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Effect of seed soaking treatments on quality parameters of soybean

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ABSTRACT

The entitled experiment was conducted in factorial Randomized block design with three replications on the field of Seed Technology Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth Akola during *Kharif* 2006-07. Main treatment were fresh seed lot and revalidated seed lot and sub treatments consisted of six invigoration treatments including control. Seed soaking treatments with vitavax-200 and hydration (2hrs) followed by dry dressing with thirum recorded maximum germination, seedling length, seeding dry weight, vigour index, and lower electrical conductivity. All invigoration treatments and seed lot L1 recorded more number of pods/ plant, 100 seed wt., H.I., seed yield/plant and yield kg/m^2 over control. Seed treatment with vitavax-200 (L1T5) recorded significantly highest seed yield per plant amongst all the treatments. The effect of seed soaking treatment seems to be beneficial for enhancing the seed quality parameter in soybean.

Key words : Seed soaking, Dry dressing, Quality parameters, Seed vigour, Soybean

INTRODUCTION

Seed is the basis of agriculture and agriculture is the foundation of the national economy of India. The quality of the seed has own capacity in enhancing productivity. An invigoration treatments brings about a qualitative improvement in seed. It also provides protection against stress and act as an efficient carrier of nutrients and fungicides in early stage of growth.

The germination of soybean is major problem faced by seed producer and farmers. Assessment of seed vigor is done by estimation of planting value of seed lot for meeting market demand. The improvement in seed quality by invigoration treatments is attributed to primary induced reduction of lipid per oxidation and quantitative changes in biochemical activities including amylase activity increasing per cent sugar during germination.

Invigoration of soybean seed is one of the potential tools in improving the quality of seed under tropical and subtropical environments.

MATERIALS AND METHODS

The experiment was carried out at the Seed Technology Research Unit Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S) during 2006-07

Experimental details :

- Design : Factorial Randomized Block Design
- Replication : Three
- Variety : JS-335

The experiment was conducted in Factorial Randomized Block Design with three replications and variety was JS-335. The crop was sown at spacing of 45 x 5cm. There were two main treatments *i.e.*

L_1 – Fresh seed lot (seed having higher level of germination than MSCS)

L_2 – Old or revalidated seed lot (seeds having germination marginally below MSCS).

The seeds were obtained from seed Technology Research Unit of NSP, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola for experiment. The seed of soybean were subjected to invigoration (soaking) treatments with regulators and fungicides. The growth regulator namely GA_3 was obtained from Department of Botany, P.G. Institute, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola.

Treatments details are as follows: T_0 : Untreated, T_1 : Hydration for 2hrs and surface drying at room temperature (below 25^{0}C), T_2 : Hydration with 50ppm GA_3 for 2hrs and surface drying at room temperature (RT), T_3 : As in T_1 followed by dry dressing with Thiram @0.25%, T_4 : 0.4% polykote T^M followed by dry dressing with Thiram @0.25% and T_5 : Vitavax-200@3g/kg of seed

Total treatments – Seed lots (2) x Seed soaking treatment (6)=12

RESULTS AND DISCUSSION

The data on initial observation on quality parameter *i.e.* germination percentage, seeding length (cm), seeding dry weight (g), vigour index and electrical conductivity in fresh seed lot (L_1) and revalidated seed lot (L_2) before application of soaking treatments are reported in Table 1.

It was observed that the fresh seed lot (L_1) was

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Table 1 : Quality parameter in fresh seed lot (L_1) and revalidated seed lot (L_2) before application of soaking treatments

Seed quality parameters	Fresh seed lot (L_1)	Revalidated seed lot (L_2)
Germination %	76.66	63.66
Seedling length (cm)	26.66	24.13
Seeding dry wt. (g)	0.859	0.752
Vigour index	65.89	49.42
Electrical Conductivity	0.956	0.991

superior for various quality parameter against seed of revalidated lot (L_2) . However, the electrical conductivity of seed leachate recorded lower value in (L_1) lot (0.956 mmhos/cm) than (L_2) (0.99 mmhos/cm) before soaking treatments. After application of soaking treatments, effect on seed quality parameters *i.e.* germination percentage, seedling length, seedling dry weight, vigour index and electrical conductivity showed significant difference among the seeds lots, within soaking treatments and also for interaction of seed lot x invigoration treatments, as indicated in Table 2. Similar results were observed by Suneeta (2000) and Annonymous (2006[abc])

The data presented in Table 2 showed significant improvement in germination and other quality parameters, significantly higher germination was recorded in seed lot L_1 (79.88%) than revalidated seed lot L_2 (70.94%) The treatment T_5 recorded higher (79.33%) germination than rest of treatments. Interaction of L_1T_5 recorded higher germination percentage over rest of the treatments. Similar results were reported by Agrawal and Joshi (1971).

Seedling length includes shoot length and root length together. The data indicated significant improvement in seedling length by soaking treatments. Maximum seedling length was recorded in T_5 (32.06cm). Interaction L_1 T_5 recorded higher seedling length followed by L_1 T_4.

The normal seedling counted on 8th day were dried in hot air oven and seedling dry weight was recorded and presented in Table 2. Seedling dry weight is one of the major component to measure seed quality in soybean . Seed lot L_1 recorded significantly higher seedling dry weight than seed lot L_2 in all the treatments. The seed soaking treatments T_5 (1.040g) and T_3 (1.003g) recorded significantly higher dry weight than rest of the treatments. Interaction L_1T_5 recorded higher seedling dry weight over rest of the treatments. Dave and Guar (1970) reported that dry weight significantly improved by seed soaking with vitavax-500 and Thiram.

The electrical conductivity which is negativity correlated with vigour index was noted to be low by vitavax-200 in both the types of seed lots. The study indicates that vitavax-200 is beneficial for improvements of vigour index in Soybean. Similar finding were obtained by Baki and Anderson (1970). They observed lower glucose content in seed leachate and hence, lower conductivity in fresh seed lots as compared to the older and less vigorous seeds. Similar finding were also reported

Table 2: Effect of seed soaking treatment on seed quality parameters (before sowing)

Treatments	Germination (%)			Seedling length(cm)			Seedling dry weight(g)			Seed vigor index			Ec (mmhos/cm)		
	L_1	L_2	M	L_1	L_2	M	L_1	L_2	M	L_1	L_2	M	L_1	L_2	M
T_0	76.66 (61.12)	65.66 (54.13)	71.16 (57.62)	26.66	24.13	25.66	0.859	0.752	0.806	65.89	49.42	57.65	0.956	0.991	0.973
T_1	78.33 (62.26)	67.33 (55.14)	72.83 (58.70)	27.63	27.63	26.08	0.917	0.776	0.846	71.85	52.26	62.06	0.910	0.969	0.939
T_2	79.00 (62.72)	69.33 (56.37)	74.17 (59.55)	30.03	30.03	28.23	0.960	0.864	0.912	75.86	59.95	67.09	0.899	0.938	0.919
T_3	81.33 (64.40)	74.33 (59.56)	77.83 (61.98)	33.00	33.00	30.33	1.115	0.892	1.003	90.31	66.35	78.33	0.872	0.926	0.899
T_4	81.00 (64.16)	73.33 (58.91)	77.16 (61.53)	32.73	32.73	29.86	1.040	0.877	0.962	85.91	64.31	74.75	0.882	0.931	0.906
T_5	83.00 (65.65)	75.66 (60.44)	79.33 (63.04)	35.13	35.13	32.06	1.155	0.925	1.040	95.88	70.06	82.97	0.779	0.917	0.858
Mean	79.88 (63.38)	70.94 (57.42)		30.86	30.86		1.009	0.846		80.83	60.39		0.886	0.945	
	L	T	LxT	L	T	LxT	L	T	LxT	L	T	LxT	L	T	LxT
'F' Test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E.±	0.136	0.236	0.334	0.114	0.198	0.280	0.004	0.008	0.011	0.457	0.792	1.121	0.0013	0.0023	0.0032
C.D. (P=0.05)	0.401	0.694	0.982	0.335	0.580	0.821	0.013	0.024	0.034	1.342	2.325	3.288	0.0039	0.0067	0.0096

Table 3 : Effect of seed soaking treatment on yield attributing characters like no. of pods/plant, seed yield /plant (g) seed yield/m^2 (g) and 100 seed weight (g)

Treatments	No. of pods /plant			100 seed weight (g)			Seed yield /plant(g)			Seed yield / m^2(g)		
	L_1	L_2	Mean	L_1	L_2	Mean	L_1	L_2	Mean	L_1	L_2	Mean
T_0	68.43	48.00	58.21	10.25	10.16	10.20	16.34	13.59	14.97	13.50	10.80	1210
T_1	71.42	55.80	63.61	10.30	10.18	10.24	18.80	15.43	17.11	13.90	12.00	1290
T_2	73.10	57.98	65.54	10.38	10.42	10.40	19.72	15.91	17.81	16.20	13.00	1460
T_3	78.10	66.76	72.43	10.71	10.52	10.61	22.52	17.98	20.25	16.90	13.30	1510
T_4	75.86	63.93	69.90	10.61	10.41	10.51	20.73	16.48	18.60	16.70	13.10	1490
T_5	84.00	69.86	76.93	11.12	10.82	10.97	24.83	18.28	21.56	17.20	13.90	1550
Mean	75.15	60.39		10.56	10.42		20.49	16.28		15.70	12.70	
	L	T	LxT	L	T	LxT	L	T	LxT	L	T	LxT
'F' Test	Sig.	Sig.	Sig.	Sig.	Sig.	NS	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
S.E. $\pm$	0.265	0.459	0.649	0.045	0.078	0.110	0.087	0.150	0.213	0.898	1.556	2.201
C.D. (P=0.05)	0.778	0.778	1.906	0.132	0.228	-	0.255	0.442	0.625	2.696	4.566	6.458

by Dias *et al*. (1996) in Soybean.

Seed yield is the complex character governed by polygenes. In present study it is observed that seed lots and soaking treatments showed significant differences for all yield contributing characters. The favorable increase in yield attributes and seed yield was not directly due to invigoration or soaking treatments. However, the invigoration treatments definitely added for higher and uniform germination and vigour to seedling which might have helped as effect during later period of growth of plant and finally into higher seed yield per plant.

The data given in Table 3 revealed that the number of pods $plant^{-1}$ ranged from 58.21 to 76.93 plant in T_0 and T_5, respectively. The seed soaking treatment T_5 *i.e.* 76.93 pods per plant recorded significantly higher number than control. Similar results were also obtained by Sinclair (1974) and Ganacharya (1979), they reported that fungicidal seed treatment with thiram (2g/kg) increased grain yields by 9.3% over control in Soybean.

Treatment T_5 *i.e.* Vitavax-200 @ 3g/kg of seed, showed Significantly higher yields of *i.e.* 21.56 g/plant followed by T_3 and T_4 recorded 20.25g and 18.60 g/plant, respectively than rest of the treatments. Interaction treatments like L_1T_5 produced 24.83 g/plant seed yield and was significantly higher than remaining interaction.

Seed yield per m^2 followed similar type of pattern as that of seed yield per plant. The interaction effect between seed lot and invigoration treatment L_2T_5 recorded higher seed yield than rest of interaction .These results are also supported by the finding of Gupta and Aneja (2000) and Khan *et al*. (2003).

Invigoration treatment T_5 recorded significantly higher *i.e*. 10.97 g seed weight than T_3 (10.61g) and T_4 (10.51g).

The seed quality parameter recorded after harvest of the crop indicates that effect of pre sowing invigoration treatment remain persisted only up to the harvest, however, it's residual effects are not inherited in next generation. Thus the study suggest that for the improvement in the seed quality parameters, the seed invigoration treatments are essential prior to sowing and also the marginally low grade seed can be improved up to desired (MSCS) level by presoaking treatments of H-D and chemicals and thus planting value can be enhanced in Soybean.

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