Indian J. Pl. Genet. Resources 10(1): 163-166, 1997

Short communication

INFLUENCE OF TEMPERATURES AND CONTAINERS ON THE STORAGE OF CHILLI SEEDS

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Key words : Temperature, containers, storage, chilli, seeds

Chilli (*Capsicum annuum* L) is an important commercial vegetable crop cultivated for tender green and red ripe fruits all over India. Being a native of South America, the species is well adapted to Indian climate conditions and exhibits a greater variation for several economical plant characters. The variation is of great importance for evolving suitable genotypes having high productivity, good fruit quality and resistance to several biotic and abiotic stresses. Of late large scale commercialization of farming resulted in replacement of old cultivars with high yielding ones and improper storage conditions poses a serious threat to gene pool. In order to arrest the process of genetic erosion, seeds are to be preserved in suitable conditions. A limited information is available in this crop. Seeds are popular media for the germplasm conservation. Several internal and external factors contribute to seed deterioration. High temperature and moisture during storage enhance the process of deterioration (Bass, 1980). Further, yield is affected by growing plants from older seeds (Frohlich and Henkel, 1964). The present experiment was conducted with the view to study storability behaviour in chilli seeds and suggests suitable remedy for longer retention of high viability and vigour.

Seeds of chilli cv Arka Lohit were extracted from red ripe fruits and dried in shade. Seed moisture content, estimated by oven method, was found to be 7.5 per cent. Seeds were packed in kraft paper, glass, polyethylene bags (250 gauge) and laminated aluminium foil pouches and stored for 5 years at ambient (16-35°C), low (5°C) and sub-zero (–20°C) temperatures. Seed viability and vigour were assessed in stored seeds at regular intervals. Seed viability was expressed in terms of percentage of germination. One hundred seeds in each replication in 3 replication were germinated on top of paper method at an alternate temperature of 20-30°C for 16 and 8 hours respectively in seed germinator. Seedlings were evaluated as per the standard ISTA procedure (Anon., 1985). Seedling vigour was compared by means of coefficient of

germination, root length, shoot length, dry weight and vigour indices. Shoot and root length were recorded on 8 days old seedlings. Seedlings were dried in oven at 60°C for 48 hours and dry weight was recorded. Mathematically seed vigour was calculated by using germination speed and expressed as sum of days taken for germination. Vigour indices I and II were calculated by multiplying percentage of germination with seedling length and dry weight respectively.

Seed viability and storability were significantly affected by the storage temperatures and packaging materials (Table 1). Seeds were short lived for 3 years under ambient temperatures and the highest percentage of germination was recorded in seeds stored in paper bags followed by polyethylene bags. It appears that seed moisture of 7.5% is not congenial especially for sealed storage as evidenced by significant reduction of germination in glass and laminated aluminium foil pouches stored seeds. None of the seed from all containers were germinable during 4th year of storage.

Table 1. Seed germination during storage of chilli seeds

Storage Temp (°C)	Storage Containers	Storage period (years)				
		1	2	3	4	5
Ambient	K paper	91	83	78	0	0
	Glass	85	37	29	0	0
	Polyethylene	91	82	58	0	0
	Al foil	87	31	4	0	0
5	K paper	96	91	91	94	85
	Glass	97	95	94	91	92
	Polyethylene	94	93	95	93	93
	Al foil	93	97	95	97	92
–20	K paper	16	9	0	0	0
	Glass	93	95	95	91	90
	Polyethylene	93	96	97	93	93
	Al foil	93	97	95	97	97
C D at 5%	8.6					

Seed viability was preserved for 5 years at low and sub-zero temperatures. At 5°C, the initial germination was retained for 5 years in all the containers except paper bags. Likewise, seed viability is lost rapidly when stored in paper bags at –20°C after 1 year of storage. Polyethylene and aluminium foil laminated pouches are effective in retaining the initial viability for 5 years

even at given moisture level. The percentage of germination was 97 in seeds stored in aluminium foil laminated pouches, 93 in polyethylene bags and 90 in glass containers at –20°C after 5 years of storage.

The seedling growth was slightly affected by the storage containers and temperatures. However, shoot and root length were higher for seeds stored in aluminium foil laminated pouches (Table 2). There was no significant difference observed for dry weight amongst the packaging material used.

Table 2. Seedling characters as influenced by temperatures and packaging during 5 th year of storage

Storage Temp.°C	Storage Containers	Coeff. of germination	Shoot length (cm)	Root length (cm)	Dry wt (mg)
5	K paper	15.2	2.2	5.3	2.8
	Glass	15.8	2.4	5.0	2.8
	Polyethylene	15.5	2.1	4.9	2.5
	Al foil	15.4	2.8	6.4	2.8
–20	K paper	-	-	-	-
	Glass	15.5	2.4	4.8	2.6
	Polyethylene	17.4	2.5	4.5	2.8
	Al foil	16.4	2.2	5.1	3.0
C D at 5%		0.99	NS	0.86	NS

Table 3. Influence of temperature and packaging on seedling vigour during 5 th year of storage

Storage Temp.°C	Storage Containers	Vigour	Vigour index-I	Vigour index-II
5	K paper	13.1	635	233
	Glass	14.8	684	258
	Polyethylene	14.7	653	236
	Al foil	14.5	840	255
–20	K paper	-	-	-
	Glass	13.4	650	238
	Polyethylene	16.6	653	258
	Al foil	16.3	706	294
C D at 5%		0.81	117	35

Seed vigour was successfully retained for 5 years at low temperature storage (Table 3). It was relatively higher for seeds stored in aluminium foil pouches both at 5°C and –20°C storage.

Chilli seeds appear to be poor storer under ambient conditions as observed by drastic reduction of viability during second years of ambient storage. it was particularly higher in sealed storage than unsealed storage. This might be due to moisture content in seeds. This was affected only at ambient temperature and not at 5°C or –20°C. Prevalence of high temperature in presence of high seed moisture enhances the process of deterioration resulting in low percentage of germination and vigour (Harrington, 1973). High seed moisture is more harmful when stored in small enclosure than larger ones as the exchange of moisture vapour is restricted (James, 1967). The loss of viability was slower at cooler temperatures (Harrington, 1972). In low temperature storage the period of seed longevity varied depending upon the containers used for storage. The percentage of germination was higher for seeds stored in aluminium foil laminated pouches followed by polyethylene bags. However, seeds stored in paper bags at –20°C fails to maintain the viability owing to freezing injury resulting death of seeds. Thus paper containers are not suitable for seed storage at sub-zero temperature. The choice of packaging material depends on storage conditions (Popovska *et al.* 1981). Polythylene bags are effective, readily available and inexpensive packaging for seed storage at 5°C. While aluminium foil laminated pouches are suitable for preserving valuable seeds at –20°C for longer period. Chilli seeds are poor storer and need special packaging and low temperature for retaining high viability and vigour for longer period, which could be utilized for conservation of germplasm.

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