

Population Dynamics of Rice Leaf Folder in relation to Weather Factors at Ranchi

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Abstract: -

Field experiment on population dynamics of rice leaf folder *Cnaphalocrocis medinalis* (Guenee) and its correlation with weather parameters was conducted at rice research farm of Birsa Agricultural University, Kanke, Ranchi during 2018-2019. The results revealed that initial incidence of leaf folder started during 34th standard week with 13.0% leaf damage. Then, the infestation increased gradually and attained its peak in 40th standard week with 21.4% leaf damage. Later, the pest incidence began to decline and minimum level of infestation was recorded in 45th standard week with 1.0 % leaf damage.

There was significantly positive correlation with maximum temperature ($r = 0.551^{**}$) at 5% level of significance. A non-significant negative relationship of % leaf damage was found with minimum temperature ($r = -0.074$) and RH at 2 PM. ($r = -0.405$), whereas other parameters showed a non-significant positive relationship with the leaf folder infestation.

Keywords: Seasonal incidence, abiotic factors, rice, correlation, leaf damage, *Cnaphalocrocis medinalis*

I. Introduction

Rice (*Oryza sativa* L.) is one of the most important staple food for more than half of the world population including India. For most of the rural people of Jharkhand, agriculture is the main source of livelihood. Here the agriculture economy is characterized by dependence on nature, low investment, mono-cropping with paddy as the main crop, poor irrigation facilities, small and marginal holdings. The production and productivity of rice are 4988.06 thousand tone and 2971 kg per hectare, respectively in the state of Jharkhand (Anonymous, 2018).

Insect pest infestation and adverse agro climatic conditions are mainly two major factors, responsible for low yield in rice (Thokchom *et al.*, 2018). About 52% of rice production is lost due to biotic factors of which 21% is due to insect pests and in India it is about 27.9% (Mondal *et al.*, 2017). Kharif rice grown extensively over Jharkhand is mainly infested by stem borer, gall midge, leaf folder, brown plant hopper, case worm and termite in Kharif season. The rice leaf folder, *Cnaphalocrocis medinalis* (Guenee) (Lepidoptera: Pyralidae) is widely distributed in rice ecosystem all over the world. The rice leaf folder was earlier considered as a minor pest of rice growing areas but it has attained major pest status with the introduction of high yielding rice varieties and accompanying changes in cultural practices. The incidence of leaf folder in Jharkhand is more pronounced compared to other defoliating larvae. The larvae damage the plants by

folding the leaves and scraping the chlorophyll content of leaves, causing severe yield losses by reducing photosynthetic activities. The leaf folder infestation may cause more than 50% of leaf damage with significant yield losses (Muthayya *et al.*, 2014)

Different weather parameters plays an important role in crop growth and development of pest and diseases. Abiotic factors viz., temperature, moisture, wind speed etc., have a direct influence on insect distribution and development. Therefore, studies on effect of weather parameters on pest incidence help in understanding population dynamics and to plan suitable control measures in time as it clearly indicates the peak incidence of insect, as well as insect free periods during crop growth. With this objective in this study an attempt was made to study the incidence of rice leaf folder in relation to abiotic weather factors.

2. MATERIALS AND METHODS

Present study was carried out at Rice Research Farm of Birsa Agricultural University, Kanke, Ranchi during Kharif 2018. Rice nursery was raised with variety IR-64 (drt-1) grown on well prepared raised beds and about 20-25 days old seedlings were transplanted to main field at a spacing of 20 x 15 cm in the plots of 5 x 3 m and kept free from pesticide application. The field experiment was laid out in a randomized block design and 3 replications. Weekly data on percentage of leaf damage due to leaf folder (LDLF) was correlated with weather parameters- maximum temperature

(T_{max}), minimum temperature (T_{min}), relative humidity (RH), wind speed, rainfall, rainy days and sunshine hours obtained from the meteorological observatory at Birsa Agricultural University Kanke. Based on this statistical data, the results of the investigation have been interpreted and conclusions have been drawn.

Methods of observation

For knowing the incidence of rice leaf folder the

Per cent leaf damage due to leaf folder (LDLF %) =

3. RESULT & DISCUSSION

The results on population dynamics of rice leaf folder in relation to weather factors during 2018-19 presented in **Table 1** indicates that the initial incidence of leaf folder (*Cnaphalocrosis medinalis*) started during 34th standard week (13.0% LDLF). Then, the infestation increased gradually and attained its peak in 40th standard week (21.4% LDLF). Later, the pest incidence began to decline from (15.0% LDLF) in 41st SMW to the minimum level of (1.0 % LDLF) in 45th SMW.

The correlation analysis between weather parameters and LDLF % has been presented in **Table 2** reveals that there was significantly positive correlation with maximum temperature ($r = 0.551^{**}$) at 5% level of significance. A non-significant negative relationship of LDLF (%) was found with minimum temperature ($r = -0.074$) and RH at 2 PM. ($r = -0.405$), whereas RH at 7 AM ($r = 0.057$), wind speed ($r = 0.287$), rainfall ($r = 0.270$), no. of rainy days ($r = 0.210$) and sunshine hours ($r = 0.157$) were non-significant positively related with LDLF (%).

These findings were found to be in agreement with results of earlier workers i.e. Patnaik (2001) who reported that there was increased infestation of leaf folder in rice during the last week of September and first week of October and Kumar *et al.* (2003) who recorded the peak activity of leaf folder in the first fortnight of August and declined by first fort night of November during the Kharif season.

The findings of the present experiment were also found in agreement with the reports of Khan and Ramamurthy (2004) who reported that maximum temperature was highly significant and minimum temperatures had negative impact on population build-up of leaf folder. However, the relative humidity in the morning had a positive impact on population build up.

4. CONFLICT OF INTERESTS

Authors have declared that no competing interests exist.

5. CONCLUSIONS

The most active period of leaf folder was found in 40th

observations were recorded as per standard meteorological week from 10-15 days after transplanting and was continued till harvest of the crop. The observations were taken by counting the number of damaged leaves and the total number of leaves (i.e. damaged + healthy leaves) from randomly selected ten hills on per plot basis and converted into per cent leaf damage (LD).

$$\frac{\text{Total no. of damaged leaves}}{\text{Total no. of leaves (damaged+healthy)}} \times 100$$

SMW i.e. 1st October to 7th October in rice variety IR-64 (drt-1). The peak incidence with 21.4 % LDLF was found in 40th SMW in IR-64 (Drt.-1).

There was positive correlation between the maximum atmospheric temperature and incidence of pest.

6. ACKNOWLEDGEMENTS

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