

## MANAGEMENT OF POWDERY MILDEW OF CHILLI CAUSED BY *Leveillula taurica* (Lev) Arn.

S. S. Nawkhare<sup>1</sup>, M. J. Patil<sup>2</sup>, H. R. Sawai<sup>3</sup> and R.L.Parate<sup>4</sup>

### ABSTRACT

Experiment was conducted during the year 2014-15 at Pathology section college of Agriculture, Nagpur to assess the efficacy of different fungicides viz., azoxystrobin, hexaconazole, dinocap, tebuconazole, benomyl and wettable sulphur against powdery mildew of chilli caused by *Leveillula taurica*(Lev.)Arn. *in-vivo* conditions. Among all the tested fungicides minimum disease intensity and maximum per cent disease control was recorded after third spraying with 0.1 per cent azoxystrobin (12.18 and 77.70 PDI) and 0.1 per cent hexaconazole (13.44 and 75.40 PDI) and these treatments were found at par with each other. The higher yield of chilli fruits was obtained with 0.1 per cent azoxystrobin followed by hexaconazole recording 16.97 and 15.61 q ha<sup>-1</sup> respectively. Highest incremental cost:benefit ratio (22.48 ) was recorded by hexaconazole against powdery mildew of chilli.

(Key words: *Leveillula taurica*, Chilli.)

### INTRODUCTION

Chilli (*Capsicum annum* L.) is the fourth most important vegetable crops in the world and first in Asia. The most important producers and exporters of chilli include China, India, Mexico, Morocco, Pakistan, Thailand and Turkey (Devi *et al.*, 2014). Chilli is an important spice crop cultivated in tropical and subtropical regions of the world. The important chilli growing states are Andhra Pradesh, Orissa, Maharashtra, West Bengal, M.P., Karnataka, Rajasthan and Tamil-Nadu. (Girija Ganeshan, 2011). In India, area under chilli cultivation is 775 ha producing about 1492 MT with average productivity of 1.9 MT ha<sup>-1</sup>. Area under chilli cultivation in Maharashtra was 99.50 hectares with production of 45.60 MT and average productivity of 2.1 MT ha<sup>-1</sup> (Anonymous, 2014).

Chilli suffers from many diseases caused by fungi, bacteria, viruses, nematodes and also abiotic stresses. Among the various fungal diseases such as powdery mildew, leaf spot, anthracnose or fruit rot and die back are the most prevalent ones. The powdery mildew caused by *Leveillula taurica* (Lev.) Arn. is a major constraint in chilli production in India causing heavy yield loss ranging from 14 to 20 per cent, due to severe defoliation and reduction in photosynthesis, size and number of fruits plant<sup>-1</sup>.

### MATERIALS AND METHODS

The experiment was conducted during *kharif* 2014-15 at the field of Plant pathology Section, College of Agriculture Nagpur. The attempts were made to evaluate the effect of different fungicides on the intensity of powdery

mildew of chilli. The experiment was conducted in Randomised block design with three replications and seven treatments i.e. six fungicides and one control. The cultivar Jayanti was used for the study.

The tested fungicides were Azoxystrobin (0.1%), hexaconazole (0.1%), dinocap (0.1%), tebuconazole (0.05%), benomyl (0.05%) and wettable sulphur (0.3%). The first spray was given after the appearance of the disease and repeated twice at an interval of fifteen days. The final observation on disease intensity was recorded fifteen days after third spray from five plants on six leaves i.e. two from bottom, middle and tip portion each using 0-9 scale (Mayee and Datar, 1986).

Category	Description
0	No symptom of powdery mildew
1	Small scattered powdery mildew specks covering 1% or less leaf area
3	Small powdery lesion enlarged covering 1-10% of leaf area
5	Powdery lesion enlarged covering 11-25% of leaf area
7	Powdery lesion coalesce to form big patches covering 26-50% of leaf area
9	Big powdery mildew patches covering 51% or more of leaf area and defoliation

The per cent disease intensity was calculated by following formula.

$$\% \text{ Disease intensity (PDI)} = \frac{\text{Sum of observed numerical ratings}}{\text{Number of leaves observed} \times \text{maximum ratings}} \times 100$$

The per cent disease control (PDC) was further calculated for each treatment by using following formula.

1. P.G. Student, Plants Pathology Section, College of Agriculture, Nagpur
- 2 and 4. Asstt. Professors, Plant Pathology Section, College of Agriculture, Nagpur
3. Asstt. Professor, Deptt. of Entomology, College of Agriculture, Nagpur

$$\% \text{ Disease control} = \frac{\text{PDI in control} - \text{PDI in treatment}}{\text{PDI in control}} \times 100$$

Observations on chilli yield  $q \text{ ha}^{-1}$  were recorded. Per cent increase over control and ICBR were also calculated.

## RESULTS AND DISCUSSION

The data presented in table 1 represent that all the fungicidal treatments showed of disease intensity in the range of 12.18 to 22.62 per cent as compared to control 54.64 per cent. The per cent disease control by the treatments was recorded in the range of 58.60 to 77.70.

After third spray the best treatment in reducing the powdery mildew disease was 0.1 per cent azoxystrobin followed by 0.1 per cent hexaconazole showed 12.18 and 13.44 per cent disease intensity respectively and both these treatments were at par with each other. Other promising treatments were wettable sulphur 0.3 per cent recorded 15.86 per cent disease intensity which was at par with

hexaconazole. Similarly dinocap 0.1 per cent recorded 18.24 per cent disease intensity which was at par with wettable sulphur. Tebuconazole 0.05 per cent and benomyl 0.05 per cent were recorded 21.56 and 22.62 per cent disease intensity respectively and both these treatments were at par with each other and with dinocap. Maximum disease intensity was observed in control 54.64.

All the fungicidal treatments reduced the disease as compared to control. Azoxystrobin recorded maximum per cent disease control followed by hexaconazole showed 77.70 and 75.40 per cent disease control respectively. Other effective treatments were wettable sulphur, dinocap and tebuconazole recorded 70.97, 66.61 and 60.54 per cent disease control respectively. Minimum disease control of 58.60 per cent was noticed in 0.05 per cent benomyl.

Considering incremental cost: benefit ratio, the most economical treatment which recorded highest ICBR was hexaconazole 22.48 followed by wettable sulphur showed 13.84, where as other treatments tebuconazole

**Table 1. Effect of different fungicides on powdery mildew and yield of chilli fruits**

Tr. No.	Treatments	Concentration (%)	After third spray		Chilli yield $q \text{ ha}^{-1}$	Increased yield over control $q \text{ ha}^{-1}$	ICBR
			PDI	PDC			
T <sub>1</sub>	Azoxystrobin	0.1	12.18 (20.43)*	77.7	16.97	8.64	4.72
T <sub>2</sub>	Hexaconazole	0.1	13.44 (-21.51)	75.4	15.61	7.28	22.48
T <sub>3</sub>	Dinocap	0.1	18.24 (-25.28)	66.61	13.2	4.87	5.62
T <sub>4</sub>	Tebuconazole	0.05	21.56 (-27.67)	60.54	12.96	4.63	9.12
T <sub>5</sub>	Benomyl	0.05	22.62 (-28.40)	58.6	11.6	3.27	7.77
T <sub>6</sub>	Wettable sulphur	0.3	15.86 (-23.87)	70.97	13.45	5.12	13.84
T <sub>7</sub>	Control		54.64 (-47.66)	—	8.33	-	
	SE(m)±		1.1		0.69		
	CD(P= 0.05)		3.29		2.06		

\* (Figures in parenthesis are arc sin values)



**Plate 1: Disease plant of chilli**



**Plate 2: Disease rating scale 0-9**

showed 9.12, benomyl showed 7.77, dinocap showed 5.62, and azoxystrobin showed 4.72 ICBR, respectively. ICBR was minimum in superior treatment due to high cost of fungicide.

Similar results were reported by various investigators such as Hingole and Kurundkar (2004), who reported that hexaconazole was found to be effective in controlling powdery mildew and getting maximum yield of chilli. Ajitkumar *et al.* (2014) observed minimum disease intensity of 16.33 per cent with the application of combi fungicide UPF -509 (azoxystrobin 8.3 + mancozeb 66.7 %) for the control of chilli powdery mildew. Shrinivasan *et al.* (2014) recorded lowest disease intensity of chilli powdery mildew with the application of UPF-509 (azoxystrobin 8.3 + mancozeb ) and azoxystrobin respectively. Ramesh *et al.* (2013) observed 14.46 per cent disease intensity with the application of azoxystrobin 0.1 per cent. Naik and Nagaraja (2003) noticed that three sprays of 0.1% wettable sulphure recorded 16.39 per cent disease intensity over control 60.56 per cent in okra powdery mildew. Surwase *et al.* (2009) reported that 0.05% hexaconazole was most effective with 11.2 per cent least disease intensity with maximum 70.46 per cent disease control for management of powdery mildew of pea .

## REFERENCES

- Anonymous 2014. Indian horticulture database, pp. 23.
- Ashtaputre, S. A., S. Kulkarni, M. S. Rao and M. Shivaprasad, 2007. Management of powdery mildew of chilli using triazoles. *J. Plant. Dis. Sci.* **2** (2): 132-134.
- Cerkauskas, R. F., J. Brown, G. Ferguson, and S. Khosla, 1999. First report of powdery mildew of green house pepper caused by *Leveillula taurica* in Canada. *Plant. Dis.* **83** (1): 781-783.
- Devi, P. A., and V. Prakasam, 2014. Efficacy of azoxystrobin 25 SC along with chilli powdery mildew disease under field condition. *World J. Agric. Sci.* **2** (1): 8 -12.
- Devi, P., K. Vinothini and V. Prakasam, 2013. Effect of azoxystrobin 8.3% w/w + mancozeb 68.75% on powdery and downey mildew pathogens under *in vitro* condition. *J. Agric. and Veterinary Sci.* **6** (4): 50-55.
- Dhruj, I. V., R. R. Akbari, Khandar and K. B. Jadeja, 2000. Field evaluation of fungicides against powdery mildew of fenugreek. *J. Mycol. Pl. Pathol.* **30** (9): 98-99.
- Girija, G., B. S. Chethana, A. S. Rao and K. Bellishree, 2011. Comparative efficacy of myclobutanil, triadimefon and mancozeb against major fungal diseases of chilli. *Pest Manage. Hort. Eco.* **17** (1): 42- 47.
- Hingole, D.H. and B.P.Kurundkar, 2004. Field evaluation and economics of fungicidal control of powdery mildew (*Leveillula taurica*) of chilli. *Crop Sci.* 14-15:131-136.
- Srinivasan, V. M., A. S. Krishnamoorthy, S. Kuttalam, T. Raguchander, C .R. Chinnamuthu, 2014. Performance Evaluation of azoxystrobin in the control of fruit rot and powdery mildew diseases on chilli. *Sci. Park Res. J.* **1** (36): 2321-8045.

**Rec. on 10.07.2016 & Acc. on 30.07.2016**