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In-vitro evaluation of chemical fungicides against *Colletotrichum capsici* (Syd.) Causing anthracnose disease of chilli

Nishar Akhtar, Ram Chandra and Zeeshan Mazhar

Abstract

Anthracnose of chilli is one of most important disease causing great economic loss. Anthracnose may cause yield losses up to 50 per cent. There is varied range of chemical fungicides available in the market for controlling this pathogen, viz. *Colletotrichum capsici*, but the extent of inhibition varies with different fungicides. Five fungicides viz. Kasugamycin (Kasu B 3%SL), Pyraclostrobin + Metaram (Carbrio Top 60%WG), Azoxystrobin (Onestar 23%SC), Fusilazole (Cursor 40%EC) and Carbendazim (Dhanustin 50%WP) were assayed for their efficacy against *Colletotrichum capsici* by Poison food technique. These fungicides were prepared at two concentrations viz. 250 ppm and 500 ppm concentration, evaluated for their toxicity against *Colletotrichum capsici* under *in vitro* condition using poisoned food technique. Under *in vitro* condition, all the fungicides which were tested against the growth of the fungus *Colletotrichum capsici* proved to be effective. Carbrio Top 60% WG was found highly effective with mycelia growth inhibition (72.66%) followed by (Azoxystrobin) Onestar 23%SC, (Fusilazole) Cursor 40%EC, (Carbendazim) Dhanustin 50%WP and (Kasugamycin) Kasu B 3%SL at 250 ppm with inhibition percentage of 60.78%, 43.77%, 31.1% and 24.4% respectively. Similar trend were obtained at 500 ppm also, the mycelial inhibition percentages were 81.45%, 72.33%, 66.67%, 52.4% and 35.2% respectively.

Keywords: anthracnose, fungicide, *Colletotrichum capsici*, poisoned food technique, toxicity

Introduction

Colletotrichum is one of the most important diseases causing agent around the world causing anthracnose disease in a wide range of hosts including cereals, legumes, perennial crops, vegetables, and fruit trees (Bailey and Jeger, 1992)^[1]. Among these, Anthracnose of chilli is one of most important disease causing great economic loss (Poulos, 1992)^[4]. Anthracnose may cause yield losses up to 50 per cent (Pakdevaraporn *et al.*, 2005)^[3]. There is varied range of chemical fungicides available in the market for controlling this pathogen, viz. *Colletotrichum capsici*, but the extent of inhibition varies with different fungicides. Five fungicides viz. Kasugamycin (Kasu B 3%SL), Pyraclostrobin + Metaram (Carbrio Top 60%WG), Azoxystrobin (Onestar 23%SC), Fusilazole (Cursor 40% EC) and Carbendazim (Dhanustin 50%WP) were assayed for their efficacy against *Colletotrichum capsici* by Poison food technique. These fungicides were prepared at two concentrations viz. 250 ppm and 500 ppm concentration, evaluated for their toxicity against *Colletotrichum capsici* under *in vitro* condition using poisoned food technique (Grover and Moore, 1962)^[2].

Materials and Methods

Five fungicides, Kasugamycin (Kasu B 3%SL), Pyraclostrobin + Metaram (Carbrio Top 60%WG), Azoxystrobin (Onestar 23%SC), Fusilazole (Cursor 40%EC) and Carbendazim (Dhanustin 50%WP) were assayed for their efficacy against *C. capsici* under *in vitro* condition. First of all a stock solution of 5000 ppm of each fungicide were made. The desired concentrations were obtained by adding appropriate amount of stock solution of fungicides to PDA medium in separate volumetric flask. PDA without fungicide served as control. Each plate was inoculated with a 5 mm mycelial disc of the pathogen i.e. fungus taken from seven day old culture of *C. capsici* on PDA. The inoculated plates were incubated in B.O.D incubator at 27±1°C till the fungus covered the whole plate in control. The radial growth of pathogen was recorded and per cent inhibition of each treatment was calculated by using above formula.

Table 1: The fungicides, details of the chemicals and their source are tabulated as.

S. No.	Fungicide	Trade Name	Amount Required (In 100ml.) To Make (5000 ppm.) Stock Solution
1.	Kasugamycin	(Kasu B 3%SL)	16.6ml.
2.	Pyraclostrobin + Metaram	(Carbrio Top 60% WG)	0.83g
3.	Azoxystrobin	(Onestar 23%SC)	2.17ml.
4.	Fusilazole	(Cursor 40%EC)	1.25ml.
5.	Carbendazim	(Dhanustin 50%WP)	1g

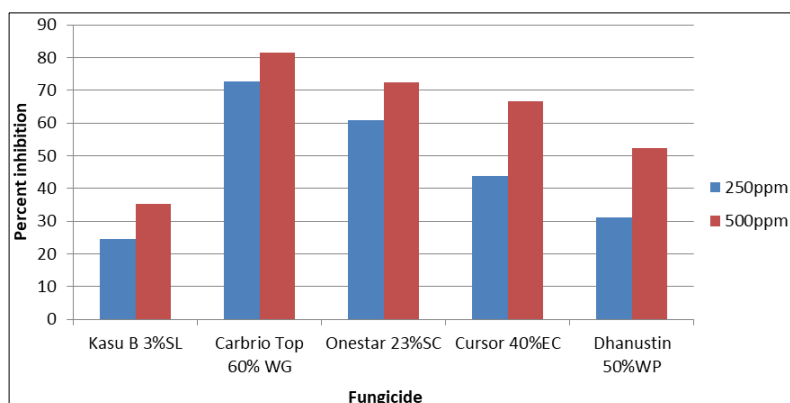
The desired concentrations of fungicides were obtained by adding appropriate amount of stock solution of fungicides to PDA medium in separate volumetric flask. The equation used for the calculation of concentration is $M_1V_1 = M_2V_2$, where M_1 is the concentration of the concentrated solution (stock solution), V_1 is the volume of the concentrated solution (stock solution), M_2 is the concentration of the dilute solution (after more solvent has been added), and V_2 is the volume of the dilute solution.

Results and Discussion

Five fungicides viz. Kasugamycin (Kasu B 3%SL), Pyraclostrobin + Metaram (Carbrio Top 60%WG), Azoxystrobin (Onestar 23%SC), Fusilazole (Cursor 40%EC) and Carbendazim (Dhanustin 50%WP) were assayed for their efficacy against *Colletotrichum capsici* by Poison food technique. These fungicides were prepared at two concentrations viz. 250 ppm and 500ppm. The radial growth of *Colletotrichum capsici* was recorded and inhibition percentage was calculated.

Table 2: Efficacy of different fungicides against *Colletotrichum capsici*.

Fungicides (Trade name)	Radial growth (cm)		Percent inhibition (%)	
	At 250 ppm	At 500 ppm	At 250 ppm	At 500 ppm
Kasugamycin (Kasu B 3%SL)	6.8	5.83	24.4	35.2
Pyraclostrobin + Metaram (Carbrio Top 60% WG)	2.46	1.67	72.66	81.45
Azoxystrobin (Onestar 23%SC)	3.56	2.5	60.78	72.33
Fusilazole (Cursor 40%EC)	5.1	3.0	43.77	66.67
Carbendazim (Dhanustin 50%WP)	6.23	4.3	31.1	52.4
Control	9			
C.V.	1.047	1.793		
C.D. (P0.05)	0.158	0.139		

**Fig 1:** Efficacy of different fungicides against *Colletotrichum capsici*.

The result showed that (Table 4.4) Carbrio Top 60% WG (Pyraclostrobin + Metaram) was found highly efficient in controlling the growth of *Colletotrichum capsici* at both concentration viz. 250 ppm and 500 ppm. At 250 ppm Carbrio Top 60% WG exhibited maximum mean mycelia growth inhibition followed by (Azoxystrobin) Onestar 23%SC, (Fusilazole) Cursor 40%EC, (Carbendazim) Dhanustin 50%WP and (Kasugamycin) Kasu B 3%SL. The mean mycelial inhibition percentage were 72.66%, 60.78%, 43.77%, 31.1% and 24.4% respectively.

At 500 ppm Carbrio Top 60% WG (Pyraclostrobin + Metaram) exhibited maximum mean mycelia growth inhibition followed by (Azoxystrobin) Onestar 23%SC, (Fusilazole) Cursor 40%EC, (Carbendazim) Dhanustin 50%WP and (Kasugamycin) Kasu B 3%SL. The mean mycelial inhibition percentage were 81.45%, 72.33%, 66.67%, 52.4% and 35.2% respectively.

Summary and conclusion

Under *in vitro* condition, all the fungicides which were tested against the growth of the fungus *Colletotrichum capsici* proved to be effective. However, Carbrio Top 60% WG (Pyraclostrobin + Metaram) was highly efficient in controlling the growth of *Colletotrichum capsici* at both concentration viz. 250 ppm and 500 ppm.

Carbrio Top 60% WG was found highly effective with mycelia growth inhibition (72.66%) followed by (Azoxystrobin) Onestar 23%SC, (Fusilazole) Cursor 40%EC, (Carbendazim) Dhanustin 50%WP and (Kasugamycin) Kasu B 3%SL at 250 ppm with inhibition percentage of 60.78%, 43.77%, 31.1% and 24.4% respectively. Similar trend were obtained at 500 ppm also, the mycelial inhibition percentages were 81.45%, 72.33%, 66.67%, 52.4% and 35.2% respectively.

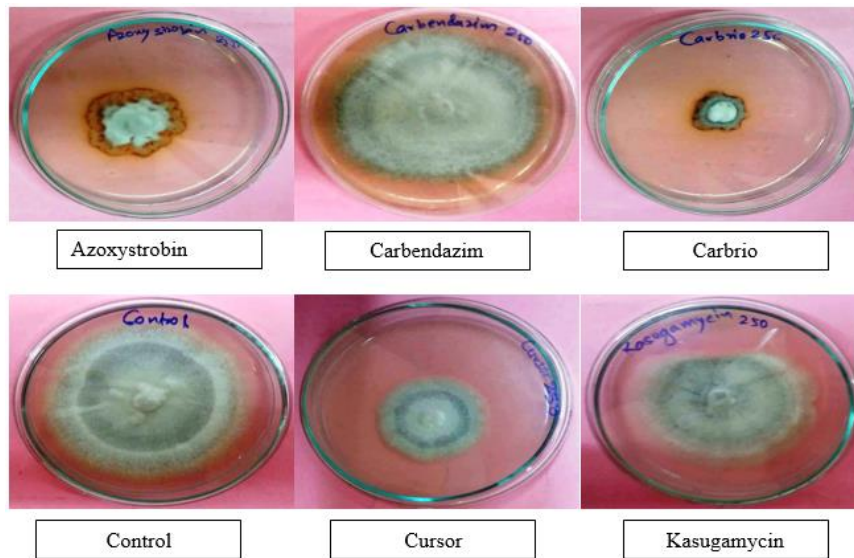


Fig 2: Efficacy of different fungicides against *Colletotrichum capsici* at 250 ppm



Fig 3: Efficacy of different fungicides against *Colletotrichum capsici* at 500 ppm

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