

Original Research Article

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Field Evaluation of Selected Botanicals and Fungicides for the Management of Alternaria Blight of Cluster Bean

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ABSTRACT

Cluster bean [*Cyamopsis tetragonoloba* (L.)Taub.] is an important arid legume crop. It is commonly called as Guar. Cluster bean is grown for different purposes viz., vegetable (pods), green fodder, green manure, straw, guar gum, seed production, cattle fodder and increase soil fertility (Yogi *et al.*, 2016).effect of different weather parameters on disease development and effective management of the disease through plant extracts and fungicides. In field study, the efficacy of laboratory effective treatments was again evaluated. *Allium cepa*(bulb extract) showed minimum per cent disease intensity against Alternaria blight disease on leaves with maximum yield (26.66 q/ha) of Cluster bean. The maximum PDI and minimum yield (15.44 q/ha) of cluster bean was showed by *Cassiatora*. Carbendazim+Mancozeb combination showed the minimum PDI 14.50 after 75 DAS against Alternaria blight disease of *A. c. var.cyamopsidis* on the leaves and maximum yield (26.33 q/ha) was obtained by this combination. *In-vivo* all the botanicals significantly reduced the per cent disease intensity of Alternaria blight of Cluster bean. Among the foliar applied botanicals (*A. cepa*) and fungicide (Carbandazim+Mancozeb) were found best insignificantly reducing the Alternaria blight disease. In the field study, *Allium cepa* leaf extract @ 20% concentration and Carbendazim (0.1 per cent) + Mancozeb (0.2 per cent) concentration were found very effective in reducing Alternaria blight and enhancing the yield of Cluster bean. The leaf extract of botanicals seems to be an alternate to the fungicides for an eco-friendly management of Alternaria blight disease.

Keywords

Alternaria cucumerina var. *cyamopsidis*, Botanical, Fungicide management

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Introduction

Alternaria spp. are economically important pathogens widely distributed throughout the world and cause devastating disease on field crops. *Alternaria* leaf blight is a common disease in guar-growing area of western India and Pakistan. Severe *Alternaria* blight of cluster bean was also reported from Pusa and

Madras (Ambesh *et al.*, 2014). Primary methods of controlling *Alternaria* leaf blight include preventing long periods of wetness on the leaf surface, cultural scouting, sanitation, and development of the host plant resistant with the application of fungicides (Kirk *et al.*, 2001 and Namanda *et al.*, 2004). In recent years, an increasing consciousness about environmental pollution due to pesticides and

development of fungicide-resistant strain in plant pathogens has challenged the plant pathologists to search for non-toxic fungicides for substituting the recommended chemicals. This is the most cost effective and eco-friendly management strategy selecting the genotypes possessing the resistant/tolerant reaction against the disease. Studies conducted on Blight of guar and its various aspects indicated that there are lot of gaps in the understanding of the disease, the pathogen and the control aspects and very meagre information is available on these aspects. Hence, a thorough investigation is required.

Materials and Methods

The present investigation was carried out on disease survey, symptomatology, suitable media for mycelial growth, biochemical test, variability, epidemiological effect, screening of different genotypes of Cluster bean for resistant reaction, control and management aspects against *Alternaria* blight of Cluster bean.

For the evaluation of selected botanicals and fungicides for the management of *Alternaria* blight of Cluster bean under field condition, the effective 16 treatments; botanicals @ 20 % concentration and fungicides @ 0.1 % for systemic and 0.2 % for non systemic were used for foliar spray. The experiment was conducted in the field during *Kharif* season of the year 2016 and 2017. The seeds of *Alternaria* blight susceptible variety (Cluster bean cultivar M83) were sown in experimental fields in the RBD with four replications. The first spray was done just after the appearance of the disease and subsequent two sprayings were given at an interval of 15 days. Standard agronomical practices were followed as per recommendations. Observations on disease intensity were recorded when plants reached at the physiological maturity.

Results and Discussion

The botanicals (*Allium cepa*, *Azadirachta indica*, *Calotropis procera*, *Cassia fistula*, *Cassia tora*, *Eucalyptus globulus* and *Parthenium hysterophorus*) and fungicides (Carbendazim, Carbendazim+Mancozeb, Kitazin, Mancozeb, Propiconazole, Tebuconazole, Tebuconazole+Tricyclazole and Thiophanate methyl), found effective *in vitro* conditions were further evaluated in field.

Total seven effective botanicals were studied against *Alternaria* blight of Cluster bean under artificial inoculated field conditions at 20 per cent concentration. Results of pooled analysis in the (Table 1) revealed that minimum disease intensity (15.98 %) was recorded in *Allium cepa* bulb extracts with highest yield of 26.66 q/ha. It was significantly superior all the treatments. This was followed by *P. hysterophorus* leaf extract (20.01 %) and *Cassia fistula* (20.84 %) with the yield of 23.81 q/ha and 23.34 q/ha respectively. *Cassia tora* leaf extract was found least effective as it gave (31.51 %) higher intensity with the minimum yield of 15.44 q/ha. Eight effective fungicides were evaluated for management of *Alternaria* blight of Cluster bean at 0.1 per cent (systemic) and 0.2 per cent (non-systemic) concentrations by spraying twice at 15 days interval under artificial inoculated field conditions.

Two years pooled results on per cent disease intensity revealed that all the fungicides were significantly effective in reducing the *Alternaria* blight disease over control (Table 2). The minimum disease intensity (14.50 %) was recorded with the application of Carbendazim (0.1 %) + Mancozeb (0.2 %) with highest yield 26.33 q/ha as compared to other treatments of fungicides.

Table.1 Effectiveness of botanicals and fungicides against *Alternaria* blight disease in Cluster bean during 2016 and 2017

Treatments	Per cent disease intensity on leaves					
	2016			2017		
	45 DAS	75 DAS	Yield (q/ha)	45 DAS	75 DAS	Yield (q/ha)
<i>Allium cepa</i>	7.58 (15.9)	15.35 (23.0)	26.2 2	8.53 (16.9)	16.60 (24.0)	27.20
<i>Azadirachtaindica</i>	15.65 (23.2)	23.28 (28.3)	25.5 5	15.65 (23.2)	24.35 (29.5)	24.44
<i>Calotropisprocera</i>	17.25 (24.5)	27.58 (31.6)	24.4 4	18.50 (25.4)	29.63 (32.9)	22.27
<i>Cassia fistula</i>	11.30 (19.6)	20.28 (26.7)	24.1 6	12.48 (20.6)	21.40 (27.5)	25.22
<i>Cassia torra</i>	23.30 (28.8)	30.50 (33.5)	24.9 9	24.55 (29.6)	32.53 (34.7)	17.88
<i>Eucalyptus globulus</i>	21.40 (27.5)	31.48 (34.1)	23.8 8	22.40 (28.2)	31.48 (34.1)	21.38
<i>Partheniumhystero phorus</i>	10.35 (18.7)	19.55 (26.2)	22.2 7	11.50 (19.8)	20.48 (26.8)	25.55
Carbendazim	6.45 (14.7)	16.38 (23.8)	21.3 8	8.40 (16.8)	18.18 (25.2)	26.00
Carbendazim+ Mancozeb	4.60 (12.3)	13.65 (21.6)	21.2 2	6.45 (14.7)	15.35 (23.0)	27.44
Kitazin	25.20 (30.1)	29.60 (32.9)	27.4 4	27.40 (31.5)	31.35 (34.0)	21.22
Mancozeb	8.55 (16.99)	16.58 (24.0)	17.8 8	9.63 (18.0)	17.30 (24.5)	26.22
Propiconazole	22.48 (28.2)	32.48 (34.7)	17.4 0	23.73 (29.1)	31.25 (33.9)	17.40
Tebuconazole	16.45 (23.9)	25.40 (30.2)	25.2 2	18.38 (25.3)	27.43 (3.5)	23.88
Tebuconazole+Tri cyclazole	19.25 (26.0)	27.35 (31.5)	26.0 0	20.33 (26.7)	28.35 (32.1)	24.16
Thiophanate methyl	13.48 (21.5)	21.50 (27.6)	27.2 0	14.50 (22.3)	23.40 (28.9)	24.99
Control	33.50 (35.3)	44.35 (41.7)	16.3 0	35.38 (36.4)	48.58 (44.1)	16.30
CD	0.36	0.26	-	0.38	0.31	-
SE (m)	0.12	0.09	-	0.13	0.11	-

The value in parenthesis are angular transform.

Table.2 Pooled data of effectiveness of botanicals and fungicides against *Alternaria* blight disease in Cluster bean during 2016 and 2017 in field management

Treatments	Parts of the plant	Concentration in Per cent	Per cent disease intensity		Yield (q/ha)
			45 DAS	75 DAS	
<i>Allium cepa</i>	Bulb	20	8.05 (16.4)	15.98 (23.5)	26.66
<i>Azadirachta indica</i>	Leaf	20	15.65 (23.2)	23.81 (29.1)	21.00
<i>Calotropis procera</i>	Leaf	20	17.88 (24.9)	28.60 (32.3)	17.46
<i>Cassia fistula</i>	Leaf	20	11.89 (20.1)	20.84 (27.1)	23.34
<i>Cassia torra</i>	Leaf	20	23.93 (29.2)	31.51 (34.1)	15.44
<i>Eucalyptus globulus</i>	Leaf	20	21.90 (27.8)	31.48 (34.1)	16.28
<i>Parthenium hysterophorus</i>	Leaf	20	10.93 (19.2)	20.01 (26.5)	23.81
Carbendazim	-	0.1	7.43 (15.7)	17.28 (24.5)	24.59
Carbendazim+ Mancozeb	-	0.1+0.2	5.53 (13.5)	14.50 (22.3)	26.33
Kitazin	-	0.1	26.30 (30.8)	30.48 (33.4)	14.67
Mancozeb	-	0.2	9.09 (17.5)	16.94 (24.2)	25.55
Propiconazole	-	0.1	23.10 (28.7)	31.86 (34.4)	14.65
Tebuconazole	-	0.1	17.41 (24.6)	26.41 (30.1)	20.05
Tebuconazole+ Tricyclazole	-	0.1+0.1	19.79 (26.4)	27.85 (31.8)	18.79
Thiophanate methyl	-	0.1	13.99 (21.9)	22.45 (28.2)	22.10
Control			34.44 (35.9)	46.46 (42.9)	12.78
CD			0.83	1.05	-
SE (m)			0.27	0.34	-

The value in parenthesis is angular transformed

Figure.1 Pooled data of effectiveness of botanicals and fungicides against intensity of *Alternaria* blight disease in Cluster bean during 2016 and 2017 in field management

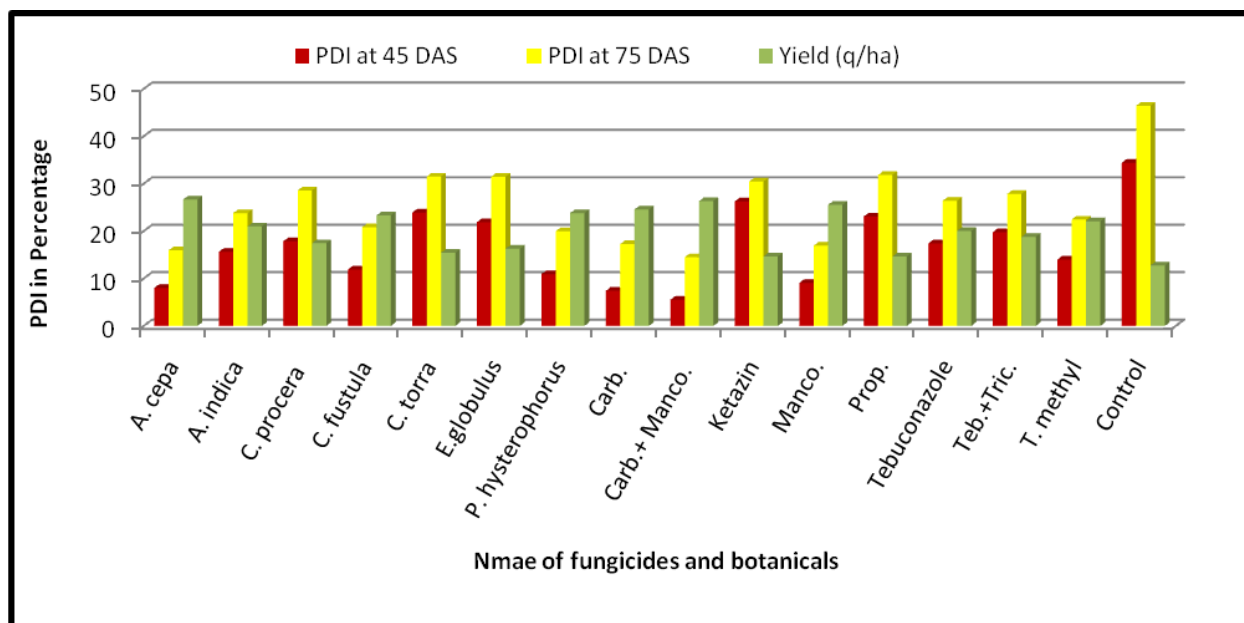


Plate.1 Field evaluation of selected botanicals and chemicals against growth of *A.c.* var. *Cyamopsidis* of Cluster bean



However, Mancozeb (0.2 %) was observed to be second best with 16.94 per cent disease intensity with second highest yield of 25.55 q/ha. Propiconazole (0.1 %) was found least effective with 31.86 per cent disease intensity with the lowest yield of 14.65 q/ha. The two year pooled data showed that the different

treatments increase the two times yield of Cluster bean over control (Figure 1 and Plate 1).

The effective botanicals @ 20% and fungicides @ 0.2 per cent concentration were further evaluated in the field study. *Allium*

cepa showed minimum intensity against *Alternaria* blight disease and showed maximum yield. The maximum PDI and minimum yield of Cluster bean was found in *Cassia tora*. Carbendazim+Mancozeb combination showed the minimum PDI against *Alternaria* blight disease and maximum yield was obtained by this combination.

Hence, the application of eco-friendly chemicals can provide good control of *Alternaria* blight. The various workers had been tested fungicides and botanicals under field condition (Kandolo *et al.*, 2016; Reuveni *et al.*, 2002; Ingle *et al.*, 2014; Kumar *et al.*, 2005; Patil and Nargund, 2017).

A number of plant species have been reported to possess some natural substances in their leaves which were toxic to many fungi causing plant disease (Spencer *et al.*, 1957; Egawa *et al.*, 1977; Mishra and Dixit, 1976; Shekhawat and Prasad, 1971; Tripathi and Dixit, 1981).

The present investigation revealed that lowest inhibition percentage was recorded in *P. hysterothorus*. But, found that the leaf extracts of *P. hysterothorus*, *Calotropis procera* and *Azadirachta indica* distinctly reduced the growth of *A. brassicae*, *P.hysterothorus* and *A. indica*. They were found to be most effective in reducing percent disease intensity of *Alternaria* . The highest yield was also obtained in *P. hysterothorus* treated plots followed by *D. stramonium* (Tiwari *et al.*, 2000).

Aqueous leaves extract of *Parthenium hysterothorus*, *Annona reticulata*, *Polyalthia longifolia*, *Ipomea carnea*, *Tridax procumbens*, *Argemone mexicana*, *Cathranthus roseus*, *Eucalyptus globulus* and *Achyranthus aspera* were used against the post-harvest fungal mycoflora. All the plants

used were found to be antifungal. In particular *Eucalyptus globulus*, *Argemon emexicana*, *Tridax procumbens* and *Parthenium hysterothorus* were highly inhibitory (Mogle, 2013).

It is concluded in the field study, *Allium cepa* leaf extract @ 20% concentration and Carbendazim (0.1 per cent) + Mancozeb (0.2 per cent) concentration were found very effective in reducing *Alternaria* blight and enhancing the yield of Cluster bean. The leaf extract of botanicals seems to be an alternate to the fungicides for an eco-friendly management of *Alternaria* blight disease.

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