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Efficacy of Different Fungicides against *Alternaria tagetica* Causing Leaf Spot and Flower Blight of Marigold under *in vitro* Condition

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A B S T R A C T

Marigold is susceptible to a number of fungal diseases, among *Alternaria* leaf spot and flower blight caused by *Alternaria tagetica* was the most destructive and economically important disease may cause upto 50-60 % yield losses. In this experiment seven different systemic, contact and combi product fungicides were tested in different concentrations against *Alternaria tagetica* under *in vitro* condition. The results revealed that, among the fungicide tested, inhibition of growth of the fungus ranged from 61.81 per cent to 100.00 per cent. Propiconazole and Hexaconazole were proved to be the most effective fungicides and recorded the maximum reduction of mycelial growth of fungus (100%) in all concentrations which were superior over all other fungicides. The next best treatment was Difenconazale (88.36%) followed by Mancozeb (84.76%). Whereas, the least inhibition of mycelial growth was recorded in Propineb (61.81%). The effects of concentrations on *A. tagetica*, irrespective of chemicals were found significant and most effective at 0.25 % concentration. Maximum reduction of mycelial growth (87.06%) was observed at 0.25 % concentration which was significantly superior over the rest of the concentrations.

Introduction

Marigold (*Tagetes* spp. L.) is a flowering plant belongs family *Asteraceae*. Marigold flowers are widely used in religious and social functions especially for internal decoration, bedding, in hanging baskets as well as loose flower for garlands. Marigold is susceptible to a number of fungal, bacterial and viral diseases *viz.*, *Alternaria* leaf spot and flower blight, collar rot and root rot, wilt, *Cercospora* leaf spot, *Septoria* leaf spot powdery mildew, bacterial wilt, flower bud rot, damping off, *Botrytis* Flower Blight, cucumber mosaic virus (CMV) and Aster yellow virus are important. Among the fungal diseases, leaf spot and flower blight caused by *Alternaria tagetica* (Shome and Mustafee) is one of the major destructive and economically important disease and cause upto 50-60 % losses in flower yield.

Not much information is available on the effect of different fungicides in controlling leaf and flower blight of marigold. Hence, the experiments were designed to test the relative efficacy of the most commonly available fungicides under *in vitro* conditions. In this

view the present study was carried out using different fungicides against *A.tagetica* in laboratory.

Materials and Methods

The efficacy of different systemic, contact and combi product fungicides were tested in laboratory condition against *Alternaria tagetica*, using poisoned food technique (Schemitz, 1930). In the present study seven fungicides *viz*., Mancozeb (Dithane M-45), Propineb (Antracol 70% WP), Chlorothalonil (Kavach 75% WP) Carbendazim12% + Mancozeb 63% WP (Saaf 75% WP) Hexaconazole (Contaf 5% EC), Propiconazole (Tilt 25% EC), Difenconazole (Score 25% EC) at three different concentrations *viz.*, 0.1, 0.2 and 0.25 % were tested.

Required quantities of individual fungicides were added separately into molten and cooled potato dextrose agar to get the desired concentration of the fungicides. Later 20 ml of the poisoned medium was poured into sterile Petri plates.

Mycelial discs of 5 mm size from actively growing culture of the fungus was cut with help of sterile cork borer. Each disc was transferred to the centre of each plate. The PDA plates without fungicides were also inoculated and maintained as untreated control.

Each treatment was replicated thrice. Then such plates were incubated at room temperature (28-30^{0}C) for eight days and radial colony growth was measured and calculated as per cent inhibition of mycelial growth by using the following formula given by Vincent (1947).

$$I = \frac{(C-T)}{C} \times 100$$

Where,

I = Per cent inhibition
C = Radial growth in control
T = Radial growth in treatment

Results and Discussion

The results from the present study revealed that, fungicides tested at all concentrations were found significantly superior in reducing the mycelial growth of *A. tagetica.* The inhibition of the growth of the fungus ranged from 61.81 per cent to 100.00 per cent irrespective of the concentrations (Table 1 and Fig. 1). Propiconazole and Hexaconazole were proved to be the most effective fungicides and recorded the highest reduction of mycelial growth of fungus (100%) in all concentrations which were superior over all other fungicides.

The next best treatment was Difenconazale which showed (88.36%) followed by Mancozeb (84.76%). Whereas, least inhibition of mycelial growth was recorded in Propineb (61.81%). The effects of concentrations on *A. tagetica*, irrespective of chemicals were found significant and most effective at 0.25 % concentration. Maximum reduction of mycelial growth (87.06%) was observed at 0.25 % concentration which was significantly superior over the rest of the concentrations. The effectiveness of the triazole fungicide like Propiconazole and Hexaconazole may be attributed to their interference with the biosynthesis of fungal sterols and inhibit the ergosterol biosynthesis. These results are conformity with findings of Mallikarjun (1996), Amaresh (2000), Anonymous (2001), Mesta *et al.,* (2003). Sumitha and Nimbkar (2009) reported difenconazole as effective against leaf spot and flower blight *(A. zinniae)* of safflower. Kumar and Singh (2003) showed Propiconazole and Hexaconazole at 0.1% inhibited the mycelia growth of *Alternaria spp*.

Plate.1 *In vitro* evaluation of different fungicides against *Alternaria tagetica*

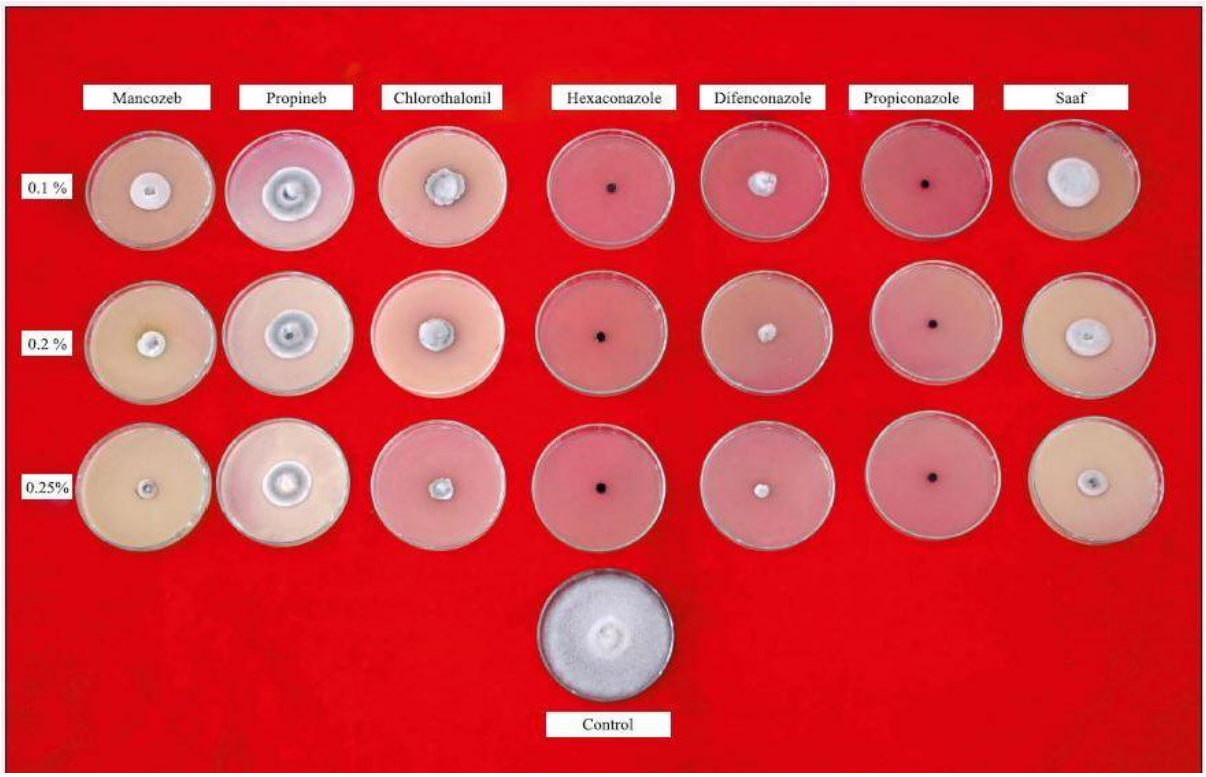

Fig.1 *In vitro* evaluation of different fungicides against *Alternaria tagetica*

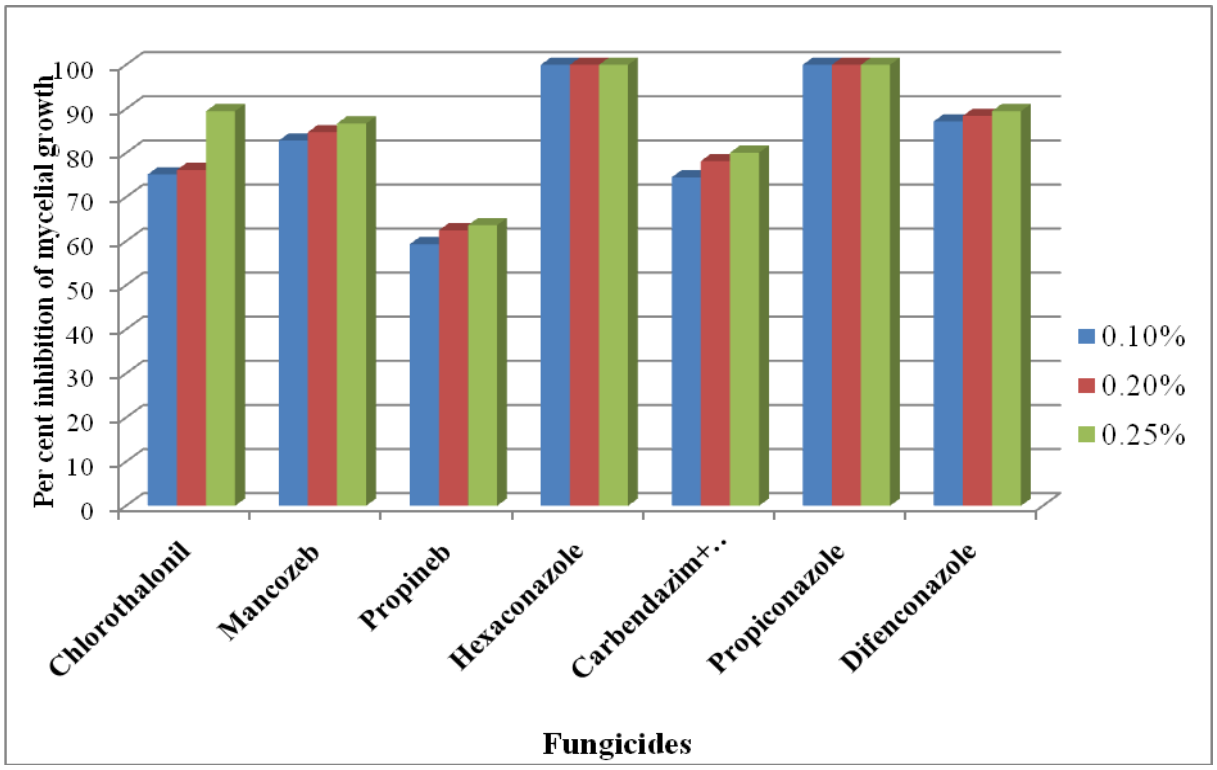

Table.1 *In vitro* evaluation of different fungicides in inhibiting the mycelial growth of *Alternaria tagetica*

Fungicides	Trade name and formulation	Per cent inhibition of mycelial growth over control			
		Concentrations			Mean
		0.1 %	0.2%	0.25%	
Chlorothalonil	Kavach 75% WP	75.17 (60.14)*	76.17 (60.81)	89.50 (71.13)	80.28 (64.03)
Mancozeb	Dithane M-45	82.83 (65.56)	84.73 (67.03)	86.70 (68.65)	84.76 (67.08)
Propineb	Antracol 70% WP	59.33 (50.40)	62.47 (52.25)	63.63 (52.94)	61.81 (51.86)
Hexaconazole	Contaf 5% EC	100.00 (90.05)	100.00 (90.05)	100.00 (90.05)	100.00 (90.05)
Mancozeb+carbendazim	Saaf 75% WP	74.50 (59.70)	78.17 (62.17)	80.07 (63.51)	77.58 (61.80)
Propiconazole	Tilt 25% EC	100.00 (90.05)	100.00 (90.05)	100.00 (90.05)	100.00 (90.05)
Difenconazole	Score 25% EC	87.17 (69.04)	88.41 (70.13)	89.50 (71.13)	88.36 (70.10)
Mean		82.71 (69.28)	84.28 (70.36)	87.06 (72.49)	84.68 (70.71)
		S.Em±		CD at 1%	
Fungicides (F)		1.52		5.82	
Concentrations (C)		1.00		3.81	
F x C		0.58		2.20	

*****Figures in parentheses are arc sine transformed values

Among seven systemic, contact and combi fungicides at all tested concentrations Propiconazole and Hexaconazole were proved to be the most effective fungicides and recorded the highest reduction of mycelial growth of fungus (100%) which were superior over all other fungicides. Whereas, least inhibition of mycelial growth was recorded in Propineb (61.81%). The effects of concentrations on *A. tagetica*, irrespective of chemicals were found significant and most effective at 0.25 % concentration.

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