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INFLUENCE OF WEATHER PARAMETERS ON INCIDENCE OF YELLOW STEM BORER, *SCIRPOPHAGA INCERTULAS* (WALKER) IN RICE ECOSYSTEM SHIVAMOGGA, KARNATAKA

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Abstract

A field experiment was conducted on the Influence of weather parameters on incidence yellow stem borer, *Scirpophaga incertulas* (Walker) in rice ecosystem Shivamogga, Karnataka incidence of yellow stem on rice variety Jyothi, initiated from 11th standard week (9.37 %) of dead of heart and maximum during 15th standard week (36.5%) and white ear head started at 17th standard week (17.2 %) and maximum during 19th standard week (22.8%) during Summer. In *Kharif*, the incidence of yellow stem borer initiated from 33rd standard week (8.1%) of dead heart and maximum during 39th standard week (32.2 %.) And white ear head started at 37th standard week (19.0%) and maximum during 42nd standard week (38.5%) whereas weather parameters viz., maximum temperature, minimum temperature, rainfall showed significant positive correlation with the incidence of yellow stem borer.

Key words: Weather parameters, *Khari*f , Jyothi variety, *Scirpophaga incertulas.*

Introduction

Rice (*Oryza sativa*), occupies the prominent place in Indian agriculture and staple diet of over half of the world's population, is grown on over 145million ha in more than 110 countries, and occupies almost one fifth of the total world cropland under cereals (Pathak and Khan 1994). About 90% of world's rice produced and consumed in Asia (Anonymous, 2004). Globally, rice is the second most widely consumed cereal next to wheat and it has occupied an area of 163.2 million hectares with total production of 719.7 miilion tonnes (Anonymous, 2014). Rice crop is subjected to sustain a considerable damage by a number of insect pests and among them yellow stem borer (YSB), *Scirphophaga incert2ulas* (Walker) is one of the most destructive pest and is widely distributed monophagous pest in Indian sub-continent and has assumed the number one pest status attacks the rice crop at all growth stages (Pasulu *et al.*, 2002). The extent of rice yield losses due YSB has been estimated as 20-70% (Catling *et al.*, 1987). It causes "Dead hearts" at vegetative stage of the crop (active tillering stage) and "White ear head" at the reproductive stage of the crop (panicle initiation stage). Yellow stem borer cause significant yield loss during September, November and February, March seasons (Gosh 1962). Globally Yellow stem borer causes yield loss of 10 million tonnes and 50% of the insecticides are used for their management in the rice fields (Gailce *et al*., 2013).

Meteorological factors such as Temperature, rainfall and relative humidity play important role in seasonal abundance, distribution and population buildup of insect pests and greatly influence the outbreak population (Chen *et al.*, 1968). So the present study has undertaken to know the infestation of yellow stem borer during summer and *Kharif*.

Materials and Methods

The experiment was conducted in Kudli, Shivamogga Karnataka during summer and *Kharif* 2018 on rice variety Jyothi, for this purpose field preparation were done and all the recommended cultivation practices were followed during the period of investigation, however experimental field was kept free from insecticidal spray throughout the study.

The observations on yellow stem borer infestation were made at weekly interval till harvesting. The percent borer incidence was assessed by counting the number of

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dead hearts (DH) in vegetative stage of the crop and white ear head (WEH) at the reproductive stage of the crop from five randomly selected spots consisting of ten hills.

To study the relationship between incidence of yellow stem borer and weather parameters viz., temperature, rainfall and humidity of both seasons were recorded during the course of investigation in their particular location and correlation coefficient was worked out. Percent incidence was calculated using the formula (Heinrichs *et al.*, 1985).

Correlation coefficient (r) between weather parameters and incidence of yellow stem borer during summer 2018.

Correlation coefficient ('r' value)					
Weather parameters	Total rainfall (mm)(X_1)	Temperature (^{0}C)		Relative humidity (%)	
		Max. (X_2)	Min. (X_3)	I (X_4)	II (X_5)
Summer 2018					
Dead hearts	0.164	0.295	0.0692	0.243	0.301
White ear head	0.755	-0.423	0.040	0.431	0.285

Significant at p = 0.05; Table r value at p=0.05

Table 1: Incidence of yellow stem borer along with weather parameters, Summer, 2018.

Month	Standard Weeks	Dead heart (%)	White ear (%)	Rain fall (mm)	Max Tem (^{0}C)	Min Tem (^{0}C)	RH-I Morning (%)	RH–II Evening (%)
FEB	9	0.00	0.00	0	35.7	15.9	55	20
MAR	10	0.00	0.00	0	36.6	18.6	82	22
	11	9.37	0.00	0	34.4	20.8	58	51
	12	15.6	0.00	0	36.7	20.6	69	40
	13	18.2	0.00	0	36.6	21.9	79	34
APR	14	29.0	0.00	8.8	36.9	22.5	76	39
	15	36.5	0.00	9.4	36.6	22.4	74	56
	16	23.2	0.00	44.2	37.0	23.1	83	62
	17	25.0	17.2	0	37.0	22.9	80	43
	18	10.86	14.8	30.2	31.7	23.2	76	45
MAY	19	14.2	22.8	37.8	34.9	21.6	79	57
	20	11.2	19.2	63.8	33.6	20.7	80	60
	21	7.6	18.9	4.8	33.6	22.5	84	58
	22	3.12	12.2	48.6	32.3	22.7	88	78

Percent dead heart =

$$\frac{Number\ of\ dead\ heart}{Total\ number\ of\ tillers} \times 100$$

Percent white ear head =

$$\frac{Number\ of\ white\ ear\ head}{Total\ number\ of\ panicles} \times 100$$

Results and Discussion

Incidence of yellow stem borer, *Scirpophaga incertulas* during summer 2018

The data presented in Table 1 revealed that incidence of yellow stem borer, *Scirpophaga incertulas* on rice variety Jyothi during summer, the incidence of yellow stem borer initiated from 11th standard week *i.e.*, second week of March 9.37 percent dead of heart and it was varied from 9.37 to 36.5 percent dead heart and reached to

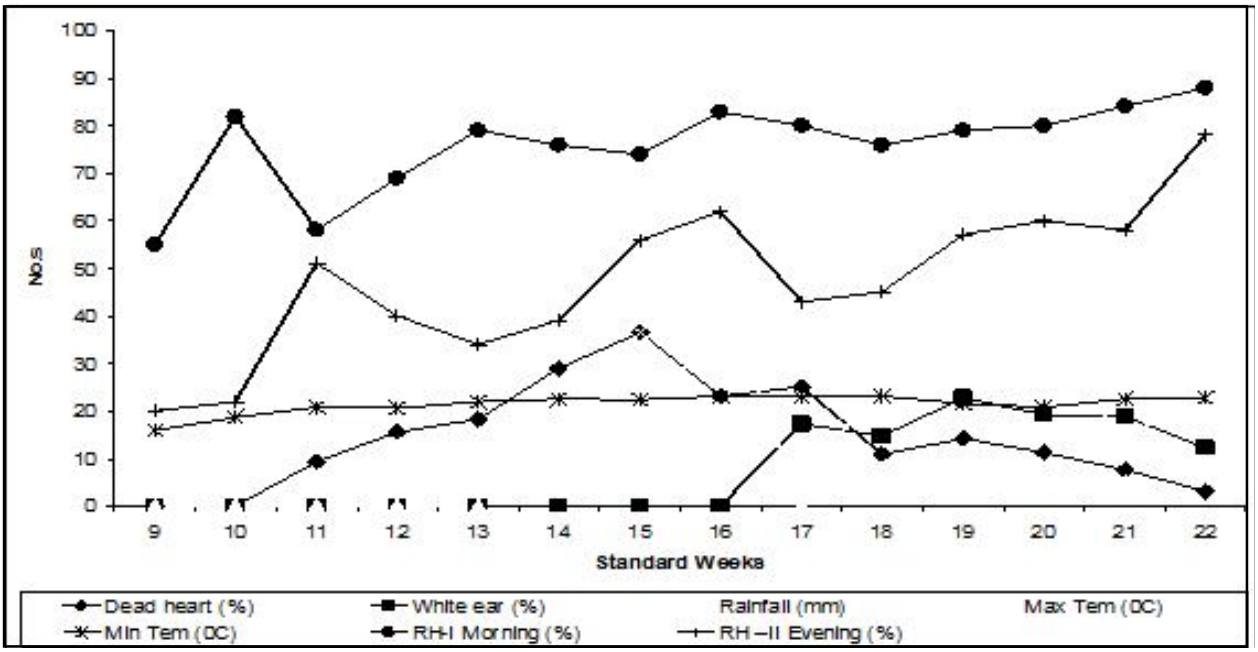

Fig. 1: Incidence of yellow stem borer along with weather parameters, Summer 2018.

its peak level during 15th standard weeks *i.e.,* second week of April 36.5 percent dead heart later on the incidence declined gradually of 3.12 percent during 22nd standard week *i.e.,* fourth week of May.

With respect to white ear head, it was started in the reproductive stage of the crop at 17th standard week *i.e.,* third week of April 17.2 percent white ear head and it was varied from 17.2 to 12.2 percent and reached to its peak during 19thstandard week *i.e.,* first week of May 22.8 percent of white ear head and later it was declined gradually during 22nd standard week *i.e.,* fourth week of May 12.2 percent white ear head.

Table 2: Incidence of yellow stem borer along with weather parameter, Kharif, 2018.

Month	SMW	Dead heart (%)	White ear (%)	Rain fall (mm)	Max Tem (°C)	Min Tem (°C)	RH-I Morning (%)	RH–II Evening (%)
JULY	31	0.00	0.00	3.6	29.8	21.7	89	77
AUG	32	0.00	0.00	57.2	27.3	21.3	91	87
	33	8.1	0.00	71	26.1	21.4	92	91
	34	14.5	0.00	21.8	27.4	20.8	90	81
	35	10.2	0.00	18.8	28.4	21	90	79
SEP	36	12.9	0.00	9	30	19.9	86	70
	37	25.5	19.0	0	31.6	20.3	81	57
	38	31.5	13.8	3.4	31.2	20.3	84	69
	39	32.2	11.4	70	31.9	21.8	85	67
	40	29.5	25.5	25.4	31.7	22.0	85	65
OCT	41	23.0	30.8	64.6	30.9	21.7	88	59
	42	9.2	38.5	44.8	31.8	20.5	85	72
	43	6.6	35.2	0	31.5	17.5	75	49
	44	5.7	29.8	2	31.2	16.8	73	50

Correlation coefficient between weather parameters and incidence of yellow stem borer during summer 2018

The correlation studies made between percent dead heart and weather parameter showed that maximum temperature (r = 0.295), minimum temperature (r = 0.692), evening relative humidity (r = 0.301), rainfall (r = 0.164) had Positive non significant correlation with percent dead heart whereas morning relative humidity (r = -0.243) had negative non significant correlation with percent of dead heart Table 1.

Correlation studies with respect to percent white ear head revealed that minimum temperature (r = 0.040), morning relative humidity (r = 0.431), evening relative humidity (r = 0.285) and rainfall (r = 0.755) had positive non significant correlation with percent white ear head whereas maximum temperature (r = -0.423) had negative

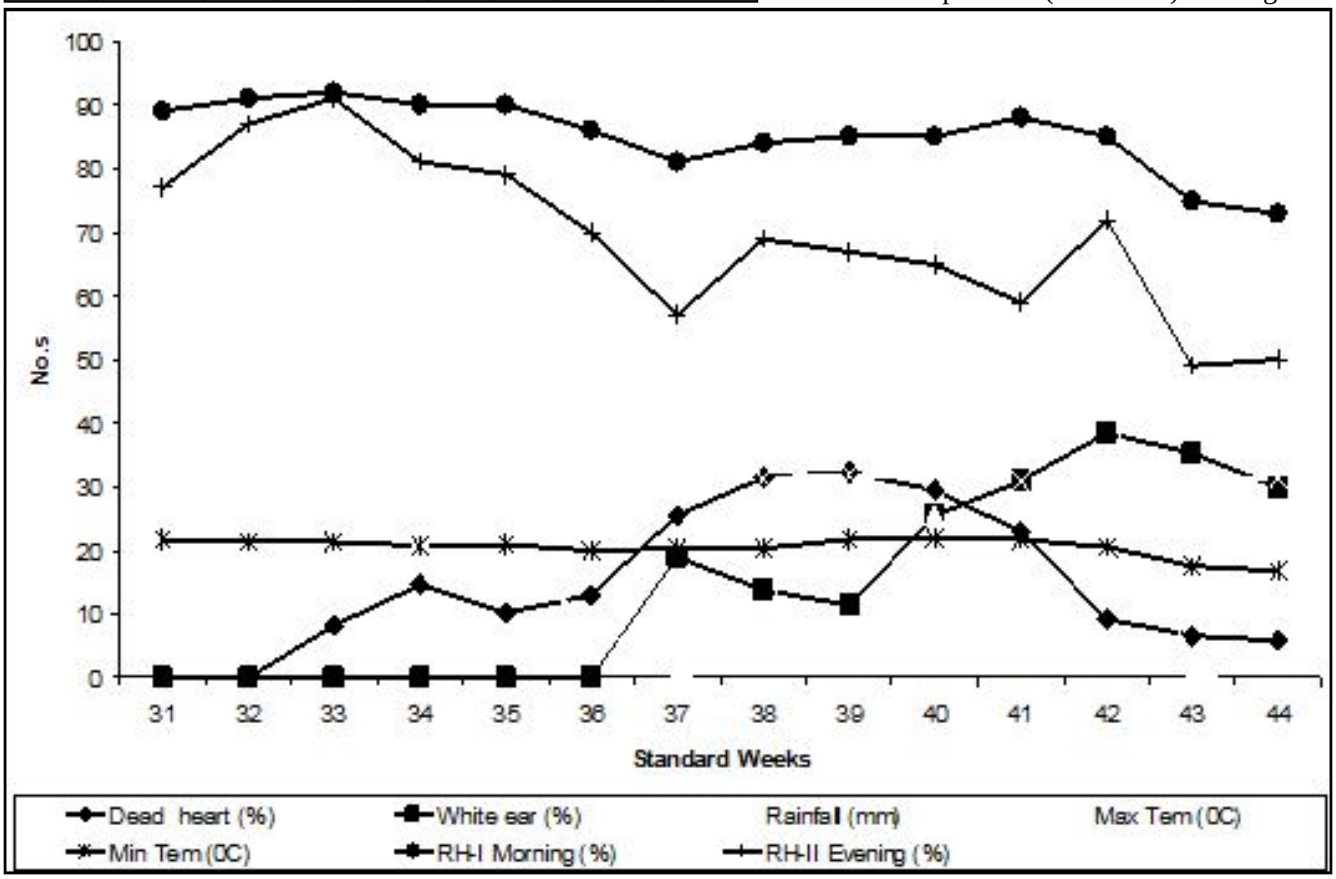

Fig. 2: Incidence of yellow stem borer along with weather parameter, *Kharif* 2018.

Correlation coefficient (r) between weather parameters and incidence of Yellow stem borer during *Kharif* 2018.

Correlation coefficient ('r' value)					
Weather parameters	**Total rainfall (mm)(X_1)**	**Temperature (^{0}C)**		**Relative humidity (%)**	
		Max. (X_2)	**Min. (X_3)**	**I (X_4)**	**II (X_5)**
Kharif 2018					
Dead hearts	0.098	0.505	0.300	-0.071	-0.303
White ear head	0.211	0.469	-0.324	0.147	-0.726

Significant at p = 0.05; Table r value at p = 0.05

non significant correlation with percent white ear head Table 1.

Incidence of yellow stem borer, *Scirpophaga incertulas* during *Kharif* 2018

The data presented in Table 2 revealed that incidence of yellow stem borer, *Scirpophaga incertulas* on rice variety Jyothi during *Kharif*, the incidence of yellow stem borer initiated from 33rd standard week *i.e.,* second week of August 8.1 percent dead heart and it was varied from 8.1 to 32.2 percent white ear head and reached to its peak level during 39th standard weeks *i.e.,* Fourth week of September 32.2 percent dead heart, later on the incidence declined gradually of 5.7 percent during 44th standard week *i.e.,* fourth week of October.

With respect to white ear head, it was started in the reproductive stage of the crop at 37th standard week *i.e.,* second week of September 19.0 percent white ear head and it was varied from 19.0 to 38.5 percent and reached to its peak during 42ndstandard week *i.e.,* second week of October 38.5 percent of white ear head and later it was declined gradually during 44th standard week *i.e.,* fourth week of October 29.8 percent white ear head.

Correlation coefficient between weather parameters and incidence of yellow stem borer during *Kharif* 2018

The Correlation studies made between percent dead heart and weather parameter showed that maximum temperature (r = 0.505), minimum temperature (r = 0.300), rainfall (r = 0.098) had non significant correlation with percent dead heart whereas morning relative humidity (r = -0.071) and evening relative humidity (r = 0.303), had negative non significant correlation with percent of dead heart Table 2.

Correlation studies with respect to percent white ear head revealed that maximum temperature (r = 0.469), Morning relative humidity (r = 0.147) and rainfall (r = 0.211) had positive non significant correlation with percent white ear head whereas minimum temperature (r = -0.324) evening relative humidity (r = -0.726) had negative non significant correlation with percent white ear head Table 2.

The present findings are similar to the findings of Adiroubane *et al.,* (2006) who reported that high yellow stem borer incidence was observed during months of March (*Rabi*,2005), August- September (*Kharif,2006*) and October- November (*Rabi,2006*). Kumar and Sudhakar (2001) reported that the yellow stem borer incidence was higher during the months of March and April during summer. Hugar and Hosamani (2009) and Kakde *et al.,* (2014), reported yellow stem borer gain peak infestation during the months of September and October.

The present results are in agreement with the findings of Adibourne *et al.,* (2006) who reported that maximum temperature had negative correlation except he reported that showing positive correlation for minimum temperature and relative humidity. Further Jastin *et al.,* (2013) from Tamilnadu during *Kharif* season reported that both maximum temperature and morning relative humidity had a major role in incidence of yellow stem borer. Ramasubramanian *et al.,* (2006) rain fall and humidity play an important role in the incidence of yellow stem borer. Sahadev nag *et al.,* (2018) reported that maximum, minimum temperature, morning and evening relative humidity had positive significant correlation with incidence of yellow stem borer.

From the present study it has been concluded that weather parameter play an important role in population buildup of yellow stem borer.

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