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Influence of meteorological parameters on the incidence of leaf folder and whorl maggot in rice ecosystem of Andhra Pradesh.

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ABSTRACT

Studies on the effect of weather parameters on the incidence of leaf folder and whorl maggot in rice at Rajendranagar (A.P.) revealed that the peak activity of leaf folder and whorl maggot occur in the first fortnight of October, first fortnight of August in *kharif* and February in *rabi* seasons respectively. The leaf folder showed a significant negative correlation with morning relative humidity. The whorl maggot exhibited significant positive relationship with rainfall and number of rainy days during *rabi*. Regression equations derived to explain the relationship between the populations of leaf folder and whorl maggot and different weather parameters have been enumerated.

Keywords : Rice, Leaf folder, Whorl maggot, Weather parameters.

Rice being the staple food, is grown under widely varying agroclimatic conditions in Andhra Pradesh. The reduction in yields are mainly due to abiotic and biotic stresses. The pests and diseases cause substantial damage to the rice crop. Insect pests alone can cause yield losses ranging between 21-51 per cent (Kalode, 1983). The leaf folder and whorl maggot are the major insect pests causing yield losses in rice in Southern Telangana Agro-climatic region of Andhra Pradesh. The population buildup of insect pests mainly depends on meteorological parameters. Temperature, rainfall relative humidity and sunshine hours are the key factors that largely affect the activity of insects. Keeping the above in view, a field experiment was carried with an objective to study the impact of weather parameters on the incidence of leaf folder and whorl maggot.

MATERIALS AND METHODS

Field trials were conducted at the Agricultural Research Institute Farm, Rajendranagar, Hyderabad during *kharif* and *rabi* seasons of 1998-99 to assess the impact of weather parameters on the incidence of leaf folder and whorl maggot. The experiment was laid out in a randomised block design with factorial concept, replicated thrice. The treatments comprised of three plantings with two varieties in each season (Tellahamsa and Samba Mahsuri in *kharif*, Tellahamsa and IR-64 in *rabi*). Same set of package of practices were adopted during both the seasons of study. The data on damaged leaves (%) due to leaf folder and whorl maggot were recorded on 10 hills, selected at random, at fortnightly intervals from the date of planting. The

Table 1 : Damaged leaves (%) due to the incidence of leaf folder in *kharif* 1998

Treatments	Means	F-Test	SEd ±	C.D
Variety (V)				
Tellahamsa	8.4 (14.2)	**	0.4	0.8
Samba Mahsari	12.1(17.7)			
Plantings (P)				
P1	16.8 (21.9)	**	0.5	0.9
P2	12.3 (20.1)			
P3	1.5 (6.9)			
DAT (D)				
30	3.6 (7.6)	**	0.5	0.9
45	5.6 (12.1)			
60	12.3 (18.6)			
75	14.4 (20.6)			
90	15.3 (20.7)			
Interactions				
V x P	-	**	0.7	1.4
V x D	-	**	0.7	1.8
P x D	-	**	1.0	2.2
V x P x D	-	**	1.5	3.1

Values in the parenthesis are angular values ** : Significant at 1% level.

Table 2 : Correlation between the incidence of leaf folder and fortnightly weather parameters

Weather parameters	Leaf folder	Whorl maggot	
	kharif 1998	*kharif* -98	*rabi* 98-99
Maximum temperature (Max. temp.) (°C)	0.0075	-0.2966	0.3412
Minimum temperature (Min. Temp.) (°C)	0.2356	0.3448	0.6151
Morning relatively humidity (RH I) (%)	- 0.5229 *	-0.2254	-0.1397
Afternoon relative humidity (RH II) (%)	0.0840	0.4703	-0.1739
Rainfall (RF) (mm)	- 0.1581	0.3758	0.8092 **
Rainy days (RD) (No.)	- 0.2612	0.3858	0.8092 **
Sunshine hours (SSH) (hrs)	0.0274	-0.0853	0.3002

* Significant at 5 % level

Table 3 : Damaged leaves (%) due to incidence of whorl maggot in *kharif* 1998

Treatments	Means	F-Test	SED ±	C.D
Variety (V)				
Tellahamsa	3.8 (7.4)	NS	-	-
Sauba Mahsuri	3.6(7.5)			
Plantings (P)				
P1	2.4 (5.9)	**	0.5	1.0
P2	5.2 (7.7)			
P3	3.5 (8.7)			
DAT (D)				
15	6.9 (12.1)	**	0.5	1.0
30	4.1(9.5)			
45	0.1(0.9)			
Interactions				
V x P	-	NS	-	-
V x D	-	NS	-	-
P x D	-	**	0.9	1.8
V x P x D	-	NS	-	-

Values in the parenthesis are angular values

DAT : Days after transplantation; NS: Non significant; ** : Significant at 1% level

fortnightly meteorological data on temperature, relative humidity, rainfall and sunshine hours were recorded using automatic weather station installed at the experimental site. The data were subjected to correlation and regression analysis.

RESULTS AND DISCUSSION

Leaf folder

The incidence of leaf folder was noticed only in *kharif* but not in *rabi* (Table 1). Similar results were also reported by Qadeer *et al.* (1988). The damage varied significantly in both the varieties. Tellahamsa and Samba Mahsuri recorded 8.4 and 12.1 per cent damaged leaves respectively. Among three plantings, a maximum of 16.8 per cent damaged leaves was observed in first planting followed by second planting and third planting with 12.3 and 1.5 per cent respectively. The data on the incidence at different DAT (days after transplantation) indicated that a mean damage of 3.6, 5.6, 12.3, 14.3 and 15.3 per cent at 30, 45, 60, 75 and 90 DAT respectively with peak activity occurrence at 90 DAT (first fortnight of October) as earlier reported by Mohan and

Table 4: Damaged leaves (%) due to incidence of whorl maggot in *rabi* 1998-99

Treatments	Means	F-Test	SED ±	C.D
Variety (V)				
Tellahamsa	3.1 (7.3)	NS	-	-
Samba Mahsuri	3.3(7.4)			
Plantings (P)				
P1	0.4 (1.4)	**	0.5	0.9
P2	2.3 (6.9)			
P3	6.8 (13.7)			
DAT (D)				
15	0.4 (1.7)	**	0.5	0.9
30	3.6 (8.4)			
45	5.5 (12.0)			
Interactions				
V x P	-	**	0.7	1.3
V x D	-	**	0.7	1.3
P x D	-	**	0.8	1.6
V x P x D	-	**	1.1	2.2

Values in the parenthesis are angular values

DAT : Days after transplantation; NS: Non significant; ** : Significant at 1% level

Janarthanan (1985).

Correlation studies (Table 2) revealed a significant negative association with morning relative humidity. Luo and Houng (1983) also reported that the development of leaf folder was negatively correlated with relative humidity. The relationship with rainfall and rainy days was negative, while, it was positive with temperature and sunshine hours but not significant. Bhatnagar and Saxena (1999) also observed similar trend.

Step wise regression analysis had selected only three weather parameters viz., maximum temperature, minimum temperature and rainy days accounting for 50 per cent of total variation in the leaf folder incidence. The equation is as follows

$$Y = 11.4 - 2.4\,(\text{Max. temp.}) + 3.4\,(\text{Min temp.}) - 2.0\,(\text{RD}) \qquad (R^2 = 0.50)$$

Whorl maggot

The data on damaged leaves (%) due to whorl maggot during *kharif* and *rabi* seasons are given in Table 3 and Table 4 respectively. The damage was high in second planting (first fortnight of August) during *kharif*, while, it was so in third planting

(second fortnight of January) during *rabi*. Saroja and Raju (1983) also reported higher damage of whorl maggot in July -September and February - April plantings and being highest in the October - January plantings.

The peak activity of whorl maggot was at 15-30 DAT (August) during *kharif* . Its incidence was initiated at 15 DAT (second fortnight of January) with peak activity at 30-45 DAT (February) during *rabi*. The crop growth at this stage (15-30 DAT during *kharif* and 30-45 DAT during *rabi*) and weather parameters like high rainfall and more number of rainy days favoured the high incidence of whorl maggot. The relationship with rainfall and number of rainy days was positive and significant in *rabi*. Similar trend was observed in *kharif* also but was not significant (Table 2). Barwal and Rao (1986) also reported that whorl maggot incidence was positively related with rainfall.

It is summerised that the leaf folder incidence was more in *kharif* season, while whorl maggot incidence was observed both in *kharif* and *rabi* due to availability of optimal climatic regimes.

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