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Effect of Pre sowing Seed Treatments on Seed Quality Parameters on Carryover Seed of Soybean

Key words : Pre sowing , Seed treamtents, Soybean.

Soybean is a rich source of protein (32.4-50.2%) and oil (13.99-23.2%) with about 42% high quality protein composed of 10 properly balanced amino acids. It will combat malnutrition by replacing the edible oil shortage in a developing country like India.

Modern crop production system demands high degree of precision in crop establishment (Salter, 1985). Rapid and uniform field emergences are two essential pre requisites for successful establishment of the crop resulting in increased yield, quality and ultimately profits. Pre plant or presowing seed treatments are used to maximize stand establishment and yield by mobilizing seeds own resources and to augment them with external resources.

The principle purpose of storing seed of economic plants is to preserve planting stocks for the following growing season. It has been reported in earlier works that soybean seeds undergo rapid deterioration during storage (Srivastava and Sareen, 1972 and Agarwal and Siddiqui, 1973). The problem of satisfactory germination level has become severe and common in soybean. In India, soybean packaging and storage is normally being done either in gunny bags or cloth bags and stored under ambient conditions since the storage under controlled conditions, is neither economical nor practicable.

JS 335 and PK 1029 are the varieties normally grown in Nizamabad and Adilabad districts of Northen Telangana Zone. Seed invigoration improves seed performance by improving germinability and field performance than corresponding untreated seed. To derive enhanced effects of seed invigoration treatments in lab and field, seed should not be fresh but should have germination less than 50%. In view of these facts a study was under taken to probe the effect of seed invigoration treatments on seed quality parameters, of carry over seed of soybean

6 months old seeds of soybean *viz.* JS 335 and PK 1029 were selected for the experiment and the following presowing seed invigoration treatments were imposed. T1: Control (no treatment was given); T2 : Hydration and dehydration in 1: 1 (W/V) for 8 hours; T3 : Chemopriming in 0.5% KNO_3 in 1: 1 (W/V) for 8 hours; T4 : Chemopriming in 1.5% $CaCl_2$ in 1: 1 (W/V) for 8 hours; T5: Chemopriming in 10^{-4} M KH_2PO_4 in 1: 1 (W/V) for 8 hours; T6: Dry dressing with calcium hypochlorite @ 2 gm kg^{-1}. These treatments were given every month starting from 6 months after harvest and data was recorded on seed quality parameters germination per cent, field emergence per cent and seedling vigour index [germination per cent X length of seedling (cm)] till the germination per cent has fallen to below certification standards (Anonymous, 1996). Data was subjected to ANOVA with factorial RCBD.

JS 335 and PK 1029 seeds recorded germination per cent above certification standards (70%). Higher field emergence and seedling vigour index were recorded upto 9 months after harvest with treatment and dry dressing with Calcium hypochlorite @ 2 gm kg^{-1} (74%, 38.5%, 2423) followed by Hydration and dehydration in 1 : 1 (W/V) treatment for 8 hours(70%, 35.5%,1778) irrespective of varieties (Tables 1, 2 and 3). Increased growth parameters due to calcium hypochlorite and hydration and dehydration were earlier reported by Mandal *et al.* (2000); Heydecker (1977) and Heydeckar and Coolber (1977).

The beneficial effects of calcium hypochlorite might be due to the effective enzymatic corrective and restorative action during favorable hydration phase which would improve subsequent seed performance (Harman and Stasz, 1986). Increase in germination and production of quality seedlings in the nursery of Terminalia chebula after soaking of depulped seed in cold water for 48 hrs was reported by Hossain *et al.* (2005). The increase in field performance of hydration – dehydration treatment might be due to enhanced oxygen uptake, increased amylase activity and efficient mobilization of nutrients from cotyledons to the embryonic axis. It is attributed to the fact that it effectively regulated the entry of water into seed without causing injury in leguminous seeds and advanced germination

Table 1. Effect of pre sowing seed treatments on seed germination (%) in soybean.

	Germination (%)														
	6 months after storage			7 months after storage			8 months after storage			9 months after storage			10 months after storage		
Treatment	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
T1	77	74	75.5	73	70	71.5	66	61	63.5	54	41	47.5	49	34	41.5
T2	91	82	86.5	91	81	86.0	77	74	75.5	71	69	70.0	52	44	48
T3	74	69	71.5	73	67	70.0	62	56	59.0	51	36	43.5	45	24	34.5
T4	81	68	74.5	75	66	70.5	69	56	62.5	52	30	41.0	45	21	33
T5	82	76	79.0	80	75	77.5	74	62	68.0	55	58	56.5	49	43	46
T6	93	87	90.0	92	84	88	89	80	84.5	76	72	74.0	65	59	62
Mean	83.0	76	79.8	80.6	73.8	77.5	72.8	64.8	68.9	59.8	72	55.8	50.8	37.5	44.3
	V	T	V X T	V	T	VXT	V	T	VXT	V	T	VXT	V	T	V X T
C.D (0.05)	1.246	2.15	3.051	1.154	1.999	2.827	1.257	2.177	3.079	0.892	1.546	2.186	1.786	3.094	4.375

V1 = JS 335
V2 = PK 1029

T1 = Control
T2 = Hydration – dehydration in 1: 1 (W/ V) for 8 hrs.
T3 = Chemopriming in 0.5% KNO_3 in 1 : 1 (W/V) for 8 hrs.
T4 =Chemopriming in 1.5% $CaCl_2$ in 1 : 1 (W/V) for 8 hrs
T5 = Chemopriming in 10^{-4} M KH_2PO_4 in 1 : 1 (W/V) for 8 hrs.
T6 = Dry dressing with Calcium hypochlorite @ 2 gm kg^{-1}

Table 2. Effect of pre sowing seed treatments on field emergence (%) in soybean

	Field emergence (%)														
	6 months after storage			7 months after storage			8 months after storage			9 months after storage			10 months after storage		
Treatment	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
T1	63	59	61.0	63	57	60	50	46	48	35	22	28.5	28	23	25.5
T2	80	71	75.5	72	65	68.5	66	58	62	39	32	35.5	29	27	28
T3	65	62	63.5	62	52	57	58	35	46.5	35	24	29.5	22	13	17.5
T4	66	53	59.5	67	59	63	58	36	47	37	24	30.5	32	12	22
T5	72	64	68	73	61	67	62	54	58	43	34	38.5	28	32	30
T6	83	74	78.5	81	70	75.5	83	75	79	60	42	51	42	39	45.5
Mean	71.5	63.8	68	69	60.6	65.4	62.8	59.6	57.1	41.5	30	37.5	30.1	24.3	27.5
	V	T	V X T	V	T	VXT	V	T	VXT	V	T	VXT	V	T	V X T
C.D (0.05)	1.675	2.901	4.103	1.666	2.886	4.082	1.913	3.313	4.686	1.414	2.449	3.464	2.023	3.503	4.955

V1 = JS 335
V2 = PK 1029

T1 = Control
T2 = Hydration – dehydration in 1: 1 (W/ V) for 8 hrs.
T3 = Chemopriming in 0.5% KNO_3 in 1 : 1 (W/V) for 8 hrs.
T4 =Chemopriming in 1.5% $CaCl_2$ in 1 : 1 (W/V) for 8 hrs
T5 = Chemopriming in 10^{-4} M KH_2PO_4 in 1 : 1 (W/V) for 8 hrs.
T6 = Dry dressing with Calcium hypochlorite @ 2 gm kg^{-1}

Table 3. Effect of presowing seed treatments on seedling vigour index in soybean.

	Seedling vigor index														
	6 months after storage			7 months after storage			8 months after storage			9 months after storage			10 months after storage		
Treatment	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean	V1	V2	Mean
T1	3857	3424	3640	3069	251	2789	2486	1788	2137	1358	859	1108	538	323	430
T2	5379	4383	4881	4306	3375	3840	2902	2662	2782	1824	1732	1778	791	445	618
T3	4464	3794	4129	3497	3021	3259	2606	1943	2274	1733	920	1326	900	343	621
T4	3884	3068	3476	3166	2312	2739	2450	1463	1956	1163	482	822	690	168	429
T5	4941	4376	4658	3981	3702	3841	2805	1356	2080	1298	603	950	662	232	447
T6	6697	5427	6062	5909	4533	5221	4376	3332	3854	2680	2166	2423	1301	709	1005
Mean	4870	4078	4474	3988	3742	3615	2937	2090	2514	1676	1127	1401	813	370	592
	V	T	V X T	V	T	VXT	V	T	VXT	V	T	VXT	V	T	V X T
C.D (0.05)	192	332	470	215	373	528	124	216	306	NS	212	301	NS	127	180

V1 = JS 335
V2 = PK 1029

T1 = Control
T2 = Hydration – dehydration in 1: 1 (W/ V) for 8 hrs.
T3 = Chemopriming in 0.5% KNO_3 in 1 : 1 (W/V) for 8 hrs.
T4 =Chemopriming in 1.5% $CaCl_2$ in 1 : 1 (W/V) for 8 hrs
T5 = Chemopriming in 10^{-4} M KH_2PO_4 in 1 : 1 (W/V) for 8 hrs.
T6 = Dry dressing with Calcium hypochlorite @ 2 gm kg^{-1}

reactions to a more or less fixed level determined by water potential (Heydecker, 1977; Heydeckar and Coolber, 1977)

Varietal variation with germination per cent, field emergence per cent and seedling vigour index was observed. JS 335 seed recorded higher quality parameters compared to PK 1029.

Thus the study revealed that presowing seed treatments of carry over seed of soybean with dry dressing of calcium hypochlorite @ 2 gm kg^{-1} is beneficial to farmers in enhancing the seed quality parameters there by plant stand, which ultimately results in increasing yields of soybean.

LITERATURE CITED

Agarwal P K and Siddiqui M N 1973. Influence of storage temperature and germination, free fatty acid content and leaching of sugars from soybean seeds during storage. *Seed Research* 1 : 75-82.

Anonymous 1996. International Rules for Seed Testing (ISTA). *Seed Science and Technology,* 24.

Harman G E and Stasz J E 1986. Influence of seed quality on soil microbes and seed rots. In : *Physiological and Pathological Interactions Affecting Seed Deterioration,* (eds., S.H.West) Crop Society of America, Special Publication, pp 11-37.

Heydecker W 1977. Stress and seed germination- an agronomic view. In : *The Physiology and Biochemistry of Seed Dormancy and Germination.* (eds.,. A.A. Khan) Elsevier, North Holland,Amsterdam, Pp237 – 282

Heydecker W and Coolber P 1977. Seed treatment or improved performance survey and attempted prognosis. *Seed Science and Technology,* 5 : 353 – 425

Hossain M A, Arefim M K, Khan B M and Rahman M A 2005. Effect of seed treatments on germination and seedling growth attributes of Horitaki (*Terminalia chebula* Retz.) in the nursery. *Research Journal of Agricultural Biological Sciences,* 1 (2) : 135-141.

Mandal A K, De B K, Saha R and Basu R N 2000. Seed invigoration Treatments for improved storability, field emergence and Productivity of soybean. *Seed Science and Technology,* 28: 349 – 355

Salter P J 1985. Crop establishment : Recent research and trends in commercial practice. *Scientific Horticulture* 36:32 – 47.

Srivastava A K and Sareen K 1972 Germination of soybean seeds as affected by different storage conditions . *Bulletin of Grain Technology* 10 : 190 – 196.

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