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Evaluation of Yield Loss Assessment Caused due to Curvularia Leaf Spot (*Curvularia lunata)* in Maize

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A B S T R A C T

An experiment was conducted during K*ahrif* 2017 and *Kharif* 2018 at department of plant pathology, Rajasthan collage of Agriculture, Udaipur, Raj. to find out the average yield loss assessment caused due to Curvularia leaf spot of maize. During *Kharif* 2017 estimated average yield loss was 21.69% with 18.56 % PDI and 1032.33 kg/plot yield in protected plot similarly in *Kharif* 2018 yield loss was 22.49% and 992.73 kg /plot yield with 18.07% PDI. On average yield loss caused due to CLS in maize in both years was estimated 22.06%.

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). 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).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 µm in diameter and have a curved appearance (Macri and Dilenna, 1974). 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).

Materials and Methods

To know the extent of losses in yield due to CLS, a model suggested by Le Clerg, 1957 was followed. In this model it is mandatory to take minimum of 10 replications of protected and unprotected treatments. It is also necessary to inoculate all the replication of both treatments artificially to maintain homogenous disease pressure.

The experiment was taken in the field allotted to AICRP- Maize Pathology *viz.* B3A. The maize cultivar 'Surya' was sown in RBD in field during *Kharif* 2017 and *Kharif* 2018. The row length was 3 m plant to plant and row to row 30 & 60 cm respectively. The crop was inoculated through spray and inoculation using conidial suspension on 40 DAS plants twice with two days interval. Inoculation was done in warm and humid condition at 5-6 pm before sunset.

The yield data in protected and unprotected were recorded replication wise and the reduction in PDI was also calculated. PDI and yield loss Cramer (1967) was calculated by adopting following formulas:

$$\text{Per cent disease index} = \frac{\text{Sum of all individual disease ratings}}{\text{Total numbers of plants assessed X Maximum rating}} \times 100$$

$$\text{Loss} = \frac{\text{Difference in yield of protected and Inoculated plot}}{\text{Yield in protected plot}} \times 100$$

Results and Discussion

Loss assessment is pre requisite task to know how much disease cause loss in main crops during favourable condition. A paired T technique was used to find avoidable lose caused by CLS. We select the susceptible cultivar *i.e.* Surya for Curvularia leaf spot of maize. In paired T technique two plots were maintained one is protected plot and other is unprotected to know lose.

In both plots protected and unprotected was inoculated with mass multiplied pathogen culture and generated the artificial epiphytotic condition. Protected plot was sprayed with propiconazole at 0.2% twice in 15 days interval of time and unprotected plot was remain unsprayed with fungicide. Total 30 lines (15 replication) for both plots were maintained at 30X60 cm distance.

Table.1 Losses assessment of CLS of maize during *Kharif* 2017

Replication	Treatment	Disease rating	PDI	Yield (gm/plot)	Yield loss (%)
R1	Protected	3	22.5 (28.32)	895	23.57
	Unprotected	7.5	72.0 (58.05)	684	
R2	Protected	3	17.5 (24.73)	985	22.13
	Unprotected	6.5	74.16 (59.45)	767	
R3	Protected	2.5	20.0 (26.57)	998	18.63
	Unprotected	6	75.71 (60.47)	812	
R4	Protected	2	15.0 (22.79)	1231	22.17
	Unprotected	7	78.33 (62.26)	958	
R5	Protected	3	21.66 (27.74)	910	21.53
	Unprotected	8	72.85 (58.60)	714	
R6	Protected	2.5	16.00 (23.58)	1037	20.63
	Unprotected	7	67.33 (55.14)	823	
R7	Protected	2	14.28 (22.20)	984	24.59
	Unprotected	7.5	65.71 (54.16)	742	
R8	Protected	2.5	18.57 (25.75)	1072	23.04
	Unprotected	6.5	70.0 (56.79)	825	
R9	Protected	2	16.00 (23.58)	1124	19.48
	Unprotected	6	64.28 (53.30)	905	
R10	Protected	2.5	20.0 (26.57)	940	23.29
	Unprotected	6	71.25 (57.58)	721	
R11	Protected	2.5	16.66 (24.09)	1242	25.76
	Unprotected	7.5	68.57 (55.90)	922	

R12	Protected	2	14.28 (22.20)	1026	19.98
	Unprotected	6.5	71.42 (57.68)	821	
R13	Protected	2	25.0 (30.00)	964	23.75
	Unprotected	6.5	74.44 (59.63)	735	
R14	Protected	1.5	16.66 (24.09)	1167	19.28
	Unprotected	6	71.42 (57.68)	942	
R15	Protected	2	24.0 (29.33)	955	17.59
	Unprotected	6	77.77 (61.87)	787	
Mean	**Protected**	**2.3**	18.56 (24.43)	1032.33	**21.69**
	Unprotected	**6.7**	71.68 (57.90)	795.40	
T calculated		**27.66**	52.92 (47.70)	27.34	
T tabulated		**12.70**	12.70	12.70	

Table.2 Losses assessment of CLS of maize during *Kharif* 2018

Replication	Treatment	Disease rating	PDI	Yield(gm/plot)	Yield loss (%)
R1	Protected	2.5	14.28 (22.20)	1186	22.34
	Unprotected	6.5	62.22 (52.07)	921	
R2	Protected	1.5	17.14 (24.46)	954	24.00
	Unprotected	6	72.50 (58.37)	725	
R3	Protected	2.0	15.00 (22.79)	891	22.89
	Unprotected	6.5	71.25 (57.58)	687	
R4	Protected	2.5	21.66 (27.74)	1127	23.51
	Unprotected	6	81.25 (64.34)	862	
R5	Protected	3	21.25 (27.45)	1052	22.52
	Unprotected	7.5	79.33 62.96)	815	

R6	Protected	2.5	15.71 (23.35)	926	22.89
	Unprotected	6	87.69 (69.46)	714	
R7	Protected	1.5	18.00 (25.10)	938	25.58
	Unprotected	6.5	66.67 (54.74)	698	
R8	Protected	3	21.87 (27.88)	877	20.98
	Unprotected	6	72.94 (56.65)	693	
R9	Protected	2	21.42 (27.57)	908	18.94
	Unprotected	7	80.71 (63.95)	736	
R10	Protected	3.5	12.85 (21.01)	1225	20.16
	Unprotected	7	76.15 (60.77)	978	
R11	Protected	3	18.33 (25.35)	945	22.53
	Unprotected	7.5	77.4 (61.61)	732	
R12	Protected	2	17.22 (24.52)	981	24.36
	Unprotected	6.5	36.75 (37.32)	742	
R13	Protected	3	26.25 (30.82)	832	22.59
	Unprotected	6	82.94 (65.60)	644	
R14	Protected	3.5	11.42 (19.75)	1025	23.51
	Unprotected	6	81.25 (64.34)	784	
R15	Protected	2	18.75 (25.66)	1124	20.64
	Unprotected	6.5	70.00 (56.79)	892	
Mean	**Protected**	**2.50**	**18.08 (25.04)**	**992.73**	**22.49**
	Unprotected	**6.50**	**73.27 (59.24)**	**760.53**	
T calculated		**19.88**	**17.77 (17.33)**	**27.95**	
T tabulated		**1270**	**12.70**	**12.70**	

Table.3 Pooled data of losses assessment of *Kharif 2017* and *Kharif* 2018

Treatments	Disease rating			Mean grain yield(gm)			Mean PDI			Per cent yield loss	
	***Kharif* 2017**	***Kharif* 2018**	**Pooled**	***Kharif* 2017**	***Kharif* 2018**	**Pooled**	***Kharif* 2017**	***Kharif* 2018**	**Pooled**		
Protected	2.33	2.5	2.41	1032.33	992.73	1012.53	18.56	18.07	18.31	***Kharif* 2017**	***Kharif* 2018**
Unprotected	6.7	6.5	6.6	795.40	774.86	792.69	71.68	73.27	72.47	**21.69**	**22.49**
T calculated value			**31.58**			**34.94 (33.97)**			**41.43**	**22.06**	

During *Kharif* 2017(Table 4.10) the mean disease rating for protected plot were recorded with 2.33 and unprotected with 71.68 whereas, mean PDI for protected recorded 18.56 % and 71.68% for unprotected plot.

Resulted yield in protected plot was 1032.33 kg/plot and 795.40 kg/plot in unprotected. The mean disease loss was recorded 21.69 %.

Similarly in *Kharif* 2018 (Table 4.11) mean disease rating was 2.5 and 6.5 in protected and unprotected plots respectively. Mean PDI and yield were recorded for protected was18.07% and 992.73 kg /plot and for unprotected 72.47% and 774.86 kg /plot respectively. Mean disease loss in *Kharif* 2018 was 22.49%.

Pooled mean result of *Kharif* 2017 and *kahrif* 2018 (Table 4.12) for protected and unprotected is as follow the disease rating was 2.5 and 6.4, PDI was 18.31 and 72.47 and yield 1012.53 and 792.69 were observed. The mean yield lose of *Kharif* 2017 and *kahrif* 2018 was 22.06% recorded.

As per recent study the loss assessment of maize causes due to Curvularia leaf spot of maize the yield loss due to Curvularia leaf spot of maize was identified 22.06 % that in epiphytic condition disease was cause economical dame to crop.

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