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Short Communication

Determination of storage potential of natural and accelerated aged wheat seed

D.S. CHAUHAN* AND D.P. DESWAL
Department of Seed Science and Technology, CCS, Haryana Agriculture University, Hisar-125004
davender_chauhan@rediffmail.com

Various crop species have variable life span when stored under identical conditions. Two types of seeds *viz.* poor and good storers for seed storability have been identified. A third category having intermediate storability has also been included. However, these seed storability differences are not confined only to species, as many studies have demonstrated that storability variation prevails at the genotypic level too. Significant cultivar responses for differential seed storability have been reported in various vegetable crops [1-3]. There is not much information available as to the storage response and relative storability of cereal crops. Therefore, in view of the above, present study was undertaken to obtain reliable information on the seed storage potential and relative storability of six varieties of wheat in natural and accelerated aged seed lots.

The present research work was carried out in the laboratories of Department of Seed Science and Technology CCS Haryana Agricultural University, Hisar during 2006-2010. The seed material comprised of six varieties of wheat *viz.* C-306, PBW-502, WH-542, WH-711, WH-283 and RAJ-3765 having germination above minimum seed certification standards (MSCS) collected at the time of sowing of crop and stored in ambient conditions. For defining the variables for artificial ageing, seed of all six varieties were artificially aged (40±1°C/72 hrs.) and observation was recorded after ageing. In case of natural ageing, observations were recorded quarterly on the stored wheat seed in cotton bags in ambient conditions up to one year until germination fall below as compared to fell fresh seed lot. In case of natural ageing, data on seed germination and seed vigour was recorded at quarterly intervals until germination fell below minimum seed certification standards *i.e.*, 85 percent for wheat. Standard germination test was conducted as per ISTA Rules [4] and vigour index was calculated using formula given by Abdul-Baki and Anderson [5].

Seed germinability of several species has been reported to reduce with age during storage [6-7]. In the present studies, data on standard germination and seed vigour index after ambient storage (Table 1 & 2) as well as after accelerated ageing (Table 3 & 4) indicated that different wheat varieties exhibited differential seed storability. Seed of C-306 showed decline in percent germination (76%) below minimum seed certification standards after 18 months of ambient storage conditions. However, PBW-502 maintained higher germination percentage (85%). In case of vigour index, maximum vigour index was retained by WH-542 (2460.40) and minimum by RAJ-3765 (2066.93). After two years of storage, maximum germination percentage and vigour index was recorded in PBW-502 (79 percent and 1072.03 respectively) whereas, minimum germination percentage and vigour was recorded in RAJ-3765 (71.33 percent and 891.65 respectively). One of the reasons associated with seed deterioration leading to loss of germination and vigour is loss of

*Corresponding author

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membrane integrity. Accelerated ageing of various seed lots also showed the variability in storage potential of seed lots. After accelerated ageing, maximum germination percentage and vigour index also retained by variety PBW-502 (55% and 742.50 respectively) and minimum germination percentage and vigour index retained by variety RAJ-3765 (44% and 524.92 respectively).

With the increase in ageing, period seeds undergo several structural, biochemical and genetic alterations. These include reduced capacity of synthesis of protein, lipids and RNA, injury to membranes, chromosomes and decreased repair systems [8-9]. Variable responses of genotypes to accelerated ageing conditions have also been reported in pea, cucumber, fenugreek [10-12]. The reduction in seed vigour after accelerated ageing reported in cotton, turnip and sunflower [13-15]. Similarly, decrease in germination percentage after natural ageing was recorded in different crops such as okra, cotton, carrot and onion [16-19]. From the present studies, it can safely be inferred that RAJ-3765 is a poor storer after 18 months of seed storage potential under natural conditions, whereas variety PBW-502 can be

Table 1. Effect of natural ageing on seed germination (%) in Wheat

	Ageing period (months)						
Varieties	0	12	15	18	21	24	Mean
C-306	98.67	96.67	95.00	82.67	76.00	71.33	86.72
PBW-502	97.67	95.00	93.33	91.33	85.00	79.00	90.06
WH-542	98.00	95.67	93.33	90.33	82.67	74.33	89.06
WH-711	97.33	95.00	92.33	90.00	82.67	77.67	89.06
WH-283	95.33	89.00	89.33	87.67	77.67	74.00	85.50
RAJ-3765	98.00	94.33	93.00	89.33	80.00	71.33	87.67
Mean	97.50	94.28	92.72	88.56	80.50	74.61	
Factors		CD (p=0.05)		SE(d)		SE(m)	
Treatment (A)		1.0071		0.5051		0.3572	
Varieties (B)		1.0071		0.5051		0.3572	
Factor(A X B)		2.467		1.2373		0.8749	

Table 2. Effect of natural ageing on vigor index in Wheat

	Ageing period (months)						
Varieties	0	12	15	18	21	24	Mean
C-306	2960.00	2803.60	2597.00	2176.00	1757.20	939.41	2205.64
PBW-502	2740.87	2629.33	2519.33	2396.67	1866.83	1072.03	2202.99
WH-542	2678.67	2557.73	2583.33	2460.40	1860.10	1003.45	2191.34
WH-711	2563.33	2489.33	2388.60	2296.13	1749.43	978.64	2073.29
WH-283	2637.67	2433.13	2352.00	2267.60	1616.50	976.80	2046.87
RJ-3765	2482.67	2295.47	2170.67	2066.93	1462.20	891.62	1894.87
Mean	2677.20	2534.77	2435.16	2277.29	1718.71	976.99	
Factors		CD (p=0.05)		SE(d)		SE(m)	
Treatment (A)		71.1511		35.6855		25.2335	
Varieties (B)		71.1511		35.6855		25.2335	
Factor(A X B)		174.284		87.4113		61.8091	

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Table 3. Effect of natural and accelerated ageing on Germination of wheat

Varieties	Ageing			
	Fresh	Natural	Accelerated	Mean
C-306	98.67	71.33	47.00	75.33
PBW-502	97.67	79.00	55.00	77.22
WH-542	98.00	74.33	49.33	73.88
WH-711	97.33	77.67	50.00	75.00
WH-283	95.33	74.00	52.67	74.00
RJ-3765	98.00	71.33	44.00	68.11
Mean	97.50	74.61	49.67	

Factors	CD (p=0.05)	SE(d)	SE(m)
Treatment (A)	1.361	0.668	0.472
Varieties (B)	1.924	0.945	0.668
Factor(A X B)	3.333	1.637	1.157

Table 4: Effect of natural and accelerated ageing on vigor index of wheat

Varieties	Ageing			
	Fresh	Natural	Accelerated	Mean
C-306	2960.00	939.41	612.41	1403.94
PBW-502	2740.87	1072.03	742.50	1518.46
WH-542	2678.67	1003.45	659.54	1447.22
WH-711	2563.33	978.64	636.50	1392.82
WH-283	2637.67	976.80	675.75	1430.07
RJ-3765	2482.67	891.62	524.92	1299.73
Mean	2668.86	976.99	550.27	

Factors	CD (p=0.05)	SE(d)	SE(m)
Treatment (A)	62.960	30.918	21.862
Varieties (B)	89.039	43.725	30.918
Factor(A X B)	154.219	75.733	53.551

designated as good storer with 18 months of storage potential. The ageing is faster in artificial accelerated ageing mechanism may be due to constant deterioration conditions available in the ageing chamber while in the natural ageing there are fluctuation in temperature and humidity condition. Therefore, there is more depletion in synthesis of protein lipid and injury to seed coat membrane as well as rapidly decreased the repair system.

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