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## Evaluation of fungicides against leaf spot of bhendi incited by *Cercospora abelmoschi* under field conditions

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### Abstract

Among eight fungicides evaluated against *Cercospora* leaf spot disease of bhendi under field conditions, Propiconazole 25 EC (0.1%) was found significantly superior in controlling the disease. The percent disease index (PDI) was significantly less (11.79) in Propiconazole 25 EC sprayed plot followed by Carbandizim 12% + Mancozeb 63% WP (16.31) and Cymoxanil 8% + Mancozeb 63% WP (19.28) compared to other fungicides and unsprayed control plot (87.85 PDI) respectively. Correspondingly, a maximum fruit yield of 16844.44 kg/ha was recorded in plot in which Propiconazole 25 EC was received followed by Carbandizim 12% + Mancozeb 63% WP (15,888.89 kg/ha) and Cymoxanil 8% + Mancozeb 63% WP (15,500.00 kg/ha) sprayed plots respectively. Whereas, in unsprayed control plot a minimum fruit yield of 11,022.22 kg/ha was recorded. The B:C ratio was also found higher in propiconazole 25EC (1:3.09) Carbandazim 12% + Mancozeb 63% (1:2.58) and Cymoxinil 8% + Mancozeb 63% WP (1:2.37) sprayed plots compare to other fungicides and untreated control plots.

**Keywords:** Bhendi, *Cercospora abelmoschi*, fungicides, B: C ratio

### Introduction

Bhendi (*Abelmoschus esculentus* L. Moench) is one of the most important vegetable crop extensively cultivated in *kharif* and *rabi* seasons in India. It belongs to the family Malvaceae. It is known by many local names in different parts of the world and it is called "lady's finger" in England, "Gumbo" in United States and "Bhendi" in India (Chauhan, 1972) [9]. Bhendi is known to be originated from West Africa (Joshi *et al.*, 1974) [12]. It is an annual vegetable crop grown from seed in tropical and sub tropical parts of the world. It is rich in vitamins, calcium, potassium and other mineral nutrients.

Bhendi is found to suffer from a number of diseases caused by fungi, bacteria, viruses, phytoplasma and nematodes. The most important diseases of okra are Damping Off *Fusarium* Wilt, Powdery Mildew, Yellow Vein Mosaic Virus (YVMV) and Leaf Spot. Among the fungal diseases *Cercospora* leaf spot of bhendi incited by *Cercospora* is one of the most economically important in all regions wherever bhendi is grown. In India, two species of *Cercospora* produce leaf spots on bhendi. *C. malayensis* causes brown, irregular spots and *C. abelmoschi* causes sooty black, angular spots. Both the leaf spots cause severe defoliation and are common during humid seasons. Dhancholia and Singh (1992) [10] reported severe infection by *C. abelmoschi* on bhendi. Nowadays, this disease incited by *C. abelmoschi* becomes more severe in southern transition zone of Karnataka. Initially the disease symptoms observed on the lower surface of the leaves as indistinct spots in the form of olivaceous specks. Later on light brown to grey mouldy growth of the fungus covered the entire lower surface. As disease advanced, necrotic spots were also observed on the upper surface of leaves. The infected leaves ultimately dry and defoliate. The disease progress upward from lower leaves and infects stem and fruits and produces similar symptoms. Keeping this in view, efforts have been made to find out the efficacy of various fungicides on the management of *Cercospora* in bhendi.

### Material and Methods

During *kharif* 2016 a field experiment was carried at Agricultural and Horticultural Research station Bhavikere, Chikmagalur district of Karnataka. The experiment was laid out in RBD design with three replications and there were nine treatments. Highly susceptible bhendi cultivar Mahyco-10 for *Cercospora* leaf spot was sown in a plot size of 3m x 3m with

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recommended package of practices. Various fungicides viz., Carbendazim 50WP, Carbendazim 12% + Mancozeb 63% WP, Propiconazole 25EC, Thiophenate methyl 75WP, Iprobenphos 48EC, Chlorothalonil 75WP, Mancozeb 75 WP and Cymoxanil 8% + Mancozeb 63% WP were sprayed twice at 8 days interval starting from the initiation of the disease. Ten days after the second spray, five plants from each plot were selected and observations were recorded. The severity of the disease was assessed based on 1-5 scale and PDI has been calculated as per Wheeler formula, 1969. Finally the fruit yield were recorded from each treatment and analysed statistically. The cost: benefit ratio was worked out based on the cost of fungicides, spray cost, yield and the market value of bhendi during 2016.

## Results and Discussion

During 2014, the percent disease index was to the tune of 88 percent. Proportionately different fungicides controlled the disease effectively. Among the different fungicides, the percent disease index was significantly less (11.79PDI) in propiconazole sprayed plots followed by Carbendazim + mancozeb (16.31 PDI) and Cymoxanil + Mancozeb (19.28 PDI). as compared to other treatments and unsprayed control plot (87.85 PDI). The maximum yield and B: C ratio (16844.44kg/ha and 1:3.09) was recorded in plots that

received propiconazole spray followed by the Carbendazim + Mancozeb (15888.89kg/ha with 1:2.58 B: C ratio) and Cymoxanil + Mancozeb (15500.00 kg/ha with 1:2.37 B: C ratio). Whereas, minimum fruit yield of 11022.22 kg/ha was recorded in untreated control plot with maximum PDI of 87.85 (Table 1). All these findings are in accordance with other researchers viz., Ghosh *et al.*, (2003) [11], Amenduini *et al.*, (2003) [11], Khalequzzaman *et al.*, (2003), Atia and Tohamy (2004) [5], Ayoub and Qureshi (2004) [6], Surviliene *et al.*, (2006) [16], Antonijevic *et al.*, (2007) [3] and Bulajic *et al.*, (2007) [8] showed propiconazole is effective to control the *Cercospora* leaf spot disease. Fungicides like Propiconazole, Tebuconazole and Bavistin were registered for use on bhendi would also effectively control *Cercospora* leaf spot (Ansari *et al.*, 1992; Srivastava *et al.*, 1992; Beura *et al.*, 2007 and Arain *et al.*, 2012) [2, 15, 7, 4].

The cost effectiveness of the systemic fungicides in bhendi against *Cercospora* leaf spot was studied and it was found that application of Propiconazole followed by Carbendazim + Mancozeb was more remunerative. Several previous reports enlightens that fungicides application increases the yield of bhendi. In the present study, the fungicide Propiconazole 25EC (0.1%) found superior in reducing the *Cercospora* leaf spot disease incidence and thus helped for getting highest fruit yield and B:C ratio.

**Table 1:** Effect of various treatments on the incidence of *Cercospora* leaf spot disease of Bhendi and yield

Treatments	Conc.(%)	Percent Disease Index (PDI)	Yield (Kg/ha)	B:C ratio
Carbendazim 12% + Mancozeb 63% WP	0.2	16.31	15888.89	1:2.58
Propiconazole 25EC	0.1	11.79	16844.44	1:3.09
Thiophenate methyl 75WP	0.1	23.84	14711.11	1:1.94
Iprobenphos 48EC	0.1	26.34	13544.44	1:1.36
Chlorothalonil 75WP	0.15	27.06	13655.55	1:1.39
Mancozeb 75WP	0.25	27.95	13777.78	1:1.49
Cymoxinil 8% + Mancozeb 63% WP	0.2	19.28	15500.00	1:2.37
Untreated control	-	87.85	11022.22	-
SEm ±		0.93	618.84	-
C.D@5%		2.78	1855.29	-
C.V(%)		5.52	7.46	-

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