International Journal of Advance and Applied Research
www.ijaar.co.in
ISSN – 2347-7075 Impact Factor – 7.328
Peer Reviewed Bi-Monthly
Vol.10 No.3 Jan – Feb 2023

In vitro efficacy of fungicides against *Colletotrichum gloeosporioides* Penz.

Dr. S.S. Chandanshive
Dept. Of Zoology
SGRG Shinde College, Paranda Dist. Osmanabad(MS)
***Corresponding Author*- Dr. S.S. Chandanshive**
Email.- chandanshive75@gmail.com
DOI- 10.5281/zenodo.8203123

Abstract

Present study revealed that all six fungicides evaluated and exhibited antifungal activity against test pathogen (*Colletotrichum gloeosporioides* Penz.) and significantly inhibited mycelial growth over untreated control. Six fungicides were evaluated against *Colletotrichum gloeosporioides* in laboratory condition from obtained data it was found that, the pathogen's development was greatly slowed down by each of the tested fungicides. Mycelial growth of Colletotrichum gloeosporioides was totally (100% inhibition) inhibited by Copper Oxychloride (0.2%), Propiconazole (0.1%) and Difenconazole (0.1%). These fungicides were followed by Carbendazim (12%) + Mancozeb (0.2 %) and Thiophanate Methyl (0.1%) showed 86.67 & 92.22 percent inhibition respectively. Whereas Mancozeb (0.25%) with 31.11 percent inhibition was proved less effective as compared to rest of fungicides.

Keywords: Sapota, *Colletotrichum gloeosporioides,* Fungicides

Introduction

Sapota (*Manilkara achras* (Mill.) Forseberg) is referred to as "Chicku." It is a member of the Sapotaceae family. It is a tropical American native it has expanded to other nations such as the Philippines, Malaysia, United States of America, Sri Lanka and India, where it was adopted very well.

In India this crop was first time planted in year 1898 in the village Gholwad, taluka Dahanu, district Palghar, Maharashtra (Chundawat, 1998).Today, this crop is grown in numerous parts of the country, including Punjab in the north, Tamil Nadu in the south, Rajasthan in the west, and West Bengal in the east, with Tripura and Assam in the north eastern provinces, as well as the Andaman and Nicobar Islands. Its rapid proliferation in the country can be due to its superior adaptability to a wide range of agro-climatic conditions and its ability to crop continuously.

India accounts for 10 percent of the world fruit production with first rank in the production of sapota (APEDA Database, 2020). According to NHB Database, India has 826.92 metric tons production in the year 2020-21. In India, Gujarat ranks first in the production with 273.87 metric tons in 2021-22 (NHB, 2021). In Maharashtra's sapota region covered 70 thousand hectares, producing 322 thousand tonnes with average yield 4.6 tons per hectare. (Surwase *et al.* 2015).

Sapota is evergreen fruit tree and occupies a significant position among the fruit crops. The fruit is mainly consumed in fresh form and it is highly delicious, sweet in taste with slight as stringency. It contains about 12 to 14 percent sugar and forms a good source of carbohydrates. Besides the table purpose uses, the processed products prepared from the sapota fruit are beverages, jams, sweet chutney, pickle and dehydrated slices. The white resin latex exuded by the bark of sapota is used to prepare chickle a basic substance in manufacture of chewing gums, which has a great export potential. The gum processed from sapota latex also finds uses in dental surgery. The bark of tree contains tannin which has many industrial uses. The seed kernel contains economic quantities of liquid fat which can give edible oil and feed cake. In many cultures, the sapota fruit has been employed as a

traditional indigenous medicine (Lim 2013).

Materials and Methods

Present investigation on management of leaf blight of sapota was conducted during the year 2021-22. Laboratory experiments were performed at Zoology SGRG Shinde College, Paranda Dist. Osmanabad(MS).

In vitro* evaluation of fungicides against *Colletotrichum gloeosporioides

The fungicides utilized in the present assessment along with particulars of trade name, ingredient of the chemical in formulation and source of supply were presented in Table 1.

The efficacy of all following fungicides was assayed by using poisoned food technique on PDA as basal medium. The effectiveness of a fungicide was assessed by calculating per cent inhibition of mycelial growth over control by utilizing the formula suggested by Vincent (1947).

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

Where,

I=Per cent inhibition of fungal growth

C=Growth/colony diameter of the pathogen in control plate (cm)

T= Growth/colony diameter of the pathogen in treatment plate (cm)

Poisoned food technique

The necessary amount of specific fungicide was added individually into molten and cooled potato dextrose agar in order to get the required concentration of fungicides. After that, 20 milliliter of the poisoned medium was added into sterile petri plates. Mycelial circular discs of 5-millimeter size from vigorously growing culture of the fungus were cut out by means of sterile cork borer and one circular disc was kept at the centre of each agar plate. Without adding any fungicides to the medium, Control plate was maintained. Each treatment was replicated thrice. The incubation was done at 27$\pm$1^{o}C temperature for time period of 8 days and radial fungal colony growth was determined.

Table: 1. Treatment details of fungicides.

Tr. No.	Chemical name	Trade Name	Active Ingredient	Conc. (Per cent)	Manufacturer
T_1	Carbendazim+ Mancozeb	Saaf	12 % + 63 % WP	0.2	UPL Limited.
T_2	Mancozeb	M-45	75 % WP	0.2	Indofil Industries Limited.
T_3	Copper Oxychloride	Tata Blitox	50% WP	0.2	Rallis India Limited
T_4	Thiophanate Methyl	Roko	70 % WP	0.1	Biostadt India Limited.
T_5	Difenoconazole	Score	25 % EC	0.1	Syngenta India Limited.
T_6	Propiconazole	Tilt	25% EC	0.1	Crystal crop Protection Pvt. Ltd.

Results and Discussion

In vitro* evaluation of fungicides against *Colletotrichum gloeosporioides.

In this study total six fungicides *viz*., Carbendazim (12%) + Mancozeb (63%) WP, Mancozeb (75%WP), Copper Oxychloride (50%WP), Thiophanate Methyl (70%WP), Difenconazole (25%EC) and Propiconazole (25%EC) were tested for their efficacy by using poisoned food technique.

The data obtained on effect of different fungicides on the mycelial growth and percent inhibition over control against *C. gloeosporioides* is presented in table: 2, fig. 1 and Plate 1.

Radial mycelial growth

From data it was revealed that, no mycelial growth was observed in the petri plates where media was poisoned with copper oxychloride, Difenconazole and Propiconazole whereas, fungicides Carbendazim + Mancozeb and Thiophanate Methyl showed least mycelial growth with 0.70 and 1.20 cm respectively. Maximum mycelial growth (6.20cm) was recorded in media which was poisoned with Mancozeb.

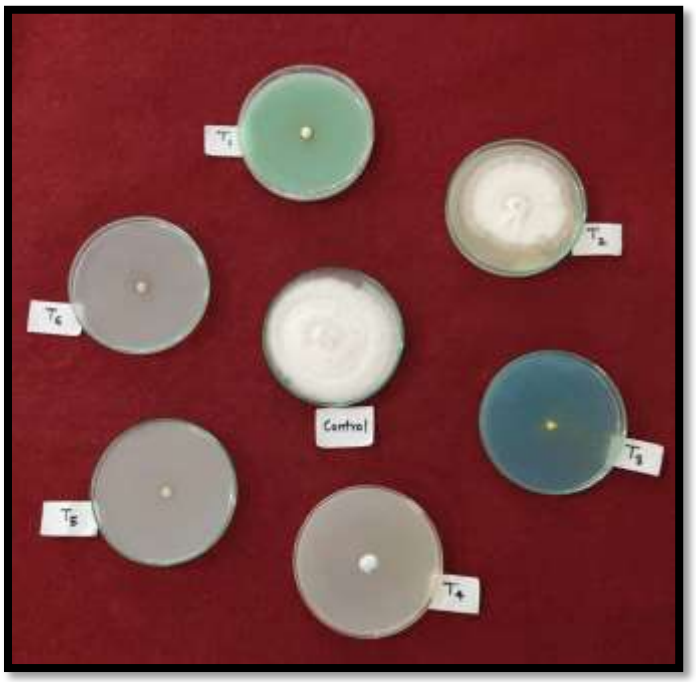
Per cent inhibition over control

Data regarding inhibition over control was revealed that, all the tested fungicides were significantly inhibited the growth of the pathogen in petri plates. Copper oxychloride, Propiconazole, and Difenconazole, completely (100%) inhibited the growth of *C. gloeosporioides* over control. These fungicides were followed by Carbendazim + Mancozeb with 92.22 percent, Thiophanate Methyl with 86.67 percent, whereas Mancozeb with only 31.11 percent inhibition was proved less effective as compared to rest of the fungicides.

All the fungicides were found effective against test fungus the observations of present investigation are in conformity with reports of Rajesha *et al*. (2010) and Kolase *et al.* (2014) who also stated that, Carbendazim at 0.1 per cent was shown to be effective in reducing the mycelial growth of *Colletotrichum gloeosporioides.* Similarly, Rathva *et al.* (2017) who also reported that, Carbendazim + Mancozeb and Propiconazole) at 500 and 1000 ppm were found completely inhibited fungus growth and proved to be highly toxic to *Colletotrichum gloeosporioides*. Somashekhara and Vani (2018) noticed that Propiconazole, Difenconazole and Tebuconazole were determined to be the most effective in inhibition of growth of fungus in laboratory condition. Ranjitha *et al*. (2019) reported that, systemic fungicides Propiconazole, Tebuconazole + Trifloxystrobin and Difenconazole showed effective against *Colletotrichum gloeosporioides* by reducing its mycelial growth on media.

Table 2. *In vitro* evaluation of fungicides against the *Colletotrichum gloeosporioides* Penz

Tr. No.	Fungicides	Conc.%	Mean Colony Diameter of Pathogen (cm)	Per cent inhibition over control
T_1	Carbendazim (12%) + Mancozeb (63%) WP	0.2	0.70	92.22
T_2	Mancozeb (75%WP)	0.25	6.20	31.11
T_3	Copper Oxychloride (50%WP)	0.2	0.00	100.00
T_4	Thiophanate Methyl (70%WP)	0.1	1.20	86.67
T_5	Difenconazole (25%EC)	0.1	0.00	100.00
T_6	Propiconazole(25%EC)	0.1	0.00	100.00
T_7	Absolute Control	--	9.00	0.00
	SE(m) ±		0.07	
	CD at 1%		0.28	



Tr. No.	Name of Treatment	Tr. No.	Name of Treatment
T_1	Carbendazim (12%) + Mancozeb (63%) WP	T_5	Difenconazole (25%EC)
T_2	Mancozeb (75%WP)	T_6	Propiconazole(25%EC)
T_3	Copper Oxychloride (50%WP)	T_7	Absolute Control
T_4	Thiophanate Methyl (70%WP)		-

Table 3 Detail of Plates

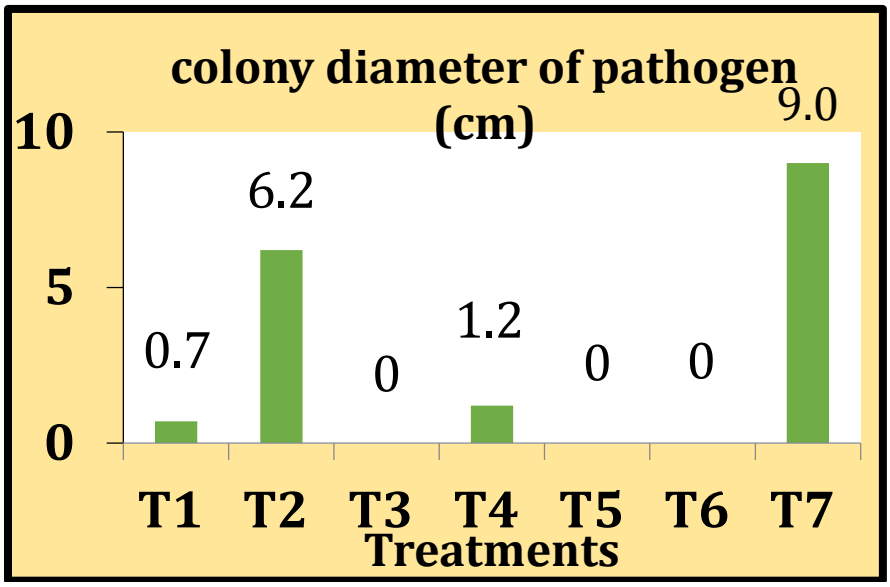


Fig. 1: *In vitro* effect of different fungicides on mycelial growth of *Colletotrichum gloeosporioides* Penz.

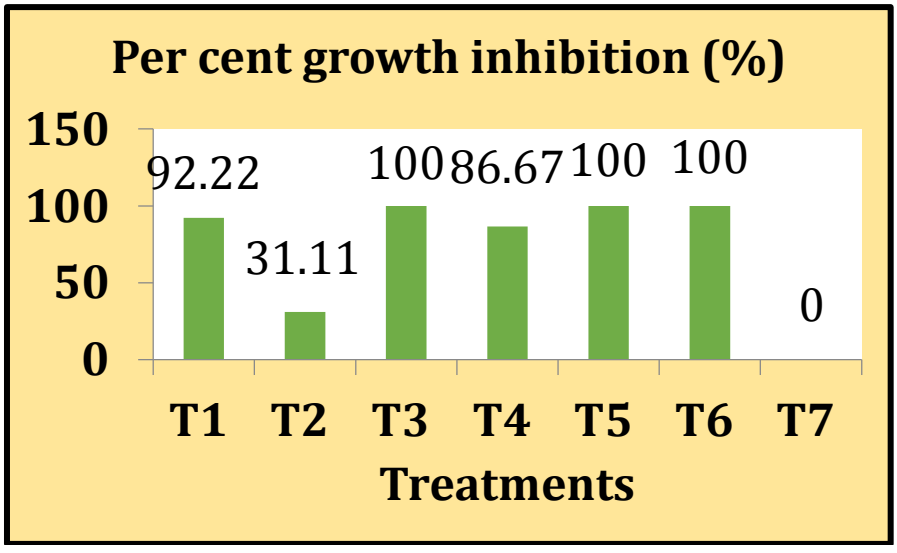


Fig. 2: Per cent growth inhibition of *Colletotrichum gloeosporioides* different fungicides by different fungicides

Conclusion

Fungicide Copper Oxychloride (0.2%) was found most effective followed by Difenconazole (0.1%) and Propiconazole (0.1%) which showed 100 per cent inhibition over control.

Acknowledgements

Author is thankful to research guide, all committee members and staff of Department of Zoology SGRG Shinde CollegeParanda Dist Osmanabad for providing the necessary facilities for research work.

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