RESEARCH ARTICLE

POPULATION FLUCTUATION OF YELLOW STEM BORER AND LEAF FOLDER ON BASMATI RICE IN RELATION TO CLIMATIC CONDITIONS OF WESTERN UTTAR PRADESH, INDIA

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Abstract : Population fluctuations of yellow stem borer, *Scirpophaga incertulus* (Walker) and leaf folder, *Cnaphalocrocis medinalis* (Guenee) were assessed in basmati rice during *Kharif* 2014 at Crop Research Center of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut. The first infestation of yellow stem borer was recorded on first week of August and reached its peak during middle of October when average temperature, relative humidity and rainfall ranged from 27.10 to 30.51 ^{0}C, 69.60 to 84.04 % and 0.30 to 7.56 mm, respectively. The population of leaf folder was first recorded in last week of July and reached at maximum level during end of September to start of October when mean temperature, relative humidity were 28.89 ^{0}C and 76.95 %, respectively. The population of yellow stem borer and leaf folder showed negative correlation with maximum and minimum temperatures, evening relative humidity and rainfall while morning relative humidity showed the positive correlation.

Keywords: Population fluctuation, Yellow stem borer, Leaf folder, Climatic factors

INTRODUCTION

Rice is grown in about 155 million hectare area on approximately 11% of the world's crop lands. India ranks second in the world rice production and 3.5 million tonns are exported (APEDA, 2014). Rice is essentially a crop of warm, humid environment which is conducive to survival and proliferation of lepidopteron insect pests like stem borer and leaf folder (Sarao and Kaur, 2014). Weather conditions are the major regulating causes for the insect pest populations under field circumstances. Certain factors support and other disfavor their multiplication and movement. Therefore, it results in serious out breaks of different insect pests (Hyslops, 1941). Therefore, it is requisite to have a through perception on population fluctuation and its relation with climatic conditions. The present investigation was carried out to assess the population fluctuation of yellow stem borer and leaf folder in western Uttar Pradesh.

MATERIAL AND MATHOD

The field experiment was conduct during *Kharif* 2014, at Crop Research Center of Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, in a randomized block design with three replications. Transplanting to experimental field was done with 25 days old seedling of Pusa Basmati-1 at 5x4 m^2 plot size. Assessment on population fluctuation of yellow stem borer and leaf folder was determined on ten randomly selected hills from untreated trials. These plants were observed regularly at weekly interval. Dead heart and folded or whitish leaves were counted per hill starting from the transplanting till the harvest of the crop.

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RESULT AND DISCUSSION

Population fluctuation of yellow stem borer, *Scirpophaga incertulus* (Walker)

Data showed that the infestation of *S. incertulas* appeared first on first week of August i.e. 31st standard week and continued till first week of November i.e. 44th standard week (Table 1). The infestation of stem borer recorded as dead hearts/white ear heads ranged from 0.60 to 7.85 per cent during the crop season *Kharif* 2014. The pest population increased from second week of August and reached its peak (7.85 per cent) during 41th standard week i.e. middle of October. During this period the weather parameters like temperature, relative humidity and rainfall ranged from 27.10 to 30.51 ^{0}C, 69.60 to 84.04 per cent and 0.30 to 7.56 mm, respectively. The stem borer infestation suddenly decreased after middle of October i.e. 42th and 43th standard week and this might be due to the no emergence of new leaves. These observations are in agreement with the earlier finding of Kumar and Sudhakar (2001), Pujari *et al*. (2007) who reported the peak activity of stem borer in the month of September - October during *Kharif*. While Joshi *et al.* (2009) reported the maximum number of eggs and pupae in the first week of October, indicating that population of borers builds up late in season.

The correlation studies between infestation of yellow stem borer, *Scirpophaga incertulas* (walker.) with weather parameter are given in Table 1. The correlation matrix indicate that there is a positive correlation with morning relative humidity, (0.37) and a negative correlation with maximum and minimum temperature, minimum relative humidity and rainfall, with the dead heart and white ear head

caused by yellow stem borer. Earlier Hugar *et al*. (2009) also reported the negative correlated with maximum temperature, morning relative humidity and rain fall and had significant positive correlation with sunshine hours. Joshi *et al.* (2009) reported that the maximum temperature, minimum temperature and evening relative humidity exhibited a negative relationship with total number of larvae.

Population fluctuation of leaf folder, *Cnaphalocrocis medinalis* (Guenee)

The infestation of *C. medinalis* on basmati rice was recorded from second fortnight of July (31th standard week) and continued till harvest of the crop during the year 2014. The infestation was low from last week of July to third week of August. The infestation increased from end of August and reached at a maximum level (9.80%) during 40th standard week, when mean temperature and relative humidity was 28.89 ^{0}C and 76.95 % respectively. There after the infestation was declined. These are similar as the earlier finding of Kumar (1996) and Mange Ram (2012), who reported the maximum infestation of leaf folder during second fortnight of September. Nigam (2009) reported that the maximum infestation of *C. medinalis* occurred at 41st standard weak.

The leaf folder infestation showed negative correlation with maximum and minimum temperature, evening relative humidity and rain fall but morning relative humidity showed the positive correlation. The present findings are similar to the finding of Rai *et al*. (2000) who reported that temperature, relative humidity and rainfall were negatively correlated with the infestation of *C. Medinalis*. Padhi and Sanjoy (2004) reported that the maximum temperature, rainfall and relative humidity were negatively correlated, while minimum temperature was positively correlated to the moth population.

Table 1. Population fluctuation of yellow stem borer and leaf folder in relation to climatic factors

S. W	Date	Per cent Dead Heart / white ear head	Per cent leaf damage	Temperature (^{0}C)			Relative Humidity (%)			Rainfall (mm)
				Maxi.	Mini.	Mean	Morning	Evening	Mean	
25	June, 16-22	0.00	0.00	39.70	25.30	32.50	72.30	50.06	61.18	0.00
26	June, 23-29	0.00	0.00	37.51	24.96	31.24	75.90	48.91	62.41	0.76
27	June,30 – July,6	0.00	0.00	35.09	25.26	30.18	89.07	59.37	74.22	3.63
28	July, 7-13	0.00	0.00	38.04	26.56	32.30	88.89	55.91	72.40	0.00
29	July, 14-20	0.00	0.00	33.79	25.79	29.79	93.70	80.91	87.31	7.17
30	July, 21-27	0.00	0.00	32.93	25.63	29.28	89.46	73.97	81.72	0.79
31	July28,- Aug,3	0.60	1.40	34.14	25.47	29.81	94.14	71.37	82.76	2.20
32	Aug,4 -10	0.85	2.15	34.00	25.43	29.72	91.84	71.89	81.87	0.97
33	Aug, 11-17	1.40	3.20	34.53	25.03	29.78	92.89	64.94	78.92	0.30
34	Aug,18- 24	2.65	4.10	35.67	25.34	30.51	84.50	56.87	70.69	0.00
35	Aug, 25-31	3.20	4.60	35.07	25.63	30.35	88.16	65.06	76.61	2.41
36	Sep, 1-7	4.80	5.75	32.89	24.50	28.70	92.93	69.99	81.46	7.56
37	Sep, 8-14	5.30	6.10	32.86	25.09	28.98	95.53	72.60	84.07	0.04
38	Sep, 15-21	5.90	6.70	34.50	23.94	29.22	94.30	59.99	77.15	0.00
39	Sep,22-28	6.35	8.50	34.11	23.01	28.56	90.41	52.47	71.44	0.00
40	Sep,29-Oct,5	7.10	9.80	34.61	23.17	28.89	95.53	58.36	76.95	0.00
41	Oct,6-12	7.85	6.40	33.61	20.59	27.10	88.76	50.44	69.60	0.30
42	Oct, 13-19	4.10	4.60	30.03	15.46	22.75	88.30	49.87	69.09	0.00
43	Oct, 20-26	2.20	3.30	31.36	16.64	24.00	92.23	52.84	72.54	0.00
44	Oct,27 - Nov, 2	1.80	2.70	29.93	15.64	22.79	91.37	55.20	73.29	0.00
Correlation coefficient with per cent dead heart/ white ear head				-0.31	-0.30	-0.33	0.37	-0.22	0.01	-0.18
Correlation coefficient with per cent leaf damage				-0.32	-0.26	-0.31	0.44	-0.16	0.02	-0.20

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