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## Distribution and prevalence of curvularia leaf spot of maize caused by *Curvularia lunata* in major maize growing areas

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### Abstract

In both *kharif* 2017 and 2018, survey was conducted according to plan of work disease prevalence ranged between 91.66% to 34.28% in all surveyed areas. Severity scale of disease in surveyed area was ranged from 1.5 to 8 which indicate disease was present in traces to severe form in most of the surveyed areas. Identification of disease prevalence and severity in maize growing area will helps to manage the disease before it spread epidemically.

**Keywords:** severity, curvularia leaf spot, prevalence

### Introduction

Maize (*Zea mays* L.), belonging to the family Gramineae is one of the important cereal crops of the world. The maize kernel, like that of other cereal grains, includes pericarp (6%), endosperm (82%) and germ (12%). The main structural component of the endosperm is starch, a complex carbohydrate that constitutes on an average 71 per cent of the grain and is a source of concentrated energy. Several million people, particularly in the developing countries, derive their protein and calorie requirements from maize. The maize grain accounts for about 15 to 56 per cent of the total daily calories in diets of people in about 25 developing countries, particularly in Africa and Latin America, where animal protein is scarce and expensive and consequently, unavailable to a vast sector of the population (Prasanna *et al.*, 2001) [6]. Maize is currently produced on nearly 100 million hectares in 125 developing countries and is among the three most widely in grown crops in 75 of those countries (Anonymous, 2012) [2]. These include seedling blights, stalk rots, foliar diseases, downy mildews and ear rots. Among the fungal diseases *Curvularia lunata* (*Cochliobols lunatus*) was recorded on maize by *Curvularia* leaf spot is potentially an important foliar disease in areas where the temperatures drop at night while the humidity is high. The disease is known to affect maize from seedling stage till harvest. Loss in grain yield will be more if it occurs at flowering, silking and grain filling stages. *Curvularia* is a hyphomycete (mold) fungus which is a facultative pathogen of many plant species and of the soil. Conidia develop at the tips and sides of the spores and have a smooth texture. *C. lunata* is differentiated from other *Curvularia* species by its 3 septa and 4 cells, with the first and last cell usually of a paler shade of brown than those in the middle. Conidia range from 9-15  $\mu$ m in diameter and have a curved appearance (Macri and Dilenna, 1974) [5]. Importance of maize, it is being plagued by an array of diseases which include the leaf spot of maize, caused by *Curvularia lunata*. This disease is a very important seed and soil borne prevalent in the hot, humid maize areas. The disease produces or chlorotic spot with a light colored halo lesions are about 0.5 cm per spot when fully developed and this cause significant damage to maize up to 60 per cent due to great loss of photosynthetic region of the crop (Akinbode, 2010) [1].

### Material and Methods

#### Distribution and prevalence of CLS in major maize growing areas

Distribution and Prevalence of Curvularia leaf spot of Maize was observed in five district *viz.* Udaipur, Chittorgarh, Bhilwara, Banswara and Dungarpur. An extensive and regular consecutive survey was done in the month of September for two crops to record CLS incidence in *kharif* 2017 and 2018.

Three random fields were selected at each surveyed location and in each field a 1 sq. meter bamboo frame was placed randomly at the three different place. PDI of plants was recorded. In each case and average is presented in tables. Diagonal pattern was used for disease survey. The following formula is used for calculation of prevalence.

$$\text{Prevalence} = \frac{\text{Number of infected plants}}{\text{Total numbers of plants}} \times 100$$

**Results and discussion**

For the identification of occurrence, distribution and severity of the CLS caused by *Curvularia lunata* of maize in Southern

Rajasthan, a survey was conducted during *kharif* 2017 and 2018 (Fig. 1 & 2). Rural areas were randomly selected for survey in two consecutive years. Randomly selected fields from rural area were surveyed to record disease prevalence and per cent disease incidence in the districts namely Udaipur, Chittorgarh, Bhilwara, Banswara and Dungarpur. It was observed that farmers predominantly use local collection especially white and yellow local varieties which were retained by mass selection with few land races of maize. *Curvularia* leaf spot was observed in these surveyed areas in traces to severe form. *Curvularia* leaf spot severity was recorded on the basis of 1-9 rating scale and disease prevalence was recorded with score.

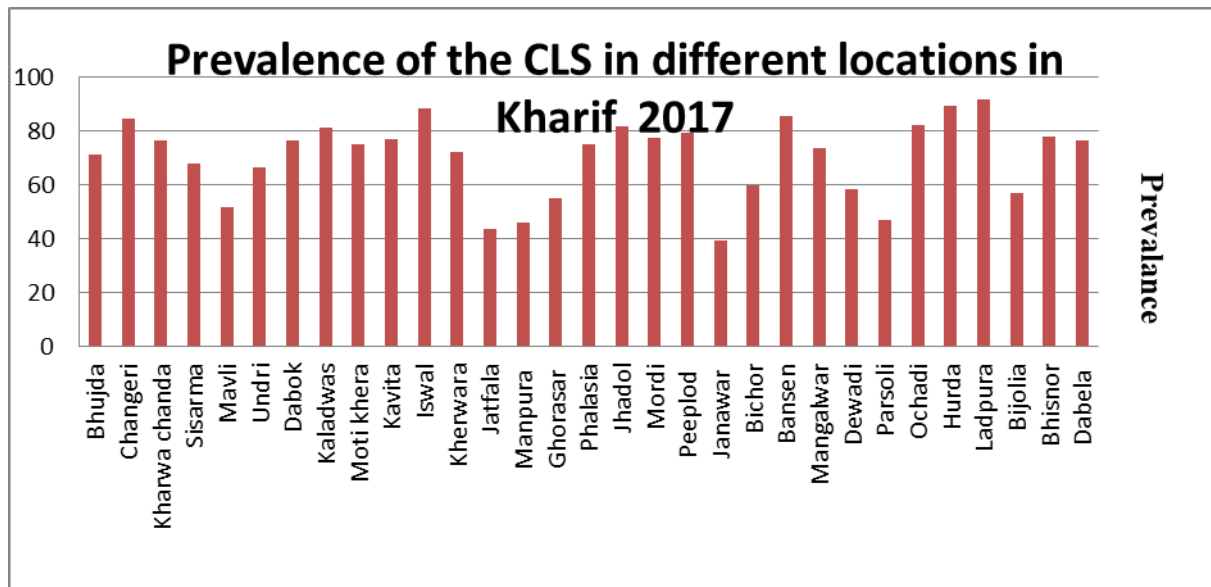


Fig 1: Prevalence of CLS during Kharif 2017 in different location

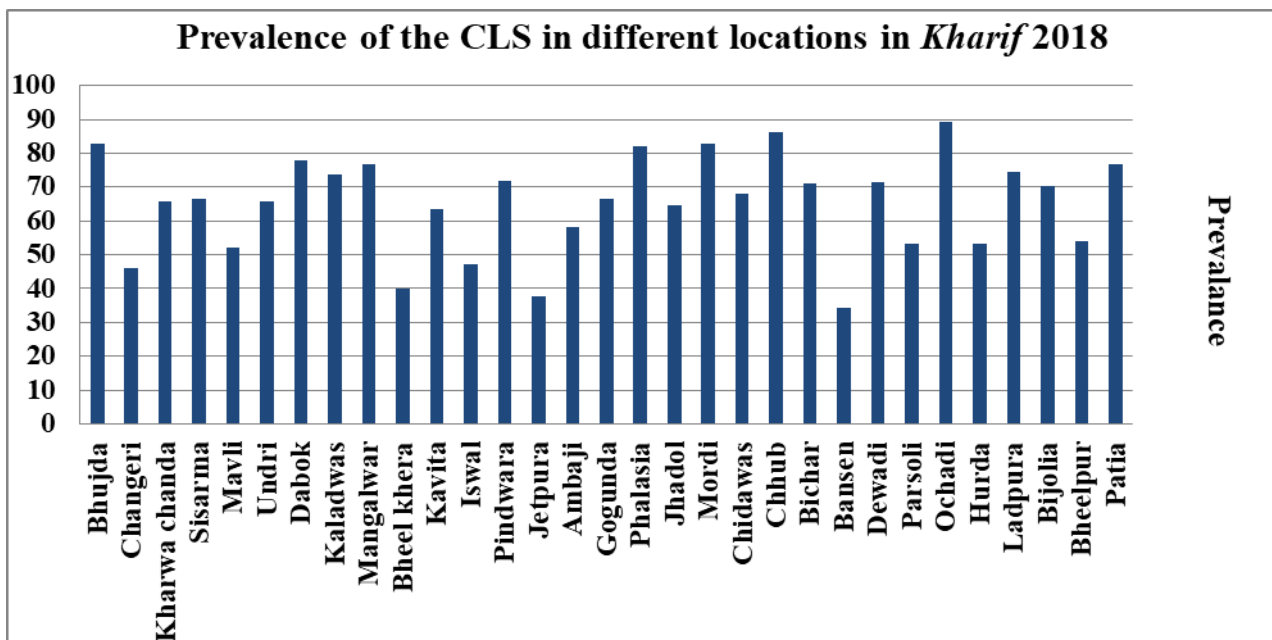


Fig 2: Prevalence of CLS during Kharif 2018 in different location

The detailed survey report is presented in Table 1 show that the disease is cosmopolitan in nature and the surveyed area were found disease infection in traces to severe form which shows widespread of the disease at variable extent in *kharif* 2017. In Udaipur district the adjoining villages surveyed, the

maximum disease prevalence was recorded in Iswal (88.46%) followed by Changeri (84.34%), Jhadol (81.84%) and Kaladwas (81.25%) respectively. The minimum diseases prevalence was recorded in Jatfala (43.75%) and Manpura (46.15%). The disease was recorded during survey and in

AICRP- Maize Pathology where, trap nursery showed maximum of 8 scale disease rating.

In Banswara the disease ratings were recorded 1.5 to 6.5 and maximum prevalence was recorded in Peeplod with 79.41% followed by Mardi 77.41% and minimum in Janawar 39.28%. Similarly in Chittorgarh district disease rating was recorded 3.0 to 7.0. Maximum diseases prevalence in Bansen 85.71% followed by Ochadi 82.14% and Manglarwar with 73.52%. Moderate incidences were recorded at Parsoli with 46.87% and Dewadi with 58.62%.

In Bhilwara and Dungarpur disease prevalence recorded from 91.66% to 57.15% and disease rating was recorded 7.5 to 8.0. Maximum prevalence was recorded at Ladpura of Bhilwara 91.66% and Hurda 89.28% where as moderate was recorded in Bijolia 57.14%. In Dungarpur district Bhisnor the severe incidence with 78.04% and 76.66% in Debela village was found.

Similarly disease survey was conducted during *kharif* 2018. The recorded disease occurrence, severity and its prevalence showed that rural area of selected districts show severe to moderate incidence of diseases. In Udaipur and adjoining districts (Table 2) the disease incidence and severity were

recorded.

In Udaipur disease rating was recorded from traces to severe form (2.5 to 7.5). Maximum disease prevalence was recorded in Bhujda 82.75% followed by Phalasia 82.66%, Dabok 77.77% respectively. Moderate disease prevalence was recorded in Jatfala 37.5% followed by Moti khera 40.00% and Changeri 46.78% respectively.

In Banswara, disease rating was recorded in the range of from 5.0 to 8.0. Maximum prevalence was recorded in Janawar with 86.36% and Mordi with 82.85. Minimum disease prevalence was recorded in Peeplod with 68.00%. Similarly in Chittorgarh recorded diseases rating was range from 2.0 to 7.0. Maximum prevalence of diseases was recorded in Ochadi 89.28% followed by Magalawar 76.66% and Dewadi 71.41%. Minimum were recorded in Bansen 34.28% and Parsoli% respectively.

In district Bhilwara disease ratings was ranged from 3.5 to 6.0% whereas, the disease prevalence in Ladpura 74.28%, Bijolia (70.37%) and Hurda (53.12%) were recorded. The district showed 4-5 disease rating range and disease prevalence in Debela 76.66% and Bishnor 53.84% was recorded.

**Table 1:** Survey of CLS in major maize growing areas in *Kharif* 2017

S. No.	District	Place	No. of field surveyed	Crop variety	Prevalence	CLS severity	Disease rating	Stage of crop
1	Udaipur	Bhujda	8	Maize Local	71.42	Moderate	5.0	Pre flowering stage
2	Udaipur	Changeri	6	Maize Local (Yellow/white)	84.34	Moderate	6.5	Post flowering stage
3	Udaipur	Kharwa chanda	3	Maize Local	76.31	Moderate	5.5	Pre flowering stage
4	Udaipur	Sisarma	4	Maize Local	68.00	Moderate	4.0	Post flowering stage
5	Udaipur	Mavli	8	Sathi Local	51.72	Traces	3.0	Post flowering stage
6	Udaipur	Undri	7	Ujjawal Private Company	66.66	Traces	4.0	Pre flowering stage
7	Udaipur	Dabok	15	Gujarati Local and Sweet Corn	76.66	Moderate	4.5	Post flowering stage
8	Udaipur	Kaladwas	10	Local	81.25	Moderate	6.0	Post flowering stage
9	Udaipur	Moti khera	8	Local	75.00	Moderate	5.5	Pre flowering stage
10	Udaipur	Kavita	5	Maize Local	77.14	Moderate	5.0	Pre flowering stage
11	Udaipur	Iswal	4	Maize Local (Yellow/white)	88.46	Moderate	6.5	Post flowering stage
12	Udaipur	Kherwara	3	Maize Local	72.41	Moderate	5.0	Post flowering stage
13	Udaipur	Jatfala	4	Maize Local	43.75	Moderate	4.5	Post flowering stage
14	Udaipur	Manpura	8	Sathi Local	46.15	Moderate	4.0	Post flowering stage
15	Udaipur	Ghorasar	7	Ujjawal Private Company	55.17	Traces	4.5	Post flowering stage
16	Udaipur	Phalasia	15	Gujarati Local and Sweet Corn	75.00	Moderate	5.5	Post flowering stage
17	Udaipur	Jhadol	10	Local	81.84	Moderate	6.5	Post flowering stage
18	Banswara	Mordi	8	Local	77.41	Moderate	5.0	Pre flowering stage
19	Banswara	Peeplod	4	Local	79.41	Moderate	6.5	Post flowering stage
20	Banswara	Janawar	8	Ujjawal Private Company	39.28	Trace	1.5	Post flowering stage
21	Chittorgarh	Bichor	6	Maize Local (Yellow/white)	60.00	Moderate	5.0	Post flowering stage
22	Chittorgarh	Bansen	7	Sweet corn	85.71	Severe	7.0	Post flowering stage
23	Chittorgarh	Mangalwar	12	Local	73.52	Moderate	5.5	Pre flowering stage
24	Chittorgarh	Dewadi	5	Gujarati Local and Sweet Corn	58.62	Traces	3.0	Post flowering stage
25	Chittorgarh	Parsoli	6	Maize Local	46.87	Moderate	4.5	Post flowering stage
26	Chittorgarh	Ochadi	4	Ujjawal Private Company	82.14	Moderate	6.5	Post flowering stage
27	Bhilwara	Hurda	9	Sathi Local	89.28	Severe	7.5	Post flowering stage
28	Bhilwara	Ladpura	8	Local	91.66	Severe	8.0	Post flowering stage
29	Bhilwara	Bijolia	11	Local	57.14	Moderate	4.5	Post flowering stage
30	Dungarpur	Bhisnor	9	Local	78.04	Moderate	5.0	Post flowering stage
31	Dungarpur	Dabela	7	Maize Local	76.66	Moderate	5.0	Post flowering stage

**Table 2:** Prevalence of the CLS in major maize growing areas in *Kharif* 2018

S. No.	District	Place	No. of field surveyed	Crop variety	Prevalence	CLS severity	Disease rating	Stage of crop
1	Udaipur	Bhujda	10	Ujjawal Private Company	82.75	Moderate	6.5	Pre flowering stage
2	Udaipur	Changeri	9	Gujarati Local and Sweet Corn	46.15	Traces	3.0	Post flowering stage
3	Udaipur	Kharwa chanda	11	Maize Local (Yellow/white)	65.78	Moderate	5.0	Pre flowering stage
4	Udaipur	Sisarma	16	Maize Local	66.66	Moderate	5.5	Post flowering stage
5	Udaipur	Mavli	14	Maize Local	52.17	Traces	4.0	Pre flowering stage
6	Udaipur	Undri	9	Maize Local (Yellow/white)	65.71	Moderate	5.0	Post flowering stage
7	Udaipur	Dabok	12	Maize Local	77.77	Moderate	6.5	Post flowering stage
8	Udaipur	Kaladwas	7	Maize Local	73.52	Moderate	6.0	Pre flowering stage
9	Udaipur	Moti khera	14	Maize Local (Yellow/white)	40.00	Traces	2.5	Pre flowering stage
10	Udaipur	Kavita	12	Maize Local	63.33	Moderate	5.0	Post flowering stage
11	Udaipur	Iswal	8	Maize Local (Yellow/white)	47.05	Traces	4.0	Post flowering stage
12	Udaipur	Kherwara	6	Maize Local	71.87	Moderate	6.0	Post flowering stage
13	Udaipur	Jatfala	7	Maize Local	37.5	Traces	1.5	Post flowering stage
14	Udaipur	Manpura	10	Sathi Local	58.06	Traces	3.0	Pre flowering stage
15	Udaipur	Ghorasar	15	Ujjawal Private Company	66.66	Moderate	5.0	Pre flowering stage
16	Udaipur	Phalasia	113	Gujarati Local and Sweet Corn	82.14	Severe	7.5	Post flowering stage
17	Udaipur	Jhadol	8	Local	64.70	Moderate	5.5	Post flowering stage
18	Banswara	Mordi	11	Local	82.85	Moderate	7.0	Pre flowering stage
19	Banswara	Peeplod	5	Local	68.00	Moderate	5.0	Post flowering stage
20	Banswara	Janawar	8	Maize Local	86.36	Severe	8.0	Post flowering stage
21	Chittorgarh	Bichor	12	Maize Local (Yellow/white)	70.96	Moderate	6.5	Post flowering stage
22	Chittorgarh	Bansen	6	Maize Local	34.28	Traces	2.0	Post flowering stage
23	Chittorgarh	Mangalwar	14	Sathi local	76.66	Moderate	5.0	Pre flowering stage
24	Chittorgarh	Dewadi	8	Maize Local	71.41	Moderate	5.5	Post flowering stage
25	Chittorgarh	Parsoli	6	Sathi Local	53.33	Moderate	4.5	Post flowering stage
26	Chittorgarh	Ochadi	7	Ujjawal Private Company	89.28	Moderate	7.0	Post flowering stage
27	Bhilwara	Hurda	6	Gujarati Local and Sweet Corn	53.12	Traces	3.5	Post flowering stage
28	Bhilwara	Ladpura	10	Local	74.28	Moderate	6.0	Post flowering stage
29	Bhilwara	Bijolia	14	Local	70.37	Moderate	5.0	Post flowering stage
30	Dungarpur	Bhisnor	7	Local	53.84	Traces	4.0	Post flowering stage
31	Dungarpur	Dabela	7	Maize Local	76.66	Moderate	5.0	Post flowering stage

### Conclusion

In both years of *kharif* 2017 and 2018 disease prevalence ranged between 91.66% to 34.28%. Results showed local land races used by farmers were more susceptible and diseases progress increases with age of host in direct proportion. The disease was present in traces to severe form in most of the surveyed areas.

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