SEASONAL INCIDENCE OF PEA LEAF MINER *CHROMATOMYIA HORTICOLA* GOUREAU INFESTING GARDEN PEA

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ABSTRACT

The seasonal incidence of pea leaf miner *Chromatomyia horticola* Goureau, on garden pea (*Pisum sativum* L.) was assessed during 2017 and 2018 at the research farm of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Chatha. The pooled data revealed that the incidence show continuous fluctuation, with first appearance being during the 49th standard meteorological week (SMW)- 0.95 miners/ leaf which reached its peak (11.00 miners/ leaf) during the 4th SMW, then reached to minimum (1.26 miners/ leaf) during the 12th SMW. The correlation studies indicated highly significant negative association between incidence and maximum temperature (-0.714**), significant positive one with evening relative humidity (RH) (0.544*); and non-significant ones with minimum temperature (-0.385) and wind speed (-0.74), morning RH (0.258), sunshine (0.013) and rainfall (0.356).

Key words: *Chromatomyia horticola*, *Pisum sativum*, incidence, population dynamics, correlation coefficients, regression, weather parameters, temperature, humidity

Garden pea (*Pisum sativum* L.) is an important rabi grain legume crop, and in Jammu and Kashmir, it is grown over an area of 2.79 thousand ha, with an annual production of 58.08 thousand mt (Anonymous, 2017). The leaf miner *Chromatomyia horticola,* Goureau (Diptera: Agromyzidae) is an important ipest of this crop. Leaf miners are herbivorous insects that pass their larval stages inside the leaf (Anderson et al., 2002). In case of severe attack entire leaf is filled with the mines and 86-93% leaves are affected (Atwal et al., 1969). The destruction of the chlorophyll containing tissue affects the growth and yield (Vishwanath and Agrawal, 1982). Rai and Ram (1997) observed the weather parameters as the major regulatory factors for pea leaf miner infestation. The present study analyses its seasonal incidence and evaluates its population dynamics.

MATERIALS AND METHODS

A field experiment was conducted during 2017 to 2018 on *P. sativum* at the research farm of Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu Chatha. The variety Arkel was raised in a plot size of 10x 3 m in a completely randomized block design with three replications. All the recommended agronomic practices were followed except plant protection. Weekly observations were recorded on 10 randomly selected plants. The incidence/ plant was worked out by counting the number of larvae and pupae on randomly selected 5 leaves/ plant. Weather data on mean temperature (maximum/ minimum-°C), mean relative humidity- RH (morning and evening), and rainfall (mm) were obtained from the Agrometeorological Section, Division of Agronomy, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu. The analysis of data was done using SPSS software package.

RESULTS AND DISCUSSION

The pooled data revealed that the first incidence of *C. horticola* was during the 49th standard meteorological week (SMW) at 0.95 leaf miners/ plant (Fig. 1); it increased gradually and reached to a peak (11.00 leaf miners/ plant) during the 4th SMW, and then decreased to a minimum of 1.26 leaf miners/ plant during the 12th SMW. Peak activity was during first week of October and January i.e. 40th and 1st SMW with no infestation during April and May (Hemalatha and Maheswari, 2004). Diez et al. (2006) also reported maximum incidence during January and March. Singh and Saravanan (2008) observed that incidence increased with maximum temperature, slight rainfall and morning RH, and decreased with increasing minimum temperature, evening RH, wind velocity and sunshine hours. Nitin et al., (2018) revealed that the initial incidence of pea leaf miner, pea aphid, and stem fly was observed during last week of November to first week of December and subsequently reaching to peak on first and second week of February. Sapkal et al.
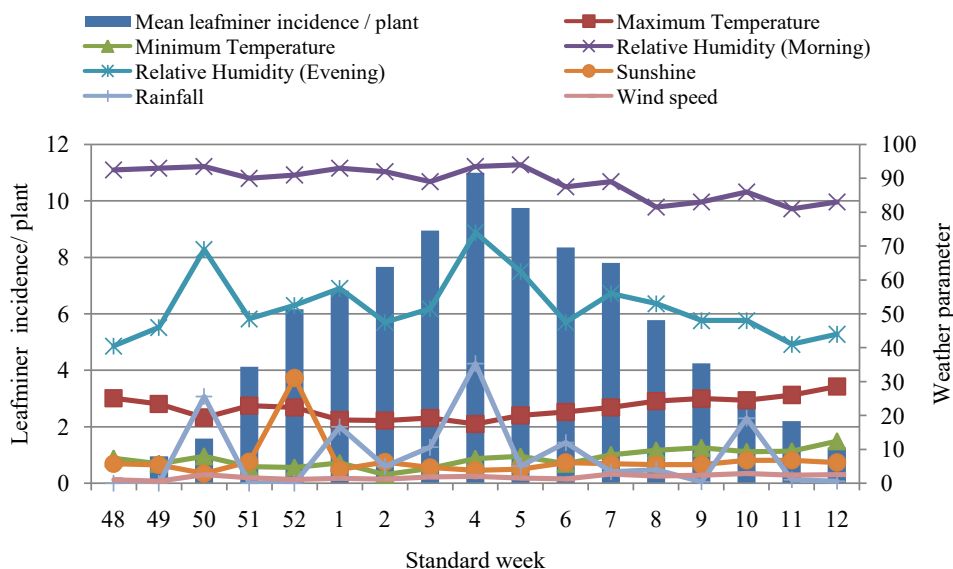
Fig. 1. Seasonal incidence of *C. horticola* on garden pea (2017 and 2018, pooled)

Table 1. Correlation coefficients - incidence of *C. horticola* vs. weather parameters (2017, 2018, pooled)

Incidence	Temperature (°C)		Relative humidity (%)		Sunshine	Rainfall	Wind speed
	Maximum	Minimum	Morning	Evening	(hr)	(mm)	(km/ hr)
	-0.714**	-0.385	0.258	0.544*	0.013	0.356	-0.074
Regression equation				Correlation coefficient (r)	R^2	Coefficient of variation (%)	
$Y = 77.294 - 1.802\,X_1 + 0.646\,X_2 - 0.404\,X_3 + 0.008\,X_4 + 0.105\,X_5 - 0.127\,X_6 - 0.457\,X_7$				0.857	0.734	73.40	

*p = 0.05; **p = 0.01; Y = Mean leaf miner/ plant, X_1 = Maximum temperature, X_2 = Minimum temperature, X_3 = RH % (Morning), X_4 = RH % (Evening), X_5 = Sunshine, X_6 = Rainfall and X_7 = Wind speed kmh^{-1}.

(2018) observed the seasonal incidence of *T. absoluta* with maximum incidence 41st SMW.

The incidence was with a highly significant negative correlation (-0.714) with maximum temperature, positive correlation (0.54) with evening RH; while a negative correlation was observed with minimum temperature (-0.385) and wind speed (-0.074). The multiple linear regression equations for incidence was $Y = 77.294 - 1.80\,X_1 + 0.646\,X_2 - 0.404\,X_3 + 0.008\,X_4 + 0.105\,X_5 - 0.127\,X_6 - 0.457\,X_7$. The corresponding correlation co-efficients of multiple determination (R^2) value worked out was 0.734 (p=0.05). Chaudhuri and Senapati (2004) had also reported that temperature and rainfall showed significantly positive correlation while a non-significant positive correlation was observed with RH, temperature but RH gradient showed significantly negative one. Naga et al. (2020) reported that the leaf miner reached peak during December to January and declined thereafter; also observed that number of mines, leaf infestation and number of larvae were negatively correlated with minimum temperature

(-0.61**), evening RH (-0.34*). The overall impact of weather factors on population buildup was 73.40 % (Table 1).

AUTHOR CONTRIBUTION STATEMENT

All authors equally contributed.

CONFLICT OF INTEREST

No conflict of interest.

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