The Pharma Innovation Journal 2022; SP-11(4): 1889-1895

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(4): 1889-1895

www.thepharmajournal.com
Received: 28-02-2022
Accepted: 30-03-2022

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Seasonal incidence and effect of weather parameters on yellow stem borer, *Scirpophaga incertulas* (Walker) in rice

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Abstract
The experiment were conducted during *kharif* season of year 2013 & 2014 at Agricultural Research Station, Rajendranagar, Hyderabad, Telangana state, India to study the influence of weather parameters on the yellow stem borer catches of light trap, pheromone trap and field incidence. The results revealed that peak light trap catches (44 SW (179/week), 39 SW (152/week), pheromone trap catches (41 SW (8.8 male moths/trap, 44 SW (13.31 male moths/week/trap) and field incidence (43 SW (15.1%), 45 SW (10.5%) of yellow stem borer were recorded during *kharif*, 2013 and 2014, respectively. Correlations worked out between YSB population and weather parameters revealed that, one week lag minimum temperature (-0.60, -0.54 and -0.82), mean temperature -0.38, -0.37 and -0.66), afternoon relative humidity (-0.50, -0.53 and -0.43), Wind speed (-0.52, -0.39 and -0.53) showed significant negative correlation while one week lag sunshine hours (0.37 and 0.42) showed significant positive influence on light trap catches, pheromone trap catches and field incidence of yellow stem borer. The prediction model developed for the YSB population revealed that one week lag minimum temperature, mean temperature, afternoon relative humidity together explained the variation to an extent of 52 per cent in light trap catches, 53 per cent in pheromone trap catches and 70 per cent in field incidence of yellow stem borer.

Keywords: Yellow stem borer, light trap catches, pheromone trap catches, dead hearts, white ears

Introduction
Rice (*Oryza sativa* L.) is one of the major staple food crops for more than half of the world's population and being grown worldwide (Aggarwal, 2006) [2]. Rice is grown under diverse growing conditions. India is the largest rice growing country, while China is the largest producer of rice (Anonymous, 2012) [7]. Warm and humid environment is essential for rice cultivation, also conducive to the survival and proliferation of insects. More than 100 different species of insects are known as rice pests; out of which about 15 are major economic significance (Teng *et al*., 1993) [36]. These pests occur regularly and ravage the crop from seedling stage to maturity and few acts as vectors of virus diseases also (Pradhan, 1971) [25]. Among the different insects associated with rice, the yellow stem borer, *Scirpophaga incertulas* Walker is one of the most destructive insect and is widely distributed monophagous insect in Indian subcontinent and has assumed the number one pest status and attacks the rice crop at all growth stages (Atwal and Dhaliwal, 2008) [8]. The extent of rice yield losses due to YSB has been estimated as 20–70% (Chelliah, 1989) [11]. Insect larvae bore into the plant and feed on leaf-sheath tissue, on tassel buds, and on the stem. Damaged plants wither and their tassels die or become infertile leading to decreased grain production (Yang *et al*., 2011) [38]. In general, yellow stem borer is multivoltine, but abiotic factors play crucial role which affects the incidence of this pest and models based on abiotic factors are very useful for prediction of pest incidence. So, forecasting the occurrence of rice yellow stem borer may help the farmers to adopt management practices well in advance thereby minimising the pest damage (Agrawal and Mehta, 2007) [3]. Therefore, it is necessary to gain a thorough knowledge on relation of weather parameters to insects (Entomo-climatology) which will be very useful to farmers in all areas where major insect pests are appearing year after year and causing serious damage to crops. Keeping in view, the severity of damage by yellow stem borer in rice growing area of Telangana and the influence of weather factors on their growth, multiplication and distribution, the present investigation was undertaken to find out the relationship between yellow stem borer population with meteorological parameters. To fulfil the objective. Further, for developing any pest management programme, specific agro-ecosystem information on

abundance and distribution of pest in relation to weather parameters is a basic requirement.

Material and Methods

The field experiment were carried out during June to October 2013 and 2014 at Agricultural Research Institute, PJTSAU, Rajendranagar, Hyderabad to study the incidence of yellow stem borer and to work out their correlation with prevailing weather parameters, The rice variety JGL-1798 was sown over an area of 500 sq m and seedlings were transplanted with a spacing of 20 x 10 cm to assess the incidence of yellow stem borer (*S. incertulas*) in both the seasons on transplanted paddy. All the recommended cultivation practices were followed during the period of investigation except plant protection measures.

The incidence of yellow stem borer was recorded from transplanting to till harvesting of the crop at weekly interval. The borer infestation was assessed by counting number of dead hearts (DH) in the initial stage of damage and number of white ears (WE) at later stage from five randomly selected spots consisting of 5 hills each. Both the dead hearts and white ears were removed from the infested tillers so that only fresh infestation of the pest can be realized every time. Finally data so obtained were worked out and converted into percentage of dead heart and white ears using the following formulae

$$\text{Per cent dead hearts} = \frac{\text{Total number of dead hearts}}{\text{Total number of tillers}} \text{ X } 100$$

$$\text{Per cent white ears} = \frac{\text{Total number of white ears}}{\text{Total number of tillers}} \text{ X } 100$$

For monitoring of yellow stem-borer, sex pheromone traps @ 4 number/acre were installed from the date of transplanting to the harvesting of crop at ARI rice fields. The traps were installed leaving 10 m space from the boundary of the field. Traps were placed at a height of 30 cm above crop canopy in all the stages of the crop, the traps were tied to 1.25-1.5m long straight bamboo sticks with the help of jutes. Male stem-borer adults caught in the trap were taken out and counted at weekly interval throughout the monitoring period. Lure was replaced with new one, once in a fortnight during the experimental period. Data on light trap catches were collected from Rice Research Centre, ARI, Rajendranagar.

The weather data on maximum and minimum temperature, rainfall, relative humidity, wind speed, evaporation, mean temperature and sunshine hour recorded at Agro Climatic Research Centre (ACRC) during *kharif* 2013 and 2014 from July to October period were utilized for this study.

Statistical analysis

Light trap catches, pheromone trap catches and yellow stem borer incidence (Dead Hearts and White Ears) were correlated with the weather parameter and regressions were worked out using statistical software SPSS.

Results and Discussion

Light trap catches of yellow stem borer and its correlation with weather parameters

The data presented in Table 1 & 2 revealed that light trap catches of Yellow stem borer population (both male and female adults) started from 33rd standard week *i.e*. third week of August (2 insects /week) during *kharif* 2013 and 34th standard week *i.e*, fourth week of August (3 /week) during *kharif* 2014, respectively, thereafter its population increased gradually during successive standard weeks during both the years. The peak catches was recorded on 44th standard week *i.e*, first week of November (179 insects/week) during *kharif* 2013 and 39th standard week *i.e*, fourth week of September (152 /week) during *kharif* 2014, respectively, there after its catches started declining during both the seasons. The present results are in agreement with padhi and saha (2004) [26] who reported that population builds up of YSB moth in the LT catches observed peak during 44 SMW in the wet season. Hall *et al*. (1992) [14] reported that, the catching of moth in trap was commenced as early as 2nd week of august with its peak during September month. Rai *et al*. (2002) revealed that peak occurrence of yellow stem borer (*Scirpophaga incertulas*) on rice was noted during the first fortnight of October during the 26 years of study. Priyadharsan *et al*. (2020) reported that the maximum population catches of 72 moths of rice stem borer during 47th SW. Similar observations were also reported by Mishra *et al.* (2012) [23] as yellow stem borer moth exhibiting their peak activity in the month of September. However, Varma *et al*. (2000) [37] reported three peak periods *viz*., July, August and September of *Scirpophaga incertulas* moth activity during Kharif season.

When Light trap catches of yellow stem borer moths (both males and females) was correlated with weather parameters (Table 3) the results revealed that one week lag minimum temperature (r = -0.60**), mean temperature (r= -0.37*), afternoon relative humidity (r= -0.53**) and wind speed (r= -0.39*) showed significant negative correlation, whereas, sun shine hours (r=0.37*) showed significant positive influence on light trap catches of yellow stem borer. Similar results were also obtained by Bhatnagar and Saxena (1999) [9] who observed that minimum temperature (-0.807) and minimum relative humidity (-0.782) had significant negative correlation with the population and sunshine hours (0.609) had significant positive correlation. Further, Somashekara and Javaregowda (2015) [32] reported that there was a positive correlation between yellow stem borer catches with the afternoon relative humidity (r=- 0.59) and contrary with the minimum temperature, morning relative humidity. While Padhi and Saha (2004) [26] investigated that maximum temperature, rainfall and relative humidity were negatively correlated whereas minimum temperature, evaporation and sunshine were positively correlated to YSB moth population but Razvi (1991) [28] reported that YSB moth population had positive correlation with temperature, rainfall and relative humidity. In contrast, Rai *et al* (2002) reported that the influence of weather factors such as maximum relative humidity and Sunshine hours on YSB population catches in light trap showed positive correlation as well as coefficient of determination was 71 per cent. The effect of temperature on catches could not show any specific influence. Guru-Pirasanna *et al*. (2020) [13] reported that correlation coefficient between YSB, *S. incertulas* population and weather parameters revealed that lag one week maximum temperature (-0.476), minimum temperature (-0.455) and wind speed (-0.493) had significant negative correlation YSB population.

The regression coefficient of yellow stem borer population on weather parameters is presented in Table 4. Weather parameters *viz*., one week lag minimum, mean temperature, afternoon relative humidity and wind speed together

explained 52 per cent variability in yellow stem borer light trap catches (Equation 4, Table 4). However, exclusion of mean temperature caused a significant reduction in coefficient of determination (R^2 = 0.42) (Equation 3, Table 4), suggesting significant role of mean temperature on yellow stem borer light trap catches. Likewise, exclusion of wind speed did not cause any reduction in R^2 (0.40) (Equation 2, Table 4) suggesting insignificant role of wind speed. Further, exclusion of RH II caused a reduction in R^2 (0.35) (Equation 1, Table 4), indicating significant role of afternoon relative humidity on yellow stem borer light trap catches. Sahdev Nag *et al* (2018) reported that the coefficient of determination (R^2) between light trap catches of *S. incertulas* and weather parameters were 0.83.

Pheromone trap catches of yellow stem borer and its correlation with weather parameters

The data presented in Table 1 & 2 revealed that, during *kharif*, 2013, Pheromone trap catches of yellow stem-borer male moths were initiated from 33rd standard week *i.e*., third week of August (0.4 male moths/ week/trap) there after its population increased gradually. The peak trap catches of male moths was observed on 41st standard week *i.e*, second week of October with 8.8 male moths per trap per week, there after its catches showed decreasing trend. Whereas, during *kharif* 2014, population of yellow stem borer male moths captured per trap per week was started from 35th SW i.e., fourth week of August (one insect /week/trap) and thereafter it showed increasing trend. The peak trap catches were recorded on 44th standard week i.e, first week of November (13.31 male moths/week/trap). The findings of present investigation are supported by the findings of Singh *et al*. (2006) [2] who observed that mean yellow stem borer (*S. incertulas* (Walker) catch per sex pheromone trap per week should two peaks – first (4.78) during 3rd week of August and second (9.77) during 2nd week of September. Chatterjee *et al* (2017) [10] reported that, the maximum number of YSB male moths were caught through pheromone trap during 4th week of October and 3rd week of November (kharif, 2010) and 2nd week of November (kharif, 2011). Shilpa *et al*. (2018) [34] found that the male yellow stem borer, Scirpophaga *incertulas* moth trap catches baited with sex pheromone were initiated from 30th standard week (0.30 moths/week) and showed increasing trend up to 38th standard week (36.2 moths/week). The peak trap catches of moth observed during 38th standard week (36.2 moths/week). However, higher moth catches was recorded between the weeks of 32nd to 38th standard weeks. Kumar *et al*. (2015) [6] indicated that pest activity started from 30th standard week and continued upto 41st standard week, meanwhile it reached peak twice in 34th and 37th standard week. Thereafter, its population declined and finally no population was recorded. similar observations were also reported by Mishra *et al*. (2012) [23] as yellow stem borer moth exhibiting their peak activity in the month of September onwards.

The results on the correlation studies between pheromone trap catches of yellow stem borer male moths and weather parameters presented in table 3 revealed that one week lag minimum (r= -0.54**), mean temperature (r= -0.37*), afternoon relative humidity (r= -0.53**) and wind speed (r=-0.39*) had significant negative correlation while one week lag sun shine hours (r=0.42*) showed significant positive influence on moth catches.

The regression model with one week lag minimum, mean temperature, afternoon relative humidity and wind speed could account for 53 per cent variability in yellow stem borer pheromone male moth trap catches (Equation 4, Table 5). With the removal of mean temperature, the model with preceding one week minimum temperature, afternoon relative humidity and wind speed explained only 32 per cent variability in yellow stem borer pheromone trap catches (Equation 3, Table 5), thereby suggesting significant role of mean temperature. Exclusion of wind speed from the model could not caused much reduction in coefficient of determination (R^2 = 0.30), (Equation 2, Table 5).indicating insignificant role of wind speed. However, exclusion of afternoon relative humidity caused a significant reduction in R^2 (0.18) (Equation 1, Table 5), suggesting significant role of afternoon relative humidity on yellow stem borer pheromone trap catches. Similarly, Rehman *et al.* (2002) [30] found that low temperature, high relative humidity and rainfall resulted in yellow stem borer outbreak. Shilpa *et al* (2018) [34] reported that the correlation studies made between yellow stem borer catches and weather parameters showed that, afternoon relative humidity (r= -0.768*), sunshine hours (r= -0.528*) shows negative significant correlation while minimum temperature (r=0.813*) had significant positive correlation on moth trap catches. In contrast, Kumar *et al.*(2015) [6] reported that weather parameters *viz*., maximum temperature (°C), minimum temperature (°C), morning relative humidity (%), evening relative humidity (%), rainfall (mm) and evaporation (mm) were positively correlated with the population of male moth of yellow stem borer, whereas, sunshine (hr) was negatively correlated (- 0.453) and they also found that weather parameters were found to contribute about 34.60 per cent male moth population fluctuation of *Scirpophaga incertulas* when acted together.

Field incidence of Yellow stem borer and its correlation with weather parameters

Field incidence data presented in table 1& 2 revealed that, during *kharif* 2013, the incidence of yellow stem borer at vegetative stage varied from 0.1 to 15.1 per cent. Field incidence of yellow stem borer initiated from 35th standard week i.e, fourth week of August (0.1% dead hearts) and continued up to 47th standard week i.e., third week of November. The maximum dead heart was observed during 41st standard week (5.0% dead hearts). With respect to per cent white ears, it was started in the reproductive stage of the crop at 42nd standard l week i.e., third week of October and continued until 47th standard week i.e., third week of November. The maximum white ear incidence was recorded in 43rd standard meteorological week (15.1% white ears) i.e., fourth week of October. During *kharif* 2014, field incidence of yellow stem borer ranged from 0.2 to 10.5 per cent and incidence started from 36th SW i.e., first week of September with 0.2 per cent dead hearts. The peak incidence of white ears was recorded on 45th SW i.e., first week of November (10.5%). The infestation of yellow stem borer was observed till 49th SW (1.2% WE) i.e., first week of December. Earlier studies carried by Sharma *et al.* (2018) [35] have reported that the per cent dead hearts and per cent white ears caused by *S. incertulas* incidence were highest during 41st and 47th standard week, respectively at Varanasi, Uttar Pradesh. Varma *et al*., 2004 [37] reported that more damage of yellow stem borer was found during September and October. Similar pattern of seasonal incidence was reported by Kakde and Patel, (2014) [15]; Kumar *et al.* (1995) [21]. Present findings are

more or less similar with the results of Moses *et al*. (2019) [22] who recorded maximum population of stem borer during 37th standard week of September. Chavan *et al*. (2013) [12] revealed that maximum, white ear head (WEH) damage was recorded during third week of October. Kalita *et al*. (2015) [18] reported that the maximum white ear heads was recorded in second fortnight of October.

The correlation studies made between field incidence of YSB and weather parameters presented in table 3 showed that there was a significant negative correlation with preceeding one week minimum (r= -0.82**), mean temperature (r= -0.66**), afternoon relative humidity (r= -0.43*) and wind speed (r=-0.53**). Whereas, sun shine hours (r=0.37* and r=0.42*) exerted significant positive correlation on per cent white ear incidence. The findings of the present study are in close agreement with the results of Adiroubane and Raja, 2013 who reported a negative correlation of per cent dead hearts with temperature. Rohit Rana *et al* (2017) reported that as far as the formation of white ears at reproductive stage is concerned, the minimum temperature (r= -0.28) and evening relative humidity (r= -0.62) had negative correlation.

The regression model with one week lag minimum, mean temperature, afternoon relative humidity could explained 70 per cent variability in dead heart and white ear head incidence (Table 6). However, removal of mean temperature and afternoon relative humidity did not result in much reduction in R^2. Out of different weather parameters, minimum temperature, mean temperature and afternoon relative humidity were found to be important with respect to their influence on yellow stem borer trap catch and incidence. The present results are in close confirmity with the findings of Hugar *et al.* (2010) [17] who found that regression equations between the infestation of stem borer and weather parameters showed a significant negative correlation with minimum temperature and afternoon relative humidity. Kumar and Sudhakar (2001) [19] also reported that regression equations between the incidence of stem borer and weather parameters showed a significant negative correlation with minimum temperature and afternoon relative humidity in kharif season.

Correlations between YSB trap catches and field incidence

When the field incidence (% DH/WE) of *S. incertulas* was correlated with pheromone trap and light trap catches, results revealed that pheromone trap catches (0.53**) and light trap catches (0.72**) showed significant positive influence on field incidence of yellow stem borer (Table 7). The observations made in the present study are in agreement with the findings of Patel and Desai (2004) [24] who observed that the correlations between moth catches from pheromones, light and pheromone+light traps with per cent infestation were significant. Chatterjee *et al.* (2017) [10] found that the YSB male population by pheromone trap (r=0.840**) and by light trap (r=0.862**) has significant effect on dead heart incidence. All the YSB population parameters were positively correlated with white ear head incidence. Pheromone trap catch showed positive significant correlation with white ear head incidence (r= 0.758*).

Table 1: Light trap catches, pheromone trap catches and field incidence of yellow stem borer during *kharif*, 2013 at ARI, Rajendranagar

Std. week	YSB catches		%DH/WE	Tmax. (ºC)	Tmin (ºC)	RH(%)		Rain fall (mm)	Rain days (days)	SSH	Wind speed (Km/hr)	Evaporation (mm)
	Light trap	Pheromone trap				I	II					
31	0	0	0	27.8	21.6	86.1	77.9	28.5	4	3.5	14.5	4.4
32	0	0	0	29.0	22.2	89.0	66.1	54.4	3	5.7	6.4	4.9
33	2	0.4	0	28.1	22.1	89.7	77.6	72.8	5	2.2	5.3	3.6
34	6	0.6	0	29.2	22.0	91.7	77.3	1.4	0	3.4	5.8	3.6
35	4	0.8	0.1	30.2	21.4	90.6	80.4	9.0	1	3.6	2.2	3.5
36	1	1.4	0.2	31.5	21.2	87.6	61.0	8.6	1	4.8	1.8	5.0
37	8	4.6	0.5	31.4	20.7	87	62	45.5	2	6.0	2.2	4.9
38	8	5.2	1	29.9	20.5	90	70	56.5	5	2.9	4.0	4.0
39	10	0.2	2.69	31.5	19.9	84	60	0.0	0	9.0	4.8	5.1
40	10	2	3.85	30.5	22.0	84	63	2.0	0	4.8	4.0	4.5
41	16	8.8	5	31.1	20.8	87	62	18.0	2	6.4	3.8	4.4
42	78	3.4	7.5	31.8	17.7	87	53	11.2	1	8.1	2.4	5.1
43	70	4.4	15.1	26.3	19.4	96	81	222.0	6	1.4	2.4	1.5
44	179	1.4	14.7	30.1	17.5	87	56	0.0	0	7.4	1.1	3.3
45	125	0	12.5	28.5	14.3	84	49	0.0	0	7.2	2.1	3.0
46	65	0	0.5	29.5	13.3	82	51	0	0	6.4	2.5	2.8
47	33	0	0.2	27	15.5	79	53	0	0	7.6	2.6	2.7

Table 2: Light trap catches, pheromone trap catches, and field incidence of yellow stem borer during *kharif*, 2014 at ARI, Rajendranagar

Std. week	YSB catches		%DH/WE	Tmax. (ºC)	Tmin (ºC)	RH(%)		Rain fall (mm)	Rain days (days)	SSH	Wind speed (Km/hr)	Evaporation (mm)
	Light trap	Pheromone trap				I	II					
31	0	0	0	30.4	22.2	84	63	3.0	1	2.7	12.5	2.0
32	0	0	0	32.0	22.7	83	61	8.6	2	7.0	11.6	2.9
33	0	0	0	33.3	24.5	81	53	25.5	2	6.4	6.6	3.9
34	3	0	0	34.0	24.0	88	58	12.2	2	6.8	1.9	3.9
35	6	1	0	28.1	22.1	92	80	160.6	6	1.5	6.0	1.4
36	8	0.75	0.2	27.5	22.6	86	66	12.2	1	5.1	8.2	2.6
37	9	1.44	0.5	31.0	22.8	87	62	12.6	3	5.8	5.4	3.2
38	33	1	1.43	31.1	22.2	90	63	9.4	1	4.2	3.8	2.9
39	152	0.5	2.69	32.3	22.1	86	51	15.0	1	6.4	2.0	3.8

40	84	2.88	4.04	34.1	21.9	80	45	40.2	1	7.6	1.3	5.3
41	98	1.44	6.5	32.4	20.3	78	49	0.8	0	4.3	3.9	4.5
42	165	2	9.5	32.8	19.2	85	47	6.2	1	8.2	2.5	5.6
43	176	3.19	6.19	28.3	19.0	89	68	22.0	1	4.0	2.0	4.0
44	120	13.31	8.7	30.4	18.4	80	24	0.0	0	8.3	2.3	4.8
45	41	4.4	10.5	30.9	16.4	76	42	0.0	0	6.8	2.3	5.4
46	89	5.4	9.89	30.0	19.7	81	61	10.6	1	5.5	1.8	4.5
47	67	2	8.51	30.6	16.4	87	42	0.0	0	7.6	1.2	4.6
48	32	1.5	5.0	30.2	15.5	79	45	0	0	7.2	2.1	3.6
49	5	0	1.2	31.2	17.8	83	54	0	0	6.5	1.9	3.8

Table 3: Correlation coefficient between one week lag weather parameters and light trap catches, pheromone trap catches and field incidence (%DH/WE) of yellow stem borer (pooled data of *kharif*, 2013 and 2014)

Weather parameters	LT catches of YSB	PT catches of YSB	%DH/WE
T max. (^{0}C)	0.07	0.02	-0.13
T min. (^{0}C)	-0.60**	-0.54**	-0.82**
RH I (%)	-0.22	-0.28	-0.24
RH II (%)	-0.50**	-0.53**	-0.43*
Rainfall (mm)	-0.14	-0.06	0.06
Rainy Days	-0.37*	-0.20	-0.26
Sunshine hours	0.37*	0.42*	0.30
WS (km/hr)	-0.52**	-0.39*	-0.53**
Evaporation (mm)	0.18	0.32	0.11
T mean (^{0}C)	-0.38*	-0.37*	-0.66**

Table 4: Regression model for prediction of yellow stem borer through light trap catches

Equation	Model equation	R^2
1	Y = 367.12-15.46 (Tmin-1)	0.35
2	Y = 337.9814 -7.08637 (Tmin-1) -2.33078(RHII-1)	0.40
3	Y = 293.841 - 4.45903 (Tmin-1) - 2.27779 (RHII-1) -3.05398 (WS)	0.42
4	Y = 542.819 -0.60182 (Tmin-1)--2.02339 (RHII-1) -5.49665 (WS) -13.0674 (T mean)	0.52

Table 5: Regression model for prediction of yellow stem borer through pheromone trap catches

Equation	Model equation	R^2
1	Y = -5.33002 + 0.376871(Tmin-1)	0.18
2	Y = 2.764411 + 0.24208 (Tmin-1) -0.08804 (RHII-1)	0.30
3	Y = 0.963943 + 0.349248 (Tmin-1) - 0.08587 (RHII-1) - 0.12457 (WS)	0.32
4	Y = 25.05872 +0.722529(Tmin-1) -0.06125 (RHII-1) -0.36096 (WS) -1.26459 (T mean)	0.53

Table 6: Regression model for prediction of yellow stem borer through field incidence

Equation	Model equation	R^2
1	Y= 42.26485 -1.83889 (Tmin-1)	0.68
2	Y = 42.88124 -1.7454 (Tmin-1) -0.04195 (RH II)	0.69
3	Y = 47.13095 -1.5273 (Tmin-1)-0.05981(RH II) -0.29995(T mean)	0.70

Table 7: Correlation coefficient between pheromone trap, light trap catches and field incidence of yellow stem borer (pooled data of *kharif*, 2013 and 2014)

% DH/WE	PT catches	LT total
	0.53**	0.72**

Conclusion

It can be concluded that, one week lag minimum temperature, mean temperature, afternoon relative humidity showed significant negative influence whereas, sunshine hours showed significant positive influence on light trap catches, pheromone trap catches and field incidence of yellow stem borer. Among these parameters minimum temperature played major role which explained maximum variability on yellow stem borer incidence.

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