

## Original Research Article

# Management of Chilli Powdery Mildew Caused by *Leveillula taurica* (Lev.) Arn. Using Fungicides

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## ABSTRACT

### Keywords

Chilli, *Leveillula taurica*, Powdery mildew, Fungicides, Propiconazole, Myclobutanil

Powdery mildew of chilli incited by *Leveillula taurica* is one of the most serious diseases of chilli. Field experiment was carried out to know the effect of different fungicides against powdery mildew of chilli during *Kharif* season. Among the nine treatments, propiconazole (0.1%) proved to be best for the management of powdery mildew (9.01%) with minimum per cent disease index (PDI), which was superior over all other treatments with maximum fruit yield of 36.13 q/ha which is followed by myclobutanil (0.1%) with the PDI of 13.24 powdery mildew with fruit yield of 34.56 q/ha.

## Introduction

Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae is mainly cultivated for green fruits as table purpose and dry chilli as spice and is popularly known as “red pepper” and is one of the most popular and highly remunerative, annual herbaceous vegetable crop. In India, chilli is extensively cultivated in Andhra Pradesh, Telangana, Madhya Pradesh, Karnataka, West Bengal, Odisha, Maharashtra and Tamil Nadu.

In India, chilli is cultivated over an area of 775 thousand hectares with annual production of 1492 thousand metric tonnes (Anonymous, 2014) which accounts for 25% of the world production. Chilli suffers from many diseases caused by fungi, bacteria, viruses and nematodes. Among the fungal diseases, powdery mildew, leaf spot and

anthracnose or fruit rot are the most prevalent ones (Khodke *et al.*, 2009). 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 30%, due to severe defoliation and reduction in photosynthesis, size and number of fruits per plant (Mathur *et al.*, 1972; Sivaprakasam *et al.*, 1976; Gohokar and Peshney, 1981).

The disease has attained the economic status in the Maharashtra state. By considering the seriousness of disease and the economic damage/exorbitant losses caused by the disease, the present investigation was carried out by using different fungicides for its efficacy against powdery mildew disease of chilli under field condition.

## Materials and Methods

The field trial was conducted during *Kharif*, 2014 at Research Farm, Horticulture Research Scheme (Vegetable), VNMKV, Parbhani (M.S.) India. The experiment was laid out in Randomized Block Design (RBD) with three replications and nine treatments with control. The seeds of chilli cv. Pusa Jwala were sown in small beds and the nursery was raised. The seedlings of 35 days old were transplanted to the main field by following a spacing of 60×45 cm and with plot size of 2.4×3.15 m. The recommended package of practices was followed for the trial.

All the foliar sprays (treatments) were given as per their doses. The first spray of fungicides was done after first appearance of disease. The same concentration was followed for second and third sprays at 7 days interval with untreated plots served as control. The severity of powdery mildew was scored at 7 days interval after each spray. The disease severity of powdery mildew was recorded on 10 plants and 10 leaves on lower, middle and upper leaves by using 0-9 disease rating scale (Mayee and Datar, 1986) and expressed as Percent Disease Index (PDI) (Wheeler, 1969).

$$\text{PDI (\%)} = \frac{\text{Sum of individual rating}}{\text{Total No. of leaves observed}} \times \frac{100}{\text{Maximum disease grade}}$$

The fruit yields were recorded after harvesting the crop at maturity and the weight of crops at every plot separately for calculate the yield per hectare.

## Statistical analysis

All the data related to diseases incidence and yield was statistically analyzed. Calculations were made after applying the test of significance of the means (Panse and Sukhatme, 1978).

## Results and Discussion

The result of the experiment is presented in Table 2. It was very clear that all the treatments reduced the disease significantly compared to the unsprayed control plot.

Among all treatments Propiconazole was found most effective against powdery mildew which was significantly superior over other treatments. Minimum PDI of 9.01% was noticed in propiconazole treatment which is significantly superior over all the treatments followed by myclobutanil (13.24%), triadimefon (17.61%), hexaconazole (19.94%) and azoxystrobin (25.63). Maximum per cent disease index (75.07%) was recorded in untreated control.

It was also clear that, 0.1% propiconazole spray provided 88.0 percent control followed by myclobutanil and triadimefon which showed maximum control of powdery mildew 82.36 and 76.54%, respectively. Spray of hexaconazole and a zoxytrobin were also found effective with 73.44 and 65.86 percent disease control. Further, difenoconazole found effective by showing 60.01 percent reduction of disease over control. Whereas, carbendazim was least effective with 50.19 percent disease control followed by wettable sulphur (55.76%).

Maximum yield was recorded with propiconazole treatment (36.13 q/ha) which was on par with myclobutanil treatment (34.56 q/ha) and triadimefon (33.16 q/ha). Whereas, least yield was recorded in unsprayed control (18.20 q/ha).

Chemicals are the most common and practical method for the management of powdery mildew. Foliar spray of propiconazole provided 88.00 per cent control of powdery mildew in chilli. Sterol inhibiting fungicides *viz.*, propiconazole,

hexaconazole and difenconazole effectively managed the powdery mildew disease. Ergosterol is essential to the structure of cell wall and its absence causes irreparable damage to the cell wall and fungus dies. They will also interfere in conidia and haustoria formation (Nene and Thapliyal, 1993).

Myclobutanilis a systemic fungicide, which is rapidly translocated upward than in the basic petal directions. It disrupts the ergosterol biosynthetic pathway, which is vital to cell wall formation of fungal pathogens. It also has greater anti-sporulant activity and does not allow the fungal spore formation thus the secondary infection or diseases spread is checked (Girija *et al.*, 2011)

Several workers reported that, propiconazole, myclobutanil, triadimefon and hexaconazole were found to be effective in reducing powdery mildew incidence in different crops (Sharma, 1991; Sharmila *et al.*, 2004; Singh, 2006; Pramod Prasad and Dwivedi, 2007 and Akhileshwari *et al.*, 2012).

In the present study, Azoxystrobin recorded 25.63 per cent PDI with 25.51 q/ha fruit yield. This result was in agreement with results obtained by Ajithkumar *et al.*,

(2014). This management effect was mainly due to translaminar and systemic movement of azoxystrobin, inside the tissues, azoxystrobin is widely distributed from the application side by diffusion (Vincelli, 2002). The results were supported by effective management of powdery mildew of chilli by using azoxystrobin 25% SC (Ahila Devi and Prakasam, 2014).

The non-systemic fungicide, wettable sulphur at 0.3 percent concentration was found less effective to reduce the powdery mildew incidence significantly over unprotected control and the efficacy of wettable sulphur and carbendazim were less when compared to the other systemic fungicides. Similar results were obtained by Sharma (1991), who observed that wettable sulphur were least effective in managing the powdery mildew (*E. betae*) of sugar beet.

Maximum yields of 36.13 q/ ha was recorded with propiconazole at 0.1% followed by myclobutanil at 0.1% (34.56). The results were in accordance with Raju *et al.*, (2017).

Overall, the use of systemic fungicides for the management of powdery mildew found to be very effective than spraying of non-systemic fungicide wettable sulphur.

**Table.1** Powdery mildew of chilli disease rating scale

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

**Table.2** Effect of different fungicides against powdery mildew of chilli

Sl.No.	Treatments	Concentration (%)	Per cent disease index	Per cent disease reduction over control	Yield(q/ha)
1	Azoxystrobin 23% SC	0.1	25.63 (30.40)*	65.86	25.51
2	Difenconazole 25% EC	0.05	30.02 (33.18)	60.01	25.40
3	Propiconazole 25% EC	0.1	9.01 (17.43)	88.00	36.13
4	Myclobutanil 10% WP	0.1	13.24 (21.32)	82.36	34.56
5	Hexaconazole 5% EC	0.1	19.94 (26.48)	73.44	26.10
6	Tridemefon 25% WP	0.1	17.61 (24.80)	76.54	33.16
7	Carbendazim 50% WP	0.1	37.39 (37.66)	50.19	24.71
8	Wettable sulphur 80% WP	0.3	33.21 (35.14)	55.76	25.08
9	Control	-	75.07 (60.12)	-	18.20
	SE ±	-	1.15	-	-
	CD at 5%	-	3.49	-	-

\*Figures in parenthesis are arc sine transformed values

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