.03) and least fungus infection (3.63) were also found in the seedlings of Kalashnagari. Tin container showed best performance in storing of onion seeds by keeping more viability of seeds, comparatively less infection by fungus (3.51) and showing less number of abnormal seedlings (2.81). Seeds stored in cloth bags also raised less number of abnormal seedlings (2.47). The maximum length of the seedlings (5.01) was found in case of the seeds stored in polythene bag. From this work it can be concluded that the variety Kalashnagari and tin container may be used for storage of onion seeds.

Key words: Storability; storage containers; onion seeds

Introduction

In Bangladesh, the onion seed production problem is an extremely serious one. The problem is increasing as time goes on due to the high price of the mother bulbs of the previous year which are used as planting materials, coupled with the restricted areas used for seed production and the climatic limitations, especially the onset of early rains in February-March which cause severe damage to the seed crop. Organized attempts have never been made to improve the method of seed production on to improve the quality of seed. Hossain *et al.* (1994) compared five Bangladeshi cultivars of onion for seed production and found that cultivar Taherpuri give the highest yield (0.35 t/ha) followed by Kalashnagari (0.25 t/ha), shalta (0.15 t/ha), Zhitka (0.11 t/ha) and Faridpuri Bhati (0.08 t/ha).

The production of onion in Bangladesh depends largely on the seed supply situation in the country. The seed available in the market is often very poor in quality in respect of germination, vigor and varietal purity. In addition, sometimes a scarcity of seed severely decreases the production of onion. Scarcity arises mainly due to elemental limitations, which present a major problem for seed production in Bangladesh. The exact situation of the production and supply of onion seed in Bangladesh is not well known to either researcher or to the people involved in the agricultural field services.

The seed growers of our country do not follow any standard method regarding storage of the onion seeds. Generally the seed growers wash them in water and then dry again in the sun for a few days. The seeds are then stored in a "earthen container" of about 30kg capacity. Conditioning of the container involves complete evaporation of about 2 liters of milk inside the container and then polishing the inner wall of the container with butter oil. Some growers' dislike drying the seed thoroughly before storage, because this process reduces the seed weight and the opening of the container is not sealed properly it is just closed with cloth packing (Rahim 1991). Considering the present status of onion seed production and storage in Bangladesh an experiment was conducted to identify the suitable storage container(s) for storing of onion seeds and to observe the performance of onion seeds stored in different containers.

Materials and Methods

The experiment was conducted during seventh February 2000 to seventh July 2000, at Horticultural Laboratory, Agrotechnology Discipline, Khulna University, Khulna, Bangladesh. In this experiment, seeds of three onion varieties viz. Faridpuri Bhati, Kalashnagari and Taherpuri were used as plant material. The varieties are indigenous and popular. The seeds were pure and harvested from last year grown crop.

Seven types of storage containers (Cloth bag, Polylined cloth bag, Gunny bag, Polylined gunny bag, Plastic container, Tin container, and Polyethylene bag) were used in this experiment. The plant materials or onion seeds were collected with the help of BADC seed-sells centre, in packed form. The containers were locally collected and widely used. The seeds were stored in room. Normal room temperature and normal pressure was in the storage. There was no artificial controlled condition in the storage.

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In seven storage containers the seeds of three onion varieties were packed. They were placed in three replications to minimize errors and to get an accurate observation. The packed seeds were stored in normal room temperature

The experiment was laid out in Completely Randomized Design (CRD). The treatments in this experiment was as follows-

T_0 = Here seeds were in packed form as collected
T_1 = Cloth Bag,
T_2 = Polylined cloth bag
T_3 = Gunny bag
T_4 = Polylined gunny bag
T_5 = Plastic container
T_6 = Tin container
T_7 = Polyethylene bag.

To observe the performance of the stored seeds, only 25 seeds from each storage containers were taken in petridishes using blotting paper as substrate. Usually after 3-4 days of setting up the experiment germination started and germination of most of the seeds completed within 3-4 days. At the tenth day of setting up the experiment, length of seedlings and other visual performances were noted down. The experiment repeated every 1-month interval and continued up to a satisfactory result.

Total germinated seeds of 25 seeds placed in the petridish were counted and the percent of germination was found by the following formula—

$$\text{Percent Germination} = \frac{\text{No. of germinated seeds}}{\text{Total no. of seeds}} \times 100$$

The seedlings were selected randomly from each petridish. The length (root + shoot) of a seedling was recorded and three samples from every petridish were taken for this purpose.

Observing the fungal bodies on the seeds placed in the petridishes were counted and some seedlings failed to germinate because of fungus attack were also counted. From these two views total fungus affected seedlings were recorded out of 25 seeds in each petridish.

The result obtained from the study was statistically analyzed by 'F' variance test and the significance of differences between pairs of means was evaluated by Duncan Multiple Range Test (DMRT) (Gomeg and Gomeg, 1984).

Results and Discussion

The results obtained from the experiment have been presented in table 1and table 2 and discussed as follows.

Table 1. Effect of different varieties on seedling performance of stored seeds

Variety	Germination percentage	Length of the seedlings (cm)	Percentage of fungus affected seedlings	Percentage of abnormal seedlings
Faridpuri Bhati	42.83	4.35	17.48	13.60
Taherpuri	38.52	4.60	14.80	10.60
Kalashnagari	49.23	5.43	14.52	12.12
Level of significance	0.01	0.01	NS	0.05

NS= Non Significant

From the results of the present experiment it was found that germination percentage varied significantly among the three varieties of onion seeds (Table 1). The highest percentage of germination of onion seeds recorded in the variety Kalashnagari (49.23%) and the lowest percentage of germination (38.53%) was found in Taherpuri. Extensive studies have been made in many countries to determine the keeping quality of various cultivars. Magruker and Allard (1941) made a study on the storability of important onion cultivars of United States. They found that regardless of the storage conditions, the various cultivars showed marked difference in keeping quality. They classified the onion cultivars into five storage groups, viz. Very poor, poor, fair, good and very well. From the study it was found that there was significant differences among the storage containers regarding germination percentage (Table 2). Germination percentage was the highest (43.82%) in tin containers (T_6). The cloth Bag (T_1) showed the lowest percentage of germination (33.49%). Das *et al.* (1998) reported that the seeds of *P. vulgaris* stored in plastic containers, polyethylene bags or cloth bags at room temperature or in cold storage for up to 8 months. Cold-stored seeds maintained a significantly

higher germination percentage and better seed vigour than those stored at room temperature. With the increase in the duration of storage, the reduction in seed germination, percentage seedling survival and seed vigor were greater under ambient conditions than in cold storage. Irrespective of the storage conditions, seeds kept in airtight plastic containers or polyethylene bags gave better results than those stored in cloth bags.

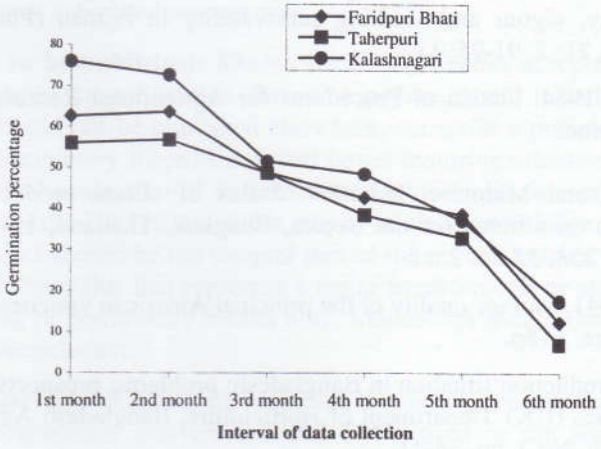

Fig. 1. Decreasing trend of germination per cent with the increase of storage time in onion seeds

Table 2: Effect of different containers on seedling performance of stored seeds

Seed containers	Germination %	Length of the seedlings (cm)	Percentage of fungus affected seedlings	Percentage of abnormal seedlings
T_0	27.51	4.01	13.76	14.24
T_1	33.49	3.95	15.64	9.88
T_2	40.71	4.56	16.80	12.56
T_3	36.99	3.84	15.92	11.12
T_4	43.38	4.27	14.24	13.68
T_5	42.22	4.80	18.12	11.44
T_6	43.82	4.96	14.04	11.24
T_7	42.76	5.02	16.36	12.88
Level of significance	0.01	0.01	NS	NS

NS = Non Significant T_0 = Here seeds were in packed form as collected, T_1 = Cloth Bag, T_2 = Polylined cloth bag, T_3 = Gunny bag, T_4 = Polylined gunny bag, T_5 = Plastic container, T_6 = Tin container, T_7 = Polythene bag.

From the study it was found that the percentage of germination decreased as the storage life of the seeds increased (Fig. 1). The trend of reduction in percentage germination was rapid in Taherpuri than the others. The findings of Yoo (1996) support the finding of the present study. He made a study on germination characteristics and fatty acid composition in storage period of onion seeds. They reported that percentage germination decreased with increased storage period. Days to 50% of final germination decreased with increasing storage period.

The results of the study showed significant relationship among the varieties regarding length of the seedlings. Kalashnagari showed the best result (5.43 cm) than Faridpuri Bhati and Taherpuri. The length of the seedlings of Faridpuri Bhati (4.35cm) and Taherpuri (4.6 cm) was found almost same (Table 1).

There was significant relationship among the varieties in producing abnormal seedlings. Faridpuri Bhati showed highest number of abnormal seedlings (Table.1). Taherpuri performed better in respect of producing lower number of abnormal seedlings during the study period. Kalashnagari showed the moderate number of abnormal seedlings. The result from the Table 2 shows non-significant relationship among the containers in respect of producing abnormal seedlings. Highest number of abnormal seedlings (3.56) was found in the collected seeds stored in polyethylene bags. Most of the seedlings showed vigorous growth in case of the seeds stored in cloth bags (T_1) as there the number of abnormal seedlings was lowest.

Summary and Conclusion

Storability performance was observed considering the parameters as percentage germination, length of the seedlings, percentage of fungus-infected seedlings and percentage of abnormal seedlings. It was found that

the variety Kalashnagari was the best among the three varieties in respect of considered parameters. It was evident that the seeds stored in tin containers (T_6) showed the best performance in storing onion seeds for around six months by keeping highest viability of seed, comparatively less infection by fungus and less percentage of abnormal seedlings.

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