

Effect of Date of Sowing on the Development of Bacterial Blight of Clusterbean

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Abstract Clusterbean (*Cyamopsis tetragonoloba* L.) is an important vegetable crop growing in Gujarat. It is severely suffered from bacterial leaf blight (BLB) caused by *Xanthomonas axonopodis* pv *cyamopsidis* responsible for 50 - 70% yield loss under severe condition, if appropriate control measures to combat this disease are not taken timely. To escape the crop from blight, the sowing time plays a vital role as non-monitory input. On this basis an experiment was planned to study the effect of date of sowing on the development of bacterial blight of clusterbean during *kharif* of 2012 to 2015. Treatments consisted various five sowing times from third week of July to third week of August were laid out in randomized block design with four replications. Sowing of the clusterbean during first week of August recorded the maximum green pod yield during the course of investigation and in pooled

data also. The percent disease intensity (PDI) of BLB was decreased significantly with each delay in sowing. Early sowing i.e. third and fourth week of July increased disease intensity significantly. Thus, first week of August (D_3) was an optimum time of sowing with respect to less intensity of bacterial leaf blight, higher green pod yield, net profit and BCR.

Keywords Clusterbean, Bacterial blight, Sowing interval.

Introduction

Clusterbean (*Cyamopsis tetragonoloba* L. Taub.), commonly known in India as guar, is an important self pollinated, multipurpose, drought resistant, leguminous crop cultivated for grain as well as green vegetable. India is in prime position in clusterbean producing countries of the world contributing around 75 to 80% in the world's total production. Rajasthan is the largest guar producing state in the India and contributing more than 70% of the total production of India. In India, 1.78 million tones of clusterbean is being produced from 3.47 million ha area with an average productivity of 515 kg seed per ha [1].

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Pulses are the main constituents of vegetarian diet next to cereals. Green and tender pods of clusterbean are the most preferred vegetable in many part of the world. The tender pods are dried and eaten after frying in many part of our country. Clusterbean is a rich source of proteins and other minerals. The 100 g of edible portion contents 81g moisture, 10.8 g carbohydrates, 3.3 g protein, 0.4 g fat, 1.4 g minerals, 0.09 mg thiamine, 47.0 mg vitamin C and 316 LU vitamin A. 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 assume great significance due to its good quality gum content and its derivatives are widely used in several industries such as food processing, pharmaceuticals, cosmetics, mining, textile, paper, ceramics, synthetic vaccines, paints, oil industries, oil drilling and explosive industry.

The crop is attacked by pathogens causing diseases adversely influencing the production. Bacterial blight of clusterbean is one of the important disease caused by *Xanthomonas axonopodis* pv *cyamopsidis* [2] responsible for heavy losses under severe conditions. Dye has assumed an important place among bacterial disease which cause up to 58.68% loss in grain yield [3]. Early infection may reduces the yield to a greater extent [4]. Clusterbean is mostly cultivated in *kharif* season. Optimum time of

sowing of the crop is one of the non-monetary manipulations and plays a vital role in boosting up the yield with lower disease intensity. Information available on this aspect is very scanty. Keeping this in view, this experiment was planned.

Materials and Methods

A field experiment was conducted in a randomized block design with four replications during *kharif* of 2012-13, 2013-14 and 2014-15 at Seed Spices Research Station, Jagudan. Clusterbean var Pusa Navbahar was sown at different five dates i.e third week of July (D₁), fourth week of July (D₂), first week of August (D₃), second week of August (D₄) and third week of August (D₅) at a distance of 45 cm × 30 cm. The observations on the disease intensity was recorded after initiation of disease and subsequent after weekly intervals from 20 randomly selected plants from each plots using 0-9 scale as : 0 = healthy; 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, per cent disease intensity(PDI) of BLB was worked by using formula given by Datar and Mayee [5]. The green pod yield from individual plots was also recorded and converted in hectare basis. Recommended cultural operations were performed as per requirements of the crop.

Table 1. Effect of date of sowing on the bacterial leaf blight of vegetable clusterbean. Figures in the parentheses are retransformed values.

Sl. No.	Treatments	Bacterial leaf blight (% disease intensity)			
		2012	2013	2014	Pooled
1	Third week of Jul (D ₁)	28.38* (22.60)	21.50* (13.4)	25.05* (17.95)	24.97* (17.82)
2	Fourth week of Jul (D ₂)	26.83 (20.38)	18.33 (9.90)	20.02 (11.75)	21.73 (13.17)
3	First week of Aug (D ₃)	12.40 (4.60)	14.41 (6.20)	16.30 (7.88)	14.37 (6.15)
4	Second week of Aug (D ₄)	6.24 (1.19)	13.51 (5.48)	12.85 (4.96)	10.87 (3.84)
5	Third week of Aug (D ₅)	5.19 (0.82)	11.37 (3.89)	9.49 (2.74)	8.68 (2.28)
	SEm ±	0.26	0.33	0.62	2.25
	CD at 5%	0.80	1.02	1.91	7.33
	Y × T SEm ±				0.43
	CD at 5%				1.24
	CV %	3.37	4.17	7.42	5.37

Table 2. Effect of date of sowing on the yield of vegetable clusterbean.

Sl. No.	Treatments	Green pod yield (kg/ha)			
		2012	2013	2014	Pooled
1	Third week of Jul (D ₁)	12969	13169	14373	13504
2	Fourth week of Jul (D ₂)	14265	13330	14862	14152
3	First week of Aug (D ₃)	17029	14756	15706	15847
4	Second week of Aug (D ₄)	14747	13156	12774	13559
5	Third week of Aug (D ₅)	12747	11753	12312	12270
	SEm ±	538	571	790	371
	CD at 5%	1656	1760	2433	1065
	Y × T				NS
	CV %	7.36	8.63	11.27	9.27

Results and Discussion

Percent disease intensity (PDI)

During the course of investigation, bacterial leaf blight disease intensity (PDI) was decreased significantly with each delay in sowing. The significantly maximum and minimum percent disease intensity (PDI) were recorded in early (third week of July) and late (third week of August) sowings respectively (Table 1). Similar findings were also reported by Yadav and Nath [6] and Patel et al. [7].

Higher relative humidity and more number of rainy days with considerably higher the maximum temperature during 2nd fortnight of July create congenial conditions for increase in the intensity of bacterial leaf blight. Reduction in maximum temperature and relative humidity during August might reduced the intensity of bacterial leaf blight disease.

Green pod yield (kg/ha)

In general, the green pod yield of clusterbean in-

creased with each delay in sowings from third week of July to first week of August. Further, delay in sowings reduced green pod yield (Table 2).

During the first year (2012), crop sown on the first week of August (D₁) recorded significantly the highest green pod yield of 17029 kg/ha. Similarly, the maximum green pod yield of clusterbean 14756 and 15706 kg/ha was recorded when crop sown on first week of August (D₃) during 2013 and 2014 respectively and were statistically near to equal with treatments D₂ and D₁ but significantly superior over rest of the treatments except in the year 2013 where it was at par with treatments D₂, D₁ and D₄.

In pooled analysis the highest green pod yield of 17029 kg/ha was recorded under treatment D₃ i.e. first week of August. Optimum climatic condition reduced disease intensity and improved growth attributes consequently higher yield. During the course of investigation, the pooled data revealed that crop sown on early (D₁) or late (D₅) were at par and recorded significantly lower green pod yield than rest of the sowings times except in 2014. This might be due to poor vegetative growth caused by disease infection in early sowing and reduction in maximum temperature in late sowing. The results are in conformity with those reported by Yadav and Nath [6].

Economics

The maximum gross (Rs 2,37,705/-) and net realization (Rs 1,99,305/-) as well as BCR (5.19) were obtained when crop sown during first week of August (D₃) and closely followed by treatment D₂ with net realization of Rs 1,72,880/- and D₄ with BCR of 4.44.

Table 3. Economics of different treatments. Green clusterbean pod price : Rs 15/kg, Urea cost Rs 6.20/kg, DAP cost Rs 24.92/kg.

Sl. No.	Treatment details	Yield kg/ha	Gross realization (Rs)	Cost of inputs	Net realization (Rs)	BCR
1	Third week of Jul (D ₁)	13504	2,02,560	40400	1,62,160	4.01
2	Fourth week of Jul (D ₂)	14152	2,12,280	39400	1,72,880	4.39
3	First week of August (D ₃)	15847	2,37,705	38400	1,99,305	5.19
4	Second week of Aug (D ₄)	13559	2,03,385	37400	1,65,985	4.44
5	Third week of Aug (D ₅)	12270	1,84,050	36400	1,47,650	4.06

Conclusion

Delays in sowings during the second and third week of August affect the plant growth and development adversely. Early sowing i.e. third and fourth week of July increased disease intensity significantly, this might reduced green pod yield. Sowing of first week of August provided better environment for growth and development of crop, which increased green pod yield. Thus, first week of August (D₃) was an optimum time of sowing with respect to less intensity of bacterial leaf blight and higher green pod yield.

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