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Fungicidal Control of Phomopsis Blight of Brinjal

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ABSTRACT
Experiment was conducted to assess the efficacy of different fungicides against Phomopsis blight of brinjal caused by *Phomopsis vexans in-vivo* conditions. Among the tested fungicides the minimum disease intensity and maximum per cent disease control was recorded by carbendenzim (10.35% and 69.25%) followed by propiconazole (11.41% and 66.10%) after third spraying and both these treatments were at par with each other and significantly superior over rest of the treatments. The higher yield of brinjal fruits was obtained with carbendenzim 185.52 q ha^{-1} followed by propiconazole 183.78 q ha^{-1}. Highest incremental cost:benefit ratio 1:14.48 was recorded by propiconazole.
Key words: *Phomopsis vexans*, Fungicide, *in vivo*, Brinjal

INTRODUCTION

Brinjal or egg plant (*Solanum melongena* L.) is one of the most common, popular vegetable crop grown in almost worldwide. India is considered to be the centre of origin of cultivated brinjal from where it spread to the other parts of the world (Chaudhury and Kalda, 1968). The global area under brinjal cultivation has been estimated as 18.75 million hectares with total production of brinjal fruit of about 49.66 million MTs with an average productivity of 26.5 t/ha (FAO, 2014). Eggplant suffers from twelve different diseases among them Phomopsis blight and fruit rot caused by *Phomopsis vexans* is a major constraints in its cultivation in our country.

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It is reported that the losses due to this disease are to the extent of 10-20 per cent. The causal organism of the disease, *Phomopsis vexans* viable for about 14 months in soil debries and in the seed from infected fruits. The pathogen is reported both externally and internally seed borne. The disease was first reported from Gujarat in 1914 and since then it is noticed in many parts of the India (Hossain *et al.*, 2013). The fungus attacks all parts of plant starting from seedling to maturity. The pathogen lives in dead plant material present in the soil, attacks the plants when conditions are favourable. Although it initiates as foliar blight, the most destructive phase is fruit rot. Since sources of complete resistance are not available, Phomopsis blight of brinjal is generally managed by the chemicals. Keeping in view the damage caused by this fungus, the present studies were undertaken to manage the disease by the use of different fungicides.

MATERIALS AND METHODS

The trial was laid out in Randomized Block Design with three replication and seven treatments using Aruna variety of brinjal during the year 2015 in *kharif* season at College of Agriculture, Nagpur. Sowing was done in 3 × 3 m^2 plots with 30 cm x 30 cm spacing. Thirty five days old seedlings raised on seed bed treated with Phorate granules 10% @ 10 kg/ha were used for transplanting. The crop was manured with 30:50:50 NPK Kg/ha as a basal dose and top dressed with 30 kg N/ha at 30 days after transplanting. The tested fungicides were carbendazim (0.1%), propiconazole (0.05%), hexaconazole (0.1%), copper oxychloride (0.3%), copper hydroxide (0.3%) and tebuconazole (0.05%). The first spray was given after the appearance of the disease and repeated twice at fifteen days interval. Disease intensity was recorded after the initiation of disease and after each spraying on five brinjal plants were randomly selected from each treatment. Disease intensity was recorded by applying 0 to 5 disease rating scale (Kalda *et al.*, 1976)

Category	Description
0	No infection
1	1-5% infection
2	5-10% infection
3	10-25% infection
4	25-50% infection
5	Above 50% infection

The per cent disease intensity was calculated by following formula.

Sum of observed numerical ratings

$$\% \text{ Disease intensity (PDI)} = \frac{\text{Number of fruits observed} \times \text{maximum rating}}{\text{Number of fruits observed} \times \text{maximum rating}} \times 100$$

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

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

RESULTS AND DISCUSSIONS

The data presented in table 1 indicated that three spray of fungicides significantly reduced Phomopsis blight disease and increase the yield. After third spray the best treatments in reducing the Phomopsis blight disease were carbendazim followed by propiconazole showed 10.35 and 11.41 per cent disease intensity respectively and both these treatments were at par with each other. Other promising treatments were hexaconazole, tebuconazole, copper oxychloride and copper hydroxide recorded 19.52, 21.71, 24.04 and 24.70 per cent disease intensity respectively and these treatments were at par with each other. Maximum disease intensity was observed in control 33.66 per cent.

All the fungicidal treatments reduce the disease as compared to control. carbendazim recorded maximum per cent disease control 69.25 per cent followed by propiconazole observed 66.10 per cent. Other fungicidal treatments were hexaconazole, tebuconazole and copper oxychloride which recorded 42.00, 35.50 and 31.55 per cent disease control respectively. The observation are similar with Mandal *et al.* (2013) observed that foliar spraying of carbendazim 50 WP (0.1%) was found most effective followed by contaf 5 EC (0.1%) treatment in the reduction of foliar disease severity and incidence of fruit rot along with the augmentation of fruit yield. Patil *et al.* (2000) reported that three sprays of carbendazim 0.1% at an interval of one month starting from the setting of fruits was highly effective in reducing the incidence of the blight (16.31 PDI) and proved significantly superior to all other treatments.

The data in table 1 shows differences due various treatments on yield of brinjal over control. Maximum yield of brinjal fruits was obtained in the treatment of carbendazim 185.52 q ha^{-1} followed by propiconazole recording 183.78 q ha^{-1} yield of brinjal fruits and both these two treatments were at par with each other. Other promising treatments were hexaconazole and tebuconazole recording brinjal fruits yield 170.69 q ha^{-1} and 168.74 q ha^{-1} respectively and these two treatments were at par with each other. However copper oxychloride and copper hydroxide exhibited 155.26 q ha^{-1} and 153.04 q ha^{-1} respectively and these two treatments were at par with each other. Minimum brinjal fruit yield was noticed in control recorded 140.43 q ha^{-1}. These observations are similar with Singh *et al.* (2012) reported spraying of carbendazim (0.1%) at the interval of 15 days was more effective in minimizing the disease incidence and increasing the yield. Highest yield of 235.5 q/ha was obtained with carbendazim. Patil *et al.* (2000) reported maximum yield in the treatment of carbendazim followed by mancozeb and copper oxychloride.

The maximum increased yield over control was recorded in carbendazim followed by propiconazole recorded 45.09 q ha^{-1} and 43.35 q ha^{-1} respectively. Other treatments *viz.*, hexaconazole, tebuconazole and copper oxychloride recorded 30.26 q ha^{-1}, 28.31q ha^{-1} and 14.83 q ha^{-1} respectively. Copper hydroxide showed minimum increase in yield 12.61 q ha^{-1} over control.

Considering incremental cost: benefit ratio, the most economical treatment which recorded highest ICBR was the propiconazole 14.48 followed by carbendazim 12.87 where as other fungicidal treatments *viz.*, hexaconazole, tebuconazole, copper hydroxide showed 11.87, 8.16, 3.08 respectively. However minimum ICBR ratio was noticed in the treatment of copper oxychloride showed 2.61. Similar results were found with Beura *et al.* (2008) recorded maximum fruit yield (227.25 q/ha) registering 71.12 per cent increase in yield over control with maximum cost benefit ratio of 1:12.85 and a net return of Rs. 31,329/ha with carbendazim (0.1%) against phomopsis blight of brinjal.

Table 1: Effect of different fungicides on Phomopsis blight and yield of brinjal

Sr. No.	Treatments	Concentration (%)	After third spray		fruits yield q ha^{-1}	Increased yield over control q ha^{-1}	ICBR
			PDI	PDC			
1	Carbendazim	0.1%	10.35 (18.77)*	69.25	185.52	45.09	1:12.87
2	Propiconazole	0.05%	11.41 (19.74)	66.10	183.78	43.35	1:14.48
3	Hexaconazole	0.1%	19.52 (25.22)	42.00	170.69	30.26	1:11.87
4	Copper oxychloride	0.3%	24.04 (28.89)	31.55	155.26	14.83	1:2.61
5	Copper hydroxide	0.3%	24.70 (29.80)	26.61	153.04	12.61	1:3.08
6	Tebuconazole	0.05%	21.71 (27.77)	35.50	168.74	28.31	1:8.16
7	Control	-	33.66 (35.46)		140.43	-	
F test			Sig.		Sig.		
SE(m)±			1.77		3.81		
CD(P= 0.05)			5.22		11.45		

*(Figures in parenthesis are Arc sin values)

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