Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 2521-2526

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7692 **Special Issue-6 pp. 2521-2526**
Journal homepage: http://www.ijcmas.com

Original Research Article

Efficacy of Seed Dressing Fungicides against Major Seed borne Fungi of Sunflower

A. P. Suryawanshi[1*], A. C. Patil[2], K. A. Anbhule[3], S. S. Hurule[1] and R. B. Raner[1]

[1]Department of Plant pathology, College of Agriculture, Latur- 413512 (MS), India
[2]Vasantrao Naik Marathwada Krishi Vidyapeeth, Parabhani, Maharashtra, India
[3]Department of Botany, Badrinarayan Barwale College of Arts & Science, Jalana, India
**Corresponding author*

Keywords

Sunflower, Seed borne, *Alternaria alternata*, *Fusarium oxysporum*, Fungicides, Inhibition

A B S T R A C T

Sunflower (*Helianthus annuus* L.) crop is attacked by a variety of seed and soil borne fungal pathogens as well as other pathogens, under field conditions as well as during storage, causing economical losses. Therefore, present *in vitro* study was planned in CRD with 10 treatments replicated, to assess the efficacy of seed dressing fungicides against major seed borne pathogenic fungi of sunflower, at the Department of Plant Pathology, College of Agriculture, Latur (Maharashtra), during 2016-17. Results revealed that all of the nine seed dressing fungicides tested exhibited significant mycelial growth inhibition of two major seed borne fungi *viz.*, *Alternaria alternata* and *Fusarium oxysporum* of sunflower. However, the fungicides *viz.*, thiophanate methyl 70% WP (@ 0.1%), benomyl 50% WP (@ 0.2%), carbendazim 50% WP (@ 0.1 %), thiram 75% WP (@ 0.2%), mancozeb 75% WP (@ 0.25%), carbendazim 25% + mancozeb 50% (@ 0.25%) and carboxin 37.5% + thiram 37.5% (@ 0.25%) resulted with 100 per cent mycelial growth inhibition of both test pathogens. Rest of the fungicides also were found effective.

Introduction

Sunflower (*Helianthus annuus* L.) is one of the popularly grown oilseeds crop, for edible oil. The crop is prone to be attacked by a variety of seed and soil borne fungal pathogens as well as other pathogens.

Under field conditions and during storage, sunflower seeds are infected by several pathogenic and saprophytic fungi (externally, internally or both), which may lead to accountable quantitative as well as qualitative losses (Gosal *et al.*, 1988).

Some of the major seed borne pathogenic fungi in sunflower are: *Alternaria alternata*, *A. helianthi*, *Plasmopara halstedii*, *Macrophomina phaseolina*, *Botrytis cinerea*, *Rhizoctonia solani*, *Sclerotinia sclerotium*, *Fusarium oxysporum*, *Aspergillus niger*, *A. flavus* etc., (Mathur and Manandhar, 2003; Sangawan *et al.*, 2005; Afzal *et al.*, 2010).

Therefore, present study was planned and conducted to assess the efficacy of seed dressing fungicides against major seed borne pathogenic fungi of sunflower, at the Department of Plant Pathology, College of Agriculture, Latur (Maharashtra), during 2016-17.

Materials and Methods

Isolation and pathogenicity of seed borne fungi

Previous season stored seeds of sunflower Hyb. LSFH-171 and Var. Morden were collected from Oilseeds Research Station, Latur. These seeds were plated aseptically onto autoclaved and cooled Potato Dextrose Agar medium, in separate sterile glass petri plates and incubated at room temperature. After a week of incubation, various fungal colonies developed on PDA plates were observed under stereomicroscope, distinguished on the basis of colony colour and growth habit, further re-isolated on fresh PDA plates and incubated at room temperature. Based on morpho-cultural characteristics and microscopic observations, the most predominant fungi identified were *Alternaria alternata* and *Fusarium oxysporum.* The pathogenicity of both fungi was proved by seed inoculation and standard blotter paper techniques, by using the surface sterilized (2% Sodium hypochlorite solution) seeds of sunflower Hyb. LSFH-171 and Var. Morden.

In vitro evaluation of seed dressing fungicides

Efficacy of nine seed dressing fungicides was evaluated at their recommended dosages against *Alternaria alternata* and *Fusarium oxysporum,* by applying Poisoned food technique (Nene and Thapliyal, 1993) and using Potato Dextrose Agar (PDA) as basal culture medium. Two separate experiments, one each for *A. alternata* and *F. oxysporum* were planned in Completely Randomized Design (CRD), with ten treatments replicated thrice. Observations on radial mycelial growth/colony diameter were recorded at 24 hrs interval and continued till the untreated control plates were fully covered with mycelial growth of the test fungus. Per cent mycelial growth inhibition of *A. alternata* and *F. oxysporum,* over untreated control was calculated by applying following formula (Vincent, 1927).

$$\text{Per cent inhibition} = \frac{C - T}{C} \times 100$$

Where,

C = growth of the test fungus in untreated control plate

T = growth of the test fungus in treated plate

The data obtained was statistically analyzed (Panse and Sukhatme, 1978).

Results and Discussion

The results (Table 1, PLATE 1A & B, Fig. 1) obtained on per cent mycelial growth inhibition of *A. alternata* and *F. oxysporum* revealed that all of the nine seed dressing fungicide tested found effective and resulted with significant mycelial growth inhibition, over untrated control, of both the test pathogens. However, the fungicides *viz*., thiophanate methyl 70% WP (@ 0.1%), benomyl 50% WP (@ 0.2%), carbendazim 50% WP (@ 0.1 %), thiram 75% WP (@ 0.2%), mancozeb 75% WP (@ 0.25%), carbendazim 25% + mancozeb 50% (@ 0.25%) and carboxin 37.5% + thiram 37.5% (@ 0.25%) resulted with 100 per cent inhibition of both test pathogens. These fungicides were followed by Mancozeb 75% WP (@ 0.25%), which caused cent per cent mycelial growth inhibition in *A. alternata* and 35 % inhibition in *F. oxysporum,* Carboxin 75%WP (@ 0.25%) and captan 75% WP (@ 0.3%) caused mycelial growth inhibition of 69.60% and 66.50 % in *A. alternata* and 69.20 % and 60.00 % in *F. oxysporum,* respectively.

Table.1 *In vitro* efficacy of various fungicides against *A. alternata* and *F. oxysporum* associated with sunflower seeds

Tr. No.	Treatments	Conc.	Inhibition* (%)	
			A. alternata	*F. oxysporum*
T_1	Benomyl 50%WP	0.2%	100 (90.00)	100 (90.00)
T_2	Thiophanate methyl 70%WP	0.1%	100 (90.00)	100 (90.00)
T_3	Carboxin 75%WP	0.25%	69.60 (56.54)	69.20 (56.29)
T_4	Carbendazim 50%WP	0.1%	100 (90.00)	100 (90.00)
T_5	Thiram 75%WP	0.2 %	100 (90.00)	100 (90.00)
T_6	Captan 75%WP	0.3%	66.50 (54.63)	60.00 (50.77)
T_7	Mancozeb 75%WP	0.25%	100 (90.00)	35.00 (36.27)
T_8	Carbendazim 25% + Mancozeb 50% (75%WP)	0.25%	100 (90.00)	100 (90.00)
T_9	Carboxin 37.5% + Thiram 37.5% (75%WP)	0.25%	100 (90.00)	100 (90.00)
T_{10}	Control (Untreared)	-	00.00 (00)	00.00 (00)
SE±		-	**0.44**	**1.30**
CD (P=0.01%)		-	**1.31**	**3.74**

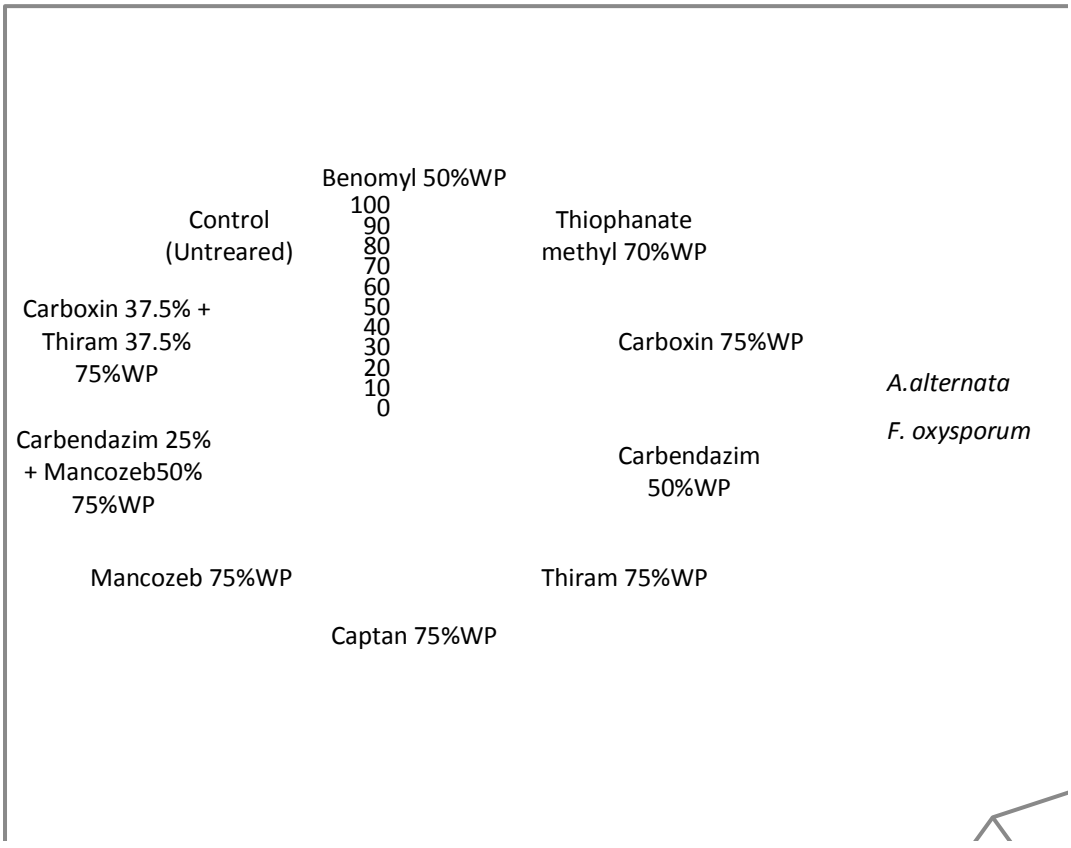
*: Mean of three replications. Figures in parentheses are Arcsine values

Plate.1 *In vitro* evaluation of various fungicides against *Alternaria alternata* (A) and *Fusarium oxysporum* (B)

(A)

(B)

Fig.1 *In vitro* efficacy of various fungicides against *A. alternate* and *F. oxysporum* associated with sunflower seeds



Thus, except the fungicides carboxin 75% WP and captan 75% WP at their recommended dosage, rest of the seven seed dressing fungicides tested were found highly effective against *A. alternata* and *F. oxysporum*, except Mancozeb 75% WP, which was found ineffective in *F. oxysporum.*

The seed dressing fungicides *viz*., thiophanate methyl 70% WP, benomyl 50%, carbendazim 50% WP, thiram 75% WP, mancozeb 75% WP, carbendazim 25% + mancozeb 50% and carboxin 37.5% + thiram 37.5%, carboxin 75% WP, captan 75% WP etc., at their recommend dosages as well as at various concentrations were reported as most effective against many seed and / or soilborne pathogenic fungi, earlier by several workers (Singh *et al.,* 2003; Mathivana and Prabhabathy, 2007; Mesta *et al.,* 2009; Murumkar *et al.,* 2009; Bavaji *et al.,* 2012; Sahar *et al.,* 2013; Kumari *et al.,* 2014; Somu *et al.,* 2014; Patil *et al.,* 2015; Thejakumar and Devappa, 2016; Jakatimath *et al.,* 2017).

Mathivanan and Prabhavathy (2007) reported cent per cent mycelial growth inhibition of *A. helianthi* with the combi - fungicide carbendazim 12% + mancozeb 63%. Kumari *et al.,* (2014) reported that combi - fungicide carbendazim 12% + mancozeb 63% (@ 0.3%) resulted with significantly highest mycelial growth inhibition (97.44%) of *Fusarium oxysporum* f. sp. *cubense* causing banana wilt. Thejakumar and Devappa (2016) reported cent per cent mycelial growth inhibition of *A. alternata* with carbendazim 12% + mancozeb 63%. (@ 2000 ppm). Jakatimath *et al.,* (2017) reported the fungicides difenconazole 25% EC and tebuconazole 26% EC (each @ 0.2%) resulted with cent per cent mycelial growth inhibition of *A. alternata,* causing fruit rot of brinjal.

Thus, two major pathogenic seed borne fungi *viz., Alternaria alternata* and *Fusarium oxysporum* of sunflower can be managed efficiently with the seed dressing fungicides *viz.,* thiophanate methyl 70% WP, benomyl 50%, carbendazim 50% WP, thiram 75% WP, mancozeb 75% WP, carbendazim 25% + mancozeb 50% and carboxin 37.5% + thiram 37.5%, carboxin 75% WP, captan 75% WP etc.

References

Afzal, R., Mughal, S. M., Munir, M., Sultana, K., Qureshi, R., Arshad, M. and Laghari, M. K. 2010. Mycoflora associated with seeds of different sunflower cultivars and its management. *Pak. J. Bot.* 42(1): 435-445.

Bavaji, M., Khamar, M. D. and Nath, M. M. 2012. *In vitro* evaluation of fungicides and plant extracts on the incidence of leaf blight on sesame caused by *Alternaria alternata* (FR) Keissler. *Internat. J. Food Agric. Vet. Sci*. 2(3): 105-107.

Gosal, S. S., Vasiljevic, L. and Brar, D. S. 1988. Plant biotechnology and sunflower improvement. *Proceedings of 12th Int. Sunflower Conf. Novisad, Yugoslavia*. 599 pp.

Jakatimath, S. P., Mesta, R. K., Biradar, I. B., Mushrif, S. K. and Ajjappalavar, P. S. 2017. *In vitro* evaluation of fungicides, botanicals and bio-agents against *Alternaria alternata* causal agent of fruit rot of brinjal. *Int. J. Curr. Microbiol. App. Sci.* 6: 495-504.

Kumari, A., Kumar, R. and Kumar, H. 2014. Efficacy of fungicides and *Trichoderma viride* against *Fusarium oxysporum* f. sp. *cubense in-vitro*. *The Bioscan*. 9: 1355-1358.

Mathivanan, N. and Prabhavathy, V. R. 2007. Effect of carbendazim and

mancozeb combination on Alternaria leaf blight and seed yield in sunflower (*Helianthus annuus* L.). Arch. *Phytopath. Pl. Prot*. 40(2): 90-96.

Mathur, S. B. and Manadhar, H. K. 2003 Fungi in seeds recorded at the Danish government institute of seed pathology for developing countries. Danish government institute of seed pathology for developing countries, Copenhagen, Denmark.

Mesta, R. K., Benagi, V. I., Kulkarni, S. and Shankergoud, I. 2009. *In vitro* evaluation of fungicides and plant extracts against *Alternaria helianthi* causing blight of sunflower. *Karnataka J. Agric. Sci*. 22(1): 111-114.

Murumkar, D. R., Indi, D. V., Gud, M. A., Shinde, S. K and Despande, A. N 2009. Fungicidal management of leaf spot of safflower caused by *Alternaria carthami*. *J. Maharastra Agri. Univ.*, 34(1): 54-56.

Nene, Y. L. and Thapliyal, R. N. 1993. Fungicides in plant disease control 3rdedition, IBH Pub. Co. New Dehli, India, pp 225.

Panse, V. G. and Sukhatme, P. V. 1978 Statistical methods for agricultural workers (3rd ed.). ICAR, New Delhi Pub: 157-165.

Patil, V. B., Gawade, D. B., Suryawanshi, A. P. and Zagade, S. N. 2015. Biological and fungicidal management of chickpea wilt caused by *Fusarium oxysporum* f. sp. *ciceri*. *The Bioscan*.10:685-690.

Sahar, O., Sahi, S.T. Jabbar, A., Rehman, A., Riaz, K. and Hannan, A. 2013. Chemical and biological management of *Fusarium oxysporum* f. sp. *melogenae. Pakistan J. Phytopath*. 25:155-159.

Sangawan, M., Mehata, M. and Saharanm, G. 2005 Diseases of oilseed crops. *Indus Publication. Co. India.*

Singh, S. D., Swami, S. D. and Rawal, P. 2003. Seed mycoflora of pearl millet (*Pennisetum glaucum*) and its control. *Pl. Dis. Res.* 18(2): 115-118.

Somu, R., Thammaiah, N., Swamy, G. S. K., Kulkarni, M. S. and Devappa, V. 2014. *In vitro* evaluation of fungicides against *Fusarium oxysporum* f. sp. *cubense*. *Internat. J. Plant. Protect*.7: 221-224.

Thejakumar, M. B. and Devappa, V. 2016. Efficacy of differet fungicides against *Alternaria alternata* and *Cercospora capsici* under *in-vitro* conditions. *Internat. J. Adv. Res. Biol. Sci*. 3: 126-129.

Vincent, J. M. 1927. Distortion of fungal hyapae in presence of certain inhibitors. *Nature*. 59: 850.