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Impact of weather factors on the seasonal incidence of sapota leaf webber, *Nephoptyx eugraphella* Ragonot

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Abstract

Studies on seasonal incidence of leaf webber, *Nephoptyx eugraphella* Ragonot (Lepidoptera: Pyralidae) were carried out at new orchard, Agriculture College, Dharwad and Saidapur farm, KVK, Dharwad, University of Agricultural Sciences, Dharwad, Karnataka during 2013–2014. Observations were recorded from four sapota genotypes viz., Cricket ball, Kalipatti, DSH-1 and DSH-2. The incidence of pest was high (2.27 to 3.79%) during August to November. Whereas it was low (0.00 to 1.58%) during December to July. The percentage of damaged leaves on four different genotypes of sapota was high (2.17%) on Cricket ball and it was low on DSH-1 (1.35%). The overall mean percentage of damaged leaves irrespective of the genotypes varied from 0.00 (May) to 3.79 (October). The correlation studies of leaf webber with weather parameters showed that there was a positive correlation between leaf webber damage and maximum temperature in DSH-2 hybrid similarly minimum temperature had positive correlation in Cricket ball and DSH-2 hybrid. The morning relative humidity had positive and significant correlation with leaf webber incidence in Cricket ball, Kalipatti, DSH-1 and DSH-2. The evening relative humidity showed positive and significant correlation with leaf webber incidence. There was a positive correlation between rainfall and leaf webber incidence in all the genotypes except DSH-2 hybrid grown in new orchard, College of Agriculture, Dharwad.

Keywords: leaf webber, *Nephoptyx eugraphella*, seasonal incidence, sapota, weather

1. Introduction

Sapota (*Manikara achras* Mill Forsberg) is an important tropical fruit crop. Sapota, popularly known in India as chiku, is native to tropical America. It is a tropical and subtropical fruit, belongs to family Sapotaceae. It is largely grown in Gujarat, Maharashtra, Karnataka, Tamilnadu, Kerala, Uttarpradesh, Haryana, Punjab and West Bengal. The first commercial sapota cultivation from Maharashtra was taken up in Gholvad area in 1898 by ^[11]. Among the various factors affecting the yield and quality of fruit crops, the damage caused by insect pests is considered as a major constraint. Sapota tree is attacked by more than 25 insect pests ^[2]. They remain hiding in between the leaves and under loose web of excreta. Later the larvae devour buds, flowers and also bore into the fruits thus reducing the yield considerably ^[9]. Among the different pests, bud borer, *Anarsia achrasella* Bradley, mid rib folder, *Banisia myrsusalis elearalis* Walker, chiku moth *Nephoptyx eugraphella* Ragonot, Leaf miner *Achrocercops gemoniella* Stainton and fruit flies, *Bactrocera dorsalis* (Hendle) and *Bactrocera zonata* (Saunders) are considered as major pests of sapota whereas bud borer, leaf miner as well as mid rib folder remain active throughout the year with varying degrees of infestation by ^[8]. Among these, leaf webber, *Nephoptyx eugraphella* Ragonot (Lepidoptera : Pyralidae) is a major and regular pest causing damage to the sapota crop and commonly it is known as chiku moth. By ^[10] reported that extent of leaf area infested by *N. eugraphella* varied from 4.55 to 16.15 per cent. Damage to flowers/buds varied from 1.0 to 6.6 per cent. The pest was active throughout the year with the peak in May-June on flower/bud and in the month of February on leaves.

The larvae of leaf webber, *N. eugraphella* feed on leaves by webbing the leaves and feed on leaf tissues by feeding on chlorophyll content of leaf. It remains hidden within the webbed leaves. The larvae damages the leaves, flower buds, flowers and fruits so by considering the importance of this pest the present investigation was carried out to know its seasonal incidence on sapota leaves under Northern dry zone condition of Karnataka.

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2. Materials and Methods

Studies were conducted on seasonal incidence of leaf webber, *Nephoteryx eugraphella* Ragonot. The field experiment was conducted in new orchard, Agriculture College, Dharwad and Saidapur farm, KVK, Dharwad, University of Agricultural Sciences, Dharwad, Karnataka, India is situated at 15°12' N latitude and 76°34' E longitude with an altitude of 678 meters above the mean sea level (MSL). Observations on leaf webber, *N. eugraphella* were taken from five medium sized trees from different genotypes viz., Cricket ball, Kalipatti, DSH-1 and DSH-2 were selected randomly. No insecticidal application was done during the period of study. The observations were recorded at 15 days intervals from June 2013 till May 2014. From each of the tree ten twigs were selected and in each twig all the leaves were observed for the incidence of leaf webber. Observations were taken on number of damaged leaves / twig and total number of leaves observed / twig on different genotypes and per cent of infestation was worked out. Mean percentage of leaves damaged by leaf webber was worked out on different genotypes by using formula:

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

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

3. Results and Discussion

The percentage of damaged leaves on four different genotypes of sapota was high (2.17%) on Cricket ball and it was low on DSH-1 (1.35%) (Table 1). The overall mean percentage of damaged leaves irrespective of the genotypes varied from 0.00 (May) to 3.79 (October). In general the incidence of pest was high (2.27 to 3.79%) during August to November. Whereas, it was low (0.00 to 1.58%) during December to July. The incidence of leaf webber on Cricket ball variety ranged from 0.00 to 7.80 per cent. Minimum of 0.50 per cent was recorded during second fortnight of April followed by 0.53 per cent during first fortnight of June. Maximum of 7.80 per cent was recorded during second fortnight of September followed by 5.31 per cent during first fortnight of November. In Kalipatti variety it ranged from 0.00 to 4.80 per cent. Minimum of 0.51 per cent was recorded during first fortnight of January followed by 0.68 per cent during first fortnight of July. Maximum of 4.80 per cent was recorded during first fortnight of November followed by 3.71 per cent during second fortnight of September.

In DSH-1 hybrid it varied from 0.00 to 3.52 per cent. Minimum of 0.52 per cent was recorded during second fortnight of January followed by 0.58 per cent during first fortnight of March. Maximum of 3.52 per cent was recorded during second fortnight of October followed by 2.94 per cent during first fortnight of November. In DSH-2 hybrid it ranged from 0.00 to 4.72 per cent in new orchard, College of Agriculture, Dharwad. Minimum of 0.56 per cent was recorded during second fortnight of February followed by 0.63 per cent during second fortnight of June. Maximum of 4.72 per cent was recorded during second fortnight of October followed by 4.68 per cent during November first fortnight. At KVK, Saidapur farm, Dharwad, the incidence of leaf webber recorded in DSH-2 hybrid which ranged from 0.00 to 4.20 per cent. Minimum of 0.32 per cent was recorded during second fortnight of February. Maximum of 4.20 per cent was recorded during first fortnight of October. These results are in line with the findings of [7] and Patange *et al.* [5] (1997) who reported the peak infestation of chiku moth (*N. eugraphella*) from June to November in Maharashtra. Jhala *et al.* [4] (1996) reported that infestation of *N. eugraphella* on sapota buds was high 9.36% during June and October. Similarly by Anon. [1] reported that chiku moth was found with peak incidence during the later months of the monsoon, i.e. September-November. However by [3] reported *N. eugraphella* damage on leaves; which recorded 10.15 per cent during October first fortnight

The correlation studies made between the incidence of leaf webber and weather parameters (Table 2) showed that there was a positive correlation between leaf webber damage and maximum temperature in DSH-2 hybrid. Similarly, minimum temperature had positive correlation with leaf webber incidence in Cricket ball and DSH-2 hybrid. The morning relative humidity had positive and significant correlation with leaf webber incidence in Cricket ball, Kalipatti, DSH-1 and DSH-2. The evening relative humidity showed positive and significant correlation with leaf webber incidence. There was a positive correlation between rainfall and leaf webber incidence in all the genotypes except DSH-2 hybrid grown in new orchard, College of Agriculture, Dharwad. These results are in line with the findings of [6] who reported that infestation of *N. eugraphella* on buds in middle Gujarat had significant positive correlation with rain fall, morning and evening relative humidity and significant positive correlation with maximum temperature.

4. Conclusion

Infestation of leaf webber was appeared more or less throughout the year except April and May with peak activity during August to November whereas, it was low during December to July. The leaf webber incidence was significantly and negatively correlated with maximum temperature.

Table 1: Seasonal incidence of leaf webber, *Nephoteryx eugraphella* during 2013-14 on different genotypes

S. No	Month	Fortnight	Per cent leaves damaged					Mean
			Cricket Ball *	Kalipatti *	DHS-1*	DHS-2 *	DHS-2 **	
1	June-2013	I	0.53	0.84	1.20	1.25	1.25	1.05
2		II	0.83	1.13	1.58	0.63	1.30	
3	July	I	1.08	0.68	0.93	1.28	0.90	1.01
4		II	1.31	0.93	0.72	1.08	1.20	
5	August	I	2.55	1.82	1.12	1.68	1.35	2.27
6		II	3.72	2.70	1.58	2.51	3.68	
7	September	I	3.84	2.38	1.76	2.97	3.51	3.58
8		II	7.80	3.71	2.24	3.65	3.92	

9	October	I	4.52	3.18	2.61	3.45	4.20	3.79
10		II	4.86	2.94	3.52	4.72	3.92	
11	November	I	5.31	4.80	2.94	4.68	3.47	3.31
12		II	2.60	1.32	1.81	3.56	2.65	
13	December	I	1.24	0.68	0.93	4.08	0.92	1.58
14		II	1.17	1.53	2.56	2.06	0.60	
15	January-2014	I	0.83	0.51	1.55	1.95	1.52	1.06
16		II	0.56	0.82	0.52	1.27	1.08	
17	February	I	1.21	1.10	1.02	1.37	0.93	0.87
18		II	0.68	0.89	0.60	0.56	0.32	
19	March	I	1.02	1.25	0.58	0.86	0.0	0.43
20		II	0.62	0.0	0.0	0.0	0.0	
21	April	I	0.91	0.0	0.0	0.0	0.0	0.14
22		II	0.50	0.0	0.0	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			2.17	1.51	1.35	1.98	1.67	

*At new orchard, Agriculture college, Dharwad

** At KVK, Saidapur farm, Dharwad

Table 2: Correlation coefficient between leaf webber, *Nephopteryx eugraphella* and weather parameters

Weather data Varieties	Maximum temperature (°c)	Minimum temperature (°c)	Morning relative humidity (%)	Evening relative humidity (%)	Rain fall (mm)
Cricket ball	-0.447*	0.058	0.516**	0.44*	0.152
Kalipatti	-0.539**	-0.097	0.517**	0.414*	0.117
DHS-1	-0.0597**	-0.286	0.510*	0.337	0.082
DHS-2#	0.086	-0.14	-0.199	-0.219	-0.146
DHS-2##	-0.571**		0.644**	0.531**	0.232

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

New orchard, Agriculture College, Dharwad

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

KVK, Saidapur Farm, Dharwad

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