

Effect of invigouration treatments on seed quality parameters of soybean

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Received : October, 2010; Accepted : November, 2010

SUMMARY

A field experiment was carried out to evaluate the effect of seed invigouration treatments on seed quality parameters of soybean viz., germination percentage, seed vigour index and field emergence with two different lots of soybean cultivar *i.e.* JS-335 having 72% (L_1) and 57% (L_2) germination. Results revealed that seed invigouration treatments viz., IAA+NAA 10ppm 6 hrs hydration (T_1), IAA+NAA+Thiram *i.e.* T_1 +Thiram (T_2) and GA_3 50 ppm *i.e.* hydration in GA_3 50 ppm for 6 hours+Thiram (T_3) recorded maximum germination percentage, seed vigour index and field emergence. Lot L_1 was superior to lot L_2 in respect of above seed quality parameters. In the present studies, it was noted that the progeny obtained from vigorous seed produced good seed quality parameters and *vice-versa*.

Nair, Deepa P. and Deogirkar, G. V. (2011). Effect of invigouration treatments on seed quality parameters of soybean. *Internat. J. Plant Sci.*, 6 (1): 167-169.

Key words : Invigouration treatments, Germination, Seed vigour index, Field emergence

Soybean [*Glycine max* (L.) Merrill] is an important pulse as well as oil seed crop as it contains high quality protein (43.20%) and about 20% cholesterol free oil. It contains 21% carbohydrates, 0.69% phosphorus, 0.0115% iron, 0.024% calcium, vitamin A, B, C, D, E, K and all other essential amino acids. In India, it ranks third place in production, groundnut and mustard being first and second, respectively. Due to its low water requirement and greater response to applied nitrogen, it is gaining increasing popularity among farmers.

The seedling emergence and their establishment are two important factors affecting yield potential. With good field stand and vigorous plant growth, one can expect desirable level of crop yield. Seed invigouration treatments help to improve germination, seed vigour and ultimately it establishes a good field stand which results in high yield. Therefore, keeping this in view, present study on effect of seed invigouration treatments on seed quality parameters was undertaken.

MATERIALS AND METHODS

The field experiment was conducted at the experimental farm of Department of Agricultural Botany,

Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The experiment was laid out in Factorial Randomised Block Design with three replications, seven treatments on two different lots of soybean cultivar JS-335 viz., Lot L_1 with 72% germination and lot L_2 with 57% germination (Table 1).

Quality tests were conducted in laboratory of seed Technology Research Unit and Department of Agril. Botany, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The germination percentage was calculated by conducting towel paper germination test of control and treated seeds. From each treatment, 100x4 seeds were placed on moist towel paper, covered with another moist paper, wrapped with wax coated paper, rolled properly and kept in seed germinator, at constant temperature (25°C) and 80% relative humidity. First germination count was taken on 4th day and final germination count on 8th day and total was reported as a standard germination.

Seed vigour index was calculated by multiplying per cent normal seedlings with normal seedling dry weight with formula given by Abdul Baki and Aderson (1973). For this on eight days per cent normal seedlings were determined and the seedlings were kept in hot air oven for determining its dry weight. The field emergence count was studied on the experimental plot on 7th day after sowing. Count was taken on each plot. Seedlings were deemed to have emerged once they broke the soil surface.

The treatment details are given below.

T_0 -untreated (control)

T_1 -IAA+NAA (10 ppm, 6hrs hydration)

T_2 -IAA+NAA Thiram

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T₃-Hydration for 16 hours + Thiram (2g kg⁻¹) dry dressing after hydration

T₄-Hydration for 6 hours + Thiram dry dressing after hydration

T₅-GA₃60ppm *i.e.* hydration in GA₃50ppm for 6 hours.

T₆-GA₃50ppm + Thiram *i.e.* T₅ + Thiram

The treatments were applied to each lot as per the treatment details given above. The seed was immersed in weighed quantity of growth regulators, which were firstly dissolved in small quantity of alcohol then volume was made up with distilled water in order to get desired concentrations. Seeds were then dried in drying machine and were immediately dry dressed with thiram.

RESULTS AND DISCUSSION

Data revealed on the effect of seed invigouration treatments on per cent normal seedlings, seed vigour index and field emergence are presented in Table 1. The seed used in the present studies belonged to two lots *i.e.* L₁ with 72% normal seedlings and L₂ with 57% normal seedlings. The seeds of both lots were invigourated with various treatments as detailed earlier.

Germination percentage (per cent normal seedlings):

The data indicated significant in per cent normal seedlings invigouration treatment. Mean per cent normal seedlings of lot L₁ and L₂ showed improvement by 5 to 8 %, respectively. The mean per cent normal seedling of lot L₁ (77.70%) were significantly higher than normal seedlings of lot L₂ (65.10%). The effects of invigouration treatments (T₁ to T₆) recorded significantly higher per

cent normal seedling over control (63.40%). Amongst the treatments, treatments T₁, T₂, T₅ and T₆ were at par and had significantly greater number of normal seedlings than T₃ and T₄. The Treatments T₃ and T₄ were also at par. The interaction effects were non-significant.

Seed vigour index :

Seed vigour index also indicated significant effects between lots and invigouration treatments. The seed of lot L₁ exhibited significantly greater seed vigour index (522.43) than seed of lot L₂ (370.11). All the seed invigouration treatments recorded significantly higher seed vigour index. The treatments T₁, T₂ and T₆ were at par. The treatment T₁ exhibited significantly higher seed vigour index than T₃, T₄ and T₅. The treatments T₅ also exhibited significant superiority over T₃ and T₄. The treatments T₃ and T₄ were at par. Interaction effects were non-significant.

Field emergence:

Data on field emergence showed that lot L₁ recorded significantly higher field emergence (72.47) than lot L₂ (59.14). As regards the seed invigouration treatment given to lots, resulted in non-significant difference. The interaction effects were non-significant. The interactions *viz.*, L₁T₀, L₁T₂, L₁T₆ recorded significantly higher field emergence than L₂T₀. The treatment combinations L₁T₁, L₁T₂, L₁T₅ and L₁T₆ were at par. Thus, it reveals that for field emergence, lot means differed significantly while treatments showed non-significant difference. LxT interactions were significant.

Thus, the results of experiment indicated that the seed fortification provides physiological protection to

Table 1: Effect of seed invigouration treatments on seed quality of soybean

Treatments	Per cent normal seedlings recorded on 8 th day			Seed vigour index			Field emergence per plot		
	L ₁	L ₂	M	L ₁	L ₂	M	L ₁	L ₂	M
T ₀	71.00 (57.43)	55.00 (48.15)	63.40 (52.79)	435.31	264.31	349.82	66.00	49.00	57.50
T ₁	81.00 (64.19)	69.00 (56.18)	75.30 (60.18)	583.53	418.00	500.76	79.00	68.00	73.50
T ₂	82.10 (64.98)	68.00 (55.55)	75.40 (60.26)	583.29	405.78	494.53	76.00	65.00	70.50
T ₃	72.50 (58.38)	62.00 (51.94)	67.40 (55.16)	454.48	328.83	391.66	69.00	54.00	61.50
T ₄	72.70 (58.47)	65.00 (53.73)	68.90 (56.10)	475.09	364.24	419.66	70.33	56.00	63.16
T ₅	81.00 (64.19)	67.00 (54.95)	74.30 (59.57)	552.18	390.97	471.57	72.00	59.00	63.50
T ₆	82.10 (64.98)	69.00 (56.18)	75.90 (60.58)	573.08	418.68	495.88	75.00	63.00	69.00
Mean	77.70 (61.80)	64.10 (53.81)	-	522.43	370.11	-	72.47	59.14	-
	L	T	L x T	L	T	L x T	L	T	L x T
'F' test	Sig.	Sig.	NS	Sig.	Sig.	NS	Sig.	NS	Sig.
S.E. (m) ±	0.358	0.670	0.948	5.128	9.594	13.569	2.853	5.338	7.549
S.D. (P=0.05)	1.024	1.916	--	14.671	27.449	--	8.295	--	21.949

NS=Non-significant

seeds, also it gives protection against stress and acts as an efficient carrier of nutrients and fungicides. The seed invigouration treatments improved per cent normal seedlings, seed vigour index and field emergence indicating usefulness of the treatments. The fortification or

invigouration treatments can thus be helpful to obtain good crop stand through improved germination and seed vigour. The results are in close conformity as reported by Reddy *et al.* (1977) and Bose and Saxena (1999).

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