



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(5): 737-739
Received: 16-07-2019
Accepted: 18-08-2019

Rekha M Samrit
M. Sc (Agriculture Entomology)
Student, College of Agriculture,
Nagpur, Maharashtra, India

BN Chaudhari
Asstt. Professor of Entomology,
Agriculture Research Station,
Sakoli, Dist: Bhandara,
Maharashtra, India

AS Khedikar
M. Sc (Agriculture Fruit Science)
Student, College of Agriculture,
Parbhani, Maharashtra, India

Seasonal incidence of leaf folder *Cnaphalocrocis medinalis* (Guence) and its correlation with weather parameters and natural enemies

Rekha M Samrit, BN Chaudhari and AS Khedikar

Abstract

A field experiment was conducted during *kharif* season of 2018 at Agriculture Research Station, Sakoli, Dist. Bhandara (MS) under Dr. Panjabrao Krishi Vidyapeeth, Akola to study the seasonal incidence of leaf folder *Cnaphalocrocis medinalis* (Guence) and its correlation with weather parameters and its natural enemies. The result revealed that abundance of leaf folder was initiated from third week of August (33rd MW) with 0.12 per cent damaged leaves and reached peak level during second week of September *i.e.* 37th MW with 4.09 per cent damaged leaves. Furthermore, the fluctuation in the incidence were recorded, which again reached second peak during last week of October (44th MW) with 6.62 per cent damaged leaves. Then damage of leaf folder was gradually declined and reached to 0.66 per cent at the maturity of crop (47th MW). Incidence of leaf folder had significant positive correlation with maximum temperature ($r=0.606$) and significant negative correlation with minimum temperature at 5% significant level.

Keywords: Rice, leaf folder, seasonal abundance, correlation, weather parameters

Introduction

Rice (*Oryza sativa* L.) is the most important food crop, which provides half of the daily food for one of every three persons on earth. The nutritive value of rice includes protein, fat, crude fibre, carbohydrates, ash, minerals viz. Ca, P, Fe, Na, K and Vitamins viz. Thiamine, riboflavin, niacin, tocopherol. It plays an important role in health benefits and disease prevention such as high blood pressure, cancer prevention, Alzheimer's disease, heart disease, skin care, dysentery with together in mankind (Verma and Shukla, 2011) [16]. In India rice cultivated on area 43.57 million hectares with an annual production 104.32 million tonnes and productivity about 2.98 tonnes/ha in 2017 (Anonymous, 2017) [2]. Total Indian output of rice at an all-time high of 166.5 MT (111.0 MT, milled basis). This level would stand 1.2 per cent above the final estimate for the 2016 season and some 2.3 million tonnes above previous FAO expectations, (Anonymous, 2018) [3].

More than 100 species of insect have been recorded to infest the paddy crop but out of these 20 insects pest are of major economic significance. A few are widely distributed with great potential to create havoc the paddy crop viz., stem borer, gall midge, leaf folder, brown plant hopper, white blacked plant hopper and green leaf hopper. The rice leaf folder, *Cnaphalocrocis medinalis* (Guence) belongs to order Lepidoptera, family Pyralidae. Larva fold the leaves longitudinally and feed within on the green matter, resulting in linear pale white stripe damage. In case of severe infestation, damaged portion are dried up entirely and the crop gives a whitish appearance. The yield losses caused by insect pest in rice have been reported to the tune of 25 per cent (Dhaliwal *et al.* 2010) [5]. The average yield loss in rice have been accounted for leaf folder 10% loss in leaf folder (Krishnaiah and Varma, 2015) [9].

Change in a region's climate due to changes in temperature, humidity, rainfall could induce changes in the occurrence pattern of insect pests. Climate change, especially temperature increase will affect insect physiology, behaviour and development as well as species distribution and abundance, evidenced by changes in the number of generations a year, increasing survival rates in winter and the earlier appearance of some insects. Studies of the seasonal abundance and population build up trend is essential to ensure timely preparedness to tackle impending pest problems and prevent crop losses (Patel and Singh, 2017).

Material and Method

The experiment on study the seasonal incidence leaf folder of paddy was carried at Agriculture Research Station, Sakoli, Dist. Bhandara (MS) under Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during *kharif* 2018.

Correspondence

Rekha M Samrit
M. Sc (Agriculture Entomology)
Student, College of Agriculture,
Nagpur, Maharashtra, India

PKV HMT, a popular variety of rice was used for the experiment. The soil was puddle before planting. Experiment plot was filled with water for one to two days to allow the water to sink properly into the soil and to make the soil soft for easy puddling. The puddling was done by tractor. Before transplanting, the layout was made in the field in accordance with experimental design by using of measuring tape, nylon string and wooden pegs. 2-3 seedling of PKV HMT were transplanted per hill at the spacing of 20 x 15 cm in puddled soil. A separate plot of 500 m² area was sown. The recommended fertilizers dose for paddy crop were applied @ 100:50:50 kg NPK/ha. Half dose of N (50 kg) and full dose of P₂O₅ (50 kg) and K₂O (50 kg) was applied before transplanting and half dose of N (50 kg) was applied at 30 days after transplanting.

Thirty hills from seasonal incidence plot were taken for recording observations of seasonal incidence of leaf folder and observations were recorded from nursery at weekly interval till the harvest of crop.

$$\% \text{ Damage leaf folder} = \frac{\text{No. of damaged leaves in 10 hills}}{\text{Total no. of leaves in 10 hills}} \times 100$$

Results and Discussion

Periodical observations on the incidence of folded leaves/damaged leaves due to leaf folder were recorded at weekly interval according to standard weeks. The data presented in table revealed that the incidence of leaf folder was initiated from third week of August (33rd MW) with 0.12 per cent damaged leaves and reached peak level during second week of September *i.e.* 37th MW with 4.09 per cent damaged leaves. Furthermore, the fluctuation in the incidence were recorded, which again reached second peak infestation during last week of October (44th MW) with 6.62 per cent damaged leaves. Then damage of leaf folder was gradually declined and reached to 0.66 per cent at the maturity of crop (47th MW). The correlation co-efficient analysis data in table indicated that rainfall ($r = -0.512$), rainy days ($r = -0.512$), relative humidity ($r = -0.078$), spider ($r = -0.303$) and lady bird beetles ($r = -0.063$) had non-significant negative correlation with leaf folder incidence. However, maximum temperature ($r = 0.606$) had significant positive correlation and minimum temperature ($r = -0.570$) had significant negative correlation with leaf folder incidence at 5% significant level.

Earlier, Ram (1986) [13] observed leaf folder peak incidence in October. Kaul and Singh (1999) [6] reported peak incidence of leaf folder during second week of September at Kangra valley when crop was at the booting to panicle emergence stage. Velusa my and Subramaniam (1974) [15] recorded leaf folder occurrence throughout the year in Tami Nadu and reaching peak numbers during October-November and April. Balasubramni *et al.* (2000) [4] observed significantly higher leaf folder during month of September in Tamil Nadu. Similarly, Patnaik (2001) [12] also recorded the peak incidence of leaf folder occurred in the month of September and October. Alvi *et al.* (2003) [11] recorded the activity of leaf folder from second week of August to second week of October in Pakistan. Sankalp (2011) [14] stated that higher incidence of leaf folder was observed from 3rd week of September to 3rd week of October. These results of above authors are more or less similar and confirm the similar trends of seasonal incidence.

The present study is also in accordance with Kharat (2006) [8], who revealed that leaf folder incidence exhibited non-significant negative correlation with rainfall and rainy days. Patel (2006) exhibited significant positive correlation of leaf folder with maximum temperature, while non-significant negative correlation with rainfall, rainy days, minimum temperature, morning relative humidity and evening relative humidity. Similarly, Sankalp (2011) [14] revealed that maximum temperature had significant positive correlation with leaf folder population. Minimum temperature, relative humidity and rainfall had negative association with population of leaf folder.

The data presented in table revealed that the population of spiders and lady bird beetle were observed from second week of August *i.e.* 32nd MW (0.30 nos./hill) and continued up to the harvest of the crop *i.e.* 47th MW (0.67 nos./hill). The peak population of spiders was also observed at 47th MW. In the findings of natural enemies population occurrence, similar type findings were reported by Khan and Mishra (2003) [7] and Vijaykumar and Patil (2004) [17], wherein they found that the spider population was directly related to growth stages of the rice plants. Kharat (2006) [8] revealed that the population of spiders increased from 32nd standard week. Khan (2006) stated that abundance of natural enemies are very reliable to suppress pest population. Kumar *et al.* (2013) reported that spider as predator upon larva of pests. These earlier reports support the present finding and variation in the result might be due to alteration in ecological conditions.

Table 1: Seasonal incidence of leaf folder and population natural enemies of paddy in fixed plot survey during *kharif*2018.

Date	MW	Leaf folder (% Damage)	Natural enemies (No./hill)		Rainfall (mm)	Rainy days	Temperature		Relative morning humidity (%)
			Spider	Lady bird beetles			Max (°C)	Min (°C)	
	26				132.2	2	32	24	83.71
6.7.2018	27	0.00	0.00	0.00	106.6	5	31	23	97.14
12.7.2018	28	0.00	0.00	0.00	92.2	6	29	24	89.00
19.7.2018	29	0.00	0.00	0.00	123.6	4	29	24	79.14
25.7.2018	30	0.00	0.00	0.00	49.6	2	29	23	81.28
3.8.2018	31	0.00	0.00	0.00	0.0	0	33	23	74.57
8.8.2018	32	0.00	0.30	0.30	42.4	3	32	24	70.85
17.8.2018	33	0.12	0.30	0.00	134.0	4	31	24	91.28
23.8.2018	34	0.48	0.70	0.30	102.4	2	30	23	87.28
29.8.2018	35	0.65	0.00	0.00	68.8	3	28	23	90.14
3.9.2018	36	1.27	0.17	0.00	25.4	2	29	22	94.57
12.9.2018	37	4.09	0.33	0.10	0.0	0	34	21	94.28
18.9.2018	38	1.25	0.17	0.07	47.0	2	32	23	90.28
24.9.2018	39	1.29	0.60	0.16	0.0	0	34	22	64.00
1.10.2018	40	1.28	0.50	0.23	0.0	0	35	21	94.71
8.10.2018	41	4.70	0.33	0.17	0.0	0	34	19	78.71

15.10.2018	42	5.90	0.30	0.23	0.0	0	35	19	84.00
22.10.2018	43	5.67	0.16	0.10	0.0	0	35	17	73.57
31.10.2018	44	6.62	0.16	0.13	0.0	0	32	17	80.71
5.11.2018	45	4.50	0.30	0.27	0.0	0	32	15	91.42
13.11.2018	46	0.90	0.20	0.20	0.0	0	33	13	89.28
19.11.2018	47	0.66	0.67	0.67	0.0	0	32	15	77.42

Table 2: Correlation of leaf folder of paddy with weather parameters and natural enemies.

Pest	Weather parameters				Natural enemies (No./hill)		
	Rainfall (mm)	Rainydays	Temperature		RH Mor. (%)	Spider	Lady birdbeetles
			Max (°C)	Min (°C)			
Leaf folder (% Damage)	-0.512	-0.512	0.606*	-0.570*	-0.078	-0.303	-0.063

Table 'r' value at 1% significance level: 0.641

Table 'r' value at 5% significance level: 0.514

**Significant Correlation at 1% significance level, *Significant Correlation at 5% significance level

Conclusion

On the basis of present investigation, it was concluded that peak activity of rice leaf folder was observed in second week of September. Furthermore, the fluctuations in the incidence were recorded, which again reached second peak during last week of October. Then damage of leaf folder was gradually declined and continued upto maturity of crop. Incidence of leaf folder had significant positive correlation with maximum temperature and significant negative correlation with minimum temperature.

References

- Alvi SM, Ali MA, Sanaullah C, Shaheen I. Population trends and chemical control of rice leaf folder. *Int. J. Agril. Bio.* 2003; 5(4):615-617. (Fide: <http://www.ijab.org>.)
- Anonymous. Agriculture statistics at a glance 2016, 2017, 489.
- Anonymous. Rice market monitor, Food and Agriculture Organization of United Nation. 2018; 21(1):3-6.
- Balasubramani V, Sridharan S, Sadakathulla S. of shade on leaf folder incidence in hybrid rice. *Insect Environ.*, 2000; 6(1):15-16.
- Dhaliwal GS, Jindal V, Dhawan AK. Insect pest problem and yield losses: Changing Trends. *Indian J. Ecol.* 2010; 37:1-7.
- Kaul BK, Singh R. Seasonal abundance of rice leaf folder in Kangra valley of Himachal Pradesh, India. *Oryza*, 1999; 36(1):96-97. [Fide: *RAE* (2000), 88(1), Ab: 22].
- Khan AA, Misra DS. Abundance of spider fauna in relation to biotic and abiotic factors in lowland rice ecosystem of Eastern Uttar Pradesh. *Pl. Prot. Bull. Faridabad.* 2003; 55(1, 2):14-15.
- Kharat SR. Influence of nutrients on incidence of insect pest complex of paddy and their management. M. Sc. (Agri.) thesis, Navsari Agricultural University, Navsari, 2006.
- Krishnaiah K, Varma NRG. Changing Insect pest scenario in the Rice Ecosystem – A National Perspective. *IRRI ecosystem of Andhra Pradesh. J Agrometeorol.* 2015; 5(1):84-85.
- Kumar ADVSLPA, Sudhakar TR, Reddy DR. Influence of meteorological parameters on the incidence of leaf folder and whorl maggot in rice ecosystem of Andhra Pradesh. *J Agrometeorol.* 2003; 5(1):84-85.
- Patel HN. Seasonal incidence, varietal screening and Botanical control of rice leaf folder, *Cnaphalocrocis medinalis* Guenee and 2XV *Pelopidas mathias* Fabricious in South Gujarat. M. Sc. (Agri.) thesis, Navsari Agricultural University, Navsari (Gujarat), 2006.
- Patnaik HP. Forecast of rice leaf folder, *Cnaphalocrocis medinalis* Guenee incidence. *Insect Environ.* 2001; 7(1):36.
- Ram P. White backed plant hopper (WBPH) and leaf folder in Hariyana. *I. Rice Res. Newsl.*, 1986; 11(3):23.
- Sankpal ND. Seasonal occurrence and management of major insect pests of paddy (*Oryza sativa* L.) under middle Gujarat conditions. M. Sc. (Agri.) thesis, Anand Agricultural University, Anand (Gujarat), 2011.
- Velusamy VR, Subramaniam TR. Bionomics of the leaf roller, *Cnaphalocrocis medinalis* (Guenee). *Indian J. Entmol.* 1974; 36(3):185-189.
- Verma DK, Shukla K. Nutritional value of rice and their importance. *Research gate.* 2011; 44(1):21.
- Vijaykumar, Patil BV. Spider fauna of paddy ecosystem in selected areas of Tungabhadra Project in Karnataka. *Karnataka J Agri. Sci.* 2004; 17(3):584-585.