

## **Storage studies of chilli (*Capsicum annuum* L) cultivars on germination and vigour index**

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### **Abstract**

The experiment was conducted at the Chillies Improvement Project, Regional Agricultural Research Station, Lam, Guntur and in the Priyanka Cold Store, Chilakaluripet Road, Guntur during the year 2001-2002. The fresh ripe chilli cultivars viz: LCA 334, LCA 357, LCA 206, LCA 235, Paprika type, Guntur Grand and Wonder Hot were collected and Sun dried both moisture lend of 10-11 per cent. Then the dried chilli was packed in gunny bags in two sets. One set was kept in cold store and the other set at ambient condition. Samples were drawn at monthly intervals and subjected to seed germination and seedling vigour index. The seeds of cultivars LCA 235, LCA 206, LCA 334 and LCA 357 recorded higher germination percentage and vigour index at different intervals of storage. The chilli stored in cold store proved superior to ambient storage even for good quality seed.

**Key words:** *Capsicum annuum*, chilli, oleoresin, capsanthin, capsaicin, cold store, ambient condition, germination, vigour index

**Abbreviations:** LCA=Lam *Capsicum annuum*

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### **Introduction**

Normally chilli seeds are viable for shorter periods under ambient conditions (Doijode, 1990). Seed viability and storability are dependent on moisture content and/or relative humidity and temperature (Bass, 1980). High seed moisture at higher temperature storage hastened the process of seed deterioration resulting in the loss of seed viability (Villareal *et al.*, 1972). Similarly the plants raised from older seeds may also affect the yield (Frohlich and Hankel, 1964). Therefore, there is a need for producing and conserving larger quantities of seeds with good vigour and viability by developing simple, practicable and inexpensive technique. With this in view, a study was

conducted on the response of the seed germination and vigour index on the stored chilli cultivars.

### **Material and methods**

The ripe chilli of LCA 235, LCA 206, LCA 334, LCA 357 were collected from Chillies Improvement Project, Lam and hybrids viz: Guntur Grand, Wonder Hot and Paprika variety were collected from progressive farmer of Ponnekallu village of Guntur district and the experiment was conducted at RARS, Lam and Priyanka cold store.

Ten kilograms of ripe chilli of LCA334, LCA357, LCA 206, LCA 235, Guntur Grand, Wonder hot and Paprika were collected and sun dried till the moisture is below eleven

per cent. Then the entire material was divided into two sets, one set of 7 samples were packed separately in gunny bag and kept in the cold store and the other set was also packed similarly in gunny bags and kept under room temperature.

The experiment was conducted in a random block design with factorial concept and replicated thrice. The experiment consists of two factors. The first factor consist of storage conditions viz; Ambient condition (S1) and Cold store (S2) and the second factor consists of Varieties/ Hybrids viz; LCA 334 , LCA 357, LCA 206, LCA 235, Paprika type, Guntur Grand and Wonder Hot

Three samples were drawn separately from each lot at monthly intervals both from the chilli stored in cold store as well as from those stored at ambient condition for a period of 9 months. Each sample represents one replication. After drawing the samples at monthly intervals, the germinability viz., germination percentage and seedling vigour index were calculated. Germination was studied as per recommended methods (ISTA, 1993). Germination count was taken on 13th day after sowing. Three replications of 100 seeds each were used for each treatment. It was expressed in percentage. Vigour index was computed by adding seedling shoot length and root length in centimeters and multiplied by percentage germination as suggested by Abdulbaki and Anderson (1973).

Vigour Index: (seedling shoot+ root length in cm) X germination percentage.

The experimental data were analysed statistically by the method of analysis of variance as outlined by Panse and Sukatme (1978). Statistical significance was tested by F value at 5 per cent level of significance. Critical differences at 5 per cent were worked out, where F test was found significant

## Results and discussion

### Germination

Among the cultivars, LCA 206 showed the

highest germination percentage of 97.3. It was followed by the cultivars LCA 334, LCA 357 and LCA 235 which recorded a germination percentage of 95 and the cultivar Guntur Grand recorded 92 per cent germination. Contrarily, a moderate germination of 73.3 per cent was recorded by cultivar Wonder Hot and the lowest germination of 56 per cent by cultivar Paprika type. This indicates that there is genetic variability among the cultivars and among them, the cultivars LCA 206, LCA 334, LCA 357 and LCA 235 are considered to be potential cultivars with high seed viability in the initial stages before placing in storage. The germination percentage was found to be gradually declining during storage. The data in Table 1 revealed that the LCA 235 recorded a minimum loss of germination percentage of 14.7 after 9 months of storage. while that of the cultivar that has recorded a maximum germination percentage of 97.30 per cent in the initial stage (i.e., LCA 206) showed a loss of 20.9 per cent in germination. It indicated that not only the seed viability potential in initial stages but the storage condition is also influencing the loss in viability of the seed. It is further confirmed from the data that the Guntur Grand which recorded 92 percentage has shown a loss of 48.4 per cent germination .However, considering the minimum loss of germination percentage, LCA 235 followed by LCA 357 and LCA 206 are the best among the cultivars employed in the study. Similar results of genetic variability for seed germination were reported by James *et al.* (1967), Bass (1973) and Doijode (1988).

Between the storage conditions, the chilli kept in cold store recorded a significantly superior percentage of germination at all stages of storage (Table 1). The seed obtained from the chilli stored in cold store showed a decline of only 11.39 per cent after 9 months of storage, whereas the seed obtained from chilli that was kept at ambient temperature had lost the germination by 36.81 per cent. These results are in tune with the findings of Woodstock *et al.* (1976) and Bass and Stanwood (1978). It could be attributed to the



Table 2 : Seedling vigour index of chilli cultivars at different months after storage

Storage/Cultivar	Months after storage									Per cent loss
	1	2	3	4	5	6	7	9		
Am bñent (S1)	386.59	362.24	349.24	314.84	260.20	245.64	228.93	149.84	61.25	
Col d store (S2)	417.54	397.20	388.13	382.22	364.08	355.94	335.26	309.55	25.84	
LCA 334 (Cv.1)	464.00	438.20	427.80	416.50	378.60	372.30	365.30	296.80	42.90	
LCA 357 (Cv.2)	487.40	455.10	451.47	436.20	411.50	401.00	376.40	303.00	37.83	
LCA 206 (Cv.3)	498.00	487.00	473.20	459.60	407.30	397.60	376.80	300.80	42.15	
LCA 235 (Cv.4)	523.60	485.00	450.02	435.40	416.10	382.00	366.90	286.60	45.26	
P aprika type (Cv.5)	130.50	110.90	107.78	96.30	76.20	73.10	71.30	64.00	50.96	
G untur Gand (Cv.6)	404.00	395.00	389.98	355.50	316.90	303.70	249.50	198.00	50.99	
W onder Hot (Cv.7)	362.80	296.90	280.55	240.40	178.40	175.90	172.60	158.80	56.23	
S1*Cv.1	455.60	426.60	419.73	406.30	351.00	342.60	330.30	226.40	50.31	
S1*Cv.2	450.90	432.40	431.77	404.30	360.90	347.00	331.30	205.10	54.51	
S1*Cv.3	478.80	469.60	448.17	428.90	326.40	320.70	301.50	198.40	58.56	
S1*Cv.4	500.60	469.80	434.07	419.60	385.00	343.10	325.40	206.60	58.73	
S1*Cv.5	112.70	105.90	101.07	88.90	57.00	54.60	52.10	43.50	61.40	
S1*Cv.6	351.00	349.40	343.53	278.00	207.50	185.30	138.70	53.30	84.81	
S1*Cv.7	356.60	291.90	266.33	177.80	133.60	126.10	123.20	115.60	67.58	
S2*Cv.1	472.40	449.70	435.87	426.60	406.20	401.90	392.20	367.10	22.29	
S2*Cv.2	483.30	477.70	471.17	468.00	462.10	455.00	421.40	401.00	17.03	
S2*Cv.3	517.30	504.40	498.23	490.30	488.20	474.40	452.10	403.10	22.72	
S2*Cv.4	502.70	500.30	465.97	451.10	447.20	420.90	408.30	366.60	27.07	
S2*Cv.5	141.30	115.90	114.50	103.60	95.30	91.70	90.40	84.40	40.27	
S2*Cv.6	443.20	440.60	436.43	433.00	426.30	422.00	360.20	342.70	22.68	
S2*Cv.7	362.60	301.80	294.77	303.00	223.10	225.60	222.10	202.00	44.29	
CD for S	21.62	19.29	3.60	23.09	24.16	26.05	14.75	18.51		
CD for Cv	40.44	36.09	6.70	43.19	45.21	46.12	27.60	32.63		
CD for S x Cv	NS	NS	11.30	72.70	76.09	77.63	46.45	58.26		

hastened process of deterioration in the seed collected from the chilli kept at high temperature (ambient condition). Further, it could also be attributed to the changes that were associated at cellular level which increase electrolyte leaching as explained by Doijode (1985).

Among the interactions, the data clearly revealed the usefulness of storing the chilli in cold store even for the seed production of high quality seed. All the cultivars kept in cold store recorded a loss of seed germination ranging from 3.1 to 20.0 per cent whereas the same chilli cultivars kept at ambient temperature recorded a germination percentage loss of 25.5 to 71.8 per cent. It explains that irrespective of cultivar, the storage conditions influenced markedly the quality of seed material. The LCA 235 kept in cold store recorded a minimum loss of only 3.1 per cent in seed germination. Doijode (1988) and Thakur *et al.* (1988) also reported that the seed obtained from the chilli stored at low temperature may have good viability and keeping quality of seed.

### **Seedling vigour index**

Another character that is more valued for seed purpose is vigour index, which is the product of shoot and root lengths of the seedling multiplied by the percentage of seed germination as suggested by Abdul Baki and Anderson (1973). The data presented in Table 2 indicated similar trend as observed in case of seed germination percentage. The initial vigour index of the chilli seed in different cultivars varied from 130.5 (Paprika type) to 523.6 (LCA 235) indicating that there is genetic variability among the cultivars employed in the study. The vigour index worked out from the seed of these different cultivars at different intervals of storage period showed a declining trend. However, the decline was 37.83 to 45.26 per cent in case of cultivars LCA 334 and LCA 235 but it was maximum of 50.96 to 56.23 per cent loss in cultivars Paprika type and Wonder Hot.

Between the storage conditions, the vigour index of the seedling developed from the seeds of the chilli stored in cold store at all stages showed a relatively higher values of vigour index (Table 2). The percentage loss of vigour index after 9 months of storage was 25.84 per cent in case of cold store and 61.25 per cent in case of ambient temperature. Similar results of decreased vigour index with increase in storage period was reported by Doijode (1996). It could be due to lower germination percentage in the seed extracted from chilli stored at ambient temperature. In other words, the storage atmosphere of the seed is the most important factor that influences the vigour of the seedlings.

Interaction between storage conditions and cultivars showed similar trend of decreasing vigour index with increase of storage period. From the above discussion, it appears that the cold store provided a congenial condition for the storage of chilli which in turn provided a natural protective condition for the seed.

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