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Influence of Abiotic Factors on the Population Dynamics and Species Composition of Stem Borer Complex in Rice Ecosystem

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

A field experiment was carried out at the Murjhad Research Farm, College of Agriculture**,** Balaghat in Madhya pradesh during *Kharif* 2022 and *Kharif* 2023 to ascertain the population dynamics of stem borer complex, their relative abundance and correlation with abiotic factors in order to propose ecologically and financially feasible measures. Results pertaining to the dynamics of species composition of stem borers of rice reveal that all the three species of stem borer of rice *viz.***,** yellow stem borer, *Scirpophaga incertulas* (Walker), pink stem borer, *Sesamia inferens* (Walker), white

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stem borer, *Scirpophaga innotata* (Walker) were prevalent during the crop season. The pooled data of the total population of stem borer complex observed during the 30th SMW was 8.0 larvae/ 20 hills attaining two peaks, the first peak during the 36th SMW (69.0 larvae/ 20 hills) and the second peak during the 42nd SMW (96.0 larvae/ 20 hills) and thereafter, the population started decreasing and reached 65.0 larvae/ 20 hills during the 43rd SMW and it disappears at the time of harvest. The per cent dead heart incidence was first observed during the 30th SMW (2.43% dead hearts) with its peak during the 36th SMW (14.84% dead hearts) and thereafter, it started decreasing and reached 5.06 per cent dead hearts during the 38th SMW and further, it disappears. The per cent white ears incidence was first observed during the 37th SMW (1.30 % white ears) with its peak during the 42nd SMW (21.52% white ears) and thereafter, it started decreasing and reached 9.24 per cent white ears during the 43rd SMW and further, it disappears. The pooled data revealed that a total of 654.5 larvae stem borer complex were observed throughout the crop growth. Among them, 467 larvae of *Scirpophaga incertulas* were observed comprising 71.35 per cent, *Sesamia inferens* population was 110.0 larvae comprising 16.81 per cent and *Scirpophaga innotata* population was 77.5 larvae comprising 11.84 per cent among the stem borer complex. The data revealed that population of *Scirpophaga incertulas* was found significantly positive correlated (r= 0.617) with sunshine hours and significantly negative correlated with minimum temperature (r= -0.553). The population of *Sesamia inferens* was found significantly positive correlated (r= 0.613) with sunshine hours. The larval population of *Scirpophaga innotata* was not found significant with any weather parameter. The per cent dead heart was found significantly positive correlated with minimum temperature, morning relative humidity and evening humidity (r= 0.550, 0.662 and 0.633, respectively). The per cent white ear was found significantly positive correlated with maximum temperature and sunshine hours (r= 0.535 and 0.627, respectively) and significantly negative correlated with minimum temperature, morning relative humidity, evening relative humidity and evaporation (r= -0.658, -0.689, -0.703 and 0.819, respectively).

Keywords: Seasonal incidence; stem borer complex; rice Scirpophaga incertulas (Walker); Sesamia inferens (Walker); Scirpophaga innotata (Walker); abundance, population dynamics, abiotic factors.

1. INTRODUCTION

Rice (*Oryza sativa* L.) belongs to the family Gramineae/Poaceae and is an important cereal crop in the world being one of the most important cereal crops worldwide feeding more than 50 per cent of the human population [1]. World rice production in 2021 was 502.98 million metric tons in an area of 165.25 million hectares. China and India are considered the main producers of paddy rice worldwide. In 2021, India's paddy rice production amounted to over 195 million metric tons in an area of about 45 million hectares after China [2]. In Madhya Pradesh, paddy is grown in an area of about 21.17 mha with a production of 44.14 million tons and productivity of 2085 kg/ha [3], while in the Balaghat region, it is grown on about 3.10 lakh ha area with a production of 10.25 million mt and the productivity of 3305 kg/ha [4]. Considering the area, production and productivity of Balaghat district is referred to be the "Paddy Bowl" of Madhya Pradesh.

The productivity of rice crop is influenced by several biotic and abiotic factors. The rice crop is subjected to considerable damage by nearly 300 species of insect pests, among them 23 species are serious pests of rice [5]. Yield loss due to insect pests of rice have been estimated to be 25% [6]. About 40% damage is caused by stem borer alone [7]. The young larva of yellow rice stem borer initially enters into the leaf sheath and feeds for two to three days, after which the larva enters the basal region usually 5 to 10 cm above water level and feeds inside the stem which causes central shoot to die *i.e.*, dead heart at vegetative stage and white ear head is formed by boring at the peduncle node during the heading stage of the crop [8]. The yellow stem borer, *Scirpophaga incertulas* (Walker) is monophagous while, pink stem borer, *Sesamia inferens* (Walker) and white stem borer, *Scirpophaga innotata* (Walker) are polyphagous pests of the Gramineae. The prevalence and population fluctuations of paddy stem borers are influenced by a number of abiotic variables [9]. The changing climatic scenario with modern cultivation practices in rice crop has made yellow stem borer the most predominant species followed by pink stem borer and white stem borer in many rice growing regions of India, that causes dead heart, white ear and results in yield reduction [10,11,12]. Similarly, some other researcher *i.e*., [13,14,15,16,17,18,19,20,21] have also reported population dynamics of paddy stem borer.In view of the above facts, the present study was conducted to examine the population dynamics of stem borer complex, their relative abundance and correlation with abiotic factors in rice ecosystem.

2. MATERIALS AND METHODS

A field study was carried out at the Murjhad farm of the College of Agriculture, Balaghat (M.P.) during the *Kharif* seasons of 2022 and 2023 in order to investigate the population dynamics of the rice stem borer complex, which includes the yellow stem borer, *Scirpophaga incertulas* (Walker), pink stem borer, *Sesamia inferens* (Walker), and white stem borer, *Scirpophaga innotata* (Walker) in the Balaghat region. For this purpose, the nursery was raised with a well-established susceptible variety JRB-1 in the second fortnight of June. For transplanting, the main field was prepared by ploughing once by tractor drawn disc plough and second ploughing was done by mould board plough. In the second fortnight of July, the rice was transplanted with 15cm (plant to plant) x 15cm (row to row) spacing in 15m x 20m (300 sq.m.) plot area. Before transplanting the seedlings into main plots, the recommended doses of fertilizers (N: P: K: 100:60:40) were applied. The suggested agronomic practices were conducted but there was no application of any pesticides during the crop season.

The observations on incidence of stem borer complex of rice crop were recoded at weekly intervals starting from the first appearance of symptoms of stem borer complex up to the harvesting of the crop. A total of 5 spots (5m x 6m each) were fixed for the seasonal incidence of stem borer complex in 300 m^2 plot area. Observations were taken from 20 randomly selected hills in each fixed spot. Infested tillers (dead hearts and white ear heads) were carefully uprooted and brought to the laboratory for their splitting and identification of larval species. The larvae were kept under observation for the confirmation of the species of stem borers of rice. The species were identified based on larval characters mentioned in Table 1 that were described by Kok and Varghese [22]. After the confirmation of stem borers species, the number of larvae were counted and computed. Per cent dead heart and white ears were also computed by using the following formula:

Dead heart (%) = (No. of dead hearts per hill)/ (Total no. of tillers per hill) x 100

White ear head (%) = (No. of white ear head per hill)/ (Total no. of tillers per hill) x 100

Further, the relative abundance of the stem borer species based on larval incidence during the study period was assessed by the following formula:

Relative abundance (%) = (Total no. of individuals of each species)/(Total no. of individuals of all species) x 100

For the correlation and regression studies of stem borer complex with weather parameters, observations on meteorological parameters *viz.,* maximum and minimum temperature, morning and evening relative humidity, sunshine hours, wind velocity, evaporation and rainfall were also recorded from Krishi Vigyan Kendra, Badgaon, Balaghat, (M.P.) and Water Resources Department, Rajegaon, Balaghat, (M.P.)

Table 1. The species were identified based on larval characters described by Kok LT and Varghese C. [22]

Species	Head	Body	Prothoracic shield	Crochets
Scirpophaga incertulas (Yellow stem borer)	Yellowish brown	Creamy yellow 20-25 mm 1st abdominal segment white	Yellowish brown	Biordinal, sometimes almost uniordinal, arranged in an ellipse
Scirpophaga inferences (Pink stem borer)		Creamy yellow 20-25 mm	Yellowish brown, anterior margin tinged with dark colour	
Scirpophaga innotata (White stem borer)	Black to blackish brown	Dull white tinged with pink grey with longitudinal stripes 17-22mm	Black to blackish brown	Almost triordinal arranged in a circle

3. RESULTS AND DISCUSSION

The pooled data presented in Table 1 revealed that all the three stem borer species *viz.,* yellow stem borer, *Scirpophaga incertulas* (Walker), pink stem borer, *Sesamia inferens* (Walker), and white stem borer, *Scirpophaga innotata* (Walker) were prevalent during *Kharif* 2022 and *Kharif* 2023. [11] supported the present results and revealed that species of stem borer of rice *viz*. yellow stem borer, *Scirpophaga incertulas* (Walker), pink stem borer, *Sesamia inferens* (Walker), and white stem borer, *Scirpophaga innotata* (Walker) were prevalent during the crop season.

The Table 2 explored that the incidence of *Scirpophaga incertulas* was first observed during the 30thSMW (8.0 larvae/ 20 hills). Further, it gradually increased and attained two peaks, first peak during the 36th SMW (46.0 larvae/ 20 hills) and second peak during the 42nd SMW (70.5 larvae/ 20 hills) and thereafter, the population started decreasing and reached (48.5 larvae/ 20) hills during 43rdSMW and it disappears during harvest. The incidence of *Sesamia inferens* was first observed during the 31st SMW (2.0 larvae/ 20 hills). Further, it gradually increased and attained two peaks, first peak during the 36th SMW (14.0 larvae/ 20 hills) and second peak during the 42nd SMW (16.0 larvae/ 20 hills) and thereafter, the population started decreasing and reached 12.5 larvae/ 20 hills during the 43rd SMW and it disappears during harvest. The incidence of *Scirpophaga innotata* was first observed during the 31st SMW (1.0 larvae/ 20 hills). Further, it gradually, increased and attained two peaks, first peak during the 35th SMW (9.5 larvae/ 20 hills) and second peak during the 42nd SMW (9.5 larvae/ 20 hills) and thereafter, the population started decreasing and reached 4.0larvae/ 20 hills during the 43rd SMW and it disappears during harvest. Considering as a whole, the total population of stem borer complex observed during the 30th SMW was 8.0 larvae/20 hills. Further, it gradually increased and attained two peaks, first peak during the 36th SMW (69.0 larvae/20 hills) and the second peak during the 42nd SMW (96.0 larvae/ 20 hills) and thereafter, the population started decreasing and reached 65.0 larvae/20 hills during 43rd SMW and it disappears during harvest. The present results are supported by the findings of, [23] who reported that the catching of *Scirpophaga incertulas* moth was commenced as early as 32nd standard week (2nd week of August) with its peak during 37th standard week. Similarly, [24] also recorded maximum population of *S. incertulas* Walker in the month of September. Additionally, [25] studied on the stem borer complex revealed that only two stem borer species *viz*., yellow stem borer (*Scirpophaga incertulas* Walker) and pink stem borer (*Sesamia inferens* Walker) were prevalent in different rice ecosystems (upland, irrigated and shallow water) during the year 2007.The current results are in consistent with those of, [26] who recorded activity of yellow stem borer started from 30th standard week and continued up to 41st standard week, meanwhile it reached peak twice in 34th and 37th standard week. Thereafter, population of yellow stem borer declined and finally no population found. Also, [27] reported that the population of *Scirpophaga incertulas* began to show up from 26th standard mean and proceeded till 43rd standard week the highest population was recorded during 34th to 38th standard week.

The per cent dead heart incidence was first observed during the 30st SMW (2.43% dead hearts). Further, it gradually increased and attained its peak during the 36th SMW (14.84% dead hearts) and thereafter, the per cent dead heart incidence started decreasing and reached 5.06 per cent dead hearts during the 38thSMW and further, it disappears. The per cent white ears incidence was first observed during the 37th SMW (1.30% white ears). Further, it gradually increased and attained its peak during the 42nd SMW (21.52% white ears) and thereafter the per cent white ears incidence started decreasing and reached 9.24 per cent white ears during 43rd SMW and further it disappears. The present results are in consistent with those of, [23] who reported incidence of dead heart started at 34th standard week (4th week of August) and reached the peak at 38th standard week (3rd week of September). Subsequently, [28] also reported that per cent incidence of DH and WEH was highest between third to fourth week of September and first fortnight of November, respectively. [29] also supported the present results and showed that first trace of dead heart (DH) was noted from 31st SMW. Incidence of DH gradually increases attaining the maximum at about 39th SMW. After 39th SMW no incidence of white head (WH) was noted. Numerically DH was abundant at about 39th SMW. The maximum incidence WH was counted at about 44th SMW.

Table 2. Population dynamics of stem borer complex in rice ecosystem during *Kharif* 2022 and *Kharif* 2023

SMW	*Scirpophaga incertulas* Larval population/ 20 hills			*Sesamia inferens* Larval population / 20 hills			*Scirpophaga innotata* Larval population/ 20 hills			Total Larval Population/ 20 hills			Dead Hearts (%)			White Ears (%)		
	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled	2022	2023	Pooled
30	9.0	7.0	8.0	0.0	0.0	0.0	0.0	0.0	0.0	9.0	7.0	8.0	3.31	1.55	2.43	0.00	0.00	0.00
31	10.0	11.0	10.5	2.0	2.0	2.0	1.0	1.0	1.0	13.0	14.0	13.5	7.95	2.92	5.44	0.00	0.00	0.00
32	18.0	13.0	15.5	5.0	5.0	5.0	7.0	3.0	5.0	30.0	20.0	25.0	8.32	4.18	6.25	0.00	0.00	0.00
33	25.0	18.0	21.5	6.0	6.0	6.0	9.0	4.0	6.5	40.0	28.0	34.0	8.98	4.98	6.98	0.00	0.00	0.00
34	36.0	37.0	36.5	11.0	10.0	10.5	9.0	5.0	7.0	56.0	52.0	54.0	9.82	5.67	7.75	0.00	0.00	0.00
35	42.0	39.0	40.5	16.0	11.0	13.5	10.0	9.0	9.5	68.0	59.0	63.5	16.25	7.94	12.10	0.00	0.00	0.00
36	54.0	38.0	46.0	12.0	16.0	14.0	11.0	7.0	9.0	77.0	61.0	69.0	18.36	11.32	14.84	0.00	0.00	0.00
37	42.0	42.0	42.0	3.0	8.0	5.5	4.0	4.0	4.0	49.0	54.0	51.5	12.14	5.79	8.97	1.32	1.28	1.30
38	34.0	30.0	32.0	5.0	4.0	4.5	6.0	3.0	4.5	45.0	37.0	41.0	7.28	2.83	5.06	3.87	2.56	3.22
39	12.0	7.0	9.5	6.0	6.0	6.0	8.0	1.0	4.5	26.0	14.0	20.0	0.00	0.00	0.00	6.25	4.85	5.55
40	33.0	29.0	31.0	7.0	7.0	7.0	9.0	1.0	5.0	49.0	37.0	43.0	0.00	0.00	0.00	9.28	8.28	8.78
41	58.0	52.0	55.0	11.0	5.0	8.0	12.0	4.0	8.0	81.0	61.0	71.0	0.00	0.00	0.00	16.45	11.32	13.89
42	79.0	62.0	70.5	17.0	15.0	16.0	10.0	9.0	9.5	106.0	86.0	96.0	0.00	0.00	0.00	23.18	19.85	21.52
43	59.0	38.0	48.5	13.0	12.0	12.5	4.0	4.0	4.0	76.0	54.0	65.0	0.00	0.00	0.00	10.25	8.23	9.24

The data on the relative abundance of stem borer complex is presented in Table 3. The pooled data revealed that a total of 654.5 larvae stem borer complex were observed throughout the crop growth. Of them, 467.0 larvae of *Scirpophaga incertulas* were observed comprising 71.35%, *Sesamia inferens* population was 110.0 larvae comprising 16.81% and *Scirpophaga innotata* population was 77.5 larvae comprising 11.84% among the stem borer complex. The findings of the present study are supported by Mishra et al. [25] who reported that among the stem borer species, the composition of yellow stem borer was higher at late tillering and panicle initiation stages, but declined at maturity stage. However, the composition of pink stem borer was slightly increased at panicle initiation stage and dominated at the maturity stage. Similarly, [11] found that yellow stem borer was dominant over other species of stem borer and recorded 87.00% to 93.00% at 30 DAT during two *kharif* seasons, respectively. The population of yellow stem borer was 82.50% to 89.00% at 50 DAT and 85.00% to 91.50% at 90 DAT. Additionally, [12] revealed that larval abundance of both yellow stem borer and pink stem borer was maximum in 41st standard meteorological week (61 and 51 larvae in 100 plants showing white ear, respectively) and the per cent share of yellow stem borer and pink stem borer was 54.46% and 45.53% and the occurrence of both the species was minimum during 33rd and 34th standard meteorological weeks (0 and 1, 2 and 1, respectively) with the per cent share of 0.00 and 100 per cent, 66.66 and 33.33 per cent, respectively.

Correlation studies of stem borer complex with weather parameters are presented in Table 4. The data revealed that population of *Scirpophaga incertulas* was found significantly positive correlated (r= 0.617) with sunshine hours and significantly negative correlated with minimum temperature (r= -0.553). The population of *Sesamia inferens* was found significantly positive correlated (r= 0.613) with sunshine hours. The larval population of *Scirpophaga innotata* and was not found significant with any weather parameter. The per cent dead heart was found significantly positive correlated with minimum temperature, morning relative humidity and evening humidity (r= 0.550, 0.662 and 0.633, respectively). The per cent white ear was found significantly positive correlated with maximum temperature and sunshine hours (r= 0.535 and 0.627, respectively) and significantly negative correlated with minimum temperature, morning relative humidity, evening relative humidity and evaporation (r= -0.658, -0.689, -0.703 and 0.819, respectively).The results in the present correlation study are in line with the findings of Sharma et al. [24] who reported that the value of multiple correlations for the insect was 0.949. Meteorological factors were also responsible for the dynamics of the populations of insects.

Also, [30] inferred that the occurrence of *Scirpophaga incertulas* exhibits a critical positive relationship with morning RH (0.11), Aver. Humidity (0.542) and evening Humidity (0.296), whereas, a huge negative connection with Tmin (0.650) and Tmax (-0.699) against Dead heart incidence though Relative Humidity morning(r=0.047), Aver. Humidity (0.945), Relative Humidity Evening (0.296), Min. Temperature (-0.256) and Maximum temperature (-0.648) against White Ear Headrate showed positive relationship. Also, the present results are supported by Mondal and Chakraborty [29] who observed that Tmin (r=0.561), Relative Humidity Morning (0.561), Relative Humidity Evening (r=-0.564), Sunshine (r= 0.463) and Evaporation (-0.591) showed significant positive correlation against Dead Heart and also positive relationship between White Ear Head(WEH)and abiotic factors such as Tmin (0.589), Relative Humidity Morning (0.618), Relative Humidity Evening (-0.569), Sunshine (0.362) and Evaporation (-0.798) was recorded. [31] also reported that YSB had non-significant positive correlation with sunshine hours while, other parameters exhibited non-significant negative correlation.

Table 3. Relative abundance of stem borer complex in rice ecosystem during *Kharif* 2022 and *Kharif* 2023

S. No.	Stem borer Species	Total Larval Population			Relative Abundance (%)		
		2022	2023	Pooled	2022	2023	Pooled
1.	*Scirpophaga incertulas*	511	423	467.0	70.48	72.43	71.35
2.	*Sesamia inferens*	114	106	110.0	15.72	18.15	16.81
3.	*Scirpophaga innotata*	100	55	77.5	13.79	9.42	11.84
	Total	725	584	654.5	100	100	100

Table 4. Corelation coefficients (r) of stem borer complex with weather parameters in rice ecosystem during *Kharif* 2022 and *Kharif* 2023

Stem borer complex		Correlation coefficients (r)							
		Maximum Temperature (ºC)	**Minimum Temperature (ºC)**	**Morning RH (%)**	**Evening RH (%)**	**Rainfall (mm)**	**Evaporation (mm)**	**Wind Velocity (kmph)**	**Sunshine Hours (hr)**
Scirpophaga incertulas	2022	0.182^NS^	-0.533*	0.378^NS^	-0.574*	-0.343^NS^	0.389^NS^	-0.391^NS^	0.705**
	2023	0.302^NS^	-0.532*	-0.306^NS^	-0.236^NS^	-0.152^NS^	-0.528^NS^	0.027^NS^	0.469^NS^
	Pooled	0.348^NS^	-0.553*	-0.380^NS^	-0.447^NS^	-0.347^NS^	-0.502^NS^	-0.228^NS^	0.617*
Sesamia inferens	2022	0.404^NS^	-0.433^NS^	0.477^NS^	-0.578*	-0.418^NS^	0.468^NS^	-0.370^NS^	0.713**
	2023	0.203^NS^	-0.432^NS^	-0.269^NS^	-0.137^NS^	-0.329^NS^	-0.255^NS^	-0.250^NS^	0.280^NS^
	Pooled	0.459^NS^	-0.492^NS^	-0.373^NS^	-0.426^NS^	-0.489^NS^	-0.239^NS^	-0.370^NS^	0.613*
Scirpophaga innotata	2022	0.135^NS^	0.051^NS^	0.711**	-0.025^NS^	-0.096^NS^	-0.082^NS^	-0.047^NS^	0.268^NS^
	2023	0.259^NS^	-0.217^NS^	-0.118^NS^	0.030^NS^	-0.189^NS^	-0.001^NS^	-0.092^NS^	0.352^NS^
	Pooled	0.435^NS^	-0.116^NS^	-0.083^NS^	-0.052^NS^	-0.283^NS^	-0.081^NS^	-0.270^NS^	0.409^NS^
Dead Hearts (%)	2022	0.031^NS^	0.533*	0.180^NS^	0.494^NS^	0.269^NS^	0.087^NS^	0.344^NS^	-0.217^NS^
	2023	-0.300^NS^	0.529^NS^	0.625*	0.670**	0.329^NS^	0.630*	-0.076^NS^	-0.418^NS^
	Pooled	-0.234^NS^	0.550*	0.662**	0.633*	0.369^NS^	0.694**	0.200^NS^	-0.363^NS^
White Ears (%)	2022	0.208^NS^	-0.553*	0.157^NS^	-0.639*	-0.436^NS^	0.075^NS^	-0.558*	0.541*
	2023	0.583*	-0.722**	-0.702**	-0.669**	-0.528^NS^	-0.808**	-0.054^NS^	0.612*
	Pooled	0.535*	-0.658*	-0.689**	-0.703**	-0.558*	-0.819**	-0.402^NS^	0.627*

*Significant at 5% level of significance; **Significant at 1% level of significance; NS= Non-significant

4. CONCLUSION

The pooled data revealed that three stem borer species *viz.,* yellow stem borer, *Scirpophaga incertulas* (Walker), pink stem borer, *Sesamia inferens* (Walker), and white stem borer, *Scirpophaga innotata* (Walker) were prevalent during *Kharif* 2022 and *Kharif* 2023. The total population of stem borer complex observed during the 30th SMW was 8.0 larvae/ 20 hills. Further, it gradually increased and attained two peaks, first peak during the 36th SMW (69.0 larvae/ 20 hills) and the second peak during the 42nd SMW (96.0 larvae/ 20 hills) and thereafter, the population started decreasing and reached 65.0 larvae/ 20 hills during 43rd SMW and it disappears during harvest. The per cent dead heart incidence was first observed during the 31st SMW (2.43% dead hearts). Further, it gradually increased and attained its peak during the 36th SMW (14.84% dead hearts) and thereafter the per cent dead heart incidence started decreasing and reached 5.06% dead hearts during the 38th SMW and further, it disappears. The per cent white ears incidence was first observed during the 37th SMW (1.30% white ears). Further, it gradually increased and attained its peak during the 42nd SMW (21.52% white ears) and thereafter, the per cent white ears incidence started decreasing and reached 9.24 per cent white ears during the 43rd SMW and further, it disappears. The pooled data revealed that a total of 654.5 larvae stem borer complex were observed throughout the crop growth. Of them, 467.0 larvae of *Scirpophaga incertulas* were observed comprising 71.35 per cent, *Sesamia inferens* population was 110.0. larvae comprising 16.81 per cent and *Scirpophaga innotata* population was 77.5 larvae comprising 11.84 per cent among the stem borer complex. The data revealed that population of *Scirpophaga incertulas* was found significantly positive correlated (r= 0.617) with sunshine hours and significantly negative correlated with minimum temperature (r= -553). The population of *Sesamia inferens* was found significantly positive correlated (r= 0.613) with sunshine hours. The larval population of *Scirpophaga innotata* and was not found significant with any weather parameter. The per cent dead heart was found significantly positive correlated with minimum temperature, morning relative humidity and evening humidity (r= 0.550, 0.662 and 0.633, respectively). The per cent white ear was found significantly positive correlated with maximum temperature and sunshine hours (r= 0.535 and 0.627, respectively) and significantly negative correlated with minimum temperature, morning relative humidity, evening relative humidity and evaporation (r= -0.658, -0.68, -0.703 and 0.819, respectively).

5. PURPOSE OF RESEARCH

Abiotic factors, such as temperature, humidity and rainfall play a crucial role in shaping the population dynamics and species composition of stem borer complex in rice ecosystems. These factors directly influence insect life cycles, reproduction, and habitat suitability. Understanding their impact is vital for effective pest management and sustaining rice crop productivity.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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