International Journal of Plant Protection, **Vol. 1 No. 2 : 54-57 (Oct. 2008)**

Efficacy of fungicidal seed treatment on incidence of grain mould in sorghum

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Accepted : ***August, 2008***

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ABSTRACT

Ten varieties of sorghum [*Sorghum bicolor* (L.) Monech.] with three fungicidal seed treatments were examined to find out the best fungicidal treatment on mould situation of grain in rainy season. The seeds treated with thiram + carbendazim (0.2%) showed better results, where the minimum infection of *Fusarium* sp. was found in genotype IS-14332 (7.53%) x physiological maturity and *Curvularia* spp. in SPH-1445 (21.33%) x physiological maturity than the seed treated with thiram and carbendazim, separately.

Key words : *Fusarium* sp., *Curvularia* sp., Grain mould, Fungicideds, Sorghum.

Sorghum [*Sorghum bicolor* (L.) Moench.] is the second largest grain crop in India. In Asia, sorghum is extensively cultivated in India, China, Yemen, Pakistan and Thailand (Anonymons, 2001). But the Sorghum has behind in case of yield because of so many factors. Among these factors diseases are one of the important constraints in the quality production of sorghum. A number of diseases attack on sorghum like grain mould, charcol rot, downy mildew, anthracnose and sorghum viral diseases (Frederiksen, 1982) out of that grain mould is a major problem at maturity. The grain becomes discoloured such as black (*Curvularia* sp.) and pink (*Fusarium* sp.). The effect of moulds on grain may include discoloured pericarp, relative sprouting and presence of mycotoxins (Somani *et al.*, 1999 and Sawant, 2000). The losses due to mould in sorghum is up to 50 per cent (Sundaram *et al*., 1972). Grain mould results in reduction of market value, germination and acceptability of grains for human consumption. Numerous fungal species are assoicated with deterioted grains *viz*. *Fusarium Curvualria* and *Alternaria* (Castor, 1977; Sharma *et al*., 1976). Among that species of *Fusarium* and *Curvularia* were found to cause the infection (Tar, 1962; Junejo and Malik, 1967; Mathur, *et al*., 1964; Reddy and Reddy, 1977, Gaymukhe, 1984).

However, as new sorghum genotypes are coming up, it is necessary to harvest the crop timely because the harvest of sorghum genotypes plays and important role in occurrence and severity of grain mould infection (Kumar *et al*., 1991; Garud *et al*., 1998 and Gaikwad *et al*., 2000.). Hence, the present investigation has been taken to study the effect of fungicidal seed treatments on grain mould incidence of sorghum.

MATERIALS AND METHODS

The experiment was conducted at Sorghum Research Station, Marathwada Agricultural University, Parbhani to find out the best fungicidal treatment on mould situation of grain in *kharif* season. Ten verities of sorghum were selected with three treatments *viz.* Thiram (Hexathir) @ 0.1%, Carbendazim (Bavistin) @ 0.1% and Thiram + Carbendazim @ 0.2% and untreated control. The experiment was laid out in Factorial Randomized Block Design with three replications with 45 x 15 cm spacing. Data on per cent incidence at physiological maturity stage and maturity stage have been recorded. The per cent infection of grain mould was recorded by using blotter paper method. For that purpose, a lot of one hundred apparently healthy seeds of each genotype at different harvesting stages, at physiological maturity and maturity stage was treated with the fungicides and all the seeds were placed on blotter paper. Second lot of 100 apparently healthy seed of same genotypes harvested at different harvesting stages were used as untreated control. Seeds were placed on blotter paper for comparison. The material was incubated at 28^0c + 1^0c and exposed for 12 hours to light and 12 hours to dark. After 7 days the observations were recorded.

RESULTS AND DISCUSSION

Data presented in Table 1 indicate that the treatment of thiram + carbendazim was significantly superior over untreated control where the *Fusarium* sp. infection was increased from 8.50% to 15.00% and in the variety IS-14332 and CSH-9, respectively. Also *Curvularia* sp. infection was increased from 24.16% to 29.33% in the variety SPH-1457 and IS-14332, respectively. The second promising treatment was seed treated with thiram in which

Table 1: Effect of fungicidal seed treatments on the mould incidence in different genotypes at different harvesting stages by using blotter paper method

Sr. No.	Fungicides / Genotype	Thiram (0.1% conc.)		Carbendazim (0.1 %conc.)		Thiram + Carbendazim ((0.2 % conc.)		Untreated control	
		Fusarium sp.	*Curvularia* sp.	*Fusarium* sp.	*Curvularia* sp.	*Fusarium* sp.	*Curvularia* sp.	*Fusarium* sp.	*Curvularia* sp.
1.	SPH-1441	13.00	30.60	14.66	34.00	10.83	27.83	35.16	50.66
2.	SPH-1443	15.00	27.16	16.83	31.83	12.60	25.00	40.83	51.00
3.	SPH-1445	12.00	28.83	14.00	32.33	10.16	25.83	36.83	51.66
4.	SPH-1448	14.16	31.66	17.00	35.16	10.50	28.50	42.66	49.66
5.	SPH-1451	13.10	29.89	15.50	33.66	10.50	26.50	40.16	52.66
6.	SPH-1455	12.16	29.33	16.33	33.50	10.00	26.16	39.50	53.16
7.	SPH-1457	18.16	26.83	20.16	30.83	13.50	24.16	49.16	49.60
8.	CSH-9	20.33	29.00	23.16	32.83	15.00	26.00	50.66	49.60
9.	CSH-16	17.33	30.83	19.66	34.33	13.66	27.66	49.50	48.00
10.	IS-14332	10.00	33.16	11.80	38.16	8.50	29.33	16.00	56.33
	S.E. ±	0.43	0.67	1.00	0.94	0.39	0.64	1.00	1.47
	C.D. (P=0.05)	1.21	1.87	2.78	2.62	1.09	1.78	2.77	4.08
	Average mean	14.53	29.73	16.91	33.66	11.53	26.70	40.50	51.25
	Physiological maturity stage	12.06	25.93	13.60	29.60	9.73	23.06	36.46	46.80
	maturity stage	17.00	33.53	20.23	37.70	13.33	30.33	43.63	55.60
	S.E. ±	0.19	0.30	0.44	0.42	0.17	0.28	0.44	0.65
	C.D. (P=0.05)	0.54	0.83	1.24	1.17	0.48	0.49	1.24	1.82

the infection of *Fusarium* sp. was minimum in IS-14332 (10.00%) and maximum in CSH-9 (20.33%). The infection of *Curvularia* sp. was minimum in SPH-1457 (26.83%) and maximum in IS-14332 (38.16%). In carbendazim the minimum *Fusarium* sp. infection was observed in IS-14332 (11.80%) and maximum infection was observed in CSH-9 (23.16%) which was higher than other genotype. In case of *Curvularia* sp., infection was significant. Minimum *Curvularia* sp. infection was observed in SPH-1457 (30.83%), which was at par with SPH-1443 (31.83%), SPH-1445 (32.33%), CSH-9 (32.83%) genotypes and also lowest as compared to untreated control. The result indicated that highest infection percentage was observed in treatment of thiram + carbendazim was significantly superior over all other treatments. Similar results were reported by Singh and Agarwal (1989) and Somani *et al.* (1993).

Interaction effect of thiram seed treatment on *Fusarium* sp. infection was statistically significant. Minimum infection was found in genotype IS-14332 (8.66%) x physiological maturity, which was less as compared to other genotypes and untreated control (Table 2). Maximum infection was observed in CSH-9 (24.00%) x maturity stage. In *Curvularia* sp. infection was statistically significant, where the lower infection was found in genotype SPH-1457 (24.00%) x physiological

Table 2: Effect of fungicidal seed treatment of thriam + carbendazim on mould incidence of different genotypes in different harvesting stages

Sr. No.	Genotypes	*Fusarium* sp.		*Curvularia* sp.	
		Physiological maturity stage	Maturity stage	Physiological maturity stage	Maturity stage
1.	SPH-1441	8.00	13.66	24.33	31.33
2.	SPH-1443	9.66	15.66	23.33	26.66
3.	SPH-1445	8.33	12.00	21.33	30.33
4.	SPH-1448	10.00	11.00	23.66	33.33
5.	SPH-1451	8.66	12.33	22.66	30.30
6.	SPH-1455	8.33	11.66	23.60	28.66
7.	SPH-1457	12.33	14.66	21.60	26.66
8.	CSH-9	12.60	17.33	22.00	30.00
9.	CSH-16	12.00	15.33	23.00	32.33
10.	IS-14332	7.33	9.66	25.00	33.66
	S.E. ±	0.17		0.28	
	C.D. (P=0.05)	0.48		0.79	

Table 3 : Effect of fungicidal seed treatment of thriam on mould incidence of different genotypes in different harvesting stages

Sr. No.	Genotypes	*Fusarium* sp.		*Curvularia* sp.	
		Physiological maturity stage	Maturity stage	Physiological maturity stage	Maturity stage
1.	SPH-1441	9.33	16.66	27.66	33.66
2.	SPH-1443	11.33	18.66	24.33	30.60
3.	SPH-1445	10.33	13.66	24.66	33.00
4.	SPH-1448	12.00	16.60	26.33	37.00
5.	SPH-1451	11.33	15.00	26.00	33.66
6.	SPH-1455	9.66	14.66	27.00	31.66
7.	SPH-1457	15.66	20.66	24.00	29.60
8.	CSH-9	16.60	24.00	24.66	33.33
9.	CSH-16	15.66	19.00	25.66	36.00
10.	IS-14332	8.66	11.33	29.00	37.33
	S.E. ±	0.19		01.30	
	C.D. (P=0.05)	0.54		2.96	

maturity which was at par with genotype SPH-1443 (24.33%), SPH-1445 (24.66%) and CSH-9 (24.66%) x physiological maturity stage, on the contrary the highest infection was observed in genotype IS-14332 (37.33%) x maturity stage which were par with genotype SPH-1448 (37.00%) x maturity stage and lower than untreated control (Table 2). Similarly, Kumar *et al.* (1991), Garud *et al.* (1998), Gaikwad *et al.* (2000), Magar (2003) reported that the minimum seed mycoflora infection was observed at physiological maturity than maturity stage.

The data of Table 3 showed that the effect of *Fusarium* sp. and *Curvularia* sp. were statistically significant. Deshmukh *et al.* (1994) and Ingle *et al.* (1994) have reported that the seed treatment with thiram + carbendazim was found significantly superior than rest of the treatments. Here, the minimum infection of *Fusarium* sp. was found in genotype IS-14332 (7.53%) x physiological maturity, which was superior over rest of the genotypes and also as compared to untreated control. The next minimum infection was observed in SPH-1441 (8.00%), SPH-1445 (8.33%) x physiological maturity stage and at par with each other. The maximum infection was found in CSH-9 (17.33%) x maturity stage. In *Curvularia* sp. the infection was found minimum in genotype SPH-1445 (21.33%) x physiological maturity, it was lower than rest of the genotypes and at par with SPH-1457 (21.60%), CSH-9 (22.00%) x physiological maturity stage. The maximum *Curvularia* sp. infection was observed in genotype IS-14332 (33.66%) x maturity stage, which was at par with SPH-1448 (33.33%) x maturity stage.

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REFERENCES

Anonymous (2001). Agriculture Statistics of India, 2000 Ministry of Agriculture Government of India. New Delhi.

Castor, L.L. (1977). Seed molding of sorghum grain development of high yielding and disease resistant sorghum cultivars. Third Annual Progress Report, Agril. Experiment Station, College Station. TAES-US/AID, contract act 1092, Texas.

Deshmukh, P.P., Raut, J.G. and Khan, Y.D. (1994). Effect of *Trichoderma* species and fungicides on fungi of *Sorghum bicolor. Indina J. Agric. Sci*., **64 (3) :** 205-206.

Frederiksen, R.A. (1982). Disease problem in sorghum. ICRISAT Sorghum in eighties. Proc. on the International Symp. on sorghum, 2-7 Nov., 1981 Patancheru, A. P. India : 263 p.

Gaikwad, M.S., Wadibhasme, S.S., Atale, S.B. and Deshmukh, P.W. (2000). Effect of delayed harvesting on infestation of grain moulds on sorghum. Paper presented in National Seminar on 'Sorghum under different Agro-ecological systems and its industrial utilization', March 1-2, 2000, 40-41pp.

Garud, T.B., Shinde, B.M., Syed, Ismail and Aglave, B.N. (1998). Effect of delayed harvesting on grain mould development in Sorghum. *Internat. Sorghum and Millet Newsletter*, **41:** 54.

Gaymukhe, A.D. (1984). Significance of *Curvularia lunata* and *Fusarium moniliforme* in seed sorghum and their control. M.Sc. (Ag.), Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.).

Ingle, R.W., Somani, R.B., Wanjari, S.S., Patil, D.B. and Potdukhe, N.R. (1994). Effect of preharvest sprays and seed treatment on seed mycoflora and germination in sorghum (cv. 296 B). *Crop. Res.*, **8 (3) :** 578-581.

Junejo, V.A.K. and Malik, M.S. (1967). Studies on microflora associated with sorghum seed: survey, isolation and pathogenicity. *W. Pak. J. Agric. Res.*, **5(4) :** 81-82.

Kumar, L.S., Prakash, S.H., Shetty, H.S. and Mallieshi, N.G. (1991). Influence of seed mycoflora and harvesting conditions on milling, popping and malting qualities of sorghum (*Sorghum bicolor*). *J. Sci. Food Agri.*, **55 (4) :** 617-625.

Magar, S.J. (2003). Occurence of mould flora at different grain development stages in sorghum. M.Sc. Thesis, M.A.U., Parbhani.

Mathur, R.M. and Sehgal, S.P. (1964). Fungal microflora of seeds of Jowar (*Sorghum vulgare*), its role in reducing emergence of seedling and control. *Indian Phytopath*., **17 :** 227-223.

Reddy, A.G.R. and Reddy, R.V. (1977). Studies on grain moulds in sorghum. *Sorghum and Millets Newsletter*, **20 :** 10.

Sawant, L.V. (2000). Effect of grain mould fungi on physiological and nutritional qualities of grains in sorghum M.Sc. (Ag.). Thesis M.A.U., Parbhani (M.S.).

Sharma, H.N., Jain, K. and Agarwal, R.K. (1976). Effect of seed treatment with fungicides alone and in combination with carbofuron on stand and yield of *Sorghum bicolor* (L.) Moench. *J. N. K. V. V. Res. J.*, **10 :** 83-84.

Singh, D.P. and Agarwal, V.K. (1989). Effect of different degrees of grain moulds infection on yield and quality of sorghum seed. *Indian J. Plant Pathol.* , **7 (2) :** 103-108.

Somani, R.B., Potdukhe, N.R., Shekhar, V.B., Wadhokar, R.S. and Jilani, S.K. (1993). A study on germination and seed mycoflora of sorghum as influenced by fungicidal seed treatment. *J. Mah. Agric Univ.*, **18 (3) :** 475-476.

Somani, R.B. and Indira, S. (1999). Effect of grain mould on grain weight in sorghum. *J. Mycol. Pl. Pathol*., **29 (1) :** 22-24.

Sundaram, N.V., Talmer, L.T., Nagranjan, K. and Prescott, J.M. (1972). Disease survey of sorghum and millets in India. *Plant Dis. Report*., **56 :** 740-743.

Tar, S.A.J. (1962). Diseases of sorghum, Sudan grass and broom corn. Commonwealth Mycological Institute, Kew, Surrey:380 pp.

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