EFFECT OF SEED TREATMENT AND PACKAGING MATERIALS ON SUNFLOWER (Helianthus annuus L.) SEED VIABILITY, VIGOUR AND STORABILITY

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ABSTRACT: A study was conducted on the influence of seed treatment and containers on storability of sunflower seeds. Hybrid seeds of BSH-1, KBSH-1, APSH-11 and their parental lines CMS 234A, 234B, CMS 7-1A, 7-1B, RHA 271, RHA 274 and RHA 6D-1 were treated with Dithane M-45, Bavistin at 2 g/kg seed, Malathion at 5g/kg seed and stored in gunny bag, cotton bag and in sealed polythene bag (700 gauge). Seeds were earlier dried to 8.55 per cent moisture content (SMC) and stored under ambient conditions* for 18 months. Observations were recorded at bi-monthly interval.

Seed stored in sealed polythene bags treated with Dithane M-45 showed least increase in SMC (8.55%) with maximum germination (76 per cent), seedling dry matter (16.24 mg) and vigour index (1263) at the end of 18 months of storage. Whereas, untreated control seeds stored in cotton bag showed higher SMC (10.5%), least germination (58 per cent), seedling dry matter (12.47 mg) and vigour index (723) at the end of the storage period.

* Temperature (range) 12.6° C to 34.00°C
R.H.(range) 29 % to 90 %

Key words: Sunflower, Seed treatment, container, seed moisture content

Sunflower is one of the fast developing oil seed crop next to groundnut. The seeds of one season cannot be used for sowing in the next season due to quick fall in germinability if not stored properly. It suffers deterioration both in quality of seed and oil during storage. Toole et al.(1948) found that the loss of germination due to genetic differences among cultivars, immature seeds, injuries during harvest, improper processing and storage, diseases and ageing of seeds. They also stated that the loss in viability leads to decline in vigour. In order to overcome quick loss of germinability, the seeds are to be treated with insecticides and fungicides during storage. However reports on storability in different containers with and without the seed treatments are meagre. Hence, an experiment was conducted to find the effect of insecticide and fungicides and packaging containers on the seed quality in sunflower genotypes.

MATERIALS AND METHOD

The seeds of sunflower hybrids (BSH-1, KBSH-1, APSH-11) and their parents (CMS-234A, 234B, CMS-7-1A, RHA-271, RHA-274 and 6D-1) were used for this study. Seeds having 8.50 to 8.61% SMC treated with Dithane M-45, 2g/kg (T_1), Bavistin, 2g/kg (T_2), Malathion, 5 g/kg (T_3) and were packed separately in polythene bags 700 guage, (C_1), tarcoated gunny bags (C_2) and cloth bag (C_3). The cloth bags and the polythene bags containing the seeds were closed by stitching and heat sealing respectively and stored under ambient conditions (having temperature range of 24.62 to 34°C and relative humidity of 42 to 78%) in Bangalore. Seed samples were drawn bimonthly and assessed for the moisture content (ISTA,1985), germination percentage (ISTA, 1985), dry matter production and vigour index (Abdul Baki and Anderson 1973).

RESULTS AND DISCUSSION

The effects of different seed package and chemical treatments on the viability of sunflower seeds are shown in Table 1.

a) Effect of packages:

Seeds stored in different packages have considerable effect on germination, seedling dry matter and vigour of the seeds. The reduction in germination was faster in gunny bag and cloth bags as compared to polythene (sealed) 700 guage packing. It is obvious that pervious containers like gunny and cloth bag allow free exchange of moisture and thereby increase in moisture content, which resulted in faster reduction in germination at the end of 18 months storage. Polythene bag maintained higher germination of 76 per cent, followed by 62 per cent gunny bag and 60 per cent in cloth bag for the same period of storage. This phenomenon is due to moisture impervious nature of polythene bags which was mainly responsible for retaining higher germination and also lower increase in moisture and least incidence of pest and seed mycoflora during storage. These results are in

agreement with the findings of Bhattacharya et al.(1983), Vanangamudi (1988), Balamurugan et al.(1989), Elemendrys (1993) in sunflower. The dry matter accumulation and vigour index were also more in polythene bags as compared to the gunny bag and cloth bag.

b) Effect of chemical treatment:

The seeds treated with different chemicals showed greater influence on the storability of seeds: The viability of seeds decreased with the increase in storage period in all the treated seeds. The rate of deterioration was faster in untreated seeds (control) followed by seed treated with Dithane M-45, Bavistin and Malathion which showed higher germination of 68 per cent, 67 per cent and 66 per cent, respectively at the end of 18 months storage. Similar findings were also reported by Abraham et al.(1976) Mahajan and More (1991), Sachidantham et al.(1983). Similar trend was also observed for accumulation of seedling dry matter and vigour index.

c) Effect of package and chemical seed treatment combinations:

The seeds stored in different packages and treatment combinations showed a gradual decline in germination during storage period except in gunny and cloth bag. Among the seed treatment using Dithana M-45 and Bavistin and packed in polythene bag recorded the highest germination of 78 per cent followed by gunny bags and cloth bag 74, 61 per cent respectively at the end of 18 months storage. It can be attributed that the results of the seed deterioration is usually affected by the class of packages and also by chemical treatment.

Among the packages polythene bag 700 guage (heat sealed) found to be superior for storage of sunflower seeds for a period 18 months under ambient conditions of Bangalore. The seed treated with Dithane M-45 and packed in polythene bags showed better germination. The similar trend observed for seed quality parameters like seedling dry matter and vigour index at the end of 18 month storage (Tables 1 and 2). These results confirm to the finding of Macda et al.(1987), Balamurugan et al.(1989),Mahajan and More(1991) in Sunflower, Narasimhulu & Rao (1989) in groundnut

The present study revealed that the sunflower seed with high initial viability of above 90 per cent and moisture content having 8.0 to 8.50 per cent SMC can be satisfactorily stored for a period of 18 months under ambient conditions in Bangalore, using polythene cover treated with Dithane M-45 chemical @ 2g/kg seed.

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Table - 1 : Germination (%) as influenced by sunflower genotypes (hybrids and their parents) seed treatment chemicals and package after different months of storage

Treatments	Storage period in months									
	0	2	4	6	8	10	12	14	16	18
Genotypes										
V_1 BSH-1	96.00	94.72	93.33	92.83	92.17	90.40	87.71	76.81	71.94	67.83
V_2 KBSH-1	98.00	95.50	93.61	93.16	92.47	90.90	88.18	77.83	72.79	68.83
V_3 APSH-11	96.00	94.86	93.48	92.89	92.26	90.72	87.78	77.03	71.83	67.19
V_4 CMS.234A	95.30	94.34	91.78	90.94	90.42	86.80	83.81	74.92	68.39	64.50
V_5 234B	96.50	94.80	92.15	91.33	91.05	87.37	84.51	76.08	69.33	65.53
V_6 CMS.7-1A	95.50	94.00	91.97	90.83	90.33	86.78	83.51	74.86	67.94	64.11
V_7 7-1B	95.60	94.50	92.30	91.23	90.89	87.11	84.58	76.08	69.19	65.69
V_8 RHA.274	98.00	94.85	92.23	91.69	91.22	89.48	85.91	76.33	70.64	65.47
V_9 6D-1	98.00	94.69	92.26	91.70	91.15	89.74	86.33	77.33	71.89	67.19
V_{10} RHA.271	95.00	94.45	91.93	91.14	90.75	89.14	85.66	76.03	70.58	65.06
Mean	96.40	94.67	92.50	91.77	91.27	88.84	85.80	76.3	70.45	66.14
F-test		*	*	*	*	*	*	*	*	*
S.Em.±		0.10	0.12	0.10	0.09	0.11	0.12	0.23	0.03	0.26
C.D.at 5%		0.37	0.46	0.36	0.34	0.39	0.45	0.84	0.92	0.93
Packages										
P_1		95.43	93.88	93.52	93.10	89.76	89.32	81.32	78.47	76.00
P_2		94.83	92.07	91.49	90.92	88.27	85.91	76.68	68.08	62.00
P_3		93.91	91.50	90.28	89.80	87.79	82.17	70.99	64.81	60.00
Mean		94.72	92.48	91.76	91.97	88.61	85.80	76.33	70.45	66.14
F-test		*	*	*	*	*	*	*	*	*
S.Em.±		0.05	0.07	0.05	0.05	0.06	0.07	0.13	0.14	0.14
C.D.at 5%		0.20	0.25	0.20	0.22	0.21	0.24	0.46	0.50	0.51
Chemicals										
C_1		95.20	93.10	92.47	91.99	89.81	88.45	78.02	72.15	68.00
C_2		94.86	92.65	92.03	91.54	89.43	86.55	77.24	71.47	67.00
C_3		94.67	92.37	91.56	91.03	88.76	85.14	75.88	69.74	66.00
C_4		94.16	91.82	91.03	90.53	87.37	83.05	74.18	68.46	61.00
Mean		94.72	92.49	91.77	91.27	88.96	85.80	76.33	70.46	65.39
F-test		*	*	*	*	*	*	*	*	*
S.Em.±		0.06	0.08	0.06	0.05	0.07	0.08	0.15	0.16	0.16
C.D.at 5%		0.23	0.29	0.23	0.19	0.25	0.28	0.53	0.58	0.58

Table 2: Interaction effect of package and chemical seed treatment on germination of sunflower seeds after different months of storage

Treatments	Storage period in months								
	2	4	6	8	10	12	14	16	18
(P1) Polythene bag (C1) Dithane M-45	95.72	94.62	94.22	93.82	90.31	89.88	82.97	79.25	78.00
(P2) Gunny bag (C1) -do-	95.52	94.12	93.82	93.36	89.97	79.59	82.30	78.33	76.97
(P3) Cloth bag (C1) -do-	95.52	93.72	93.41	92.91	89.62	89.07	80.67	70.13	65.90
(P1) Polythene bag (C2) Bavistin	94.97	93.08	92.76	92.30	89.96	88.73	79.33	75.10	74.00
(P2) Gunny bag (C2) -do-	94.52	92.49	92.07	91.44	89.74	88.71	77.90	70.03	63.53
(P3) Cloth bag (C2) -do-	94.90	92.25	91.63	91.16	89.49	86.88	77.30	69.30	62.17
(P1) Polythene bag (C3) Malathion	94.76	91.97	91.37	90.75	88.89	85.52	76.63	66.97	61.00
(P2) Gunny bag (C3) -do-	94.52	91.58	90.91	90.33	87.66	82.60	74.70	66.23	60.63
(P3) Cloth bag (C3) -do-	94.34	91.20	90.73	90.30	87.40	80.77	73.20	66.13	60.10
(P1) Polythene bag (C4) Control	94.17	91.60	90.65	90.09	88.84	83.26	72.13	65.60	60.00
(P2) Gunny bag (C4) -do-	93.72	91.42	89.33	89.43	87.66	80.83	70.13	64.70	59.10
(P3) Cloth bag (C4) -do-	93.00	90.81	89.44	88.95	85.26	77.82	68.50	62.80	57.93
F-test	*	*	*	NS	*	*	*	*	*
S.Em. ±	0.11	0.14	0.11	0.10	0.12	0.13	0.25	0.28	0.28
C.D. at 5%	0.40	0.51	0.39	-	0.43	0.48	0.92	1.00	1.02