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## Effect of different fungicides against *Colletotrichum capsici* caused chilli anthracnose disease

**Preeti Dubey, Ram Chandra and Parikshit Gupta**

### Abstract

Chilli anthracnose is one of the most important and widely distributed diseases in all chilli growing regions of the world causing considerable losses in yield and quality. Five fungicides viz. Kasugamycin (Kasu B 3%SL), Pyraclostrobin + Metaram (Carbrio Top 60%WG), Azoxystrobin (Onestar 23%SC), Fusilazole (Cursor 40%EC) and Folicur 250 EC (Tebuconazole) were assayed for their efficacy against *Colletotrichum capsici* by Poison food technique. These fungicides were prepared at two concentrations viz. 250 ppm and 500ppm. Carbio Top with per cent inhibition of 84.11% found to be best in inhibiting mycelia growth of pathogen and found to be superior over other chemical fungicides. While Cursor Folicur was inhibited 76.33% mycelia growth over control followed by Folicur, One star and Kasugamycine at 500 ppm. There are different fungicides and chemicals available in the market for control of anthracnose disease. However some fungicides are highly effective against pathogen and disease and some fungicides are not effectively control the anthracnose disease of chilli. Therefore this investigation will helpful to the farmer for selection of suitable fungicides used as a control of anthracnose disease, an integrated way to save their crop from the disease and obtain better yield.

**Keywords:** chilli, anthracnose, *Colletotrichum capsici*, fungicides, poison food technique, toxicity

### Introduction

Chilli (*Capsicum annum* L.) is considered an important tropical and subtropical crop on the basis of high consumption, nutritional and cash values to the farmers and consumers both in developing and developed countries. The chilli crop is subjected to various diseases caused by fungi, bacteria, viruses, nematodes and physiological disorders at different stages of development. Plant diseases have turned into a dilemma as it can cause significant reduction in both quality and quantity of agricultural products. *Colletotrichum capsici* is one of the most important plant pathogens worldwide causing the economically important disease anthracnose in a wide range of hosts including cereals, legumes, vegetables, others crops and in tree fruits also (Bailey and Jeger, 1992) [1]. Anthracnose of chilli caused by *Colletotrichum capsici* (Syd.) Butler and Bisby was reported for the first time in India by (Sydow, 1913) [6].

Anthracnose disease generally appears during warm and humid weather and disease attacks all plant parts at any growth stage. The symptoms are most visible on leaves and ripe fruits. At first, appears on leaves as small and irregular yellow, brown, dark-brown, or black spots. The spots can expand and merge to cover the whole affected area. The color of the infected part darkens as it ages. The disease can also produce cankers on petioles and on stems that causes severe defoliation and rotting of fruits and roots. Infected fruit has small, water soaked, sunken, circular spots that may increase in size up to 1.2 cm in diameter. As it ages, the center of an older spot becomes blackish and emits gelatinous pink spore masses. It spreads rapidly from field to field. Ripe fruit-rot is also very conspicuous as it causes severe damage to mature fruits in the field as well as some times in storage and transport.

Although, earlier several studies have been conducted for management of chilli anthracnose in which different fungicides have used against *Colletotrichum capsici* and few are found highly effective. Madhavan *et al.* (2017) [3] reported that Carbio Top was highly effective in suppressing the radial growth of all the test fungi with minimal inhibitory concentration at 250 ppm. In the field trial, Carbio Top at @ 1750 g/ha was found to be most effective in controlling anthracnose and increasing yield. Saha *et al.* (2017) reported the superiority of a ready-mix fungicide, Tricyclazole 18% + Mancozeb 62% WP in controlling the disease Anthracnose of Chilli, caused by *Colletotrichum capsici*, as compared to untreated control as well as their solo components. Keeping in view the present investigation was undertaken for Effect of different fungicides against *Colletotrichum capsici* caused chilli anthracnose disease

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**Materials and Methods**

The present investigation was carried out during Rabi season 2018 at the Department of Mycology and Plant Pathology, Institute of Agriculture Sciences, Banaras Hindu University, Varanasi. Five different fungicides viz., Kasu B (Kasugamycin 3% SL), One star (Azoxystrobin 23% SC), Cabrio Top (Metaram 55% +Pyraclostrobin5% WG Fungicide), Folicur 250 EC (Tebuconazole 25.9% m/m EC), Cursor (flusilazole 40% EC) at two concentrations viz. 250 ppm and 500ppm were evaluated against *Colletotrichum capsici* by employing poisoned food technique (Schmitz, 1930) [5]. The desired concentrations were obtained by adding appropriate amount of stock solution of fungicides to potato dextrose agar taken in conical flask and then transferred to petriplates and repeated thrice for each treatment. Potato dextrose agar without fungicides served as control. Each plate

was inoculated with a 5 mm mycelial disc of the pathogen taken from 7 days old culture of *Colletotrichum capsici*. The inoculated plates were incubated in BOD incubator at 27°C for mycelia growth of pathogen. The colony diameter was recorded and per cent inhibition in each treatment over control was calculated by using the formula (Vincent, 1947) [7]. Radial growth of the fungus was measured with metric scale (mm).

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

Where,

I = per cent inhibition over control

C = mean maximum radial growth of colony in control

T = mean maximum radial growth of colony in treatment

**Table 1:** List of fungicides used for in vitro evaluation against *Colletotrichum capsici*

S1.No	Fungicide	Trade name
1	Kasu B	Kasugamycin 3% SL
2	One Star	Azoxystrobin 23% SC
3	Folicur	Tebuconazole 25.9% EC
4	Cabrio TOP	Metaram 55% + Pyraclostrobin 5% WG
5	Cursor	Flusilazole 40% EC

**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 Folicur 250 EC (Tebuconazole) 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.

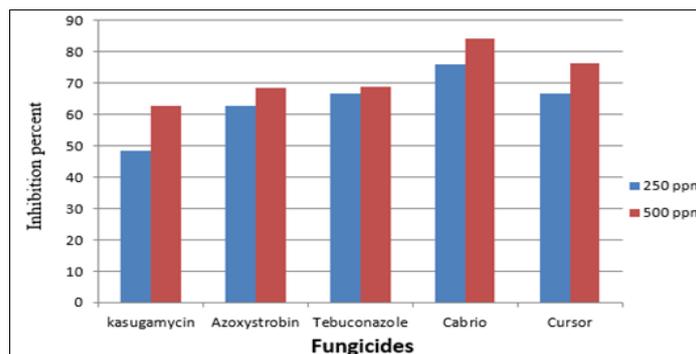
The result showed that (Table -2), Carbrio Top 60% WG (Pyraclostrobin + Metaram) was found highly efficient in controlling the growth of *Colletotrichum capsici* at both concentration viz. 250 ppm and 500 ppm. and inhibition

percentage was reported 76% and 84.11% respectively. Cursor (Flusilazole) was also effective with per cent inhibition of 66.66% and (76.33%), at250 ppm and 500 ppm followed by Folicular (Tebuconazole) and Kasu B (Kasugamycin).

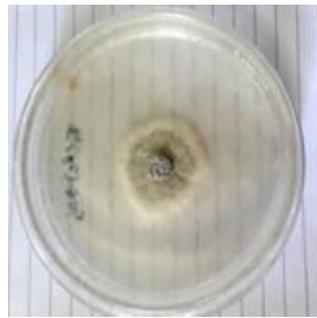
This result is in conformity with the findings of- Madhavan *et al.* (2017) [3] evaluated a fungicide, Cabrio Top for their efficacy in suppressing mycelial growth of chilli anthracnose pathogen isolates of *Colletotrichum capsici*, The test fungicide Cabrio Top was highly effective in suppressing the radial growth of all the test fungi with minimal inhibitory concentration at 250 ppm. Result is also accordance to finding of Saha *et al.* (2017) [4] who has reported the superiority of a ready-mix fungicide, against anthracnose of chilli.

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

Fungicides	Radial growth (cm)		Percent inhibition (%)	
	250 ppm	500 ppm	250 ppm	500 ppm
Kasu B (Kasugamycin 3% SL)	4.63	3.36	48.55	62.66
One Star (Azoxystrobin 23% SC)	3.73	2.83	62.55	68.55
Folicur (Tebuconazole 25.9% EC)	3	2.8	66.66	68.88
Cabrio TOP (Metriam 55% + Pyraclostrobin 5% WG)	2.16	1.43	76	84.11
Cursor (Flusilazole 40% EC)	3	2.13	66.66	76.33
Control	9.0			
CD (0.05)	0.325	0.461		
CV	4.290	7.213		



**Fig 1-** Efficacy of fungicides against *C. capsici* with respect to percent inhibition.

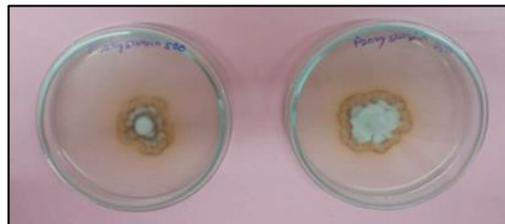


Plates At 500ppm Concentrations

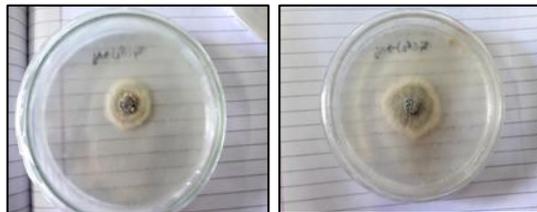


Plates At 250ppm Concentrations

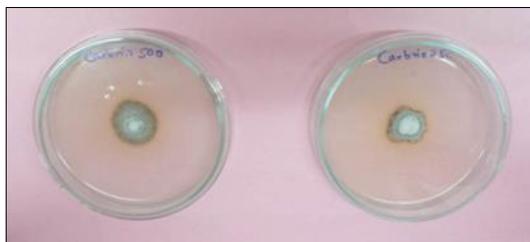
Kasu B (Kasugamycin 3% SL)



One Star (Azoxystrobin 23% SC)



Folicur (Tebuconazole 25.9% EC)



Cabrio TOP (Metaram 55% + Pyraclostrobin 5% WG)



Cursor Flusilazole 40% EC)



Control plate

### Conclusion

Chilli (*Capsicum annum* L.) is considered an important tropical and subtropical crop on the basis of high consumption, nutritional and cash values to the farmers and consumers both in developing and developed countries. The disease caused by *Colletotrichum capsici* is one of the most worst plant pathogens worldwide causing the economically important disease anthracnose in a wide range of hosts including cereals, legumes, vegetables, others crops and in tree fruits also. Presently many farmers are using fungicides and chemicals for control of chilli anthracnose. However farmers are unable for select suitable fungicides for control of this disease because different fungicides and chemicals available in the market for control of chilli anthracnose. There are some fungicides highly effective against pathogen and disease and some fungicides are not effectively control the anthracnose disease of chilli. Therefore this investigation will helpful to the farmer for selection of suitable fungicides used as a control of anthracnose disease, an integrated way to save their crop from the disease and obtain better yield.

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**Fig 2:** Effect of different fungicides on mycelia growth of *Colletotrichum capsici* (in vitro).