

# Effect of different fungicides on the management of *Cercospora* Leaf spot ( *Cercospora cruenta* Sacc.,) of cowpea under field condition

S. SARKAR, A. NANDI, S.K.BEURA, S. DAS, S.K. DASH, N. SENAPATI, G. PANDEY, AND A. PATNAIK



*J. Mycopathol, Res, 54(4) : 535-538, 2017;*  
ISSN 0971-3719

© Indian Mycological Society,  
Department of Botany,  
University of Calcutta,  
Kolkata 700 019, India

***This article is protected by copyright and all other rights under the jurisdiction of the Indian Mycological Society. The copy is provided to the author(s) for internal non-commercial research and educational purposes.***

## Effect of different fungicides on the management of *Cercospora* Leaf spot ( *Cercospora cruenta* Sacc.,) of cowpea under field condition

---

S. SARKAR\* , A. NANDI , S.K.BEURA, S. DAS , S.K. DASH, N. SENAPATI, G. PANDEY AND A. PATNAIK  
AICRP on Vegetable Crops, Orissa University of Agriculture and Technology, Bhubaneswar 751003, Odisha

---

Received : 15.02.2016

Accepted : 16.07.2016

Published : 30.01.2017

---

The aim of this study was to investigate the effects of different fungicides on the management of *Cercospora* leaf spot of popular cowpea variety Utkal Manik. The investigation was carried out during the period from 2009-10 to 2014-15 at experimental field of AICRP on Vegetable Crops, OUAT, Bhubaneswar. The experiment was laid out in randomized complete block design (RCBD) with three replications. Standard rates of nine fungicides viz. Carbendazim @ 0.15 %, Mancozeb @ 0.25%, Hexaconazole @ 0.1 %, Difenconazole @ 0.05 %, Tebuconazole @ 0.1 %, Tricyclazole @ 0.1 %, Chlorothalonil @ 0.2 %, Ziram @ 0.2 % and Propiconazole @ 0.1 % were applied two times at 10 days interval after initiation of disease for management of *Cercospora* leaf spot disease of cowpea. Results showed that among the 10 (ten) tested treatments including control, Difenconazole @ 0.05 % recorded a much lower per cent disease index ( mean PDI- 4.0 ) which was significantly superior over control, the treatment also subsequently resulted in higher per cent disease reduction (90.8%) over control. Difenconazole @ 0.05 % sprays also brought about higher yield ( mean yield 67.7q/ha ) which was significantly superior over control and per cent yield increase was more than the other treatments with benefit cost ratio 3.15. However, the control plot recorded maximum mean disease intensity (PDI- 43.8) with minimum mean fruit yield (34.1q/ha). No phytotoxic effects such as stunting, chlorosis, necrosis, discoloration, blackening and burning / malformation were observed.

**Key words:** Fungicides, *Cercospora cruenta* ,cowpea, phytotoxicity

---

### INTRODUCTION

Leguminous vegetable crops play an important role in improving livelihood, nutritional security of farmers and populations in less developed countries as well as sustainability of agriculture in dry areas worldwide. Among the legumes, cowpea ( *Vigna unguiculata* L. Walp ) is the important vegetable crop grown in warm season and it is highly susceptible to foliar blight caused by *Pseudocercospora cruenta* . This pathogen and *Phoma phaseoli* jointly causes heavy losses every year. The yield loss caused by *Cercospora* leaf blight alone was

reported to be 42% , while 25%, 10% , and 3% losses were recorded in mature pod, seed number per pod and average weight per 100 seeds respectively *Cercospora* leaf spot disease in cowpea has world wide distribution. It is reported that *Cercospora cruenta* caused severe leaf spotting and defoliation in cowpea in India. The disease is so severe in the months of September – October that farmers are unable to harvest a single pod due to complete defoliation within few days. So appropriate control measures are needed at the appropriate time to combat this disease. But studies on the control of *Cercospora* leaf spot have mostly centered on the use of host resistance. The host plant resistance has frequently broken down as a

---

\*Corresponding author : subratasarkar78@rediffmail.com

result of emergence of new strains of pathogens and changes in environmental conditions. Already few fungicides have been recommended against *Cercospora* leaf spot disease in cowpea which play an important role in management of the disease. The present study was also carried out to find out a suitable fungicide taking into consideration their bioefficacy and phytotoxicity against *Cercospora* leaf spot of cowpea.

## MATERIALS AND METHODS

Field experiment was conducted to evaluate the bioefficacy of different fungicides against *Cercospora* leaf spot disease of cowpea (*Cercospora cruenta*, Sacc.) disease under field condition during six consecutive years from 2009-10 to 2014-15 at experimental field of AICRP on Vegetable Crops, OUAT, Bhubaneswar during *Kharif* season. Cowpea variety Utkal Manika was sown and the trial was laid out in a randomized block design (RBD) with ten treatments and three replications in a plot size of 3.0 m x 2.7 m and with a spacing of 45 cm x 20 cm. The experiment consisted of ten treatments viz. T<sub>1</sub>- Carbendazim @ 0.15 %, T<sub>2</sub>- Mancozeb @ 0.25 %, T<sub>3</sub>- Hexaconazole @ 0.1 %, T<sub>4</sub>- Difenconazole @ 0.05 % , T<sub>5</sub>- Tebuconazole @ 0.1 % , T<sub>6</sub>- Tricyclazole @ 0.1 % , T<sub>7</sub>- Chlorothalonil @ 0.2 % , T<sub>8</sub>- Ziram @ 0.2 % , T<sub>9</sub>- Propiconazole @ 0.1 % and T<sub>10</sub>- Control. Two sprayings were given at 10 days intervals at the onset of the disease. The recommended package of practices were followed for the trial. The observation on the disease incidence was recorded after 10 days of each spray. The severity of *Cercospora* leaf spot of cowpea was recorded by using 0 to 5 scale ( Table.1). Five infected plants were selected randomly from each plot and five leaves were selected from each selected plant for scoring the disease intensity

**Table 1** : Rating scale for *Cercospora* leaf spot disease of cowpea

Scale	Disease Severity
0	No infection
1	1-19 % leaf area infected
2	20-39 % leaf area infected
3	40-59 % leaf area infected
4	60-79 % leaf area infected
5	80-100 % leaf area infected

Finally per cent disease index ( PDI) was calculated based on the following formula

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{Total no of leaves observed} \times \text{maximum scale}} \times 100$$

The data were statistically analysed to find out the significance of variation among the treatments. The different fungicides were sprayed at different doses as mentioned earlier. The phytotoxicity symptoms were recorded a week after last spray on the following parameters viz. stunting, chlorosis, necrosis, discolouration, blackening and burning / malformation.

## RESULTS AND DISCUSSION

The results obtained during the present investigation in respect of disease intensity and yield attributes of cowpea are presented below.

### *Effect of fungicides on the disease intensity of Cercospora leaf blight of cowpea*

Nine tested fungicides were effective in controlling *Cercospora* leaf spot of cowpea in the field during six consecutive years of study. The different tested fungicides have differed in respect of disease intensity (%) and yield (q/ha). Difenconazole @ 0.05% , however, recorded substantially the lowest (4.0%) disease intensity and showed statistical superiority over T<sub>5</sub>- Tebuconazole @ 0.1 % , T<sub>6</sub>- Tricyclazole @ 0.1 % , T<sub>7</sub>- Chlorothalonil @ 0.2 % , T<sub>8</sub>- Ziram @ 0.2 % , T<sub>9</sub>- propiconazole @ 0.1 % and T<sub>10</sub>- control but it showed statistical parity with the treatment T<sub>1</sub>- carbendazim @ 0.15 % , T<sub>2</sub>- Mancozeb @ 0.25 % and T<sub>3</sub>- hexaconazole @ 0.1 % in respect of disease severity. The treatment also subsequently recorded highest percentage of disease reduction (90.8% ). Hexaconazole @ 0.1 % was found to be the next best treatment in respect of reducing the disease intensity of *Cercospora* leaf spot of cowpea. The treatment was also significantly superior over control while the highest disease intensity (43.8% ) was recorded in control plot .

### *Effect of fungicides in respect of yield of cowpea*

The present study on effect of fungicides on disease intensity and fruit yield revealed that fruit yield obtained from fungicides treated plots significantly differed from untreated control plot. Maximum mean fruit yield (67.7 q/ha) was obtained from the plots treated with Difenconazole @ 0.05% which was at par with the treatment Hexaconazole @

**Table 2:** Effect of different fungicides on disease intensity of *Cercospora* leaf spot and fruit yield (q/ha) of cowpea (Pooled)

Treatments	Disease intensity (PDI)	% disease control	Fruit yield(q/ha)	% fruit yield increase over control
T <sub>1</sub> - Carbendazim @ 0.15 %	7.0(11.86)	84.0	58.7	72.14
T <sub>2</sub> - Mancozeb @ 0.25 %	7.6(15.98)	82.6	57.1	67.4
T <sub>3</sub> - Hexaconazole @ 0.1 %	5.1(12.94)	88.3	63.1	85.0
T <sub>4</sub> - Difencnazole @ 0.05 %	4.0(11.39)	90.8	67.7	98.5
T <sub>5</sub> - Tebuconazole @ 0.1 %	13.5(21.44)	68.9	51.1	49.8
T <sub>6</sub> - Tricyclazole @ 0.1 %	13.6(21.60)	68.9	50.5	48.0
T <sub>7</sub> - Chlorothalonil @ 0.2 %	18.1(25.25)	58.6	45.1	32.2
T <sub>8</sub> - Ziram @ 0.2 %	18.3(25.32)	58.2	45.9	34.6
T <sub>9</sub> - Propiconazole @ 0.1 %	17.9(24.19)	59.1	48.4	41.9
T <sub>10</sub> Control	43.8(41.43)	-	34.1	-
C.D. (0.05)	4.44	-	5.52	-

**Table 3:** Economics of fungicidal management of *Cercospora* leaf spot disease of cowpea

Treatments	Cost of cultivation (Rs/ha)	Gross Income (Rs/ha)	Net income (Rs/ha)	Benefit: Cost ratio
T <sub>1</sub>	41575.00	117400.00	75825.00	2.82
T <sub>2</sub>	41500.00	114200.00	72700.00	2.75
T <sub>3</sub>	41750.00	126200.00	84450.00	3.02
T <sub>4</sub>	42925.00	135400.00	92475.00	3.15
T <sub>5</sub>	43000.00	102200.00	59200.00	2.37
T <sub>6</sub>	43750.00	101000.00	57250.00	2.30
T <sub>7</sub>	44450.00	90200.00	45750.00	2.02
T <sub>8</sub>	41200.00	91800.00	50600.00	2.22
T <sub>9</sub>	42550.00	96800.00	54250.00	2.27
T <sub>10</sub>	40200.00	68200.00	28000.00	1.69

0.1 % in respect of mean fruit yield (63.1 q/ha), while the lowest mean fruit yield (34.1q/ha) was obtained from untreated control plots. Economics of two sprays of different fungicides revealed that Difenconazole @ 0.05% not only effectively re-

In the present study, the minimum disease intensity of *Cercospora* of cowpea and maximum yield was found when Difenconazole @ 0.05% was used as foliar spray. The probable reason for such finding may be that, Difenconazole would have affected

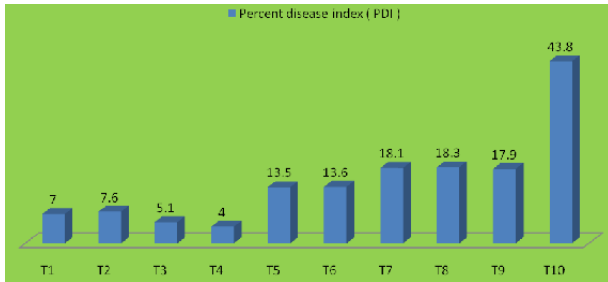


Fig. 1 : Effect of different treatments on PDI

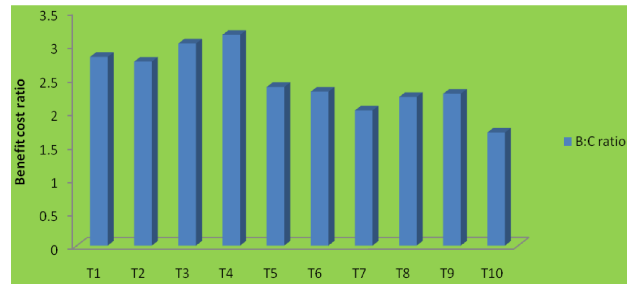


Fig. 3 : Effect of different treatments on B:C ratio

duced the disease intensity but also registered highest benefit: cost ratio (3.15). There were no phytotoxicity symptoms viz. stunting, chlorosis, necrosis, discolouration, blackening and burning / malformation recorded during the course of study.

the spore germination by inhibiting the sterol synthesis which is the important component of cell wall of fungi which may have resulted in the inhibition of disease producing activity of pathogen in the plant.

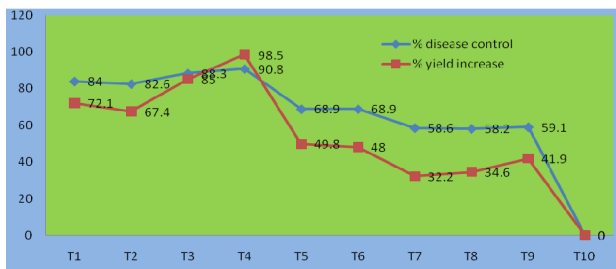


Fig. 2 : % Disease control and % yield increase as influenced by different treatments

Although there is no such finding which supported the present study but it is reported that difenconazole is effective against *Cercospora arachidicola* due to its excellent protective and curative activity. Present study revealed that Difenconazole @ 0.05% was also effective against *Cercospora cruenta* causing *Cercospora* leaf spot disease of cowpea.