

Management of coriander powdery mildew through new generation molecules

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Abstract

Six fungicides (Tebuconazole 0.1%, propineb 0.2%, azoxystrobin 0.1%, wettable sulphur 2%, hexaconazole 0.1% and propiconazole 0.1%) were evaluated at Seed Spices Research Station, S.D. Agril. University, Jagudan (Gujarat) during the *rabi* season of 2015-16 to 2018-19, for the control of powdery mildew disease of coriander (*Coriandrum sativum*), caused by *Erysiphe polygoni*. All the fungicides were found effective and reduced the disease intensity and increase the yield significantly over the control. The minimum disease intensity and higher yield were recorded when the plots sprayed with propiconazole (0.1%), which was at par with hexaconazole (0.1%) and wettable sulfur (0.2%). Higher test weight and volatile oil content of seed were noticed in treatments T₆ i.e spraying of Propiconazole 0.1%.

Key words : Coriander, fungicides, powdery mildew, yield.

Coriander (*Coriandrum sativum* L.) is an important spice which is widely used as foliage and seed. In India, it is cultivated in Gujarat, Rajasthan and some adjoining states. The crop suffers by several biotic stresses including powdery mildew. Powdery mildew is an important disease caused by *Erysiphe polygoni* L. It is also wide spread in distribution and appears in devastating form every year. Under such favourable condition, losses may be as high as 50 percent in absence of effective control measures. Different fungicides have been tried by workers. Chemical control is reported to be the effective method for the management of powdery mildew (Adiver & Rajanna 1991; Ali *et al.*, 1999; Singh, 2006; Ushamalini & Nakkeeran 2017). In market certain new generation fungicides are available. With a view to find out an alternative chemical, six new generation fungicides were tested for their efficacy against powdery mildew of coriander in this study.

A field experiment was conducted in a randomized block design with three replications during *rabi* 2015-16, 2016-17, 2017-18 and 2018-19 at Seed Spices Research Station, Jagudan (Gujarat). Coriander cv. Gujarat coriander-2 (GCor-2) was sown in the month of November at a distance of 30 cm row spacing by using 12 kg seed rate hectare⁻¹. Six fungicides were compared with untreated control. The efficacy of these fungicides was evaluated with untreated control. Two sprays of each fungicide with their prefixed concentration were applied. First spray was applied immediately after the initiation of the disease and second spray at 15 days after first spray. The observations on the powdery mildew disease was recorded from 20 randomly selected plants from each plot using (Anonymous, 2004)

0-4 scale (0.0=No incidence/Healthy; 1.0= Whitish small spots on the leaf; 2.0= Whitish growth covering the entire leaf; 3.0= Whitish growth on leaf and stem; 4.0= Whitish growth on leaf, stem and umbel) and percent disease index (PDI) was calculated according to the formula suggested by Datar & Mayee (1981).

$$PDI = [(Total\ grade) / (Maximum\ grade)] \times [(100) / (No.\ of\ leaves\ scored)]$$

It is revealed from the data that there was significant difference in percent disease intensity during all the year and pooled (Table 1). The minimum percent disease intensity was observed in T₆ i.e spraying of Propiconazole 0.1% (4 ml lit⁻¹) and was at par with treatments T₅ i.e spraying of Hexaconazole 0.1% (20 ml lit⁻¹) and T₄ i.e spraying of Wettable sulphur 0.2% (2.5 g lit⁻¹) during all the year and pooled also.

There was significant difference in seed yield of coriander during all the year and pooled except the year 2016-17 (Table 2). Looking to the different treatments, the plots sprayed with Propiconazole 0.1% (1 ml lit⁻¹) at the initiation of the disease and second spray at 15 days after first spray. (T₆) had obtained the highest seed yield of coriander but it was at par with treatment T₅ i.e spraying of Hexaconazole 0.1% (1 ml lit⁻¹) in pooled data, T₅ i.e spraying of Hexaconazole 0.1% (1 ml lit⁻¹) and T₄ i.e spraying of wettable sulphur 0.2% (1 ml lit⁻¹) during the year 2017-18 and T₅ i.e spraying of Hexaconazole 0.1% (1 ml lit⁻¹), T₄ i.e spraying of wettable sulphur 0.2% (1 ml lit⁻¹), T₃ i.e spraying of Azoxystrobin 0.1% (1 ml lit⁻¹) and T₁ i.e spraying Tebuconazole 0.1% (1 ml lit⁻¹) during the year 2015-16 & 2018-19 at the initiation of the disease and

Table 1. Effect of different fungicides on powdery mildew of coriander

Sr. No.	Treatments	Per cent disease intensity				
		2015-16	2016-17	2017-18	2018-19	Pooled
T ₁	Foliar spray of Tebuconazole 0.1%	34.68 ^{bc*} (31.90)	21.75 ^{bcd*} (13.30)	22.86 ^{b*} (14.60)	23.36 ^{bc*} (15.25)	25.66 ^{b*} (18.76)
T ₂	Foliar spray of Propineb 0.2%	36.25 ^{bc} (34.50)	23.63 ^b (15.70)	23.04 ^b (14.80)	24.15 ^b (16.27)	26.77 ^b (20.32)
T ₃	Foliar spray of Azoxystrobin 0.1 %	37.80 ^b (37.10)	23.15 ^{bc} (15.0)	22.19 ^{bc} (13.80)	22.53 ^{bc} (14.20)	26.42 ^b (20.03)
T ₄	Foliar spray of Wettable sulphur 0.2%	34.31 ^{cd} (31.30)	19.51 ^{cd} (10.70)	20.81 ^{bc} (12.20)	20.65 ^{cd} (11.98)	23.82 ^c (16.55)
T ₅	Foliar spray of Hexaconazole 0.1%	32.22 ^d (27.97)	18.74 ^d (9.80)	20.71 ^{bc} (12.0)	21.11 ^{cd} (12.55)	23.19 ^c (15.58)
T ₆	Foliar spray of Propiconazole 0.1%	32.33 ^d (28.13)	18.24 ^d (9.30)	20.28 ^c (11.5)	19.40 ^d (10.57)	22.56 ^c (14.88)
T ₇	Un treated Control	41.91 ^a (44.15)	28.03 ^a (21.70)	33.75 ^a (30.40)	34.63 ^a (31.82)	34.58 ^a (32.02)
	C.D at 5%	2.36	3.41	2.21	2.56	2.05

* Arcsin transformed values, Figures in the parenthesis are retransformed values

Table 2. of different treatments on yield.

Sr. No.	Treatments	Seed Yield (Kg ha ⁻¹)				
		2015-16	2016-17	2017-18	2018-19	Pooled
T ₁	Foliar spray of Tebuconazole 0.1%	1290 ^a	1358 ^{ab}	1296 ^{cd}	1992 ^{ab}	1484 ^{cd}
T ₂	Foliar spray of Propineb 0.2%	1272 ^{ab}	1235 ^{ab}	1333 ^{bcd}	1917 ^{bc}	1439 ^d
T ₃	Foliar spray of Azoxystrobin 0.1 %	1299 ^a	1265 ^{ab}	1389 ^{bcd}	2055 ^{ab}	1502 ^{cd}
T ₄	Foliar spray of Wettable sulphur 0.2%	1364 ^a	1463 ^a	1667 ^{abc}	1990 ^{ab}	1621 ^{bc}
T ₅	Foliar spray of Hexaconazole 0.1%	1441 ^a	1512 ^a	1710 ^{ab}	2190 ^{ab}	1713 ^{ab}
T ₆	Foliar spray of Propiconazole 0.1%	1352 ^a	1481 ^a	1997 ^a	2387 ^a	1804 ^a
T ₇	Un treated Control	1059 ^b	1062 ^b	1062 ^d	1549 ^c	1183 ^e
	C.D at 5%	166.83	NS	349.41	399.01	152.38

second spray at 15 days after first spray.

Higher test weight and volatile oil content of seed was recorded in treatments T₆ i.e spraying of Propiconazole 0.1% at the initiation of the disease and second spray at 15 days after first spray. Reduction in PDI might be helpful for growth and development consequently seed size and weight. Thus, spraying of Propiconazole 0.1% might improve the seed quality also. The economics of different fungicides for the management of powdery mildew of coriander indicates the highest net realization (72840/- per ha and benefit cost ratio (BCR) of 2.06 in two spray of Propiconazole 0.1 per cent were recorded which was followed by wettable sulphur 0.2 per cent (1.90) and Hexaconazole 0.1 per cent (1.64). (Table 3).

In the present study, spraying propiconazole (0.15%) was found to be effective in reducing the incidence of powdery mildew and produce higher yield. Similar results were also recorded by Singh (2006) and Ushamalini (2017), who reported spraying azole compounds were effective in reducing powdery mildew incidence in coriander. The efficacy of propiconazole against powdery mildew was also reported in chilli (Sharmila *et al.*, 2004) and in okra (Vijaya 2004).

Under this study residues level of the crop sprayed with Propiconazole 0.1% (4 ml lit⁻¹) and Hexaconazole 0.1% (20 ml lit⁻¹) at the initiation of the disease and second spray at 15 days after first spray (T₆ & T₅) were found below critical limit fix by various agencies (Table 4).

Table 3. Economics of different treatments.

Sr. No	Treatment details	Yield Kg ha ⁻¹	Gross Realization (₹)	Cost of Inputs	Net Realization (₹)	BCR
T ₁	FS with Tebuconazole 25 WG (0.1%)	1484	89040	35800	53240	1.49
T ₂	FS with Propineb 70 WP (0.2%)	1439	86340	32740	53600	1.64
T ₃	FS with Azoxystrobin 25 SC (0.1 %)	1502	90120	53000	37120	0.70
T ₄	FS with Wettable sulphur 80 WP (0.2%)	1621	97260	33500	63760	1.90
T ₅	FS with Hexaconazole 5 EC (0.1%)	1713	102780	39000	63780	1.64
T ₆	FS with Propiconazole 25 EC (0.1%)	1804	108240	35400	72840	2.06
T ₇	Un treated Control	1183	70980	30000	40980	1.37

Table 4. Pesticide residue analysis in different treatments in coriander.

Tr No	Treatments	Results (ppm)	LoD (ppm)	LoQ (ppm)	Maximum Residue Limit (ppm)		
					EU	CODEX	Japan
T ₅	FS with Hexaconazole 5 EC (0.1%)	1.35	0.02	0.05	0.05	NR	NR
T ₆	FS with Propiconazole 25 EC (0.1%)	1.87	0.02	0.04	0.05	2.0 Barly	2.0 Barly
T ₇	Un treated Control	BDL					

BDL-Below detection limit * MRL as Dithicarbamates as CS₂

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