Bioefficacy of different fungicides along with bioagents against Chilli Anthracnose (*Colletotrichum capsici*) disease under field condition

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

J. Mycopathol, Res, 54(1) : 85-87, 2016;
ISSN 0971-3719

**Department of Botany,
University of Calcutta,
Kolkata 700 019, India**

J. Mycopathol. Res. ***54(1)*** *: 85-87, 2016;* (ISSN 0971-3719)

Bioefficacy of different fungicides along with bioagents against Chilli Anthracnose (*Colletotrichum capsici*) disease under field condition

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

Received : 08.07.2015 RMS Accepted : 05.10.2015 Published : 25.04.2016

Bioefficacy of different fungicides viz. Thiophanate methyl, Flusilazole, Copper hydroxide , Azoxystrobin, Mancozeb, Propiconazole , Difenconazole, Penconazole, Tebuconazole and two bioagents viz. *Pseudomonas fluorescens , Trichoderma harzianum* were evaluated against Anthracnose of chilli at AICRP on Vegetable Crops under Horticulture Research Station, OUAT, Bhubaneswar during *rabi* season of 2012-13 and 2013-14. Among the 12 (twelve) tested treatments including control, all the treatments significantly reduced the Anthracnose incidence as compared to control. Difenconazole (T_7) was found to be most effective in reducing the disease intensity (mean PDI-5.0) which significantly varied from all other treatments. The same treatments also registered maximum disease control over control (85.2%) corresponding to the highest mean ripe fruit yield (74.5 q/ha). However, the control plot recorded maximum mean disease intensity (PDI- 33.9) with lowest mean ripe fruit yield (32.3 q/ha). The bioagents viz. *Pseudomonas fluorescens, Trichoderma harzianum* also significantly reduced the disease intensity as compared to control but both the treatments were at par with each other in reducing the disease intensity. No phytotoxic effects such as stunting, chlorosis, necrosis, discolouration, blackening and burning / malformation were observed.

Key words: Bio efficacy, fungicides, bioagents, anthracnose, chilli, *Colletotrichum capsici*. phytotoxicity

INTRODUCTION

Chilli (*Capsicum annum* L.) cultivation has existed for several hundred of years as a sustainable form of agriculture in India and is the fourth most important vegetable crop in the world and first in Asia. India accounts for 25 per cent of the world's total production of chilli , and is the largest producer in terms of International trade, exporting 25 per cent of its total production (FAO, 2003). However, the average productivity of dry chilli is low (1 ton/ha) as compared to China, Tiwan and Mexico where it yields 3 ton/ha of dry chilli (Peter, 1998). The main reason for the low productivity in India is the local cultivars are prone to various fungal, viral and bacterial diseases which account for significant reduction in chilli productivity . Among them Anthracnose (Fruit rot and Die back) caused by *Colletotrichum capsici* (Syd. Butler and Bisby) is prevalent throughout the chilli growing areas of India (Jayalakshmi, 1996) and producing typical anthracnose symtoms on red chilli fruit include sunken necrotic tissues with concentric rings of accervuli . It has been reported that pre harvest and post harvest losses account for more than 50 percent in severe cases (Pakdeevaraporn *et al*, 2005). Several fungicides have been recommended against anthracnose.

*e-mail: subratasarkar78@rediffmail.com

The present investigation has been carried out using some new formulation along with bio agents for their bio efficacy and phytotoxicity against chilli anthracnose disease.

MATERIALS AND METHODS

Field experiments were conducted to evaluate the bioefficacy of different fungicides along with bioagents against chilli anthracnose (*Colletotrichum capsici*) disease under field condition in two consecutive years of 2012-13 and 2013-14 at AICRP on Vegetable Crops under Horticulture Research Station, OUAT, Bhubaneswar. Chilli variety Utkal Rashmi was transplanted and the trial was laid out in a Randomized Block Design (RBD) with twelve treatments and three replications in a plot size 3.0 x 2.7 m and with a spacing of 50 cm x30 cm. The experiments consisted with twelve treatments viz. T_1 -Thiophanate methyl @ 0.1%, T_2 - Flusilazole @ 0.1%, T_3- Copper hydroxide @ 0.2%, T_4 -Azoxystrobin @ 0.03%, T_5 - Mancozeb @ 0.2%, T_6 -Propiconazole @ 0.1%, T_7 - Difenconazole @ 0.05%, T_8 -Penconazole @ 0.1%, T_9 - Tebuconazole @ 0.1%, T_{10} - *Pseudomonas fluorescens* @ 0.2%, T_{11} - *Trichoderma harzianum*@ 0.2% and T_{12} - Control . Three 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 intensity was recorded after 10 days of each spray. The severity of Anthracnose was recorded by using 0 to 5 scale i.e 0= no infection,1= 0.1-5.0% area infected,2= 5.1-10.0 % area infected,3= 10.1-25.0% area infected,4= 25.1-50.0% area infected and5= >50% area infected on 10 plants and in each plant 10 fruits were selected at random in each replication of the treatment. Finally per cent disease index (PDI) was calculated by using following formula. And the data were statistically analysed to find out the significant of variation among the treatments. The different fungicides and bio agents were sprayed at different doses as

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

mentioned earlier. The phytotoxicity symtoms were recorded a weak after last spray on the following parameters viz. stunting, chlorosis, necrosis, discolouration, blackening and burning / malformation.

RESULTS AND DISCUSSION

The Anthracnose disease incidence under different treatments and corresponding yield during two years are provided in Table 1, Figure 1 and 2. Two years (2012-13 and 2013-14) pooled data revealed that among the 12 (twelve) tested treatments including control, all the treatments significantly reduced the anthracnose incidence as compared to control. Difenconazole @ 0.05% (T_7) was found to be most effective in reducing the disease intensity (mean PDI-5.0) which significantly varied from all other treatments. The same treatments also registered maximum disease control over control (85.2%) corresponding to the highest mean ripe fruit yield (74.5 q/ha) with B:C ratio of 3.53. Propiconazole @ 0.1%(T_6) was found to be next

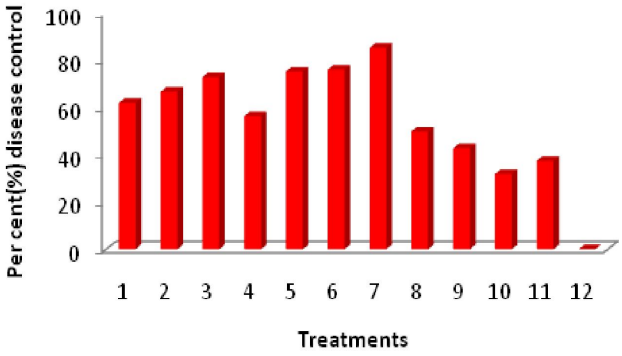

Fig. 1 : Per cent (%) disease control as influenced by different treatments

best treatment in reducing the disease intensity (mean PDI-8.1) which is also significantly varied from control but at par with copper hydroxide@ 0.2% (T_3) and mancozeb 0.2% (T_5). However, the control plot recorded maximum mean disease intensity (PDI- 33.9) with lowest mean ripe fruit yield (32.3 q/ha) (Figure 1 and 2).The bioagents viz.

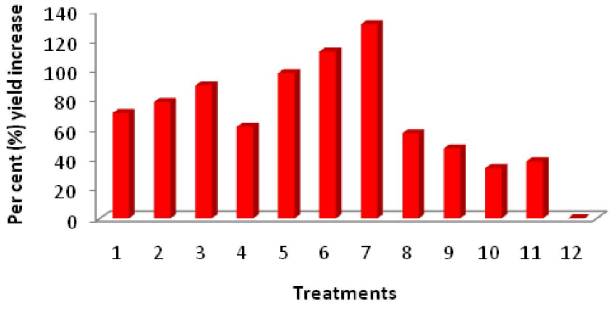

Fig. 2 : Per cent (%) yield increase as influenced by different treatments

Pseudomonas flurescens, Trichoderma harzianum also significantly reduced the disease intensity as compared to control but both the treatments were at par with each other in reducing the disease intensity. No phytotoxic effects such as stunting, chlo-

Table 1 : Efficacy of different fungicides along with bioagents against chilli anthracnose disease under field condition (pooled 2012-13 and 2013-14)

Treatments	Concentration (%)	Mean PDI	% disease control over control	Mean Yield(q/ha)	% Yield increase over control	B:C
T_1 Thiophonate methyl 70% WP	0.1	12.9(20.96)	61.94	55.2	70.89	2.64
T_2 Flusilazole 40% EC	0.1	11.3(19.66)	66.66	57.6	78.32	2.54
T_3 Copper hydroxide 50% WP	0.2	9.2(17.66)	72.86	61.2	89.47	2.88
T_4 Azoxystrobin 25% SC	0.03	14.8(22.65)	56.34	52.2	61.60	2.41
T_5 Mancozeb 75% WP	0.2	8.4(16.81)	75.22	63.9	97.83	3.18
T_6 Propiconazole 25% EC	0.1	8.1(16.540	76.10	68.6	112.38	3.31
T_7 Difenconazole 25% EC	0.05	5.0(12.81)	85.25	74.5	130.65	3.53
T_8 Penconazole 10% EC	0.1	17.0(24.35)	49.85	50.8	57.27	2.58
T_9 Tebuconazole 25% EC	0.1	19.4(26.10)	42.77	47.5	47.05	2.08
T_{10} *Pseudomonas fluorescens*	0.2	23.1(28.70)	31.85	43.2	33.74	1.96
T_{11} *Trichoderma harzianum*	0.2	21.20(27.44)	37.46	44.7	38.39	2.30
T_{12}control	-	33.9(35.62)	-	32.3	-	1.40
CD(0.05)		2.15	-	5.84	-	-

rosis, necrosis, discolouration, blackening and burning / malformation were observed.

Chemical are the most common and practical method of controlling anthracnose disease. However, choise of appropriate chemical is also a important factor for controlling the disease. The fungicide traditionally recommended for anthracnose management in chilli is maneb @ 2.5g /l , Smith (2000), although it does not consistently control the severe form of anthracnose on chilli fruits. The Difenconazole fungicide has recently been identified for control of Anthracnose in chilli and some reports are available on the efficacy of this fungicide against Anthracnose. Alexander and Waldenmaier (2002), Lewis and Miller (2003), reported that Difenconazole @ 0.1% have recently been labeled for control of Anthracnose disease. The present study also revealed that difenconazole @ 0.1% significantly reduced the anthracnose disease incidence as compared to all other treatments. The treatment also non phytotoxic at or below the recommended dose for field (Nithyameenakshi *et al*., 2006).

REFERENCES

Alexander, S. A. and Waldenmaier, C. M. 2002. Management of anthracnose in bell pepper, 2001. Fungic.Nematicide Tests (online). *Report* **57:** 1094

FAO, 2003. *FAO Production Yearbook 2001*. Rome : FAO, p. 333.

Jayalakshmi, C. 1996. Studies on fruit rot and die back disease of chilli (Capsicum annum L.) incited by Colletotrichum capsici (Syd.) Butler and Bispy. M.Sc.(Ag.) Thesis, Tamil Nadu Agric. Univ., Madurai, India. 216p.

Lewis, I.M.L. and Miller, S.A. 2003. Evaluation of fungicides and biocontrol agents for the control of anthracnose on green pepper fruit. *Nematicide Test Report* **58:** 62 - 63.

Nithyameenakshi, S., Jeyaramraja, P.R. and Manian, S. 2006. Investigation on phytotoxicity of two new fungicides Azoxystrobin and Difenconazole . *American Journal of Plant Physiology*, **1**: 89-98.

Pakdeevaraporn, P., Wasee, S., Taylor, P.W.J. and Mongkolporn, O.2005. Inheritance of resistance to anthracnose caused by *Colletotrichum capsici* in *Capsicum*. **124**: 206-208.

Peter, K.V. 1998. Recent advances in chilli breeding. *Indian Spices*, **35**: 3-5.

Smith, K.L. 2000. Peppers. Ohio Vegetable Production Guide. Columbus, Ohio. **672:** 166 - 173.