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# Status of bacterial blight disease in major clusterbean growing districts of Rajasthan, India

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## ABSTRACT

Bacterial blight pathogen (*Xanthomonas axonopodis* pv. *cyamopsidis*) of clusterbean caused considerable damage every year during *Kharif* season and sometimes become very severe, which results in heavy loss in grain yield. During survey, On the basis of district wise over all mean data during *kharif* 2018 and 2019, the maximum per cent disease index (31.59) was recorded in Jaipur than followed by Sikar (19.26) and least PDI was observed at Bikaner district (10.03) and maximum per cent disease index (35.42) was recorded in Chomu tehsil followed by Jamwa Ramgarh (33.33), Shahpura (26.04), Danta Ramgarh (22.96), Srimadhapur and Sikar (17.40), Lunkaransar (11.35), Nokha (11.23) and least PDI was observed at Bikaner tehsil (7.52).

**Key words:** Bacterial blight, Survey, Per cent disease index and Clusterbean.

## Introduction

Clusterbean [*Cyamopsis tetragonoloba* (L.) Taub.] is an important annual legume crop of *kharif* season in arid and semi-arid regions of the Indian subcontinent. It is a self-pollinated, short duration legume crop generally cultivated under resource constrained conditions on marginal and sub marginal lands (Kumar, 2005). Clusterbean belongs to the tribe Indigoferae of the Leguminosae (Fabaceae) family with diploid chromosome number  $2n=14$ . The crop is known for drought tolerance having deep root system (Kumar and Rodge, 2012). The area under clusterbean production in India is 4.26 million ha with a production of 2.42 million tonnes and productivity of 567 kg/ha (Anonymous, 2020). Rajasthan is the biggest clusterbean producer state contributes about 80 per cent of the total clusterbean production in the country. In Rajasthan, area under the clusterbean crop is 35.30 lakh hectare with pro-

duction of 14.04 lakh tonnes and productivity 398 kg/ha (Anon, 2020.) Clusterbean is grown in all the districts of Rajasthan however, Alwar, Barmer, Bikaner, Churu, Hanumangarh, Jaipur, Jaisalmer, Jalore, Jhunjhunu, Jodhpur, Kota, Nagaur, Pali, Sri-Ganganagar and Sikar are major producer contributing about 80 per cent of the total clusterbean production in the state.

Clusterbean suffers from a number of diseases caused by fungal, bacterial and viral pathogens, which adversely affect its quality and yield resulting in huge economic losses to the country as the crop have high foreign exchange earning potential. The major diseases of clusterbean are bacterial blight (*Xanthomonas axonopodis* pv. *cyamopsidis*). Looking to the importance of this disease a thorough study is required to understand about its actual distribution and prevalence in major clusterbean growing districts of Rajasthan.

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## Materials and Methods

Survey's were conducted to know the status of bacterial blight in major clusterbean growing districts of Rajasthan during the *kharif* season of 2018 and 2019 in clusterbean growing areas of Rajasthan, which includes districts *viz.*, Jaipur, Sikar and Bikaner (Fig. 1). Three tehsils under each district were surveyed. Under each tehsil three villages were selected and under each village three farmers fields were assessed. The bacterial blight disease severity were recorded by using a standard 0-5 scale given by Rathore (2006). The disease severity in the plants was recorded at 30 days after sowing till maturity stage by randomly selecting five spots in every field and closely examining 20 plants in each of the four directions of the selected point. Severity of disease in a field was recorded as per centage of lesion area infected out of total leaf area examined. The disease situation for each plant was noted on an arbitrary scale of 0-5. The disease rating key was used based on leaf spot disease development in which infected plants were categorized in arbitrary classes. Natural symptoms of disease were recorded during this period. The disease severity was recorded by using the following scale (Rathore, 2006).

### Disease rating scale of bacterial leaf blight of clusterbean

- 0 No infection
- 1 Minute water soaked spots scattered over the leaves covering about 1-10% leaf area.
- 2 Little bigger spots covering about 10-25% leaf area.
- 3 Bigger leaf spot covering about 25-50% leaf area, few small spots on petiole and stem initiated.
- 4 About 50-75% leaf area covered by heavy ne-

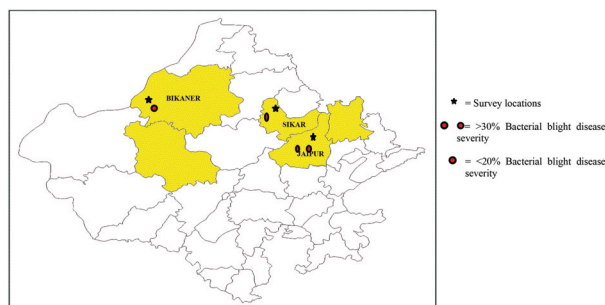


Fig. 1. Map showing surveyed locations and prevalence of bacterial blight disease severity in clusterbean growing districts of Rajasthan

croitic spotting, distinct enlarged elliptical lesion on petiole and stem.

- 5 Above 75% leaf area covered with necrotic leaf spots, cracking of stem, leaf spot or infection on pods.

The entire data were pooled together and per cent disease index was calculated by using following formula.

$$\text{Percent disease index} = \frac{\text{Sum of individual disease ratings}}{(\text{Total no. of plants leaves assessed} \times \text{Maximum disease rating})} \times 100$$

## Results and Discussion

Surveys were conducted to know the status of bacterial blight in major clusterbean growing districts of Rajasthan *viz.*, Jaipur, Sikar and Bikaner during the *kharif* season of 2018 and 2019. Three tehsils of each district and three villages of each thesil were selected for the survey. Three fields were assessed from each selected village. The five spots were selected randomly from each field and disease severity was recorded at 30 days old plants to till maturity on 20 selected plants of each selected spot. The plants were examined critically and disease severity was measured by using 0-5 scale.

A total of 81 clusterbean fields were monitored from the three major clusterbean growing districts of Rajasthan. The two years pooled data depicted in Table 1 revealed that the bacterial blight disease of clusterbean was observed at all the locations with per cent disease index was ranging from 10.03-31.59. The maximum per cent disease index (35.42) was recorded in Chomu tehsil followed by Jamwa Ramgarh (33.33), Shahpura (26.04), Danta Ramgarh (22.96), Srimadhapur and Sikar (17.40), Lunkaransar (11.35), Nokha (11.23) and Bikaner (7.52). On the basis of district wise over all mean per cent disease index, the maximum disease index (31.59) was recorded in Jaipur followed by Sikar (19.26) and it was minimum in Bikaner (10.03). The overall mean of pre cent disease severity at three districts was 20.29 (Table 1 & Fig. 1 & 2).

The obtained results are in conformity with the research findings of Chakravarth *et al.* (2005) who conducted survey in *kharif* 2002 and 2003 in major clusterbean growing area of Karnataka and reported 30.00 to 40.00 per cent disease. Further, Sandipan *et al.* 2017 in conducted a survey in Surat, Bharuch and Narmada districts and reported the

**Table 4.1.** The status of bacterial blight in major clusterbean growing districts of Rajasthan

S. No.	District	Tehsil	Village	Cultivar grown	No. of Fields	Per cent disease index			Over all severity (%)	
						2018	2019	Pooled		
1.	Jaipur	Shahpura	Khoraladkhani	RGC-1017, 1003, Local	3	19.25 (26.03)	26.66 (31.09)	22.95 (28.56)	31.59	
			Charsha	RGC-1055, 1038, Local	3	21.48 (27.61)	29.62 (32.97)	25.55 (30.29)		
			Nayabash	RGC-1017, Local	3	28.14 (32.04)	31.11 (33.90)	29.62 (32.97)		
				<b>Mean</b>				<b>22.96(28.63)</b>	<b>26.04 (30.64)</b>	
		Jamwa Ramgarh	Gathwari	RGC-1055, 1003, Local	3	30.37 (33.44)	34.07 (35.71)	32.62 (34.57)		
			Ratnpura	RGC-1017, 1003, Local	3	32.59 (34.81)	36.29 (37.04)	34.44 (35.55)		
			Bamanwas	RGC-986, 936, Local	3	31.81 (34.35)	34.81 (36.15)	33.31 (35.25)		
				<b>Mean</b>				<b>31.60(34.20)</b>	<b>33.33 (35.25)</b>	
		Chomu	Khejroli	RGC-1055, 1003, Local	3	28.88 (32.51)	37.03 (37.48)	32.95 (34.99)		
			Harad Rampura	RGC-1017, 1038, Local	3	35.55 (36.60)	37.77 (37.92)	36.66 (37.26)		
			Amarpura	RGC-1055, 1003, Local	3	34.31 (36.15)	38.51(38.36)	36.41 (37.25)		
				<b>Mean</b>				<b>33.08(35.11)</b>	<b>35.42 (36.51)</b>	
		2.	Sikar	Srimadhampur	Ajeetpura	RGC-1017, 1003, Local	3	15.55 (23.22)	17.03 (24.37)	16.29 (23.79)
Gokalpura	RGC-1038, 936, Local				3	16.29 (23.80)	18.51 (25.48)	17.40 (24.64)		
Rampura	RGC-1017,936,986				3	14.81 (22.63)	22.22 (28.12)	18.51 (25.37)		
				<b>Mean</b>				<b>15.55(23.22)</b>	<b>17.40 (24.62)</b>	
Sikar	Reengus			RGC-1066, Local	3	20.74 (27.09)	22.92 (28.63)	21.83 (27.86)		
	Govindpura			RGC-1002, 1038	3	14.07 (22.03)	17.77 (24.93)	15.92 (23.48)		
	Khandela	RGC-1055,986, Local	3	12.59 (20.78)	16.29 (23.80)	14.49 (22.29)				
		<b>Mean</b>				<b>15.80(23.42)</b>	<b>17.40 (24.68)</b>			
3.	Bikaner	Danta Ramgarh	Palsana	RGC-1002, Local	3	19.25 (26.03)	24.44 (29.63)	21.84 (27.83)		
			Rajpura	RGC-1066, 1055,Local	3	25.18 (30.12)	27.40 (31.56)	26.29 (30.84)		
			Ranoli	RGC-1017, Local	3	20.00 (26.56)	21.48 (27.61)	20.74 (27.08)		
				<b>Mean</b>				<b>21.48(27.61)</b>	<b>22.96 (28.62)</b>	
		Lunkaransar	Udai Ramsar	RGC-1066, Local	3	5.92 (14.08)	8.88 (17.34)	7.40 (15.69)	10.03	
			Khara	RGC-1017,1002, Local	3	4.44 (12.17)	7.40 (15.79)	5.92 (13.98)		
			Palana	RGC-1066, Local	3	8.14 (16.58)	10.37 (18.78)	9.25 (17.68)		
				<b>Mean</b>				<b>6.17(14.38)</b>	<b>7.52 (15.86)</b>	
		Nokha	Rojha	RGC-1017, 936, 986	3	13.33 (21.41)	9.62 (18.07)	11.47 (19.74)		
			Sehniwala	RGC-1066, 936, Local	3	3.70 (11.09)	6.66 (14.96)	5.18 (13.02)		
			Hariyasar	RGC-936, 986,Local	3	11.85 (20.13)	22.96 (28.63)	17.40 (24.38)		
				<b>Mean</b>				<b>9.62(18.07)</b>	<b>11.35 (19.63)</b>	
Nokha	Surpura	RGC-1066, 986, Local	3	14.81 (22.63)	16.29 (23.80)	15.55 (23.21)				
	Sribalaji	RGC-1038, 936, Local	3	7.40 (15.79)	11.11 (19.47)	9.25 (17.63)				
	Nokha Gram	RGC-1066,936, Local	3	5.18 (13.16)	12.59 (20.78)	8.88 (16.97)				
		<b>Mean</b>				<b>9.13(17.59)</b>	<b>11.23 (19.50)</b>			
<b>Total</b>	<b>9</b>	<b>27</b>			<b>81</b>			<b>20.29</b>		

\*All the data are mean of *kharif* 2018 and 2019

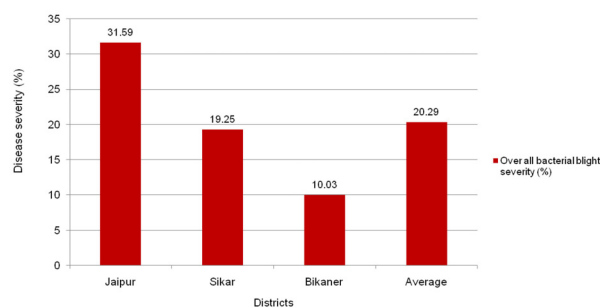


Fig. 2. The status of bacterial blight in major clusterbean growing districts of Rajasthan

bacteria leaf blight incidence in the range of 0.0 to 5.5 per cent, 0.0 to 3.0 per cent and 0.0 to 24.0 per cent PDI in Surat, Bharuch and Narmada districts respectively. Isameldin *et al.* (2018) conducted survey in irrigated and rain-fed production areas of clusterbean and recorded greatest disease incidence under rain-fed conditions than irrigated areas where 100 per cent infection was recorded in the Blue Nile State, followed by 74 per cent disease incidence at Gennib location. Kumar and Doshi (2018) conducted survey in 2013 and 2014 in Rajasthan in green gram fields and reported maximum disease severity in Vallabhnagar tehsil and least per cent disease severity at Kherwara tehsil of Udaipur districts during surveys in the years. Jyosthna *et al.* (2019) conducted survey within Andhra Pradesh in pomegranate orchards and recorded highest disease incidence in Kurnool district followed by Kadapa district and least in Ananthapuram district. Mohamed *et al.* (2020) also reported bacterial blight disease (ranged 37.5 to 47.3%) incidence in southern geographic area.

## Conclusion

During survey, maximum bacterial blight severity was recorded in Chomu tehsil followed by Jamwa Ramgarh, Shahpura, Danta Ramgarh, Srimadhapur, Sikar, Lunkaransar, Nokha and least severity was

observed at Bikaner tehsil.

## References

- Anonymous 2020. Directorate of Economics and Statistics, Government of Rajasthan, Jaipur.
- Chakravarthi, C.N., Krishnapp, M. and Thippeswamy, B. 2005. Isolation and characterization of *Xanthomonas axonopodis* pv. *cyamopsisidis* in cluster bean (*Cyamopsis tetragonoloba* (L.) Taub). *Asian Journal Microbiology Biotechnology and Environment Science*. 7(2) : 197-200.
- Isameldin, O.A., Yousif, Abbo, A.S., Hamad, M.A.A., Eltahir, M.E.S. and Elhassan, S.M. 2018. Occurrence, etiological and ecological aspects of bacterial blight of guar in Sudan. *Journal Agriculture Environment Science*. 18(6): 358-362.
- Jyosthna, M.K., Reddy, N.P.E, Padmodaya, B., Prasad, K.V.H. and Naidu, G.M. 2019. Status of bacterial blight disease on pomegranate in Andhra Pradesh. *International Journal Pure Applied Bioscience*. 7(3) : 583-588.
- Kumar, D. 2005. Status and direction of arid legumes research in India. *Indian Journal Agriculture Science*. 75(7) : 375-391.
- Kumar, D. and Rodge, A.B. 2012. Status, scope and strategies of arid legumes research in India- A review. *Journal Food Legume*. 25(4): 255-272.
- Kumar, J. and Doshi, A. 2018. Severity of bacterial leaf spot (*Xanthomonas axonopodis* pv. *vignaeradiatae*) of green gram in different tehsils of Udaipur district, Rajasthan. *International Journal Current Microbiology and Applied Science*. 7(3) : 2924-2931.
- Mohamed, E.M., Suliman, M.E. and Ismail, M.I. 2020. Identification and evaluation of bacterial blight occurrence on guar crop in Gadarif State (Sudan). *International Journal Trend Scientific Research Development*. 4(3) : 809-814.
- Rathore, B. S. 2006. Efficacy of streptomycin and plant extracts against bacterial leaf spot disease caused by *Xanthomonas axonopodis* pv. *vignaradiatae* of green gram. *Indian Phytopathology*. 63(4) : 384-386.
- Sandipan, P.B., Bhandari, G.R., Patel, R.D. and Solanki, B.G. 2017. Survey and status of different diseases of cotton under South Gujarat region, India. *International Journal Current Microbiology and Applied Science*. 6(9): 1362-1367.