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Vijayaraghavendra R
Department of Entomology,
College of Agriculture, PJTS
Agricultural University
Rajendranagar, Hyderabad,
Telangana, India

K Basavanagoud
Professor and University Head
(Retd.) Department of
Agricultural Entomology,
College of Agriculture, UAS
Dharwad, Karnataka, India

Seasonal incidence of leafminer (*Achrocercops gemoniella* Stainton) in relation to weather parameters on sapota

Vijayaraghavendra R and K Basavanagoud

Abstract

The Seasonal incidence of Sapota Leafminer *Achrocercops gemoniella* Stainton (Gracillariidae: Lepidoptera) infesting in relation to weather parameters was carried out on sapota varieties viz., Kalipatti, DHS-1, DHS-2 and Cricket ball at new orchard College of Agriculture, Dharwad and DHS-2 variety at KVK, Sadapur Farm, Dharwad, Karnataka, India during 2013 June–2014 May. Infestation of leaf miner was appeared more or less throughout the year except April and May with peak period of infestation 3.02 % in October and lowest of 0.30 % in March. Maximum incidence (1.60%) in Cricket ball and it was lowest (1.13%) in DHS-1 whereas the pest incidence on other two genotypes varied from 1.39 to 1.53%. Leaf miner incidence had significantly positive correlation with morning, evening relative humidity and rainfall in all the four genotypes. Whereas, maximum and minimum temperature had significantly negative correlation with pest incidence.

Keywords: seasonal incidence, sapotaleaf miner, genotypes and weather parameters

1. Introduction

Sapota (*Manilkara achras* (Mill.) Farsberg, syn. *Achras zapota* Linn.) Belongs to family Sapotaceae. It is called by several names such as Chiku, Sapodilla, Zapata or Sapodilla plum in different regions. Sapota is an interesting fruit crop especially for its peculiar flowering and fruiting behavior. In general flowering is erratic and this has been facilitated the harvest of fruit throughout the year. It is therefore rightly called “All the year cropper” (Katyal, 1961) [5]. India is considered to be the largest producer of sapota in the world and it is being cultivated in an area of about 163.9 thousand ha with a production of 1495.0 metric tonnes (Anon, 2014) [1]. Karnataka ranks first in sapota production. The total area of sapota grown in Karnataka is about 31.7 thousand ha. With an annual production of 373.7 lakh metric tonnes with a productivity of 11.8 metric tonnes per ha (Anon., 2014) [1]. It is largely grown in Gujarat, Maharashtra, Karnataka, Tamil Nadu, Kerala, Uttar Pradesh, Haryana, Punjab and West Bengal. Among the various factors affecting the yield of fruit crop damage caused by insect pests is important. More than 25 insect pests attack sapota (Butani, 1979) [3]. Among the different pests, bud borer, *Anarsia achrasella* Bradley, mid rib folder, *Banisia myrsusaliselearalis* Walker, chiku moth *Nephoptery xeugraphella* Ragonot, Leafminer *Achrocercops gemoniella* Stainton and fruit flies, *Bactrocera dorsalis* (Hendle) and *Bactrocera zonata* (Saunders) are considered as major pests of sapota. Leaf miner as well as mid rib folder remain active throughout the year with varying degrees of infestation (Patel, 2002) [8]. The literature on the seasonal incidence of leafminer *Achrocercops gemoniella* of sapota is very scanty and hence the present study has been taken up.

2. Material and Methods

The studies were carried out during 2013-2014 and observations on the seasonal incidence of leaf miner *A. gemoniella* were recorded from four sapota varieties viz., Kalipatti, DHS-1, DHS-2 and Cricketball at new orchard College of Agriculture, Dharwad and DHS-2 variety at KVK, Sadapur Farm, Dharwad. No insecticidal application was done during the period of study. The observations were recorded at 15 days intervals from June 2013 till May 2014. Five medium sized trees from different genotypes were selected randomly. From each of the tree ten twigs were selected and in each twig leaves were observed for the incidence of leaf miner. Observations were taken on number of damaged leaves / twig and total number of leaves observed / twig was observed on different genotypes and per cent of infestation was worked out. Mean percentage of leaves damaged by leaf miner was worked out on different genotypes by using formula:

Correspondence

Vijayaraghavendra R
Department of Entomology,
College of Agriculture, PJTS
Agricultural University
Rajendranagar, Hyderabad,
Telangana, India

$$\text{Per cent leaves damaged} = \frac{\text{Number of damaged leaves}}{\text{Total number of leaves observed}} \times 100$$

The meteorological data was collected from observatory of main Agricultural research station (MARS), Dharwad. The data on per cent damage by pest was correlated to understand the relationship between incidence of pest and various weather parameters viz., temperature (maximum and minimum), relative humidity (morning and evening) and rainfall.

3. Results and Discussion

The tiny larva of leaf miner, *A. gemoniella* mined into epidermal layers of young leaves and the affected leaves showed glistening galleries (Fig-1) which later distorted dried and ultimately fell down.

The mean percentage of damaged leaves recorded from June 2013 to May 2014 indicated higher incidence (1.60%) in Cricket ball and it was lowest (1.13%) in DHS-1. Whereas the pest incidence on other two genotypes varied from 1.39 to 1.53 (Table-1). The overall mean percentage of leaf minor damage irrespective of genotypes indicated higher incidence of the pest from September to November which ranged from 2.78 to 3.02 whereas in remaining period i.e. from December to August it was low which ranged from 0.30 to 1.62 except that there was no incidence during April and May. These

results are in line with the findings of Patel and Jhala (1991)^[6] who reported peak incidence of pest during June- July and September-October. Anon (1995)^[1] also reported the activity of leaf miner that it was at its peak in the month of May and September.

The correlation studies made between the incidence of leaf miner and weather parameters showed that there was a significant and negative correlation between leaf miner damage and maximum temperature (Table-2). Negative but non-significant correlation existed between minimum temperature and leaf miner incidence in all the genotypes. Morning relative humidity had positive and significant correlation with pest incidence in all the genotypes. Whereas this correlation was significantly positive between evening relative humidity and pest incidence in Kalipatti, DHS-1 and DHS-2 (KVK, Saidapur farm) while in remaining two genotypes it was non-significant. In all the genotypes rainfall had positive correlation with the pest incidence. This observation is in line with the findings of Patel (1990)^[6] who reported that from South Gujarat the incidence of leaf miner *A. gemoniella* had significant negative correlation with maximum temperature and positive correlation with minimum temperature and rainfall. Whereas Dongre (2011)^[4] reported that, leaf miner had significant positive correlation with minimum temperature, relative humidity and rainfall.

Table 1: Seasonal incidence of leaf miner, *Achrocercops gemoniella* during 2013-14 in different genotypes

S. No	Month	Fortnight	Per cent leaves damage					Mean
			Cricket Ball *	Kalipatti *	DHS-1*	DHS-2 *	DHS-2 **	
1	June-2013	I	0.85	0.84	0.86	0.65	1.25	0.99
2		II	0.71	1.13	0.92	0.82	1.82	
3	July	I	1.58	0.68	1.31	1.05	1.68	1.16
4		II	0.67	0.93	1.12	1.28	1.25	
5	August	I	1.54	1.82	0.85	1.31	1.12	1.62
6		II	1.83	2.70	2.82	1.52	1.61	
7	September	I	2.60	2.38	2.28	2.05	1.95	2.94
8		II	3.92	3.71	2.65	4.22	3.68	
9	October	I	3.25	3.18	2.15	4.05	2.43	3.02
10		II	4.81	2.94	2.15	3.52	1.72	
11	November	I	3.62	4.80	1.82	3.91	2.65	2.78
12		II	3.59	1.32	1.30	2.67	2.08	
13	December	I	2.56	0.68	0.81	2.69	1.32	1.56
14		II	1.32	1.53	1.32	1.51	1.86	
15	January-2014	I	1.09	0.51	1.54	1.36	1.33	1.02
16		II	0.0	0.82	0.97	1.05	1.54	
17	February	I	0.0	1.10	0.54	0.0	1.23	0.44
18		II	0.0	0.89	0.61	0.0	0.0	
19	March	I	0.53	1.25	0.25	0.0	0.0	0.30
20		II	0.79	0.0	0.20	0.0	0.0	
21	April	I	0.0	0.0	0.00	0.0	0.0	0.00
22		II	0.0	0.0	0.00	0.0	0.0	
23	May	I	0.0	0.0	0.0	0.0	0.0	0.00
24		II	0.0	0.0	0.0	0.0	0.0	
Mean			1.60	1.51	1.13	1.53	1.39	

*At new orchard, Agriculture college, Dharwad

** At KVK, Saidapur farm, Dharwad

Table 2: Correlation co- efficient between leaf miner, *Achrocerops gemoniella* and weather parameters

Varieties	Weather data	Maximum temperature (°c)	Minimum temperature (°c)	Morning relative humidity (%)	Evening Relative humidity (%)	Rain fall (cm)
Cricket ball		-0.484*	-0.106	0.517**	0.366	0.126
Kalipatti		-0.539**	-0.097	0.517**	0.414*	0.117
DHS-1		-0.701**	-0.081	0.676**	0.557**	0.26
DHS-2#		-0.560**	-0.183	0.541**	0.396	0.088
DHS-2##		-0.736**	-0.193	0.621**	0.525**	0.157

** Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

New orchard, Agriculture College, Dharwad

KVK, Saidapur Farm



Fig 1: Symptoms of damage and larva of leaf miner, *Achrocerops gemoniella* on sapota

4. Conclusion

The activity of leaf miner observed throughout the year except April and May with peak activity during September to November. There was no influence of weather factors on leaf miner incidence except morning, evening relative humidity and rainfall were found favorable for incidence of pest in field.

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