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EFFECTS OF DATE OF TRANSPLANTING ON THE INCIDENCE OF RICE LEAF FOLDER *CNAPHALOCROCIS MEDINALIS* (GUENÉE) AND ITS POPULATION DYNAMICS

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ABSTRACT

Field studies were conducted to evaluate the impact of transplanting dates and weather parameters on the incidence of rice leaf folder *Cnaphalocrocis medinalis* (Guenee). During 2018 kharif season, the first incidence was noticed during 27th standard meteorological week (SMW) irrespective of the transplanting dates, with peak being in the 28th SMW (1.67% damaged leaves/ hill). Least damage was observed in 4th date of transplanting (20th July), while maximum incidence was with 20th June transplanting. The correlation of incidence with temperature showed negative correlation, while rainfall and relative humidity showed positive relationship.

Key words: *Cnaphalocrocis medinalis*, population dynamics, rainfall, relative humidity, temperature, correlation coefficients, transplanting dates, seasonal incidecne

Rice (*Oryza sativa*) is an important cereal crop, and it is attacked by 800 species of insect out of which 20 (e.g. rice leaf folder, stem borer, plant hopper, grass hopper and gall midge etc.) cause economic damage and are considered as major pests (Jena et al., 2018). Among these, the rice leaf folder *Cnaphalocrocis medinalis* (Guenee) (Lepidoptera: Pyralidae) is a predominant foliage feeder and is one of the most devastating pests (Luo, 2010). It occurs in all growth stages of the crop. Larvae damage the crop by feeding on chlorophyll content of leaves after folding (Bisen et al., 2019). Its damage at reproductive stage can reduce yield up to 6.2%, and overall losses range from 63 to 80% (Satish et al., 2007; Teng et al., 1993). Growers rely heavily on pesticides to protect their rice crop. The weather parameters and the transplanting dates have an influence on the appearance of the pests. This experiment evaluates the seasonal incidence in relation to date of transplanting and the population dynamic is in relation to weather factors.

MATERIALS AND METHODS

A field experiment was carried out at the agriculture research farm, Lovely Professional University, Jalandhar (31 24’ N, 75 69’ E, 4342 masl) during 2018 kharif season. Thirty days’ old seedlings of Pusa 1509 variety were transplanted, and randomized block design was followed in 5x 5 m plots replicated thrice. Recommended agronomic practices by the PAU, Ludhiana were followed. Four transplanting dates evaluated were: 20th June/ 25th standard meteorological week (SMW), 30th June/ 26th SMW, 10th July/ 28th SMW and 20th July/ 29th SMW, 2018. Incidence of *C. medinalis* was recorded at weekly intervals from randomly selected six hills from untreated plots. Weather data were obtained from the meteorological observatory, agriculture research farm, LPU, Phagwara (Punjab). The incidence data was subjected to angular transformation prior to statistical analysis. Pearson correlation was obtained to find out the relationship with weather factors. The statistical analysis was done using SPSS (version 22).

RESULTS AND DISCUSSION

Incidence of *C. medinalis* was observed during 27th SMW (0.32/ hill) which reached its peak during 28th SMW (1.67/ hill) (Fig. 1); and with 29th SMW it decreased till 36th SMW (0.08/ hill) and then increased during 38th SMW (0.82/ hill), while at maturity stage of crop (39th and 40th SMW) the incidence declined abruptly. The weather factors viz., temperature, humidity and rainfall showed a non-significant effect on the incidence; maximum (r = -0.214) and minimum (r = -0.154) temperature showed a negative correlation while relative humidity- RH (r = 0.420 and r = 0.375) and rainfall (r = 0.211) showed a positive one (Fig. 2). Similar results were obtained by Singh et al. (2017) and Zainab et al. (2017) showing a negative correlation with temperature and positive correlation with rainfall. Tiwari et al. (2021) observed a positive correlation with the maximum temperature but negative with the rainfall and evening RH. The present results agree with those of Singh et al. (2017) in terms of positive correlation of rainfall and RH. Yimjenjang and Mishra (2020) also observed that maximum (r= 0.527*, 0.590) and minimum temperature (r=0.849**, 0.853**), morning (r=0.244, 0.458) and evening RH (r=0.518*, 0.269) and wind velocity (r=0.356, 0.361) had significant positive relationship. Haider et al. (2020) obtained similar results with weather factors as having an insignificant relationship. Kakde and Patel (2015) observed non-significant positive relationship of maximum temperature, RH, rainfall and sunshine hours with the leaf damage by leaf folder; and non-significant negative correlation of minimum temperature was observed under SRI planting method.

About the dates of transplanting, least damage (0.03 -1.34% leaves/ hill) was observed in fourth transplanting date (20th July/ 29th SMW), followed by third date of transplanting (10th July/ 28th SMW); maximum damage was observed with the first date of transplanting (20th June/ 25th SMW, 0.35-9.58%) Rautaray et al. (2019) observed that the rice transplanted late (30th August) had higher infestation. In the present study June transplanting was observed to be the best with least infestation. Rautaray et al. (2019) concluded that transplanting rice on first July would be a better option. As far as the crop stage is concerned, maximum damage (0.35-9.58%/ hill) was observed during vegetative phase of the crop, 30 days after transplanting (DAT) followed by 45 DAT (Table 1). Thus, the rice leaf folder incidence was more when crop was sown early. Similar observations had been reported by Ma and Lee (1996) and Chaudhari et al. (2018).

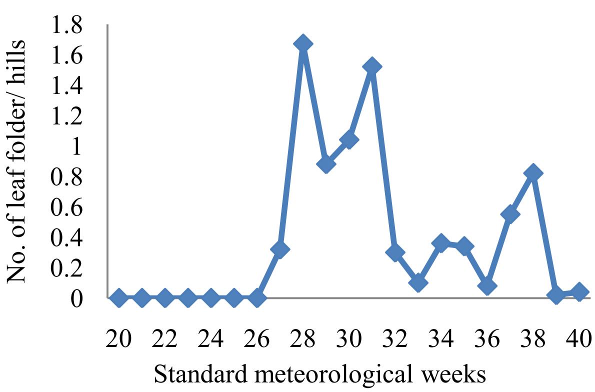

Fig. 1. Seasonal incidence of *C. medinalis*

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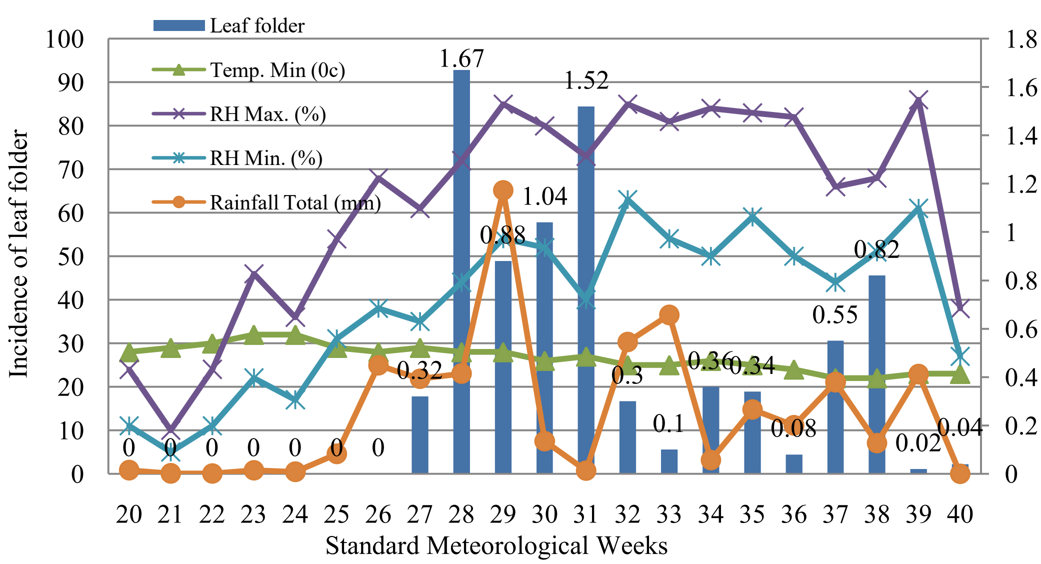

Fig. 2. Population dynamics of *C. medinalis*

Table 1. Effect of transplanting dates on *C. medinalis* incidence

Factors	Vegetative stage				Reproductive stage			
	30 DAT		45 DAT		60 DAT		90 DAT	
Transplanting	Mean % damage/hill*							
20th June	9.58 (17.78) [a]		3.13 (9.28) [a]		1.34 (4.04) [c]		0.35 (2.11) [b]	
30th June	4.91 (12.62) [b]		1.89 (7.22) [b]		2.00 (7.81) [a]		0.36 (3.34) [a]	
10th July	0.76 (4.55) [c]		1.24 (6.33) [d]		0.69 (4.69) [b]		0.08 (0.88)[c]	
20th July	0.56 (4.16) [d]		1.34 (6.61) [c]		0.03 (0.31) [d]		0.00 (0.14)[d]	
DAT	S.Em (±)	CD@ 0.05%	S.Em (±)	CD@ 0.05%	S.Em (±)	CD@ 0.05%	S.Em (±)	CD@ 0.05%
	0.12	0.36	0.08	0.24	0.12	0.36	0.002	0.006

*Figures in parentheses angular transformed values ($p \geq 0.05$)

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