

Effect of Seed Treatment with Imidacloprid 600 FS on Seed Quality During Storage in Sunflower

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International Journal of Plant Protection, Vol. 2 No. 2 : 167-170 (October, 2009 to March, 2010)

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SUMMARY

A laboratory experiment was conducted to know the effect of seed treatment with imidacloprid 600 FS on the quality of sunflower seeds in storage during 2006-07. Sunflower variety NSP 92-1 E which has been recommended for this region was used for the study. There were six treatments replicated four times in completely randomized block design. The treatments consisted of five dosages of imidacloprid 600 FS @ 2.5, 5.0, 7.5, 10.0 and 12.0 ml/kg of seeds and an untreated check. The seeds treated with respective dosages of insecticides were packed in separate polythene bags of more than 700 gauges and kept under laboratory conditions. The observations on seed germination, seedling length and vigour index were recorded at 15 days after storage and subsequently at monthly interval up to nine months. The results revealed that sunflower seeds treated with imidacloprid 600 FS @ 10 ml/kg seeds could be stored in polythene bag of more than 700 gauges up to eight months without significant reduction in seed quality.

Key words :

Seed treatment,
imidacloprid 600
FS, Storage,
Viability of seeds,
Sunflower

Sunflower (*Helianthus annuus* L.) is one of the important oil seed crops grown in arid and semiarid tropics. However, the yield levels have been low due to its cultivation under resource poor management. Quite often quality seeds and insect pests are the limiting factors for higher yields. Among the insect pests, sucking pests attack the crop in the early growth period and suck the sap resulting in reduced vigour. In addition, *Thrips palmi* (Karny) is known to transmit sunflower necrosis which causes greater loss (Satish *et al.*, 2004). Therefore, the seeds are treated with insecticides before they are packed and stored till marketing. Among the seed treatment, insecticides, imidacloprid 600 FS is one, the efficacy of which has been proven beyond doubt against insect pests in many crops (Joginder Singh *et al.*, 1996; Praveen, 2005; and Lal and Sinha, 2005). Similarly, imidacloprid 600 FS @ 12 ml/kg seeds was effective against termites and foliage pests in pearl millet (Noor, 2003); against wheat pests (Deol and Singh, 2002) and against maize pests (Sharma *et al.*, 2003). Further, according to Singh (2003) seed treatment with imidacloprid 70 WS or 600 FS at 5 and 6 g, respectively was effective against leafhoppers in sunflower. Even though the seed treatment is much safer, convenient, eco-friendly and easily practicable one, much is not known about the viability treated seeds during

its storage. Hence the present studies were under taken to know the influence of various dosages of imidacloprid 600 FS on the quality of seeds during storage.

MATERIALS AND METHODS

A laboratory experiment was conducted in the Department of Seed Science and Technology at UAS, Bijapur Campus during 2006-07 to know the effect of seed treatment with imidacloprid 600 FS on the quality of sunflower seeds in storage. Sunflower variety NSP 92-1 E which has been recommended for this region was used for the study. There were six treatments replicated four times in completely Randomized Block Design. The treatments consisted of five dosages of imidacloprid 600 FS @ 2.5, 5.0, 7.5, 10.0 and 12.0 ml/kg of seeds and an untreated check. The seeds treated with respective dosages of insecticides were packed in separate polythene bags of more than 700 gauges and kept under laboratory conditions. The observations on seed germination, seedling length and vigour index were recorded at 15 days after storage and subsequently at monthly interval up to nine months. The germination was tested using Cabinet Germinator as per ISTA rules (Anonymous, 1996) by adapting rolled towel method. The data on germination per cent was

Accepted :
July, 2009

subjected to arcsine transformations before statistical analysis.

RESULTS AND DISCUSSION

The results of the present investigations are presented in Tables 1, 2 and 3. Seed treatment with imidacloprid 600 FS significantly influenced the seed germination. Among the various concentrations of imidacloprid 600 FS, the germination level was above the minimum seed certification standards (more than 70%) and reduced from 72.4 per cent in imidacloprid 600 FS @ 2.5 ml/kg seeds to 76.2 per cent in imidacloprid 600 FS 12 ml/kg seeds in comparison to 84.3 per cent in untreated check, irrespective of storage periods (Table 1). The storage period also significantly influenced the seed germination. The germination was reduced from 91.4 (first fortnight) to 74.4 and 63.8 per cent, respectively during eighth and ninth months of storage indicating that the seeds failed to meet minimum seed certification standards after nine months of storage irrespective of concentrations. The

interaction due to storage period and imidacloprid concentrations varied significantly. In all the concentrations of imidacloprid 600 FS (2.5, 5.0, 7.5, 10.0 and 12.5 ml/kg seeds) the germination level was above the minimum seed certification standards (more than 70%) up to eighth month of storage and at ninth month after storage the germination was below 70 per cent (Table 1). At eighth month after storage the seed treatment with imidacloprid 600 FS @ 2.5 ml/kg seeds recorded 75.0 per cent germination and decreased with increase in concentrations up to 12 ml/kg seeds (72.0%) as compared to untreated check (79.0%). Germination of sorghum seeds was unaffected by the seed treatment with imidacloprid 70 WS @ 10 g/kg seeds and effective in controlling the shoot fly (Balikai, 2007). The seedling length and vigour index were also significantly influenced by the imidacloprid concentrations. All the five concentrations were highly significant over untreated check. However, increased concentrations significantly reduced the seedling length (31.4 cm) and vigour index

Table 1 : Effect of seed treatment with Imidacloprid 600 FS on seed germination during storage in sunflower

Treatment	Germination percentage after storage of seeds for										Mean
	15 days	1 month	2 month	3 month	4 month	5 month	6 month	7 month	8 month	9 month	
Imidacloprid 600 FS @ 2.5 ml/kg seed	92.5 (74.1)	91.0 (73.1)	90.0 (72.1)	81.5 (72.0)	81.0 (72.6)	78.0 (74.1)	78.0 (72.5)	77.0 (72.5)	75.0 (70.6)	65.5 (70.1)	80.90 (72.4)
Imidacloprid 600 FS @ 5.0 ml/kg seed	91.0 (70.1)	91.5 (68.4)	90.5 (71.0)	82.0 (71.5)	80.5 (72.0)	77.5 (70.6)	76.5 (66.4)	74.0 (66.0)	74.5 (64.5)	63.5 (64.9)	80.1 (68.7)
Imidacloprid 600 FS @ 7.5 ml/kg seed	90.5 (64.5)	89.0 (64.9)	89.0 (64.5)	81.5 (64.9)	81.5 (65.2)	77.5 (68.8)	76.0 (64.1)	73.5 (63.8)	72.5 (64.5)	61.0 (67.6)	79.2 (64.9)
Imidacloprid 600 FS @ 10.0 ml/kg seed	90.5 (63.0)	88.5 (62.4)	84.0 (67.6)	80.0 (62.0)	79.5 (61.6)	77.0 (61.7)	76.0 (61.3)	74.0 (60.0)	73.5 (65.2)	60.0 (62.4)	78.3 (61.5)
Imidacloprid 600 FS @ 12.0 ml/kg seed	91.0 (62.0)	86.5 (59.6)	83.5 (59.3)	80.0 (62.4)	78.5 (60.0)	75.0 (64.1)	75.0 (61.3)	73.0 (59.3)	72.0 (59.0)	55.0 (59.6)	76.2 (60.5)
Untreated control	92.5 (59.3)	89.5 (58.6)	90.5 (63.4)	85.0 (60.0)	85.5 (59.6)	82.5 (58.3)	81.0 (59.3)	80.0 (58.6)	79.0 (62.7)	78.0 (62.0)	84.3 (55.7)
Mean	91.4 (65.5)	89.3 (64.5)	87.9 (66.3)	81.6 (65.5)	81.0 (65.2)	77.9 (66.3)	77.0 (64.2)	75.2 (63.3)	74.4 (65.7)	63.8 (64.4)	79.9 (63.9)

For comparing the means of	S. E. \pm	C.D. (P=0.05)
Imidacloprid	0.54	1.94
Storage period	0.43	1.22
Interaction at same level	1.06	2.99
Interaction at different level	1.14	3.22

*Figure in parenthesis indicate Arc sine values

(2540) and from lower dosage of imidacloprid 600 FS @ 2.0 ml/kg seeds to higher concentration of imidacloprid 600 FS @ 12.0 ml/kg with seedling length of 22.8 cm and vigour index of 1753 as compared to 32.6 cm and 2748 in

untreated check (Tables 2 and 3). The interaction due to concentration and storage was also significant. Thus, the sunflower seeds treated with imidacloprid 600 FS @ 10 ml/kg seeds could be stored in polythene bag of more

Table 2 : Effect of seed treatment with Imidacloprid 600 FS on seedling length during storage in sunflower

Treatment	Seedling length (cm) after storage of seeds for										Mean
	15 days	1 month	2 month	3 month	4 month	5 month	6 month	7 month	8 month	9 month	
Imidacloprid 600 FS @ 2.5 ml/kg seed	35.0	34.0	34.0	33.0	33.5	32.0	30.0	29.0	28.0	26.0	31.4
Imidacloprid 600 FS @ 5.0 ml/kg seed	32.0	31.0	30.0	29.5	28.5	27.0	26.0	25.0	24.5	24.0	27.7
Imidacloprid 600 FS @ 7.5 ml/kg seed	29.5	28.5	28.0	28.0	27.5	25.5	25.0	24.0	24.0	23.0	26.3
Imidacloprid 600 FS @ 10.0 ml/kg seed	29.0	26.5	26.0	25.5	24.5	24.0	24.0	23.0	22.0	22.0	24.6
Imidacloprid 600 FS @ 12.0 ml/kg seed	30.0	24.5	24.0	22.5	22.0	22.0	22.0	21.0	20.5	20.0	22.8
Untreated control	36.0	35.0	35.0	34.0	34.0	33.0	31.5	30.0	29.5	28.0	32.6
Mean	31.9	29.9	29.5	28.2	28.3	27.3	26.4	25.3	24.7	23.8	27.5

For comparing the means of	S. E. \pm	C.D. (P=0.05)
Imidacloprid	0.46	1.66
Storage period	0.64	1.82
Interaction at same level	1.57	4.45
Interaction at different level	1.56	4.42

Table 3 : Effect of seed treatment with Imidacloprid 600 FS on seedling vigour index during storage in sunflower

Treatment	Seedling vigour index after storage of seeds for										Mean
	15 days	1 month	2 month	3 month	4 month	5 month	6 month	7 month	8 month	9 month	
Imidacloprid 600 FS @ 2.5 ml/kg seed	3337	3094	3060	2689	2713	2496	2340	2233	2100	1703	2540
Imidacloprid 600 FS @ 5.0 ml/kg seed	2912	2836	2715	2419	2294	2092	1989	1850	1825	1524	2218
Imidacloprid 600 FS @ 7.5 ml/kg seed	2669	2536	2498	2282	2241	1976	1900	1764	1740	1403	2082
Imidacloprid 600 FS @ 10.0 ml/kg seed	2624	2345	2184	2040	1947	1848	1824	1702	1617	1320	1926
Imidacloprid 600 FS @ 12.0 ml/kg seed	2730	2119	2004	1800	1727	1650	1650	1533	1476	1600	1753
Untreated control	3330	3132	3167	2890	2907	2722	2551	2400	2330	2184	2748
Mean	2915	2670	2603	2353	2304	2130	2042	1913	1848	1539	2231

For comparing the means of	S. E. \pm	C.D. (P=0.05)
Imidacloprid	37.14	135.0
Storage period	66.22	187.7
Interaction at same level	162.22	459.9
Interaction at different level	158.31	448.9



Plate 1 : Untreated and treated seeds showing uniform germination of sunflower seeds

than 700 gauges up to eight months without significant reduction in seed quality having germination of 73.5 per cent (Plate 1).

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