The Andhra Agric. J 58 (3):387-389, 2011

Studies on Accelerated Ageing in Sunflower (Morden) Seeds Produced at Different Provenances

Key words : Accelerate ageing, Germination, Sunflower.

Sunflower (*Helianthus annuus* L.) is an important oilseed crop. Seed quality is influenced by the place of its production. The environmental conditions prevailed at the time of seed development and maturation plays an important role in causing degree of deterioration. Seed deterioration is enhanced by high temperature and relative humidity during seed storage. Accelerated ageing is effective for creating ageing of seeds, resulting in reduced seed germination and changes in leakage pattern of total electrolytes. The accelerated ageing test is also useful in predicting relative storability of seed lots and has been successfully utilized in several species.

The experiment was conducted with the certified seeds of Sunflower (Morden) produced at different locations in Karnataka state. Sunflower (Morden) seeds were collected from 22 places comprising of Bellary, Bijapur, Belgaum and Raihur (Northern Dry Zone), Bangalore and Kolar (Eastern Dry Zone), Hassan (Southern Transition Zone), Dharwad and Haveri (Northern Transition Zone) of Karnataka state. The experiment was conducted at Department of Seed Technology, University of Agricultural Sciences; Bengalore Seeds were subjected to accelerated ageing (40^{0c} and 95% RH) for four days. Seeds were tested for germination and electrical conductivity as per ISTA standards (1985). Seed germination was conducted by between paper (BP) method. For electrical conductivity, seeds were surface sterilized with 0.1 per cent mercuric chloride, washed with distilled water and dried, later soaked in 25 ml. sterile distilled water for 24 hours at 27^{oc}. Electrical conductivity was measured with conductivity bridge (Type 82).

The germination percentage and electrical conductivity differed significantly after accelerated ageing text (Table 1). After accelerated ageing test 4 days seeds from Soudatti (Belgaum) recorded maximum germination of 70.66% with a loss of 20.84% over initial germination (91.50%). This was closely followed by Veerapur (Haveri) (68.67%) with a loss of 21.83 % (initial germination of 90.50%). Least germination was recorded with Chikkaballapur (Kolar) (32.00%) with a loss of 57.50% (initial germination per centage of 89.50%). The percentage loss in germination indicates the degree of deterioration of seeds under controlled ageing conditions. The seed lots which undergoes less deterioration under adverse environmental conditions, can able to maintain its high vigour during storage for longer period. The seeds produced from NTZ (Zone-VII) (Haveri and Dharwad) showed comparatively less drop in germination and maintained its high vigour after AA test. Seeds from N.D.Z. (Zone-III), showed comparatively more drop in germination. Seeds from S.T.Z. (Zone-VIII) and E.D.Z. (Zone-V) showed moderate performance. Similar findings were obtained by Shekhargouda *et al* (1997) and Kalappa (1997) in sunflower and Ramamurthy et al (1980) in maize.

Electrical conductivity of seeds collected from different locations differed significantly. Seeds collected from Veerapur (Haveri) recorded minimum, electrical conductivity (375 μS cm^{-1}) before and after AA test (395 μS cm^{-1}). Where as seeds collected from Munavalli (Belgaum) recorded maximum electrical conductivity of 558 μS cm^{-1} before and after, AA test (657μS cm^{-1}). During ageing process the integrity of seed membrane looses and leakage of electrolytes takes places. Seeds which are having good vigour and viability show of less electrical conductivity. If seed development and maturity coincides with continuous rains, high relative humidity, harvesting before physiological maturity, improper drying and storing of seeds with high moisture content will deteriorate seed quality faster. Seeds produced from NTZ(Zone-VIII) recorded less electrical conductivity before and after AA test . It was followed by N.D.Z. (Zone-III), E.D.Z. (Zone-V) and S.T.Z. (Zone-VII). These findings are in close agreement with Kalpana and Madhava Rao (1995) in pigeon pea, Perez and Arguello (1995) in peanut and Dey and Mukerjee (1986) in maize.

Table 1. Germination percentage and electrical conductivity (μ S cm^{-1}) of sunflower (morden) seed produced in different locations, before and after A A Test.

SL. No.	District Place	Zone No & Name	Code	Beofore A A Test		After A A Test	
				Germination (%)	E.C. (μ S cm^{-1})	Germination (%)	E.C. (μ S cm^{-1})
1	Bangalore-GKVK	Zone V - EDZ	L1-1	90.50	433	49.34	502
2	Bellary-Gundahole	Zone III - NDZ	L2-1	89.50	446	52.67	472
3	Bijapore-Musho	Zone III - NDZ	L3-1	79.50	421	38.67	468
4	Bijapore-Hymel	Zone III - NDZ	L3-2	84.00	421	48.00	474
5	Bijapur-Indi	Zone III - NDZ	L3-3	82.00	431	40.67	483
6	Dharwad-Mandalagi	Zone VIII - NTZ	L4-1	87.50	444	63.34	465
7	Dharwad-Hedigonda	Zone VIII - NTZ	L4-2	83.50	444	58.67	565
8	Dharwad-Hedigonda	Zone VIII - NTZ	L4-3	87.50	451	68.33	528
9	Dharwad-Bokmerd	Zone VIII - NTZ	L4-4	81.00	445	39.33	509
10	Belgaum-Soudatti	Zone III - NDZ	L5-1	91.50	452	70.66	492
11	Belgaum-Munavalli	Zone III - NDZ	L5-2	82.00	558	36.00	657
12	Belgaum-Tadrains	Zone III - NDZ	L5-3	85.00	410	48.67	472
13	Hassan-Madenur	Zone VII - STZ	L6-1	89.00	524	54.67	560
14	Hassan-Madenur	Zone VII - STZ	L6-2	88.00	500	60.66	526
15	Haveri-Havanagi	Zone VIII - NTZ	L7-1	92.00	390	51.34	446
16	Haveri-Veerapur	Zone VIII - NTZ	L7-2	88.50	348	60.67	409
17	Haveri-Veerapur	Zone VIII - NTZ	L7-3	90.50	375	68.67	395
18	Kolar-Chikaballapur	Zone V - EDZ	L8-1	89.50	462	32.00	578
19	Kolar-Gudibanda	Zone V - EDZ	L8-2	83.50	455	58.00	546
20	Raichur-Kallur	Zone III - NDZ	L9-1	87.50	394	36.67	469
21	Raichur-Sindhanur	Zone III - NDZ	L9-2	83.50	446	44.00	487
22	Raichur-Balaji Kamp	Zone III - NDZ	L9-3	84.00	444	40.00	491
	Mean			86.22	440	50.94	499
	F – Test			*	*	*	*
	SEm +/-			0.9554	4.15	1.1547	2.36
	CD at 5%			2.69	11.83	3.29	6.72
	CV			2.21	1.63	3.92	0.81

A A : Accelerated ageing

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K Bayyapu Reddy

Agricultural Research Station
Jangamaheswarapuram
Gurazala
Guntur 522 415
Andhra Pradesh

(Received on 15.09.2010 and revised on 06.10.2010)