



Management of Alternaria Leaf Blight (*Alternaria cucumerina* var. *cyamopsidis*) in Cluster Bean Through Fungicide Application

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ABSTRACT

Background: Clusterbean [*Cyamopsis tetragonoloba* (L.) Taub] commonly known as 'guar' means "cow food" is an annual arid and semi-arid legume crop belonging to the family leguminaceae.

Methods: Two field experiment were conducted during 2019-2021 to find out the most effective fungicide for the management of Alternaria leaf blight in Cluster. Seven fungicides viz., Tebuconazole 250 EC @ 0.1%, Difenconazole 25 EC @ 0.1%, Hexaconazole 5 EC @ 0.1%, Propiconazole 25 EC @ 0.1%, Chlrothalonil @ 0.2%, Trifloxystrobin 50% WG@ 0.1%, Mancozeb 75% WP @ 0.2% were evaluated for their efficacy against cluster bean Alternaria blight.

Result: In the year 2019 during Kharif season the foliar spray with Tebuconazole 250 EC @ 0.1% was found to be the most effective fungicide at initiation of flowering and at pod stage with minimum disease severity (9.87 and 12.00%) and the maximum seed yield and straw yield of 2077 and 3994 kg/ha, respectively. During Kharif-2020 same trends was observed with Tebuconazole 250 EC @ 0.1% in reducing the severity of the disease foliar spray of Tebuconazole also recorded the highest B: C ratio of 4:5 and 4.73 during 2019-20 and 2020-21 respectively.

Key words: Alternaria leaf blight, Cluster bean, Fungicide, Management.

INTRODUCTION

Cluster bean (*Cyamopsis tertragonoloba* (L.) Taub is an important leguminous crop of Kharif season in arid and semi-arid region of India (Kumar, 2005). In India cluster bean cultivation is accounted for about 75% of global trade and 80% to total guar production in the world (Swamy and Naveena, 2015). In M.P. cluster bean is cultivated as pure crop in 75,280 hectare and as mixed crop in 54,782 hectare area. Despite the highest total production, yield of cluster bean is very low due to many biotic and abiotic constraints. Among the biotic constraints, the disease viz., alternaria leaf blight, anthracnose (Verma *et al.*, 2019), dry root rot, bacterial leaf blight YVMV are important which inflicts severe yield reduction. Seed borne infection can be minimized by the use of healthy seeds or treating seeds with fungicides. Secondary spread of diseases can be checked by spraying the fungicide viz., mancozeb/ or zineb. The use of broad spectrum dithiocarbamate against Alternaria leaf blight has been reported in India (Fatehpuria and Sasode, 2020). Resistance to blight and leaf spot were reported to governed by recessive or dominant genes respectively (Singh *et al.*, 1995, Vig, 1965). Foliar diseases of crop plants have become more important in recent years due to drastic climatic change make the crop more susceptible. The spray schedule of fungicide is also play an important role in reducing the severity of the disease (Pragya *et al.*, 2020). Hence, the present investigation was carried out to identify the most effective fungicide against Alternaria leaf blight in cluster bean.

METHODS AND MATERIALS

A field experiment were conducted during Kharif season of 2019-20 and 2020-21 to identify the effective fungicide

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against alternaria blight of cluster bean using the susceptible cultivar. Seven fungicides viz., Hexaconazole 5 EC @ 0.1%, Difenconazole 25 EC @ 0.1%, Tebuconazole 250 EC @ 0.1%, Propiconazole 25 EC @ 0.1%, Chlrothalonil @ 0.2%, Trifloxystrobin 50 % WG@ 0.1%, Mancozeb 75% WP @ 0.2% were evaluated. Three replication were maintained for each fungicides and the treatments were arranged in randomized block design (RBD). First spraying was given just after the appearance of the disease and subsequently three sprays were given at an interval of 15 days. Standard agronomical practices were followed as per recommendations. Observations on disease severity were recorded at initiation of flowering and at pod formation stage. The yield parameters were also recorded to assess the best economical method for its control.

RESULTS AND DISCUSSION

Comparative analysis of various spraying schedules through seven fungicides under natural condition against Alternaria blight of cluster bean were evaluated. This experiment was conducted during *Kharif*-2019, 2020 year.

Effect of fungicidal spray at initiation of flowering stage of cluster bean

The results of the experiment conducted during 2019-20 revealed that all the treatments were found effective against Alternaria blight of cluster bean over control. The minimum per-cent disease index (PDI) of 9.87 was recorded in Tebuconazole followed by Chlrothalonil, Hexaconazole and Difeconazole with PDI of 13.60, 16.53 and 21.87 respectively, while maximum (41.60) PDI was recorded in control (Table 1).

During the year 2020 the results reveals that the minimum per cent disease index was recorded in Tebuconazole (11.13%) followed by chlrothalonil (13.07%), Propiconazole (13.73%), Trifloxystrobin (14.27%), Difeconazole (16.20%), Mancozeb (17.07%) and Hexaconazole (19.07%), while maximum PDI was recorded in control (40.47%).

The two year pooled data reveals that the minimum percent disease index was recorded in Tebuconazole (10.50%) followed by Chlrothalonil (13.34%), Hexaconazole (17.80%), Difeconazole (19.04%), Mancozeb (19.47%), Propiconazole (20.07 %), Trifloxystrobin (25.40%), while maximum intensity was recorded in control (41.14%). However, treatment T3 i.e. foliar spray with Tebuconazole 250 EC @ 0.1 % was proven as the most effective treatment for the management of alternaria leaf blight at initiation of flowering (Fig 1 and Fig 2).

Effect of fungicidal spray at podding stage of cluster bean

The findings of the year 2019 showed that all treatments significantly reduced the percentage of disease intensity compared to the control at pod formation stage. The minimum percent index was recorded in Tebuconazole (12.00%) followed by Chlrothalonil (16.00%), Hexaconazole (18.93%), Mancozeb (24.00%), Difeconazole (24.80%), Propiconazole (29.60%) and Trifloxystrobin (41.33%), while maximum disease index (PDI) was recorded in control (44.00%).

In the experimental year 2020 the minimum PDI was recorded in Tebuconazole (13.92%) followed by Chlrothalonil (17.68%), Propiconazole (18.13%), Trifloxystrobin (20.47%), Difeconazole (21.00%), Mancozeb (22.80%), Hexaconazole (26.20%), while maximum (PDI) was recorded in control (45.87%).

The two year pooled data indicate that the minimum (PDI) was recorded in Tebuconazole (12.96%) followed by Chlrothalonil (16.84%), Hexaconazole (22.57%), Difeconazole (22.90%), Mancozeb (23.40%), Propiconazole (23.87%), Trifloxystrobin (30.90%), while maximum intensity was recorded in control (48.44%). However, foliar spray with

Table 1: Efficacy of fungicides against *Alternaria cyamopsidis* causing Alternaria leaf blight of cluster bean.

Treatment	Per cent disease					Intensity at yield (kg/ha)								
	Initiation of flowering			Podding stage		Grain yield			Straw yield			B:C ratio		
	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean	2019	2020	Mean	2019	2020
Hexaconazole 5 EC @ 0.1%	16.53	19.07	17.80	18.93	26.20	22.57	1670	1831	1750.50	3268	2798	3033.00	3.67	2.97
Diflenconazole 25 EC @ 0.1%	21.87	16.20	19.04	24.80	21.00	22.90	1511	2099	1805.00	2905	2572	2738.50	3.37	3.53
Tebuconazole 250 EC @ 0.1%	9.87	11.13	10.50	12.00	13.92	12.96	2077	2613	2345.00	3994	4321	4157.50	4.55	4.73
Propiconazole 25 EC @ 0.1%	26.40	13.73	20.07	29.60	18.13	23.87	1412	2387	1899.50	2663	3395	3029.00	3.09	4.09
Chlorothalonil @ 0.2 %	13.60	13.07	13.34	16.00	17.68	16.84	1909	2428	2168.50	3147	3230	3188.50	4.04	4.23
Trifloxystrobin 50% WG@ 0.1%	36.53	14.27	25.40	41.33	20.47	30.90	1385	2346	1865.50	2663	3189	2926.00	2.99	4.10
Mancozeb 75% WP @ 0.2 %	21.87	17.07	19.47	24.00	22.80	23.40	1613	2038	1825.50	2905	3128	3016.50	3.55	3.50
Control	41.60	40.67	41.14	44.00	52.87	48.44	1272	1770	1521.00	2469	2608	2538.50	-	-
SE (m)±	1.62	0.95	4.17	1.46	1.09	4.93	1.11	83.05	-	1.39	137.07	-	-	-
CD (5%)	4.85	2.81	14.21	4.38	3.21	16.78	3.32	244.98	-	4.17	404.36	-	-	-

*Mean of three replication.

Tebuconazole 250 EC @ 0.1% was found most effective at podding stage.

Effect of fungicidal spray on grain yield (kg/ha) of cluster bean

In the year 2019, data reveals that all the treatments were found effective against Alternaria disease of cluster bean over control. Maximum grain yield was recorded in treatment Tebuconazole (2077 kg/ha) followed by Chlrothalonil (1909 kg/ha), Hexaconazole (1670 kg/ha), Mancozeb (1613 kg/ha), Difenconazole (1511 kg/ha), Propiconazole (1412 kg/ha) and Trifloxystrobin (1385 kg/ha), while minimum grain yield was recorded in control (1272 kg/ha).

Similarly in year 2020 result reveals that the maximum grain yield was recorded in Tebuconazole (2613 kg/ha) followed by Chlrothalonil (2428 kg/ha), Propiconazole (2387 kg/ha), Trifloxystrobin (2346 kg/ha), Difenconazole (2099 kg/ha), Mancozeb (2038 kg/ha), Hexaconazole (1831 kg/ha), while minimum grain yield was recorded in control (1770 kg/ha).

According to findings of a two year pooled investigation on documented in Table 1. The maximum grain yield was recorded in Tebuconazole (2345.00 kg/ha) followed by Chlrothalonil (2168.50 kg/ha), Propiconazole (1899.50 kg/ha), Trifloxystrobin (1865.50 kg/ha), Mancozeb (1825.50 kg/ha), Difenconazole (1805.00 kg/ha), Hexaconazole (1750.50 kg/ha), while minimum grain yield was recorded in control (1521.00 kg/ha). However, foliar spray with Tebuconazole 250 EC @ 0.1% was found most effective as in terms of grain yield.

Effect of fungicidal spray on straw yield of cluster bean

During 2019 data summarized in Table 1. reveals that all the treatments were found effective against Alternaria disease of cluster bean over control. Maximum straw yield was recorded in treatment Tebuconazole (3994 kg/ha) with highest B: C ratio 4.55 followed by Hexaconazole (3268 kg/ha), Chlrothalonil (3147 kg/ha), Mancozeb, Difeconazole (2905 kg/ha), respectively and Propiconazole, Trifloxystrobin (2663 kg/ha), while minimum straw yield was recorded in control (2469 kg/ha).

During 2020 the similar trends for (Table 1) was recorded with highest straw yield in Tebuconazole (4321 kg/ha) with highest B: C ratio of 4.73 followed by Propiconazole (3395 kg/ha), Chlrothalonil (3230 kg/ha), Trifloxystrobin (3189 kg/ha), Mancozeb (3128 kg/ha), Hexaconazole (2798 kg/ha), Difeconazole (2572 kg/ha), while minimum straw yield was recorded in control (2608 kg/ha).

The two year pooled data indicates that maximum straw yield was recorded in Tebuconazole (4157.50 kg/ha) followed by Chlrothalonil (3188.50 kg/ha), Hexaconazole (3033.00 kg/ha), Propiconazole (3029.00 kg/ha), Mancozeb (3016.50 kg/ha), Trifloxystrobin (2926.00 kg/ha), Difeconazole (2738.50 kg/ha), while minimum grain yield was recorded in control (2538.50 kg/ha). However, in

treatment with foliar spray Tebuconazole 250 EC @ 0.1% the highest B: C ratio of 4.55 and 4.73 was recorded.

Discussion

Disease severity of Alternaria leaf blight of cluster bean is recorded during experimental years and the PDI of leaf spot was significantly reduced in plants sprayed with Tebuconazole 250 EC, Mancozeb, Propiconazole and Trifloxystrobin as compared to control, plant sprayed with water. The result showed that the mean infection on leaves ranged from 10.50 to 41.14 and 12.96 to 48.44% respectively when the data was recorded during the application of fungicides at initiation of flowering and podding stage. However, significantly maximum reduction per cent in severity of alternaria leaf blight was recorded in case of tebuconazole 250EC. Similar finding is also given by Anupriya *et al.* (2020). Thaware *et al.* (2011) also reported that Mancozeb (0.2%) and Propiconazole (0.05%) totally suppressed the growth of *A. alternate*, which causes cowpea leaf spot. The data showed highly significant difference between treatments for yield of cluster bean infected with alternaria leaf blight. The data (Table 1) showed that the significantly lowest yield of grain and straw 1521 and 2538 kg/ha was recorded in control, while highest yields were obtained from plot treated with tebuconazole. The finding are in agreement with the Tomar *et al.* (2005) also reported the increase of seed yields of cluster bean with the management of disease through fungicides.

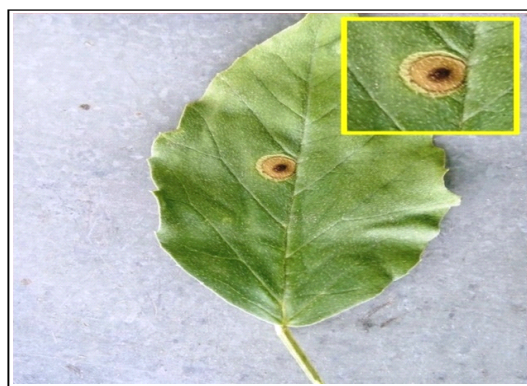


Fig 1: Symptom of Alternaria leaf blight on cluster bean leaf.



Fig 2: Plot treated with Tebuconazole 250 EC @ 0.1%.

CONCLUSION

All of the fungicides evaluated greatly suppressed the growth of *Alternaria cucumerina* var. *cyamopsidis*. Fungicides use can reduce disease increasing genetic potential and consequently yield, as a result effectual use of fungicides at the appropriate time is required. Severity of *Alternaria* leaf spot was significantly reduced in plants sprayed with Tebuconazole, Chlorothalonil, Hexaconazole, Difeconazole, Mancozeb, Propiconazole, Trifloxystrobin as compare to control, plants sprayed with water. The tested fungicides were sprayed two times with an interval during initiation of flowering and podding stage was recorded. The results showed that the maximum reduction percent in severity of leaf spot disease was recorded in case of Tebuconazole (12.96%), followed by Chlorothalonil (16.84%), Hexaconazole (22.57%), Difeconazole (22.90%), Mancozeb (23.40%), Propiconazole (23.87%) and Trifloxystrobin (30.90%). Cluster bean plants infected with leaf spot and sprayed with water (control) showed highly significant reduction in yield while, highest yield of cluster bean were obtained from plot treated with Tebuconazole followed by chlorothalonil, Hexaconazole, Difeconazole, Mancozeb, Propiconazole, Trifloxystrobin, while maximum intensity was recorded in control.

Conflict of interest

All authors declared that there is no conflict of interest.

REFERENCES

- Anupriya, Sasode, S.R. and Prahlad. (2020). Management of *Alternaria cucumerina* var. *cyamopsidis* through plant extracts, bio products and fungicides *in-vitro* and *in-vivo*. *Inter. J. Curr. Microbiol. App. Sci.* **9(3)**: 2595-2605.
- Anupriya, Sasode, R.S. and Prahlad. (2020). *In-vitro* evaluation of different culture media for the growth of *Alternaria cucumerina* var. *cyamopsidis* caused *Alternaria* leaf spot of cluster bean. *Int. J. Chem St.* **8(2)**: 964-967.
- Fatehpuria, P.K. and Sasode, R.S. (2020). Web blight of moth bean: A incited in to a chronic disease and its management. *Just Agriculture.* **1**: 1.
- Kumar, S., Upadhyay, J.P. and Kumar, S. (2005). Evaluation of plant extract for control of *Alternaria* Leaf spot of *Vicia faba*. *Ann. Pl. Protec. Sci.* **13(1)**: 213-269.
- Pragya, Fatehpuria, P.K., Trivedi, H. and Sasode, R.S. (2020). Published a Book Chapter Entitled, Production Technology and Disease Management of Chilli Crop in Book Entitled Advances in Horticulture by AkiNik Publications New Delhi. ISBN-No: 13: 978-9383774-302.
- Swamy, Dhananjaya, P.S. and Naveena, K.P. (2015). An analysis of production performance and yield variability of guar (Cluster bean) in India. *J. Prog. Agric.* **6**: 1.
- Sasode, R.S. and Fatehpuria, P.K. (2020). Published a Book Chapter Entitled, Foliar Diseases of Cluster Bean: A Consortium Approach for Disease Management to Improve Productivity in Book Entitled Research Trends and Innovations in Plant Pathology Volume-1 by Integrated Publications New Delhi. ISBN-No: 978-81-947809-1-5.
- Singh, J.V., Lodhi, G.P. and Singh, V.P. (1995). Varietal improvement in guar. *Farm Dig.* **5**: 23.
- Thaware, D.S., Fugro, P.A., Jadav, Y.T., Magar, S.V. and Karande, R.A. (2011). *In-vitro* evaluation of different fungicides, plant extracts and bio-agent against *Alternaria alternate* causing leaf blight of cowpea (*Vigna unguiculata*). *Green Farming.* **2(5)**: 563-566.
- Tomar, D.S., Singh, R. and Shastry, P.P. (2005). Management of *Alternaria* blight of clusterbean through agro-chemicals. *JNKVV Res. J.* **38(1)**: 86-89.
- Verma, D.K., Sasode, R.S., Harne, A.R. and Singh, R. (2019). Survey for severity of anthracnose of cluster bean in northern Madhya Pradesh. *J. Pharma and Phytochemi.* **8(1)**: 1043-1044.
- Vig, B.K. (1965). Effect of a reciprocal translocation on cytormorphology of guar. *Sci. Cult.* **31**: 531-533.