

RESEARCH PAPER

Management of mango anthracnose caused by *Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc.

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Abstract: Anthracnose is the most significant pre- and post-harvest disease in mango which causes yield losses upto 60 per cent or higher during the heavy rainy season. To assess the effective fungicide for the management, a field experiment was conducted on mango crop at Saidapur Farm, Main Agriculture Research Station, University of Agricultural Sciences, Dharwad during flowering and fruiting season (*rabi/summer*) of 2021- 22. Two contact fungicides Mancozeb 75% WP and Propineb 70% WP, two combi-products fluopyram 17.7% + tebuconazole 17.7% and carboxin 37.5% + thiram 37.5% and two systemic fungicides propiconazole 25% EC and tebuconazole 25.9% EC were tested. Overall, the results showed that the combination of fluopyram 17.7% + tebuconazole 17.7% at 0.05 per cent concentration significantly reduced the PDI on leaves to 11.83 per cent at 30 days after the third spray, with a reduction of 60.28 per cent compared to control. The next best fungicide was tebuconazole 25.9% EC, at a concentration of 0.025 per cent. It successfully decreased the PDI of leaves to 12.37 per cent at 30 days following the third spray, representing a 58.43 per cent decrease over the control.

Key words: Anthracnose, *Colletotrichum gloeosporioides*, Fungicides, Management, Mango

Introduction

Amongst tropical and subtropical fruit crops, the mango, also known as the “King of Fruits,” is the most important fruit crop. It has an appealing flavour, great taste, enticing aroma, tempting sweetness, and attractive tonal variations on the inside and outside of the fruit. The key centre of mango origin was in the Indo-Burman region. India, Pakistan, Philippines, and Bangladesh all have it as their national fruit or tree. India is the largest producer of mangoes in the world, with a production of 20.3 million tonnes and a productivity of 8.85 tonnes per hectare. The nation exported fresh mangoes to the world in 2021-22 for a value of ₹ 327.45 crores / 44.05 million USD (Anon, 2022). Andhra Pradesh, Uttar Pradesh, Karnataka, Bihar, Gujarat, and Telangana are the states with the highest mango production. Few diseases are of major economic relevance, despite the fact that over 140 diseases, insect pests, and physiological problems are known to harm crops at all phases of their growth, from the nursery plant till the fruit in storage or transit. (Om Prakash, 1998). *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. is the fungus pathogen that causes the serious disease, anthracnose and it is the main obstacle to the expansion of mango exports. Disease results in leaf spots, fruit rot, and flower blight symptoms. Prior to fruit ripening, in majority of green fruit disease are latent and largely unnoticeable. In this way, fruits that look healthy at harvest can quickly acquire serious anthracnose symptoms as they ripen. Fruits that are infected when they are mature take the fungus into storage and cause significant loss throughout storage, shipping, and marketing. The effectiveness of some extremely powerful commercial fungicides has been brought into question due to fungicide resistance, which has emerged as a challenging problem in the treatment of crop diseases. Therefore, it is crucial to screen fungicides to manage anthracnose disease within the acceptable

range of fungicidal residues allowed by the importing countries in order to include the most effective ones in the management strategy.

Material and methods

Field experiment was conducted on mango crop at Saidapur Farm, Main Agriculture Research Station, University of Agricultural Sciences, Dharwad, during December to March of 2021-22 to know the efficacy of two contact fungicides mancozeb 75% WP and Propineb 70% WP, two combi-products Fluopyram 17.7% + tebuconazole 17.7% and Carboxin 37.5% + Thiram 37.5%, and two systemic fungicides propiconazole 25% EC and tebuconazole 25.9% EC which showed very effectiveness under *In vitro* condition.

The experiment was laid out in Randomized Block Design (RBD) with seven treatment and three replications. Totally, 21 uniformly looking mango trees were selected in orchard. Sprays of fungicides were given, at monthly interval from December to March. Control treatment was maintained without spray of fungicide. Each treatment was scored for disease by using 0-5 scale which was recommended by Mc Kinney, 1923 and data were converted into per cent diseases index (PDI)

The details of scales are as shown below

Scale	Leaf area affected
0	No infection
1	Up to 5 per cent
2	6-10 per cent
3	11- 20 per cent
4	21-50 per cent
5	> 50 per cent

Table 1. Efficacy of fungicides in orchard against anthracnose of mango

Treatment details	Conc. (%)	Per cent Diseases Index (PDI)				Percent reduction over control
		Before 1 st spray	30 days after 1 st spray	30 days after 2 nd spray	30 days after 3 rd spray	
1 Mancozeb 75% WP	0.1	26.14(30.75)	26.24(30.81)	20.96(27.25)	18.02(25.11)	39.44
2 Propineb 70%WP	0.2	32.34(34.66)	23.62(29.08)	20.18(26.69)	15.22(22.96)	48.86
3 Propiconazole 25% EC	0.025	33.32(35.26)	22.38(28.23)	17.09(24.42)	14.45(22.34)	51.42
4 Tebuconazole 25.9% EC	0.025	29.83(33.11)	21.28(27.47)	16.53(23.99)	12.37(20.59)	58.43
5 Fluopyram 17.7% + Tebuconazole 17.7%	0.05	33.58(35.41)	21.50(27.63)	19.49(26.20)	11.83(20.12)	60.24
6 Carboxin 37.5% + Thiram 37.5%	0.05	29.18(32.70)	24.56(29.71)	21.55(27.66)	14.49(22.37)	51.30
7 Control		34.08(35.72)	31.97(34.43)	30.71(33.65)	29.75(33.06)	
S. Em. ±		2.9724	1.50	1.53	0.6925	
C.D. (5%)		N S	4.63	4.74	2.13	
C.V.		9.40	5.92	7.27	3.94	

Treatment details are mentioned below.

Treatments Description	Dosage (%)
T ₁ Mancozeb 45% WP	0.1
T ₂ Propineb 70% WP	0.2
T ₃ Propiconazole 25% EC	0.025
T ₄ Tebuconazole 25.9% EC	0.025
T ₅ Fluopyram 17.7% + Tebuconazole 17.7%	0.05
T ₆ Carboxin 37.5% + Thiram 37.5%	0.05
T ₇ Control	-

Per cent disease index was calculated by using the formula (Wheeler, 1969).

$$\text{Percent Disease Severity} = \frac{\text{Sum of individual ratings}}{\text{Total No. of leaves} \times \text{Maximum observed disease grade}} \times 100$$

Observations were taken monthly on leaves of five twigs per tree before spray of fungicides. Per cent disease reduction over the control was also worked out on 30 days after third spray observation by using following formula. (Vincent, 1947)

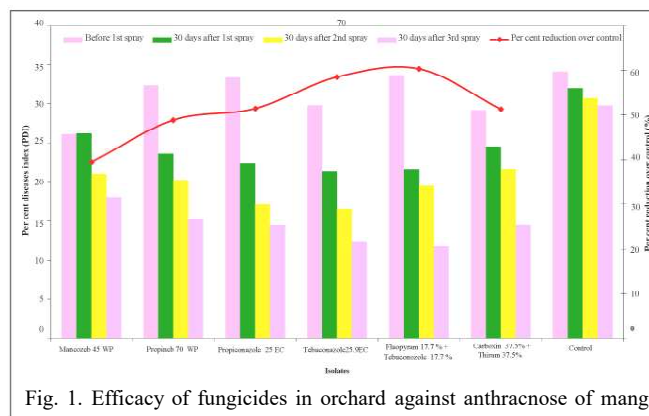
$$\text{Per cent disease reduction over the control} = \frac{C - T}{C} \times 100$$

C = PDI on control tree

T = PDI on treatment tree

Results and discussion

The efficacy of five contact, six combi-products and six systemic fungicides were assessed by Poison food technique in laboratory condition. Among contact fungicides tested mancozeb 75% WP at 0.1 per cent concentration and propineb 70% WP at 0.2 per cent concentration were effective with cent per cent and 81.31 per cent mycelial inhibition respectively. Among systemic fungicides tebuconazole 25.9 % EC and propiconazole 25% EC at 0.025 per cent concentration were found effective (100%) and among the combi-products tested, carboxin 37.5% + thiram 37.5% recorded cent per cent mycelial



inhibition, which was on par with Fluopyram 17.7% + Tebuconazole 17.7% (98.73%).

Under the field studies, results showed that the combination of fluopyram 17.7% + tebuconazole 17.7% at 0.05 per cent concentration significantly reduced the PDI on leaves to 11.83 per cent at 30 days after the third spray, with a reduction of 60.28 per cent compared to control. The next best fungicide was tebuconazole 25.9%, at a concentration of 0.025 per cent. It successfully decreased the PDI of leaves to 12.37 per cent at 30 days following the third spray, representing a 58.43 per cent decrease over the control (Table 1 and fig. 1 and 2).

Fluopyram 17.7% + tebuconazole 17.7% is a combi product of succinate dehydrogenase inhibitor fungicide and sterol biosynthesis inhibitor, respectively. This is close to the confirmations of Sayiprathap (2016) who reported that a combi product trifloxystrobin + tebuconazole recorded lowest per cent disease index (7.50%) at 0.05 per cent followed by tebuconazole (9.72%).

Before fungicide application, severity of the disease was non significant between the treatments and uniform in trees and significant difference between treatments was obtained after 30 days of 1st spray.



Fig. 2. Efficacy of fungicides against anthracnose of mango

Conclusion

From the outcomes of the studies it can be concluded that under field condition, fluopyram 17.7% + tebuconazole 17.7%

at 0.05 per cent concentration was found to be the best fungicide against anthracnose of mango with low PDI on leaves. Tebuconazole (25.9% EC) at 0.025 per cent concentration was the next best fungicide.

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