Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 2787-2790

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7692 **Special Issue-6 pp. 2787-2790**
Journal homepage: http://www.ijcmas.com

Original Research Article

Efficacy of Fungicides against *T. penicillariae* under Laboratory Condition

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A B S T R A C T

Studies on smut of pearl millet incited by *Tolyposporium penicillariae* Brefeld was carried out in the laboratory, Department of Plant Pathology, COA, RVSKVV, Gwalior (M.P.) in 2017. Bajra (*Pennisetum glaucum* (L.) R. Br.) is a staple cereal crop best for harsh climate of the seasonally hot, drought-prone, semi-arid regions. In Madhya Pradesh; Morena, Bhind, Gwalior, Sheopur and Datia jointly contribute >80% production of this crop and smut caused by *T. penicillariae* (Bref.) is occupied a key position among the diseases. In present study out of nine fungicides, two fungicides viz., carboxin and hexaconazole absolutely inhibited the fungal growth of *T. penicillariae* under *in-vitro* condition followed by propiconazole and carbendazim, azoxystrobin, tebuconazole + trifloxistrobin, carbendazim + mancozeb) and mancozeb. The maximum growth was found in control. In respect of fungal growth inhibition, the hundred per cent inhibition was given by carboxin and hexaconazole followed by propiconazole, carbendazim, azoxistrobin, tebuconazole + trifloxistrobin, carbendazim + mancozeb, mancozeb and thiram.

Keywords

Fungicides, *Tolyposporium penicillariae* Brefeld, Gwalior

Introduction

Pearl millet (*Pennisetum glaucum* (L.) R. Br.) is one of the most important dual purpose crop, and a staple food for millions of people in arid and semi-arid ecologies around the world according to Chopra (2001). In Madhya Pradesh; Morena, Bhind, Gwalior, Sheopur and Datia jointly contribute >80% production of this crop and smut caused by *T. penicillariae* (Bref.) is occupied a key position among the diseases. Rathore (2004) estimated the pearl millet grain losses due to smut in Morena, Bhind and Gwalior districts to be 12.37, 7.03 and 8.87 per cent respectively during 2002. Bhomic and Sundram (1971) reported 50-75% disease incidence in some fields with damage up to 100% in individual panicles. For controlling these losses in present study some recent and easily available fungicides were evaluated against this fungus for finding best one for complete inhibition of this fungus under laboratory condition.

Materials and Methods

Nine fungicides were evaluated against *T. penicillariae* under *in-vitro* condition by adopting poisoned food technique. The growth of the fungal mycelium was measured on 7th day after inoculation.

Poisoned Food Technique

The potato dextrose agar medium was prepared and sterilized, then under aseptic condition the required quantity of each

fungicide was incorporated into 50ml sterilized PDA filled in flask of 250 ml capacity from each flask 4 sterilized petriplates of 90mm diameter were poured. This poured petriplates were inoculated at the center with a 7mm fungal disc from seven days old culture of the test organism. Control (without fungicide) was maintained for comparison. The petriplates were incubated at 25+2ºC. The radial growth of the fungus was measured at 24 hours interval started from 48 hours after inoculation.

Details of experiment

Design: CRD
Replication: 3
Treatments: 10

Percent inhibition over control was calculated by following formula suggested by Bliss (1934)

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

Whereas,

C= Growth of fungus in control
T= Growth of fungus in treatment

Results and Discussion

It is obvious from the data presented in Table 2 that out of ten treatments, two fungicides viz., carboxin @ 0.1 per cent and hexaconazole @ 0.1 per cent absolutely inhibited the fungal growth of *T. penicillariae* under *in-vitro* condition followed by propiconazole @ 0.1 per cent (1.67 mm) and carbendazim @ 0.1 per cent (2.83 mm), azoxystrobin @ 0.1 per cent (3.33 mm), tebuconazole + trifloxistrobin @ 0.1 per cent (6.17 mm), carbendazim + mancozeb (8.33 mm), mancozeb @ 0.2 per cent (19.67 mm) and thiram @ 0.2 per cent (23.67 mm) while 85 mm growth was recorded in control.

In respect of growth inhibition carboxin and hexaconazole were significantly superior over thiram, mancozeb, carbendazim + mancozeb, tebuconazole + trifloxistrobin, azoxystrobin and control while they were statistically at par with propiconazole and carbendazim.

Other than carboxin and hexaconazole, three other fungicides viz., propiconazole, carbendazim and azoxistrobin were also found effective for inhibiting the fungal growth under *in-vitro* condition and were significantly superior over thiram, mancozeb, carbendazim + mancozeb and tebuconazole and trifloxistrobin and control.

In respect of fungal growth inhibition, the hundred per cent inhibition was given by carboxin and hexaconazole followed by (98.03%) propiconazole, carbendazim (96.66%), azoxistrobin (96.07%), tebuconazole + trifloxistrobin (92.74%), carbendazim + mancozeb (90.19 mancozeb (76.86%) and thiram (72.15%).

The above findings are in conformity with the work of Meena *et al.,* (2012). They tested the effectiveness of Carboxin, Carbendazim, Copper oxychloride, Mancozeb, Hexaconazole and Propiconazole against pearl millet smut disease caused by *Moesziomyces penicillariae* (Brief) and reported that all the fungicides significantly reduced smut incidence as compared to control.

Hexaconazole and Propiconazole have expressed their superiority over Carboxin giving 97.63 and 97.43 per cent disease control respectively.

Table.1 List of chemicals

S. N.	Trade name	Common name	Chemical name
1	Thiram	Thiram	Tetramethylthiuramdisulphide
2	Indofil-45	Mancozeb 75% WP	Manganese ethylene bisdithio-carbamate plus zinc
3	*Bavistin*	Carbendazim 50% WP	Methyl-1h benzimidazole-2-yl carbamate
4	Hexa green plus	Hexaconazole 5% SC	*(RS)-2-(2,4-dichlorophenyl)-1-(1H-1,2,4-triazol-1-yl)hexan-2-ol*
5	*Vitavax*	Carboxin	5,6-Dihydro-2-Methyl-1,4-Oxanthin3-carboxanilide
6	*Amistar*	Azoxistrobin 23% SC	Methyl (2E)-2-(2-{[6-(2-cyanophenoxy pyrimin-4-yl]oxy}phenyl)-3-methoxyacrylate
7	*Tilt*	Propiconazole 25% EC	1-[[2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl]methyl]-1,2,4-triazole
8	Nativo	Tebuconazole 50% + Trifloxystrobin 25% WG	Tebuconazole 50% + Trifloxystrobin 25% WG
9	Trick	Carbendazim 12%+ Mancozeb 63% WP	Methyl 1H benzimidazol-2-ylcarbamate+manganese ethylenenebis (dithiocarbamate) (Polymeric) complex with zinc salt

Table.2 *In-vitro* evaluation of fungicides against *T. penicillariae*

S. N.	Fungicide name	Mycelial growth (mm)*	Percent inhibition
1	Thiram	23.67	72.15
2	Mancozeb	19.67	76.86
3	Carbendazim + Mancozeb	8.33	90.19
4	Carbendazim	2.83	96.66
5	Tebuconazole + Trifloxistrobin	6.17	92.74
6	Azoxystrobin	3.33	96.07
7	Propiconazole	1.67	98.03
8	Carboxin	0.00	100.00
9	Hexaconazole	0.00	100.00
10	Control	85.00	-
S E (m)±		0.98	
CD (5%)		2.892	

*The data are the mean of three replications.

Effectiveness of some fungicides tested against smut disease caused by *T. penicillariae* and observed that out of all fungicides tested no fungicide could completely control the fungal growth but Thiram was found most effective in inhibiting the growth of *T. penicillariae* by 85% followed by Bavistin; Mancozeb and Blitox 50.

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