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Management of Bacterial Blight in Clusterbean

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Abstract Cluster bean (*Cyamopsis tetragonaloba* L.) is an important vegetable crop of Gujarat. It is severely suffered from bacterial leaf blight (BLB) caused by *Xanthomonas axonopodis* pv *cyamopsidis* which responsible for 50-70% yield loss under severe conditions, if appropriate control measures to combat this disease are not taken timely. A disease causing bacterium is either seed borne or air borne in nature. The seed treatment as well as spraying schedules play a vital role for management as well as saving of crop from blight. On this basis, an experiment was planned to study the management of bacterial blight of cluster bean during *kharif* of 2013 to 2015. Five different spray schedules along with untreated control were laid out in randomized block dsign with four replications. Seed soaking in streptocycline @ 250 ppm for 30 minutes plus first spray of streptocycline @ 250 ppm at just appearance of the disease and second at 15 th day after 1st spray (T_5) was recorded the maximum yield, gross and net realizations and minimum disease intensity, which was closely followed by T_4 (seed soaking in streptocycline @ 250 ppm for 30 minutes plus 1st spray of streptocycline @ 200 ppm at just appearance disease and second at 15 th day after 1st spray) and T_3 (seed soaking in streptocycline @ 250 ppm for 30 minutes plus spraying of copper hydroxide 77WP at the appearance of the disease) . Maximum BCR was recorded with treatments T_5.

Keywords Cluster bean, Bacterial blight, Control.

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Introduction

Cluster bean (*Cyamopsis tetragonoloba* L. Taub.), commonly known as guar, is an important self pollinated, drought resistant and leguminous crop cultivated for grain and green pod. India is in prime position for cluster bean production and contributing 80% of world's total production. Rajasthan is the

largest guar producing state in the India and contributing more than 70% of the total production in the country. In India, cluster bean produced 1.78 million tones from 3.47 million ha area with average productivity of 515 kg/ha of seed [1].

Pulses are the main constitutes of vegetarian diet next to cereals. Green and tender pods of cluster bean are the most preferred vegetable in many parts of the world. The tender pods are dried and eaten after frying in many parts of our country during off season. The plants are cut and fed as green forage to the cattle. Seed coats and cotyledons obtained after processing of cluster bean are used as high protein cattle feed. It has also great significance due to its good quality gum content and its derivatives which used in several industries viz. food processing, pharmaceuticals, cosmetics, mining, textile, paper, ceramics synthetic vaccines, paints, oil industries, oil drilling and explosive industry.

Bacterial blight of cluster bean is one of the important disease caused by *Xanthomonas axonopodis* pv *cyamopsidis* [2] which responsible for 58% yield loss [3]. Scattered rains, high humidity, cloudy weather and warm temperature (28—30°C)favors development of bacterial leaf blight (BLB) during monsoon. The infection from blighted leaves spread to stem through petiole and in advance stages, stem gets cracked. The pods also show heavy spotting . Early infection may reduce the yield to a greater extent [4]. Seed treatment as well as spraying schedules play a vital role for management of bacterial blight. Hence, an experiment was planned to manage the bacterial blight through seed treatment with different spraying schedules in vegetable cluster bean.

Materials and Methods

A field experiment was concducted in a randomized block design with four replications during *kharif* of 2013-14, 2014-15 and 2015-16 at Seed Spices Research Station, Jagudan. The antibiotics with their respective concentrations (Table 1) were compared with untreated control. Cluster bean variety Pusa navabahar was sown at a distance of 45 cm × 30 cm. The disease intensity were recorded at just initiation of disease and subsequent recordings were made at weekly intervals from 20 randomly selected plants from each net plot by using 1-9 scale as : 1 = 1-5% disease leaf area; 3=6-12% disease leaf area; 5=13-25% disease leaf area; 7 = 26-50% disease leaf area; 9=>50% disease leaf area.Based on these observations, percent disease intensity (PDI) of BLB was worked out .

Table 1. Effect of different treatments on disease intensity. * Figures in the parentheses represent original values.DAFS = Days after first spray. DASS = Days after second spray.

	PDI-Before spray				PDI-5 DAFS			
Treatments	2013-14	2014-15	2015-16	Pooled	2013-14	2014-15	2015-16	Pooled
T_1	11.11	11.50	12.9	11.84	15.60	18.65	15.6	16.62
	(3.8)	(4.0)	(5.0)	(4.2)	(7.3)	(10.3)	(7.3)	(8.2)
T_2	10.30	10.72	12.6	11.20	13.81	16.66	14.2	14.88
	(3.3)	(3.5)	(4.8)	(3.8)	(5.8)	(8.3)	(6.0)	(6.6)
T_3	11.11	10.37	12.6	11.35	15.03	18.01	14.8	15.93
	(3.8)	(3.3)	(4.8)	(5.3)	(6.8)	(9.8)	(6.5)	(7.5)
T_4	11.84	11.71	11.9	11.81	14.99	17.87	13.6	15.47
	(4.3)	(4.3)	(4.3)	(4.3)	(6.7)	(9.8)	(5.5)	(7.1)
T_5	11.50	10.72	11.9	11.37	14.74	17.20	13.2	15.06
	(4.0)	(3.5)	(4.3)	(3.9)	(6.5)	(9.0)	(5.3)	(6.7)
T_6	13.42	12.58	15.1	13.68	19.36	21.16	18.7	19.73
	(5.5)	(4.8)	(6.8)	(5.6)	(11.0)	(13.3)	(10.3)	(11.4)
SEm	0.86	0.71	0.29	0.39	0.63	0.91	0.37	0.39
CD at 5%	NS	NS	0.88	1.10	1.89	2.73	1.12	1.10
CV %	14.98	12.58	4.58	11.23	8.05	9.92	4.98	8.25
YXT				NS				NS

Table 1. Continued.

Treatments	PDI-5 DASS 2013-14	2014-15	2015-16	Pooled	PDI-Final 2013-14	2014-15	2015-16	Pooled
T_1	20.70	27.61	19.4	22.55	26.02	28.96	26.0	27.00
	(12.5)	(21.5)	(11.0)	(14.7)	(19.3)	(23.5)	(19.3)	(20.6)
T_2	19.12	24.51	17.9	20.52	22.79	27.06	24.0	24.61
	(10.8)	(17.3)	(9.5)	(12.4)	(15.0)	(20.8)	(16.5)	(17.3)
T_3	19.13	25.08	17.9	20.71	22.99	26.52	23.0	24.16
	(10.8)	(18.0)	(9.5)	(12.5)	(15.3)	(20.0)	(15.3)	(16.7)
T_4	18.66	25.09	16.9	20.23	22.17	25.83	21.5	23.18
	(10.3)	(18.0)	(8..5)	(12.1)	(14.3)	(19.0)	(13.5)	(15.5)
T_5	17.95	23.76	16.2	19.29	20.70	24.90	20.0	21.88
	(9.5)	(16.3)	(7.8)	(10.9)	(12.5)	(17.8)	(11.8)	(13.9)
T_6	23.26	32.62	22.6	26.15	27.09	32.89	28.6	29.53
	(16.3)	(27.5)	(14.8)	(19.4)	(20.8)	(29.5)	(23.0)	(24.3)
SEm	0.57	0.52	0.44	0.45	0.29	0.33	0.26	0.36
CD at 5%	1.71	1.57	1.31	1.42	0.86	1.00	0.79	1.14
CV%	5.72	3.95	4.71	4.74	2.43	2.39	2.17	2.35
YXT				S				S

The green pod yield from individual plot was also recorded and converted in hectare basis. Recommended cultural operations were performed as per requirements of crop.

Results and Discussion

Per cent disease intensity
(PDI) before spray

Data revealed that there was no significant effect of various treatments in percent disease intensity (PDI) before spray during 2013-14 and 2014-15. However, during 2015-16 and pooled results, significant difference was observed. All the chemical treatments were at par with one another but significantly superior over untreated control. The seed treatment with streptocycline was found better to reduce the disease intensity (Table 1).

Percent disease intensity (PDI)
5 days after first spray

Different spraying schedules showed significant effect on percent disease intensity at 5 days after first spray during all the year and pooled results too. Seed treatment with different spraying schedules i.e. T_2, T_3, T_4 and T_5 were at par but recorded significantly lower disease intensity over untreated control (Table 1).

Percent disease intensity (PDI)
5 days after first spray

Lower disease intensity was recorded in treatment T_5 during course of investigation and pooled results also. But, it remains at par with treatments T_4, T_3 and T_2 during 2013-14 and 2014-15, with T_4 and T_3 during 2015-16 and pooled data but significantly inferior over rest of the treatments (Table 1).

Percent disease intensity
(PDI) final

Treatments T_5 i.e seed soaking in streptocycline @ 250 ppm for 30 minutes plus spraying of streptocycline @ 250 ppm at the appearance of the disease and second at 15 days after 1st spray recorded significantly lowest percent disease intensity at final during couse of investigation and in pooled data except 2014-15 where, it was at par with treatment T_4 (Table 1). Similar findings were also reported by Yadav and Nath [5] and Chaudhari et al. [6].

Yield

Effect of different treatments on green pod yield was

Table 2. Effect of different treatments on green pod yield of cluster bean and economics of different treatments. Green cluster bean pod price Rs 15/kg, streptocycline Rs 50/6 g, copper oxychloride Rs 400/kg, copper hydroxide 77% Rs 1140/kg, urea Rs 6.20 / kg and DAP Rs 24.92 / kg.

Treatments	Green pod yield (kg/ha) 2013-14	2014-15	2015-16	Pooled	Gross realization (Rs)	Cost of inputs	Net realization (Rs)	BCR
T_1 : Seed soaking in streptocycline @ 250 ppm for 30 minutes	13575	14000	9367	12314	1,84,710	36500	1,48,210	4.06
T_2 : T_1 + spray of streptocycline @150 ppm + copper oxychloride 0.2% at appearance of the disease	14349	14148	10139	12879	1, 93, 185	37700	1,55,485	4.12
T_3 : T_1 + spray of copper hydroxide 77WP at just appearance of the disease	14687	15525	11735	13982	2, 09,730	37470	1,72,260	4.60
T_4 : T_1 + spray of streptocycline @ 200 ppm at just appearance followed by200 ppm streptocycline 15 days after 1st spray	14994	15750	12818	14520	2,17,800	38660	1,79,140	4.63
T_5 : T_1 + spray of streptocycline @ 250 ppm at just appearance followed by 250 ppm streptocycline 15 days after 1st spray	14975	15966	14000	14980	2,24,700	38970	1,85,730	4.77
T_6 : Untreated control	12854	12779	8370	11335	1,70,025	36400	1,33,625	3.67
SEm	630	528	420	308				
CD at 5%	NS	1591	1267	877				
CV%	8.85	7.18	7.73	7.99				
YXT				NS				

significant during 2014-15, 2015-16 and pooled data (Table 2). The maximum green pod yield was recorded when seeds were treated with streptocycline and 2 sprays of streptocycline @ 250 ppm were imposed (T_5) and was at par with treatment T_4 and T_3 in 2014 –15 and T_4 in 2015-16 and in pooled data too. This might be due to minimum PDI (Table 2). The results are in conformity with those reported by Yadav and Nath [5].

Economics

Seed soaking in streptocycline @ 250 ppm for 30 minutes plus spraying of streptocycline @ 250 ppm at the appearance of the disease and second at 15 days after 1st spray (T_5) recorded the lower disease intensity, maximum yield, gross and net realizations and BCR, which was closely followed by treatment T_4 (seed soaking in streptocycline @ 250 ppm for 30 minutes plus spraying of streptocycline @ 200 ppm at the time of appearance the disease and second at 15 days after 1st spray) and T_3 (seed soaking in streptocycline @ 250 ppm for 30 minutes plus spraying of copper hydroxide 77WP at the appearance of the disease (Table 2).

Conclusion

Seed soaking in streptocycline @ 250 ppm for 30 minutes followed by spraying schedules of streptocycline @ 250 ppm at just appearance of disease and second at 15 days after 1st spray manage the bacterial leaf blight (BLB) in vegetable cluster bean effectively and recorded higher green pod yield with maximum net return and BCR.

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