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SURVEY FOR THE LEAF CRINKLE DISEASE INCIDENCE ON BLACKGRAM IN NORTHERN KARNATAKA

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Abstract

Blackgram is popular as "Urad dal" in India and it is highly prized pulse among all the pulses. Blackgram has medical properties which help to heal Rheumatic pains, stiff shoulder and contracted knees. Leaf crinkle is one among the viral diseases that infects these crops and reduces yield quantity and quality of the seed. The symptoms of disease appear in the form of extreme crinkling, curling, puckering and rugosity of leaves, stunting of plants, malformation of floral organs and pollen fertility and reduced pod formation in severely infected plants. An intensive roving survey was conducted in seven district of northern Karnataka *viz.,* Belagavi, Bidar, Dharwad, Haveri, Raichur, Uttar Kannada and Yadagir to know the incidence of leaf crinkle disease in blackgram during *kharif* 2011 and 2012. During *kharif* 2011 roving survey the highest mean PDI of 39.13 recorded in Bidar district while lowest was recorded in Haveri district (21.20 %). In *kharif* 2012 also Bidar recorded highest mean PDI (42.87 %) and the lowest of 19.60 per cent in Haveri. The area covered under survey in northern Karnataka belongs to different agro climatic zones hence leaf crinkle disease is varied.

Key words: Blackgram, Leaf crinkle, Survey, Karnataka, Per cent disease incidence (PDI)

Introduction

Pulses or legumes are the rich source of protein essential to mankind. They are also play vital role in best in soil health management through biological nitrogen fixation (BNF). Blackgram is mainly cultivated in Indian subcontinent. In India, blackgram is popular as "Urad dal" and it is highly prized pulse among all the pulses. High amount of magnesium and folate of blackgram support blood circulation. Blackgram has medical properties which help to heal Rheumatic pains, stiff shoulder and contracted knees. Blackgram is consumed as Dal, even split lentil is used for same purpose. The seeds are used for treating rheumatism, a kind of nervous system ailments and liver afflictions, while the roots are narcotic used for relieving bone pains. It is consumed in many forms including the grains (whole or split). The whole grains are eaten after germination parched, salted with sugar or boiled with condiments. It is also consumed as a boiled dal, bean cakes, noodles and pudding (www.ipga.co.in).

Leaf crinkle is one among the viral diseases that infects these crops and reduces yield quantity and quality of the seed. Leaf crinkle now a days become one of the major production constraint in blackgram and greengram in both *kharif* and *rabi* seasons. Williams *et al.* (1968) first reported the occurrence of the leaf crinkle on blackgram and greengram from the states of Delhi and Uttar Pradesh in India. The symptoms of disease appear in the form of extreme crinkling, curling, puckering and rugosity of leaves, stunting of plants, malformation of floral organs and pollen fertility and pod formation is also reduced severely in infected plants (Nene, 1972).

Material and Method

An intensive roving survey was conducted in seven district of northern Karnataka *viz.,* Belagavi, Bidar, Dharwad, Haveri, Raichur, Uttar Kannada and Yadagir to know the incidence of leaf crinkle disease in blackgram during *kharif* 2011-12 and 2012-13. The percentage of disease incidence (PDI) was assessed by recording the

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number of plants showing disease symptoms and the total number of plants examined by using the following formula.

$$\% \text{ disease incidence (PDI)} = \frac{\text{Number of diseased plants}}{\text{Total number of plants examined}} \times 100$$

During the survey information on total cropped area, cultivation under irrigation or rainfed conditions, stage of crop, types of symptoms produced and insect presence were recorded.

Results and discussion

Roving survey conducted to know per cent disease incidence of leaf crinkle disease of blackgram in northern Karnataka during 2011-12 are presented in Table 1.

In Belagavi district mean PDI recorded was 24.33, which ranged from 27.00 per cent to 20.00 per cent in Ugargoola and Goravanakolla villages respectively. While in Bidar district mean PDI was 39.13, this was the highest incidence recorded among the entire surveyed area. The highest PDI of 44.67 was recorded at Rajgira village and lowest of 34.00 at Kamatana village of Bidar district.

In Dharwad district the highest incidence of 35.00 per cent was recorded at Shibargatti village and the lowest of 26.00 per cent at Mulamuttal village. The district mean PDI was 30.27. Nittur village of Haveri district recorded the highest PDI of 25.00 while Halageri recorded the lowest incidence of 17.00 per cent and mean incidence recorded in the district was 21.20 per cent and this was the lowest mean PDI recorded among entire surveyed districts.

In Raichur district the mean PDI recorded was 24.50, which ranged from the highest PDI of 28.00 at Askihal village to the lowest of 21.00 at UAS Raichur campus. Blackgram trial plot ARS Mundagod recorded the highest PDI of 31.00 and the lowest of 24.00 at Baachanaki village in Uttar Kannada district (mean PDI 27.50). Naikal being alone place in Yadagir district, where crop was found and the incidence was 32.00 per cent.

During 2012-13, roving survey in northern Karnataka for the incidence of leaf crinkle disease in blackgram (Table 2) showed that in Belagavi district mean PDI recorded was 25.40, which ranged from the highest incidence of 30.00 per cent at Asundi village to the lowest of 19.00 per cent at Karikatti village, while in Bidar district the highest PDI of 47.00 per cent was recorded at Kamatana village and the lowest incidence of 37.00 per cent was at Janawada village and district mean PDI was 42.87 and this was highest among entire surveyed districts during the season.

In Dharwad district the highest incidence of 32.00 per cent was recorded at Govanakoppa village, while the lowest of 22.00 per cent at UAS, Dharwad campus. Overall Dharwad district recorded the mean incidence of 27.00 per cent. In Haveri district the highest PDI of 25.00 per cent was recorded at Aladakatti village and the lowest of 15.00 at Bankapur village, which accounted for mean PDI of 19.60 and this was lowest mean PDI in all the districts.

In Raichur district the highest PDI recorded was 26.00 per cent at UAS, Raichur campus while the lowest of 18.00 per cent was at Ramapura. The district mean incidence was 22.00 per cent. While in Uttar Kannada district the mean PDI recorded was 29.33 per cent and the highest PDI of 32.00 was at Mundagod, while the lowest of 27.00 at Indur village. In Yadagir district at Bheemarayana Gudi where 30.00 per cent disease incidence was recorded and district mean PDI was also same.

In 1981 and 1982 in Punjab, the incidence of leaf crinkle disease in urd bean was recorded as 7.8 - 9.3 per cent and 9.5 - 11.5 per cent respectively in the summer season crops and 3.5 -7.1 per cent and 3.5 - 8.0 per cent respectively in the main season crop (Brar and Rataul, 1989).

Kadian (1983) was also recorded 37.13 per cent leaf crinkle incidence in blackgram by conducting survey in Rohtak district of Haryana. Patel *et.al* (1999) reported 1.0 to 8.3 per cent field incidences of urdbean leaf crinkle disease in Gujarat.

In Uttar Pradesh four districts were surveyed by Srivastava (2005) and reported the incidence of urdbean leaf crinkle disease vary from 28 to 85% under natural field conditions. Bashir *et al.,* (2006) reported from Pakistan after conducting survey of the incidence of urdbean leaf crinkle disease and reported mean PDI ranged from 5 to 28 per cent in mash bean.

Conclusion

Climatic factors *viz*. maximum and minimum temperature, relative humidity, rainfall along with vector population, vector movement and health condition of seed materials play important role in variation of PDI. The area covered under survey in northern Karnataka (Table 3) belongs to different agro climatic zones hence leaf crinkle disease is varied.

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Table 1: Survey for leaf crinkle disease infecting blackgram in selected district of northern Karnataka for 2011-12

District	Villages	Latitude	Longitude	Area (acre)	Variety	Crop stage	R/I	Incidence (%)	Symptom recorded	Insects observed
Belagavi	Goravanakolla	15.798662	75.128930	1.0	Local	Pod formation	I	20.00	Cr, Pu, Ru, Cu, Rpf.	A
	Hooli	15.792290	75.182051	0.75	Local	Pre flowering	R	28.00	Cr, Pu, Cu	A,Wf
	Savadatti	15.775113	75.103007	5.0	TAU- 1	Flowering	I	22.33	Cr, Pu, Cu	A,Wf
	Ugaragoola	15.741715	75.178519	0.5	Local	Pre flowering	R	27.00	Cr, Pu, Cu	A
					Mean			**24.33**		
Bidar	Barur	17.452245	77.322977	3.0	TAU- 1	Pod formation	R	41.67	Cr, Pu, Ru, Cu, Rpf.	A,Wf,Th
	Kamatana	17.855957	77.448664	5.5	TAU- 1	Pod formation	R	34.00	Cr, Pu, Ru, Cu, Rpf.	A, Th
	Rajgira	17.718599	77.454325	3.5	TAU- 1	Flowering	R	44.67	Cr, Pu, Cu	A
	Sindhol	17.719721	77.428974	2.0	TAU- 1	Flowering	R	36.00	Cr, Pu, Cu	A
	Tadapalli	17.745347	77.443815	4.0	TAU- 1	Pod formation	R	39.33	Cr, Pu, Cu, Rpf	A,Wf
					Mean			**39.13**		
Dharwad	Mulamuttala	15.553931	74.977744	2.0	TAU- 1	Pod formation	R	26.00	Cr, Pu, Cu, Rpf	A,Pb
	Narendra	15.526983	74.968271	0.5	DU- 1	Pre flowering	R	34.00	Cr, Pu, Cu	A,Th
	Shibaragatti	15.569098	74.981990	1.0	TAU- 1	Pre flowering	R	35.00	Cr, Pu, Cu	A
	UAS Dharwad	15.495400	74.992024	2.0	TAU- 1, DU-1	Pod formation	I	29.33	Cr, Pu, Ru, Cu, Rpf.	A,Wf,Ja
	Yadavada	15.557998	74.997785	1.0	TAU- 1	Pre flowering	R	27.00	Cr, Pu, Cu	A,Th,Ja
					Mean			**30.27**		
Haveri	Halageri	14.561445	75.615204	1.0	TAU- 1	Pre flowering	R	17.00	Cr, Pu, Cu	A
	Harogoppa	14.519044	75.574460	1.0	TAU- 1	Flowering	R	22.00	Cr, Pu, Cu	A,Wf
	Kuppeluru	14.833066	75.608199	1.0	TAU- 1	Pod formation	I	23.00	Cr, Pu, Cu, Rpf	A
	Malanayaka-na halli	14.437713	75.614407	0.5	Local	Pre flowering	R	19.00	Cr, Pu, Cu	A
	Nitturu	14.504283	75.595124	2.0	TAU- 1	Pod formation	I	25.00	Cr, Pu, Cu, Rpf	A,Pb
					Mean			**21.20**		
Raichur	Askihal	16.209918	77.304264	1.0	TAU- 1	Flowering	R	28	Cr, Pu, Cu	A
	UAS raichur	16.200762	77.329725	1.5	TAU- 1	Flowering	I	21	Cr, Pu, Cu	A,Wf,Ja
					Mean			**24.50**		
Uttara Kannada	ARS Mundagod	14.961029	75.044897	2.5	TAU- 1, DU-1	Pod formation	I	31.00	Cr, Pu, Cu, Rpf	A
	Baachanaki	15.007446	75.055676	1.0	Local	Pod formation	I	24.00	Cr, Pu, Cu, Rpf	A,Wf
						Mean			**27.50**	
Yadagiri	Naikal	16.722018	77.059047	1.0	Local	Pre flowering	R	32.00	Cr, Pu, Cu	A,Wf
					Mean			**32.00**		

Cr- Crinkling, Pu-Puckering, Ru-Rugosity, Cu-Curling, Rpf-Reduced pod formation, A- Aphids, Wf- Whiteflies, Th- Thrips, Pb- Pod borer, Ja-Jassids, R-Rainfed, I- Irrigated

Table 2: Survey for leaf crinkle disease infecting blackgram in selected district of northern Karnataka for 2012-13

District	Villages	Latitude	Longitude	Area (acre)	Variety	Crop stage	R/I	Incidence (%)	Symptom recorded	Insects observed
Belagavi	Asundi	15.745770	75.029606	1.5	TAU- 1	Flowering	I	30.00	Cr, Pu, Cu	A,Th
	Jalikoppa	15.742022	74.877110	1.0	TAU- 1	Pod formation	R	24.00	Cr, Pu, Cu, Rpf	A
	Karikatti	15.734133	75.028471	1.0	TAU- 1	Pre flowering	R	19.00	Cr, Pu, Cu	A
	Kenganooru	15.731382	74.880997	1.0	Local	Pod formation	R	28.00	Cr, Pu, Cu, Rpf	A
	Nayanagar	15.758469	74.877521	0.5	TAU- 1	Pod formation	I	26.00	Cr, Pu, Ru, Cu, Rpf	A,Wf
						Mean		**25.40**		
Bidar	Barur	17.453642	77.323345	3.5	TAU- 1	Flowering	R	39.33	Cr, Pu, Cu	A
	Janawada	18.005201	77.479214	1.0	TAU- 1	Pod formation	R	37.00	Cr, Pu, Ru, Cu, Rpf	A,Th
	Kamatana	17.856865	77.447521	2.5	TAU- 1	Pod formation	R	47.00	Cr, Pu, Ru, Cu, Rpf	A,Wf
	Sindhol	17.719721	77.428844	3.0	TAU- 1	Pod formation	R	44.33	Cr, Pu, Cu, Rpf	A,Wf
	Yakatpur	17.785247	77.489265	4.0	TAU- 1	Flowering	R	41.67	Cr, Pu, Cu	A
				Mean			**42.87**			
Dharwad	Chandanmatti	15.508524	75.091018	2.0	Local	Flowering	R	27.00	Cr, Pu, Cu	A
	Govanakoppa	15.467456	75.095595	1.5	TAU- 1	Flowering	R	32.00	Cr, Pu, Cu	A
	Kavalageri	15.503530	75.072235	0.5	TAU- 1	Pod formation	R	23.00	Cr, Pu, Ru, Cu, Rpf	A.Wf,Th
	UAS Dharwad	15.403547	74.697754	3.0	TAU- 1, DU-1	Pod formation	I	22.00	Cr, Pu, Cu, Rpf	A.Wf,Th
	Yattinagudda	15.482195	74.994316	1.5	DU-1	Pod formation	R	31.00	Cr, Pu, Ru, Cu, Rpf	A,Wf, Th,Ja
				Mean			**27.00**			
Haveri	Aladakatti	14.731558	75.371200	3.0	TAU- 1	Pre flowering	R	25.00	Cr, Ru, Cu	A
	Asundi	14.633797	75.549333	1.0	Local	Pre flowering	R	23.00	Cr, Pu, Cu	A
	Bankapura	14.916253	75.247211	1.5	TAU- 1	Flowering	R	15.00	Cr, Ru, Cu	A
	Lakkikoppa	14.930626	75.190886	1.0	TAU- 1	Pod formation	I	16.00	Cr, Pu, Cu, Rpf	A,Pb
	Motebennur	14.716147	75.474732	2.5	TAU- 1	Pre flowering	R	19.00	Cr, Pu, Cu	A,Wf
				Mean			**19.60**			
Raichur	Ramapura	16.188913	77.316620	0.5	TAU- 1	Flowering	R	18	Cr, Pu, Cu	A,Wf
	UAS raichur	16.196629	77.326734	1.0	TAU- 1	Pod formation	I	26	Cr, Pu, Cu, Rpf	A,Wf,Ja
				Mean			**22.00**			
Uttara Kannada	Indur	15.026807	75.019478	0.5	TAU- 1	Flowering	R	27.00	Cr, Ru, Cu	A,Wf
	Koppa	15.008488	75.016194	1.0	Local	Flowering	R	29.00	Cr, Pu, Cu	A
	Mundgod	14.978929	75.033323	2.5	TAU- 1	Pod formation	I	32.00	Cr, Pu, Cu, Rpf	A, Th
Yadagiri	Bheemaray-anagudi	16.731657	76.803395	0.5	TAU- 1	Pod formation	I	30.00	Cr, Pu, Cu, Rpf	A,Wf,Th
				Mean			**30.00**			

Cr- Crinkling, Pu-Puckering, Ru-Rugosity, Cu-Curling, Rpf-Reduced pod formation, A- Aphids, Wf- Whiteflies, Th- Thrips, Pb- Pod borer, Ja-Jassids, R-Rainfed, I- Irrigated

Table 3: Leaf crinkle disease of blackgram in different districts of northern Karnataka during 2011-12 and 2012-13

S. No.	Districts	PDI (2011-12)	PDI (2012-13)
1	Belagavi	24.33	25.40
2	Bidar	39.13	42.87
3	Dharwad	30.27	27.00
4	Haveri	21.20	19.60
5	Raichur	24.50	22.00
6	Uttara Kannada	27.50	29.33
7	Yadagiri	32.00	30.00

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