International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(3): 1219-1221
© 2019 IJCS
Received: 28-03-2019
Accepted: 30-04-2019

RR Satapathy
Department of Plant Pathology, MS Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

SK Beura
Department of Plant Pathology, College of Agriculture, OUAT, Bhubaneswar, Odisha, India

Correspondence
RR Satapathy
Department of Plant Pathology, MS Swaminathan School of Agriculture, Centurion University of Technology and Management, Paralakhemundi, Odisha, India

Fungicidal management of *Colletotrichum gloeosporioides* (Penz.) causing cashew anthracnose

RR Satapathy and SK Beura

Abstract
Cashew is infected by more than 20 diseases worldwide. Among the diseases, anthracnose caused by *Colletotrichum gloeosporioides* (Penz.), perfect stage *Glomerella cingulata* (Ston.) Spauld. & Schrenk is a serious menace in cultivation of cashew causing economic loss in Odisha. The present investigation was carried out with an objective to study the efficacy of new fungicides available in the market in *in – vitro* condition. Twelve fungicides such as azoxystrobin, tebuconazole, azoxystrobin + tebuconazole, Mancozeb, Azoxystrobin + Mancozeb, Hexaconazole, Zineb, Hexaconazole + Zineb, Difenoconazole, Pyrachlostrobin, Tebuconazole + Trifloxystrobin, Cupper hydroxide were evaluated at the concentration of 0.1%, 0.05%, 0.1%, 0.2%, 0.1%,0.25%, 0.2%, 0.05%,0.1%, 0.06% and 0.2% respectively. It has been found that mancozeb recorded maximum mycelia growth inhibition of 96.33% followed by Azoxystrobin+Mancozeb (96.17%). Tebuconazole alone recorded 94.56% growth inhibition but combination of Azoxystrobin + Tebuconazole recorded 93.22% growth inhibition. Similarly Zineb alone inhibited 95.46% but in combination with hexaconazole recorded 94.5% of growth inhibition. The combination of fungicides proved less effective as compared to sole fungicides. Further, the effectiveness of new fungicides may be tested under field condition against cashew anthracnose.

Keywords: Fungicides, cashew, anthracnose, Odisha, Mancozeb

Introduction
Cashew (*Anacardium occidentale* L.) is popularly known as the 'Gold mine' of wasteland. Cashew was originally introduced into India from Brazil in the sixteenth century mainly for checking soil erosion on the coast. Initially, it was considered as a suitable crop for soil conservation, afforestation and also wasteland development but gradually gained commercial importance.

Odisha stands third in Cashew cultivation, production and processing in India, claiming 16% of land under cashew cultivation area at 1.68 Lakh hectares and producing 1,00,000 MT of raw cashew nut (13.6% of India's raw cashew nut production). The major cashew growing districts in Odisha are Dhenkanal, Koraput, Cuttack, Puri, Ganjam, Sambalpur, Balasore and Sundargarh. As on date, there are more than 350 cashew processing industries processing approximately 125000 MT of raw cashew nuts, thus generating 35,000 employment opportunities every day. Raw cashew nut sector generates annual revenue of Rs 950 crores converting raw cashews into kernels by processing earn an additional value of more than Rs 250 crores. Hence Odisha cashew sector generates approximately Rs 1200 crores every year.

Various factors are responsible for low yield of the crop especially diseases play a vital role. There are more than 12 diseases which are reported to infect cashew tree worldwide. Anthracnose foliar blight, fruit rot, gummosis of twigs and trunk are often considered as the most relevant diseases causing severe damages across cashew growing areas. Among the diseases anthracnose caused by (*Colletotrichum gloeosporioides* (Penz.) Penz. & Sacc.), perfect stage (*Glomerella cingulata* (Ston.) Spauld. & Schrenk) is a common pathogen of cashew causing huge loss in yield.

We are using old fungicides continuously for the management of the disease. As a result there is development of resistance in the plant pathogens for that fungicide. Due to which the management of plant diseases is becoming difficult day by day. Now a day many new fungicides produced by various companies are available in the market. Keeping in view of these facts, the investigation on "Evaluation of new fungicides against plant pathogens" was

undertaken in the Department of Plant Pathology, College of Agriculture, Orissa University of agriculture and technology, Bhubaneswar, Odisha (India).

Materials and Methods

All the fungicides were tested at specified concentrations by adopting poisoned food technique. The required concentrations of chemicals were prepared and incorporated into sterilized cooled potato dextrose agar medium.

Twenty ml of medium was poured into 90 mm sterilized Petri dishes and all plates inoculated with actively growing 5 mm mycelia disc of test fungus. Three replications were maintained for each treatment. These plates were incubated at 25±1 ^{0}C for seven days and then colony diameter was recorded. The per cent inhibition over control was calculated according to formula given by Vincent (1947).

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

I = Per cent inhibition of mycelium
C = Growth of mycelium in control
T = Growth of mycelium in treatment

Table 1: Different fungicides with their concentration.

Sl. No.	Chemical name	Concentration (%)
1	Azoxystrobin	0.1
2	Tebuconazole	0.05
3	Azoxystrobin + Tebuconazole	0.1
4	Mancozeb	0.2
5	Azoxystrobin + Mancozeb	0.1
6	Hexaconazole	0.1
7	Zineb	0.25
8	Hexaconazole + Zineb	0.2
9	Difenoconazole	0.05
10	Pyrachlostrobin	0.1
11	Tebuconazole + Trifloxystrobin	0.06
12	Cupper hydroxide (Standard)	0.2

Result

It is seen from the table 2 that mancozeb recorded maximum mycelia growth inhibition of 96.33% followed by Azoxystrobin+Mancozeb (96.17%). However both the fungicides are at par. Copper hydroxide recorded the least inhibition of 29.02%. Tebuconazole alone recorded 94.56% growth inhibition but combination of Azoxystrobin + Tebuconazole recorded 93.22% growth inhibition. Similarly Zineb alone inhibited 95.46% but in combination with hexaconazole recorded 94.5% of growth inhibition. The combination of fungicides proved less effective as compared to sole fungicides.

Table 2: *In vitro* bio-assay of fungicides

Sl No.	Chemical name	Concentration (%)	Growth inhibition (%)
1	Azoxystrobin	0.1	44.56
2	Tebuconazole	0.05	94.56
3	Azoxystrobin + Tebuconazole	0.1	93.22
4	Mancozeb	0.2	96.33
5	Azoxystrobin + Mancozeb	0.1	96.17
6	Hexaconazole	0.1	84.16
7	Zineb	0.25	95.46
8	Hexaconazole + Zineb	0.2	94.5
9	Difenoconazole	0.05	72.8
10	Pyrachlostrobin	0.1	32.12
11	Tebuconazole + Trifloxystrobin	0.06	95.06
12	Cupper hydroxide (Standard)	0.2	29.02
	SE (m)	1.235	
	CD (0.05)	3.626	

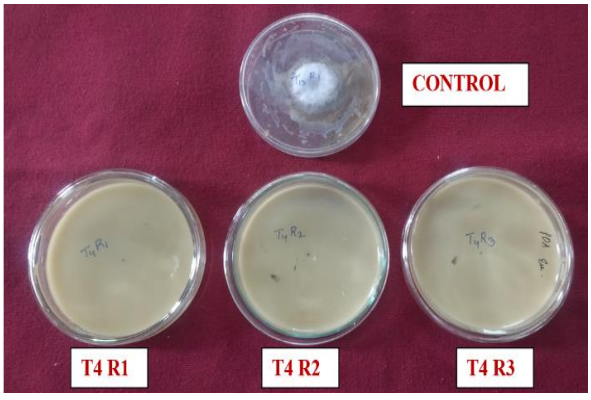

Fig 1: Effect of fungicides on the test pathogen. T4 - Mancozeb

Discussion

Among the twelve fungicides tested *in-vitro* against the test pathogen, Mancozeb recorded maximum inhibition of 96.33% followed by Azoxystrobin+Mancozeb (96.17%). However both the fungicides are at par. Cupper hydroxide recorded the least inhibition of 29.02%. Tebuconazole alone recorded 94.56% growth inhibition but combination of Azoxystrobin + Tebuconazole recorded 93.22% inhibition. Similarly Zineb alone inhibited 95.46% but in combination with hexaconazole recorded 94.5% of growth inhibition. The combination of fungicides proved less effective as compared to sole fungicides. The efficacy of mancozeb had been studied by Alam (2002) [1] and Mc Millan (2011) [2] against the *Colletotrichum gloeosporioides* which is in agreement with

the present finding. Tebuconazole was reported to be an effective fungicide against *C. gloeosporioides* in poison food technique as reported by Paravathy and Girija (2016) [3]. The efficacy of tebuconazole has been proved in the present investigation causing 94.56% growth inhibition supporting the findings of Parvathy and Girija (2016) [3].

Conclusion

The *in-vitro* study on the effect of fungicides on the mycelial growth of *Colletotrichum gloeosporioides* revealed that mancozeb (0.2%) recorded maximum inhibition (96.33%) followed by azoxystrobin + mancozeb (96.17%). Cupper hydroxide recorded the least inhibition of 29.02%. It is observed that the combination fungicides proved less effective as compared to sole fungicides.

Acknowledgments

Authors are thankful to the Head, Department of Plant pathology, College of agriculture, Orissa University of agriculture and technology for providing the necessary facilities in accomplishing the research work. My sincere appreciation is also expressed to Dr. S.K. Mukherjee, Associate professor, Department of Entomology, College of Agriculture, OUAT and also Officer in-charge of AICRP on Cashew as a committee member and for providing necessary facilities to conduct field trials. Sincere gratitude is expressed to Department of Plant Pathology and their beloved teachers Dr. M. K. Mishra, Dr. (Mrs) Gayatri Biswal, Dr. A. K. Senapati, Dr. K.B. Mohapatra for their stimulating suggestions and warm friendship. I am very much thankful to my seniors Bhagyashree didi, Amlan didi and Anshuman bhai for helping me in each part of my thesis work. I am also very much thankful to my dear friends and best friend Annu Kumari for their help and constant encouragement during my course of study. Above all, I express my greatest tributes to 'GOD' for being pillar of wisdom, strength and courage throughout my life.

Reference

1. Alam S, Banu S, Ali MF. *In-vitro* inhibition of conidial germination of *C. gloeosporioides* by fungicides, phyto-extracts and phytohormones, Pakistan journal of biological science. 2002; 5(3):303-306.
2. McMillan RT. Efficacy of Fungicides for Control of *Colletotrichum gloeosporioides* on Dendrobiums, Florida State Horticultural Society. 2011; 124:314-316.
3. Parvathy R, Girija VK. *In vitro* evaluation of fungicides and organic preparations against *Colletotrichum gloeosporioides* causing anthracnose of black pepper, International journal of applied and pure science and agriculture. 2016; 11:208-211.