



## To study the seasonal incidence of rice stem borer *Scirpophaga incertulas* through pheromone trap

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### ABSTRACT

The present investigation was carried out to study the “Eco friendly management of yellow stem borer, *Scirpophaga incertulas* (Walker) on paddy in western plain zone of Uttar Pradesh” in randomized block design with three replications and seven treatments at Crop Research Center, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. The yellow stem borer, *S. incertulas* (Walker) was recorded as major pest. The incidence of *S. incertulas* (Walker) was recorded on the incidence of yellow stem borer *Scirpophaga incertulas* (Walker) showed that it was recorded on 26th standard week for the first time and continued till second week of November *i.e.* 46<sup>th</sup> standard week. The infestation of stem borer recorded as dead heart/ white ear head ranged from 0.85 to 15.25 per cent during the crop season *i.e.* Kharif 2017 and positive correlated with all the other weather parameters.

### KEYWORDS

Seasonal Incidence, *Scirpophaga incertulas*, Pheromone Trap

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Paddy (*Oryza sativa* L.) is a cereal crop, belongs to the family Poaceae or Gramineae. Poaceae or Gramineae is a large and nearly ubiquitous family of monocotyledonous flowering plants known as grasses (Saarela, J. M., 2009, Christenhusz, M. J. M. and Byng, J. W., 2016). Paddy area in India is 44.6 million ha and production of about 90 million tons, India ranks second only to China (Mishra, 2010).

China was the leading rice producer followed by India, Indonesia and Bangladesh major rice producing countries. India rice production 111.01 MT and area coverage under rice is estimated 389.49 lakh hectares in the year 2016-17 (Anonymous, 2018). Basmati rice can be divided in two groups *i.e.* traditional and evolved. There are twenty three varieties of Basmati rice available in India up to 2015.

India is the largest producer and exporter of basmati rice in the world. We are producing more than 70% of the total world basmati rice production and the rest is produced by Pakistan. The state wise production of Basmati rice during kharif 2017 was as area and production *i.e.* Haryana 652/ 2534, Punjab 563/2145, Uttar Pradesh 256 / 763, Uttarakhand 16/39, J & K 62/132 and H. P. 7/30 (Anonymous, 2018c). However, at the current rate of population growth, rice production has to enhance to about 120 million tons by 2020 (Survey of Indian Agriculture, 2005). Achieving this target is a major challenge as this increase has to be attained simultaneously with shrinking available land and water resources, scarce and costly labour and other inputs combined with deteriorating environment and climate change.

Rice is the primary source of food for more than three billion people; it is one of the world's most important staple crops. Rice is consumed after cooking with water. Other edible products include rice flakes, puffed rice, rice wafers and canned rice. It is also used in starch and brewing industries. The byproduct of rice milling *i.e.* rice husk and bran are used as cattle and poultry feed. Rice straw is a good cattle feed, it is also used in making hats, mats, and ropes. It is a widely distributed monophagous pest and infests the crop from seedling to maturity.

The larvae of *S. incertulas* cause dead hearts during vegetative phase and white ears during reproductive phase. Rice plant can compensate for dead heart (DH) infestation but not compensate for white ear loss (Rubia *et al.*, 1996). The use of insecticides to combat the insect pests' population in times of sudden pest outbreaks is one of the components of IPM, the efficacy of newer pesticides must be worked out and documented. Hence, there is every need to evaluate efficacy of some promising new groups of chemicals to achieve desired results for pest control (R. Singh *et al.*, 2017).

To the studies the population fluctuation and to explore the possibilities of the eco friendly management of rice yellow stem borer *Scirpophaga incertulas* (Walker) in the context of prevailing agro-ecological situation particularly in Western Plain Zone of U.P. In this regard, various tools viz. species composition of stem borers of rice, sex pheromone traps for the study of population dynamics of rice yellow stem borer *Scirpophaga incertulas* (Walker), integrated pest management (IPM) and efficacy of eco friendly insecticides for the management of the pest was evaluated.

## Materials and Methods

### Experimental Site

The experiment was conducted at Chirori Farm, Crop Research Centre (CRC), Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, (Uttar Pradesh) India on the right side of the Dehradun–Delhi Road at a distance of 20.0 km away in the north of Meerut city between 78 km. on National Highway No. 58.

### Observations

#### Population Fluctuation of Yellow Stem Borer

Intensive studies were carried out to determine the population fluctuation (population density) of yellow stem borer; the random sampling was carried out and five hills were sampled from each plot of the untreated trial and dead heart/Hill at weekly intervals, starting from the transplanting till the harvesting of the crop. Data were summarized and correlated with the weather parameters.

## Results and Discussion

### Seasonal Incidence of Rice Stem Borer, *S. incertulas* (Walker)

The data recorded on the incidence of yellow stem borer, *Scirpophaga incertulas* (Walker) showed that it was recorded on 28<sup>th</sup> standard week for the first time and continued till second week of November *i.e.* 46<sup>st</sup> standard week (table 1 and fig 1). The infestation of stem borer recorded as dead heart/white ear heads ranged from 0.85 to 10.25 per cent during the crop season *i.e.* kharif 2017. The incidence was lowest during the month of July which varied between 0.85 to 2.75 per cent. The incidence reached at its peak level in the 40<sup>th</sup> standard week in the month of October (15.25 per cent white ear heads).

During the standard week in month of September to October temperature range was 19.5-33.30<sup>C</sup>, and the relative humidity was 52.4 (evening) to 97.2 (morning) and rainfall was 0.0 mm. During this period the weather parameters *i.e.* temperature, relative humidity and rainfall ranged 22.0-28.8 0<sup>C</sup>, 62.5-81.0 the activity of stem borer suddenly decreased in the first week of October 40<sup>th</sup> standard weeks. The observation of yellow stem borer infestation recorded in present research is supported by the findings of earlier workers (Bora *et al.*, 1995) who reported peak level of incidence six weeks after transplanting and also with (Senapati *et al.*, 1990,

Sachan *et al.*, 2006, Pujari *et al.*, 2007, Samui, 2008, Chawan, S. M. *et al.* 2013, A. M. Kakde and K. G. Patel, 2014, Chattergy *et al.*, 2017, Sharanappa *et al.*, 2017, Baskaran *et al.*, 2017).

### Summery and Conclusion

#### Seasonal Incidence of Rice Stem Borer, *S. incertulas* (Walker)

The incidence of yellow stem borer, *Scirpophaga incertulas* (Walker) showed that it was recorded on 28<sup>th</sup> standard weak for the first time and continued till second week of November *i.e.* 46<sup>st</sup> standard week (table 4). The infestation of stem borer recorded as dead heart/white ear heads ranged from 0.85 to 10.25 per cent during the crop season *i.e.* kharif 2017. The incidence was lowest during the month of July which varied between 0.85 to 2.75 per cent. The incidence reached at its peak level in the 40<sup>th</sup> standard week in the month of October (15.25 per cent white ear heads). During the standard week in month of September to October temperature range was 19.5-33.30<sup>C</sup>, and the relative humidity was 52.4 (Evening) to 97.2 (Morning) and rainfall was 0.0 mm. During this period the weather parameters *i.e.* temperature, relative humidity and rainfall ranged 22.0-28.8 0<sup>C</sup>, 62.5-81.0 the activity of stem borer suddenly

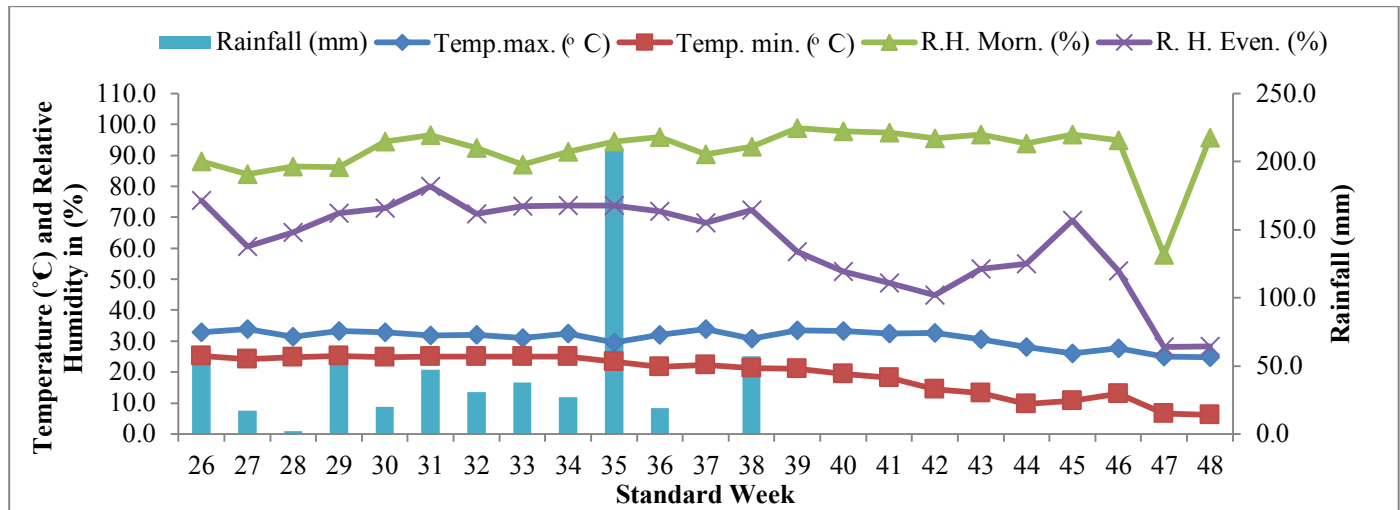
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**Table 1. Mean weekly meteorological data during crop season Kharif, 2017**

Standard Weeks	% DH	% EH	Temp Max. (°C)	Temp Min (°C)	Ave. Temp	RH Max (%)	RH Min (%)	Ave. RH	Rainfall (mm)
26	0.00	0.00	32.8	25.1	29.0	88.0	75.4	81.7	61.0
27	0.00	0.00	33.8	24.2	29.0	84.0	60.5	72.3	17.0
28	0.85	0.00	31.5	24.8	28.2	86.4	65.2	75.8	2.0
29	0.75	0.00	33.2	25.2	29.2	86.2	71.4	78.8	55.0
30	2.75	0.00	32.8	24.8	28.8	94.4	73.0	83.7	20.0
31	4.75	0.00	31.8	25.1	28.5	96.5	79.9	88.2	47.0
32	4.35	0.00	32.1	25.0	28.6	92.4	71.1	81.8	30.7
33	5.50	0.00	31.1	25.0	28.1	87.1	73.6	80.4	38.0
34	6.80	0.00	32.5	25.1	28.8	91.2	73.8	82.5	27.0
35	7.95	0.00	29.5	23.4	26.5	94.4	73.7	84.1	208.0
36	10.25	4.35	32.1	21.8	27.0	95.8	71.9	83.9	19.0
37	-	9.50	33.8	22.4	28.1	90.4	68.3	79.4	0.0
38	-	10.15	30.8	21.3	26.1	92.7	72.3	82.5	57.0
39	-	11.25	33.4	21.0	27.2	98.7	58.9	78.8	0.0
40	-	15.25	33.3	19.5	26.4	97.7	52.4	75.1	0.0
41	-	12.35	32.5	18.2	25.4	97.4	48.7	73.1	0.0
42	-	10.00	32.7	14.4	23.6	95.5	44.8	70.2	0.0
43	-	6.25	30.6	13.3	22.0	96.8	53.3	75.1	0.0
44	-	4.25	28.2	9.7	19.0	93.8	55.0	74.4	0.0
45	-	2.50	26.0	10.7	18.4	96.8	69.0	82.9	0.0
46	-	1.00	27.7	13.1	20.4	94.8	52.7	73.8	0.0
47	-	0.00	25.1	6.7	15.9	57.9	28.1	43.0	0.0
48	-	0.00	24.9	6.1	15.5	95.7	28.4	62.1	0.0



**Fig 1. Level of pest population on rice and prevailing weather parameters during Kharif-2017**

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