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Effect of weather factors on the population dynamics of litchi leaf roller *Platypeplus aprobola* (Meyrick)

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Abstract

The present study provides the observations obtained from the field experiment on the effect of weather factors on the population dynamics of litchi leaf roller *Platypeplus aprobola* carried out in 2018-19 at the State Horticulture Nursery, Department of Horticulture, Jammu, J&K. The results revealed that peak activity of leaf roller (*Platypeplus aprobola*) was observed from September Ist fortnight (50.74%) to October IInd fortnight (54.97%). The correlation and regression studies showed positive influence with weather factors like average temperature, average relative humidity, sunshine hours and average rainfall and negative influence of average wind velocity with leaf roller incidence.

Keywords: Population dynamics, incidence, Platypeplus aprobola, weather factors

Introduction

Litchi (*Litchi chinensis* Sonn.) of family Sapindaceae has been recognized as one of the most valuable fruits of the world, have vast export potential. India is the second largest producer of litchi after China. It is commercial grown in Bihar, Uttarkhand, West Bengal and Jharkhand (Rai and Kumar, 2004)^[5]. Due to its high economic return and ever increasing demand in the domestic market, the crop is also gaining momentum in Punjab, Himachal Pradesh, Assam, Tripura and Orissa. Eastern India, comprising Bihar, Jharkhand and West Bengal accounts for 85% of the total litchi production in the country. Bihar produces 45% of total litchi production and occupies about 40% of the area.

Litchi (*Litchi chinensis* Sonn.) is considered as one of the important fruit crops in J&K. Its cultivation is gaining importance among the farmers owing to favourable agro-climatic conditions of the state.

However, the crop suffers considerably due to the attack of many insect- pests in different growth stages which cause considerable damage resulting in reduced yield and unmarketable fruits. The ravages caused by various insect- pests not only result in the low production but also drastically impair the quality, rendering them unfit for human consumption, reducing marketable yield and thereby posing a serious threat to fruit industry. The litchi leaf roller, *Platypeplus aprobola* (Meyrick) has been reported as one of the serious insect pests of litchi. The incidence of leaf roller was found on litchi trees during July to February (Singh, 1971)^[7] when new leaf flush was available and restricted breeding took place during off season (March to April) on alternate hosts such as Kath Jamun (*Eugenia jambolana*) and chhota amaltas (*Cassia tora*) growing around litchi orchards (Lall and Mallik, 1976)^[4]. The symptoms of leaf injury by the larvae are manifested through rolling of tender leaves and feeding inside. As a result of larval injuries, the infested twigs distort and wither. The current change in climatic conditions and due to the enormous damage potential of the pest, the present study was therefore, commenced.

Materials and Methods

The present study was carried out during May 2018 to April 2019, in State Horticulture Nursery, Department of Horticulture, Jammu (J&K). Five trees were randomly selected for the study and were kept free from insecticides during the period of observation. Sampling was done in weekly interval. In each tree, four terminal shoots were selected at random from the entire canopy. Thus twenty shoots growing in all direction were sampled per week. Infestation levels of pests were recorded based on the per cent leaf damage during vegetative phase. The percentage of leaf infestation on the basis of number was calculated by following formula:

Per cent of leaf infestation = $\frac{\text{Number of infested leaves}}{\text{Total leaves}}$ x100

The weather data on rainfall, relative humidity, temperature, sunshine hours and wind velocity collected from Agro meteorological observatory were used in the study. The data was subjected to correlation analyses to find out the influence of abiotic factors on *P. aprobola* infestation.

Results and Discussion

The data revealed (Table 1 and Figure 1) the pest activity recorded on the litchi trees during entire year 2018-19. During the period of January to May its activity was observed low on the litchi trees during the course of investigation. The leaf roller infestation per cent increases from August to February with its peak activity during October in the second fortnight (54.97%). The minimum (3.77%) leaf infestation was

recorded in the second fortnight of the month of April 2018-19.

However, the leaf roller preferred the tender leaves and the availability of fresh leaves were governed by growth stages of trees but at the same time these factors are also influenced by weather factor.

The correlation coefficient between infestation per cent and weather parameters were found to be positive for average humidity (r=0.318), average temperature (r=0.166), rainfall (r=0.125), sunshine hours (r=0.271) and significantly negative correlation with wind velocity (r=-0.497). Multiple regression studies established that abiotic factors contributes 70.5 per cent variation in infestation per cent (Table 2).

Month	Fortnight	Mean% leaf infestation	Abiotic factors					
			Average Temp (°C)	Average Relative Humidity (%)	Rainfall (mm)	Sunshine hours	Wind velocity (Km/hr)	
May	Ι	5.31	28.07	44.25	5.90	9.40	6.10	
	II	5.09	29.55	36.75	1.30	7.20	5.30	
June	Ι	10.18	32.05	43.33	8.33	6.50	5.23	
	II	12.18	30.90	54.25	20.60	2.25	4.75	
July	Ι	23.91	30.35	69.50	76.60	5.80	4.15	
	II	25.91	30.35	76.75	45.40	4.90	3.95	
Aug	Ι	28.40	29.85	78.25	101.00	5.15	4.45	
	II	29.02	29.85	78.00	133.40	6.65	3.80	
Sept	Ι	50.74	29.50	74.99	27.90	6.46	3.20	
	II	48.94	26.60	74.75	59.30	7.05	2.75	
Oct	Ι	53.71	24.10	63.25	1.40	8.20	2.30	
	II	54.97	21.67	58.50	0.40	9.10	1.65	
Nov	Ι	42.57	19.70	69.00	7.00	5.95	2.35	
	II	40.39	17.50	67.25	0.00	6.25	1.15	
Dec	Ι	31.76	14.53	71.60	3.90	5.10	2.03	
	II	12.07	11.02	66.75	0.00	6.75	1.45	
Jan	Ι	9.95	11.60	71.50	8.10	3.40	2.65	
	II	11.13	10.95	75.72	23.50	4.75	3.35	
Feb	Ι	9.77	12.67	76.95	39.90	3.65	3.30	
	II	10.43	14.37	77.35	44.20	4.35	3.20	
Mar	I	8.06	13.87	72.25	5.20	5.25	3.10	
	II	12.06	17.37	70.20	12.50	5.75	2.95	
April	Ι	4.59	23.91	61.91	3.06	7.13	2.66	
	II	3.77	25.55	50.25	17.60	8.35	4.30	

Table 2: Influence of abiotic factors on litchi leaf roller, P. aprobola (Meyrick)

Value	Constant	Average temperature (°C)	Average relative humidity (%)	Rainfall (mm)	Sunshine hours	Wind velocity (Km/hr)	Co-efficient of determination
		X1	X2	X3	X4	X5	R ²
Co-efficient	-48.392	1.972	0.743	-0.111	2.337	-9.954	
S.E	42.335	0.488	0.431	0.126	1.644	3.118	
t- value	-1.143	4.043	1.723	-0.883	1.422	-3.192	0.705
Correlation co- efficient		0.166	0.318	0.125	0.271	-0.497*	

Multiple regression equation:

Y= -48.392 +1.972X°C +0.743X °C -0.111X °C +2.337X °C -9.954X °C

(R²=0.705)

Y= Mean percent leaf infestation

*= Significant at 5% level



Fig 1: Influence of abiotic factors on litchi leaf roller, P. aprobola (Meyrick)

The present findings are in close conformity with the reports of earlier workers (Singh, 1971; Lall and Mallik, 1976; Hameed et al., 1999 and Chakraborti and Samanta, 2005) ^{[7, 4,} ^{3, 2]}. Singh (1971) ^[7] also recorded the incidence of leaf roller on litchi trees during July to February however; the peak infestation was recorded during December to February, till pre-flowering season of litchi. Lall and Mallik (1976) [4] reported breeding season of the leaf roller on litchi leaves from August to February when new flush was available while restricted breeding took place during off season (March to April) on alternate hosts such as Kath jamun (Eugenia jambolana) and Chhota amaltash (Cassia tora) growing around litchi orchards from March to July. The incidence of litchi leaf roller (P. aprobola) was recorded as minor pest of litchi in China (Anonymous, 1978)^[1] and Australia (Waite et al., 1992)^[8]. Hameed et al., (1999)^[3] observed that, the leaf roller caused heavy damage at the advent of new flush and also infested leaves during August- November, but did not occur during other months. Chakraborty and Samanta (2005) ^[2] recorded the maximum incidence (48.00%) of litchi leaf roller, P. aprobola Meyer in the month of October in West Bengal. The results are in consonance with Ranjan et al. (2012)^[6] who also reported that the pest activity started from the month of August to July, the maximum and minimum leaf infestation during October and April respectively. Thus the result of this study would help in understanding the seasonal activity of the pest throughout the year, which is essential in formulating pest management strategies specially in making spraying schedules of eco-friendly pesticides as well as other pest management approaches to reduce the harmful effect of the pest in ecological considerations.

References

- 1. Anonymous. Annals of lychee in Guangdong Province. Guangdong Academy of Agricultural Scienc. 1978, 156.
- 2. Chakraborty K, Samanta A. Evaluation of litchi germplasms based on biochemical parameters along with incidence of leaf roller (Platypepla aprobola Meyer.) and fruit borer (*Conopomorpha cramerella* Snellen). Annals of Plant Protection Sciences 2005; 13(2):338-342.

- Hameed SF, Sharma DD, Agarwal ML. Studies on the management of litchi pests in Bihar. Rajendra Agricultural University Journal of Research 1999; 9(1):41-44.
- Lall BS, Mallik SN. Bionomics and control of litchi leaf roller (*Platypepla aprobola* Meyrick) Lepidoptera: Tortricidae. In: Proceedings of the National Academy of Science India 1976, 22-23.
- Rai M, Kumar A. Efficacy of insecticides including biopesticides for control of litchi fruit borer. Abstract of first Indian Horticulture Congres 2004, 6-12.
- Ranjan R, Ray R, Mukherjee U. Effect of abiotic factor on the incidence of litchi leaf roller *Dudua aprobola*. Pest Management in Horticultural Ecosystem 2012;18:210-212.
- 7. Singh MP. Occurrence of *Platypepla aprobola* Meyrick (Tortricidae: Lepidoptera) on litchi in north Bihar. Indian Journal of Entomology 1971; 33: 98.
- 8. Waite GK, Alpine MC, Honey JD. bee as carriers of lychee erinose mite, *Eriophyes litchii* (Acari: Eriophyiidae). Experimental and Applied Acrology 1992;15(4):299-302.