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Management of Cercospora leaf spot in Mungbean

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Abstract

Green gram (*Vigna radiata* L.), is one of the important pulse crops in India. An experiment was conducted to evaluate the efficacy of selected fungicide against Cercospora leaf spot. Minimum intensity of disease was recorded in the treatment of Metiram + Pyraclostrobin WG (0.3%) which was 2.97%, this was found significantly superior over all other treatment. The disease intensity recorded in control was 33.27% in first year. Minimum disease intensity (5.60%) was recorded in the combi product of Metiram + Pyraclostrobin WG (0.3%), which was followed by Propiconazole (0.1%) (8.45%) in 2nd year. During 2nd year the disease intensity recorded in control was 32.35%. In respect of yield, 1st, 2nd and 3rd year yield was obtained highest i.e. 1173.30, 1211.50 and 1196.56 Kg/ha in the treatment T₆ (Metiram + Pyraclostrobin WG, 0.3%) whereas, minimum yield recorded in control was 843, 838.70 and 829.58 Kg/ha respectively.

Keywords: Cercospora, mungbean, *Vigna radiata* L.

Introduction

Mungbean (*Vigna radiata* L.) is one the major pulse crop grown all over the world. There are many constraints responsible for the low yield of mungbean where, diseases are considered as dominant constraints. Cercospora leaf spot disease is an important disease of mungbean. Presently, the per capita share of pulses in nutrition supply in India with respect to energy, protein and fat is 117.4 K cal, 6.9 gm and 1.0 gm per day respectively. An adult male and female requires 80 and 70 gm per capita per day, respectively for balanced diet. Green gram crop covers a total area of 5 m ha in world with a total production of 3 m ton John, (1991) [5]. India is contributing 23% global pulses in world production from an area of about 12.08%. A wide range of yield losses (23-96%) due to Cercospora leaf spot was reported in India. (Chand *et al.*, 2012; Bhat *et al.*, 2014) [2, 1]. It is a widespread disease caused by the fungus *Cercospora canescens*. This disease can cause heavy defoliation in severe conditions on mungbean especially at optimum temperature 25-30 °C with RH 90-100%. During favorable condition the spots increase in size and at the time of flowering and pod formation lead to defoliation in case of severe attack of Cercospora. Premature defoliation is also observed. The disease can be managed by using Tebuconazole, Propiconazole, Mancozeb and Metiram + Pyraclostrobin fungicides. Major diseases include Cercospora leaf spot, powdery mildew, anthracnose, Fusarium wilt, Rhizoctonia root rot, web blight, Macrophomina charcoal rot/dry root rot and blight. Fungal pathogens can infect mungbean plants at different stages, such as during emergence, seedling, vegetative and reproductive stages and cause substantial damage leading to yield loss or complete failure of production. Species of the genera Fusarium (wilt), Rhizoctonia (wet root rot), and Macrophomina (dry root rot) infect mungbean plants during seed/seedlings stages (seed-borne or soil borne), while species of the genera Colletotrichum (anthracnose), Alternaria and Cercospora (leaf spot), Erysiphe/Podosphaera (Sphaerotheca) (powdery mildew) affect plants during vegetative and reproductive stages Ryley *et al.*, (2010) [11]. Maturity delayed in the diseased plants, resulting poor pod formation. Seeds that developed on severely infected plants are small and immature (Poehlman, 1991) [12]. There is a need for better understanding of the pathogen, the disease caused by them and so that suitable control measure can be developed. Thus, present investigation was undertaken to find out best chemical for management of Cercospora leaf spot of Mungbean.

Material and Methods

A field experiment was conducted at Pulses Research Unit, Dr. PDKV, Akola during kharif 2017-2018, 2018-2019 and 2019-2020 to evaluate the antifungal of fungicides against

Cercospora leaf spot of Mungbean. The trial was laid in Randomized Block Design with seven treatments and three replications for duration of three years. Mungbean crop variety PDKV Green gold was sown in last week of June 2018 with a spacing of 30 cm and 10 cm between rows and plants. Chemical fungicides were tested in the field, for both alone and in combination, at respective concentrations. The observation on leaf spot infection were recorded at 40 DAS and continue up to harvesting at 15 days interval by selecting two leaves each from top, middle and lower portion of the plant. Seed yield was recorded from each plot, converted to kg/ha. The data obtained from all the experiments were statistically analyzed by following the standard methods (Gomez and Gomez, 1984) [4]. Seven treatments viz., T₁ (Carbendazim 50 WP @ 0.1%), T₂ (Tebuconazole 25 EC @ 0.1%), T₃ (Propiconazole 25 EC @ 0.1%), T₄ (Hexaconazole

5 EC @ 0.1%), T₅ (Mancozeb 75 WP @ 0.2%), T₆ (Metiram 55% + Pyraclostrobin 5% WG @ (0.3%) and T₇ (untreated check) were applied with foliar spray during experiment. Cercospora leaf spot was graded on the basis of disease intensity observed on leaves by applying 0-9 disease rating scale developed by Mayee and Datar (1986) [8] as described below. The disease severity of Cercospora leaf spot was recorded before first spray, ten days after first spray and ten days after second spray by using 0-9 rating scale and per cent disease index (PDI) was calculated using the formula given by Wheeler (1969) [10].

$$PDI = \frac{\text{Sum of all disease ratings} \times 100}{\text{Total number of leaves observed} \times \text{maximum disease rating}}$$

Table 1: Disease rating scale.

Grade	Per cent disease severity with description
0	No symptoms on leaves
1	Small powdery spot-on leaves covering one per cent or less leaf area
3	Small, scattered Powdery lesions on leaves covering 1-10% of leaf area
5	Bigger Powdery lesions, covering 11-25% of leaf area
7	Bigger coalescing Powdery patches covering 26-50% of leaf area.
9	Powdery growth covering 51% or more of leaf area, white coating on petioles, flowers and pods resulting in its shedding, reduced pod set.

Table 2: Per cent disease intensity of *Cercospora* leaf spot of Mungbean

Sr. No.	Treatments	PDI <i>Cercospora</i> leaf spot			
		1 st Year (2017-18)	2 nd Year (2018-19)	3 rd Year (2019-20)	Pooled data
T ₁	Foliar spray of Carbendazim 50 WP (0.1%)	6.47 (2.54) *	17.10 (24.37) *	16.80 (24.19) *	13.45 (21.52) *
T ₂	Foliar spray of Tebuconazole 25EC (0.1%)	4.90 (2.21)	10.68 (19.06)	10.65 (19.04)	8.74 (17.20)
T ₃	Foliar spray of Propiconazole 25EC (0.1%)	6.30 (2.51)	8.45 (16.88)	8.48 (16.93)	7.74 (16.15)
T ₄	Foliar spray of Hexaconazole 5EC (0.1%)	4.70 (2.17)	10.79 (19.16)	10.55 (18.95)	8.68 (17.14)
T ₅	Foliar spray of Mancozeb 75WP (0.2%)	9.03 (3.01)	14.71 (22.54)	14.24 (22.17)	12.66 (20.84)
T ₆	Foliar spray of Metiram 55% EC + Pyraclostrobin 5% WG (0.3%)	2.97 (1.72)	5.60 (13.61)	5.42 (13.46)	4.66 (12.47)
T ₇	Untreated check	33.27 (5.77)	32.35 (34.65)	30.95 (33.80)	32.19 (34.57)
	F test	Sig.	Sig.	Sig.	Sig.
	S.E. (m)	0.3	0.79	0.79	0.57
	C.D. P= 0.05%	0.9	2.24	2.44	1.76

*Arc sign transformed value

Table 3: Effect of foliar spray of fungicides various treatments on mungbean yield (Akola location)

Sr. No.	Treatments	1 st Yield (Kg/ha)	2 nd Yield (Kg/ha)	3 rd Yield (Kg/ha)	Pooled Yield (Kg/ha)
T ₁	Foliar spray of Carbendazim 50 WP (0.1%)	1038.30	915.20	891.11	765.32
T ₂	Foliar spray of Tebuconazole 25EC (0.1%)	1091.70	1079.05	1064.97	835.97
T ₃	Foliar spray of Propiconazole 25EC (0.1%)	1080.0	1140.55	1070.67	857.07
T ₄	Foliar spray of Hexaconazole 5EC (0.1%)	1146.70	1098.80	1056.31	845.78
T ₅	Foliar spray of Mancozeb 75WP (0.2%)	956.70	924.70	902.92	761.87
T ₆	Foliar spray of Metiram 55% EC + Pyraclostrobin 5% WG (0.3%)	1173.30	1211.50	1196.56	1193.67
T ₇	Untreated check	843.30	838.70	829.58	649.79
	F test	Sig.	Sig.	Sig.	Sig.
	S.E. (m)	45.0	16.36	17.95	10.90
	C.D. P= 0.05%	136.30	46.84	55.28	33.57

Result and Discussion

Efficacy of fungicides against *Cercospora* leaf spot

The trial was conducted at Pulses Research Unit, Dr. PDKV, Akola. *In vivo* evaluation of different chemicals against *Cercospora canescens* are evaluated to control the *Cercospora* leaf spot of mungbean along with untreated control under natural field conditions. The data presented in Table 1 indicated that minimum intensity (2.97%) was recorded in the treatment T₆ i.e. Foliar spray of combination product of

Metiram + Pyraclostrobin WG (0.3%) and this was found significantly superior over all other treatment. Disease intensity as recorded in control was 33.27% in first year. In 2nd year data, least *Cercospora* leaf spot disease intensity (5.60%) was obtained in the treatment T₆ i.e. Foliar spray of combination product of Metiram + Pyraclostrobin WG (@ 0.3%) which was followed by Treatment T₃ i.e. 8.45%. The disease intensity as recorded in control was 32.35%. *Cercospora* leaf spot disease intensity recorded was least in

c1991. p. 169-274.

the treatment T₆ (5.60%) *i.e.* foliar spray of combined product of Metiram + Pyraclostrobin WG (0.3%) whereas the disease intensity recorded in control was 30.95% in third year. In pooled data minimum intensity of *Cercospora* leaf spot disease 4.66% was recorded in Treatment T₆. *i.e.* foliar spray of combination product of Metiram + Pyraclostrobin WG (0.3%) which was followed by Treatment T₃ *i.e.* foliar spray of Propiconazole (@ 0.1%) and T₄ *i.e.* foliar spray of Hexaconazole (@ 0.1%) 7.74% and 8.68% disease intensity respectively. (Table 1). In respect of yield, 1st, 2nd and 3rd year and pooled yield was obtained highest *i.e.* 1173.30, 1211.50, 1196.56 and 1193.67 Kg/ha respectively in the treatment T₆ (Metiram + Pyraclostrobin WG, 0.3%) whereas, minimum yield recorded in control was 843.30, 838.70, 829.58 Kg/ha and 649.79 Kg/ha respectively. (Table 2). Corresponding results were reported by Huma *et al.*, (2020)^[6] that is metiram and pyraclostrobin (0.3%) was found effective in restricting the mycelial growth (6.60 mm & 3.20 mm) of *Cercospora canescens* on mungbean at 100 and 200 ppm. Huma *et al.*, (2020)^[6] observed that minimum disease index (0.9) and maximum disease control (70.1%) in the foliar application of carbendazim (12%) + and mancozeb (63%) 75 WP at 0.2% concentration. Muhammad *et al.* (2014)^[7] recorded highest PDI in control (40.74%) then minimum in Mancozeb (25.92%). Redomil Gold (18.51%) and Antracol (18.52%). Lowest disease incidence (5.87%) was found in carbendazim 50% + fluazinam 600 WP. (Eva *et al.*, 2016)^[3].

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