

## Ecological studies on mango leaf webber (*Orthaga exvinacea* Hamp.) in Andhra Pradesh as a basis for IPM

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### ABSTRACT

The influence of ecological factors viz., biotic (Host plant) and abiotic factors (weather parameters) on the abundance and population fluctuation of leaf webber, *Orthaga exvinacea* (Hamp.) on mango under the conditions of Chittoor district were worked out. Peak incidence was observed during first fortnight of November (19.4 webs/tree). However, gradual increase was observed from the first fortnight of July (2.6 webs/tree) and declined during second fortnight of January (3.2 webs/tree). Correlation studies between incidence and weather parameters showed positive relationship with minimum temperature, relative humidity and rainfall and negative relationship with maximum temperature. None of the varieties was free from infestation. The infestation ranged from 7.80 to 29.47 webs/tree, 5.82 to 22.55 leaves/web and 1.92 to 29.47 larvae/tree. Variety Neelum showed less infestation, while Bangalore showed severe infestation and other varieties viz., Neeleghan, Cherakurasam, Mulgova, Rumani, Baneshan and Swarnajahangir have moderate infestation. Result of the study also revealed that older mango trees (15 and above years old) were more susceptible (18.26, 348.75, 121.61 webs/tree, webbed leaves/tree and larva/tree, respectively) to leaf webber damage than young trees (0-5 years old).

**Key Words:** Mango leaf webber, Ecological studies, Varietal susceptibility, Abiotic factors

### INTRODUCTION

Mango, *Mangifera indica* is an important fruit crop of India. Its spread gained momentum in recent years because of the export potential of the produce. Mango leaf webber, *O. exvinacea* (Hamp.) (Lepidoptera:Pyralidae) is an important pest of mango and influence the yield indirectly. Varying incidence of leaf webber was seen in the mango orchards of S.V. Agri College on different varieties. The caterpillars loosely web several leaves of a shoot together and from within feed by defoliating. After feeding what remains are dry bits of leaves, web and excreta. When the whole tree is attacked, it gives a completely burnt appearance. The infestation range varied between 25 to 100 per cent on trees. As the pest within a short period of time, it gained a major problem status (Srivastava and Verghese 1983 and Srivastava, 1997). Hence, ecological studies to generate a basis for a sustainable management technology against the pest were taken up in 2000-2001 and the results are presented in this paper.

### MATERIALS AND METHODS

Studies on seasonal incidence and population fluctuation of leaf webber were carried out in mango orchards of S.V. Agricultural College, Tirupati, Chittoor district. The crop was observed at fortnight intervals throughout the year for the incidence of mango leaf webber. Observations were recorded during morning hours to take the advantage of sedentary nature of insect at that time. Seven trees were selected and from each tree corresponding to four directions four branches were tagged. From each branch three twigs/were observed for recording data. The total numbers of webs were recorded by counting the number of webs in each tree.

Eight mango varieties viz., Neelum, Bangalore, Baneghan, Rumani, Mulgova, Neeleghan, Swarnajahangir and Cherukurasam were observed continuously to quantify the relative susceptibility of different mango varieties to leaf webber. From each variety, three trees of 15-20 years of age were selected for this study. Each tree was observed by fixing (12) sampled spots (i.e.) three in each direction. The total numbers of webs were recorded by counting the number of webs in each tree. The data were subjected to statistical analysis after transferring into square root transformation.

Impact of abiotic factors on population dynamics of leaf webber in mango were carried out by correlating meteorological observations and leaf webber incidence. Data on all mean values for temperature (both maximum and minimum, °C), relative humidity (morning and evening, %) and total rainfall (mm) in different standard weeks were recorded from the meteorological observatory of Regional Agricultural Research Station (RARS), Tirupati.

Studies on the influence of age of the tree on the population dynamics of leaf webber was done on Bangalore variety. Three distinct age group of trees viz., 0-5, 6-14 and >15 years old were selected for the study. Under each age group seven trees were selected for constant observation at fortnight intervals. From each selected trees twelve samples were observed and data's were subjected to statistical analysis (ANOVA and DMRT).

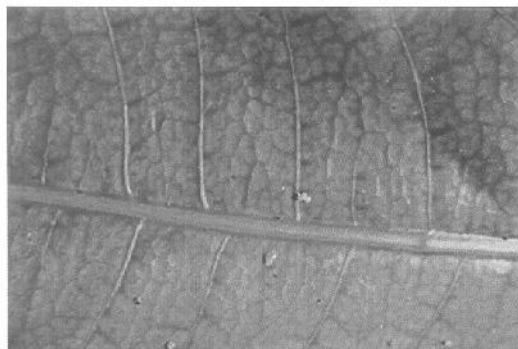
### RESULTS AND DISCUSSION

The leaf webber, *Orthaga exvinacea* Hampson was medium sized moth. Forewings were blackish with dark brown with white coloured patches. Hind wings have same colouration with less shiny patches. Females were bigger in size with stout abdomen but males were smaller than females. Eggs were laid single or in clusters with pale yellowish green in colour and larvae were found to be pale greenish in colour with brown head pupae was dark brown in colour and pupation occurred with the webbed foliage. The larvae webbed the adjacent leaves and were found feeding on chlorophyll content of the leaves plate. The extensive damage could be seen in terms of terminal shoot webs with dried leaves (Figure 1).

The leaf webber was active throughout year, except during the month of February to May (i.e.) flowering, fruit setting, fruit maturity and ripening stages. The results in the Table 1. showed that the peak leaf webber population in mango was observed during first fortnight of November (19.4 webs/tree). A gradual increase in population was observed from the first fortnight of July (2.6 webs/tree) to first fortnight of November (19.4 webs/tree) and subsequently, declined during (3.2 webs/tree) second fortnight of January. The incidence attained peak stage during September to October when the colour of the leaves was dark green with more succulence and bushiness. Correlation studies between incidence of leaf webber and weather parameters showed non-significant positive relationship with minimum temperature ( $r=0.1778$ ) and morning relative humidity ( $r=0.1374$ ) and significant positive relationship with rainfall

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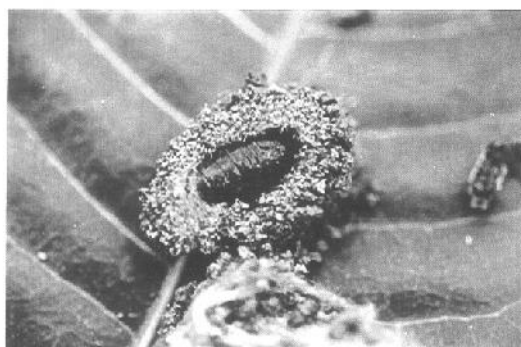
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Fig. 1 : Life stages of shoot webber, *Orthaga exvinacea* (Hampson)

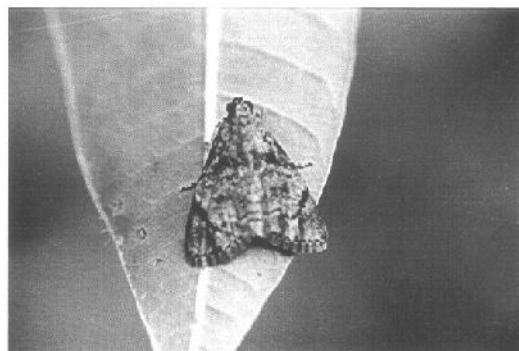
Eggs



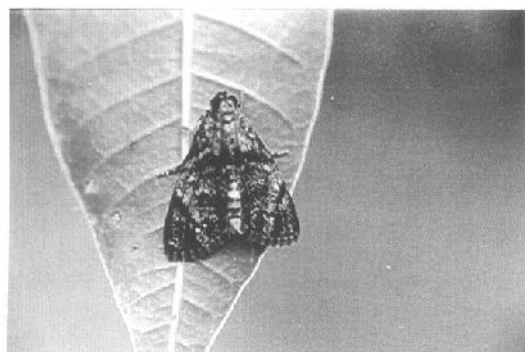
Larva



Pupa



Male moth



Female moth



Damage

( $r = 0.5043$ ). It also showed significant negative relationship with maximum temperature ( $r = -0.1375$ ) and leaf webber population (Table 2). The present findings are co-incidence with the reports of Prasada Reddy (2000), who reported that the webber had negative correlation with maximum and minimum temperature but positive correlation with rainfall and relative humidity. The present studies are in agreement with the findings of Bharath Babu (2001), who observed the activity of leaf webber during June to January in South Zone of Andhra Pradesh. Similarly, Srivastava *et al.* (1982) also observed during October-November in Uttar Pradesh. On the contrary

in Orissa the peak activity was reported during February-April (Dash and Panda, 1997) and this variation in incidence may be due to the influence of location and season specific climatic conditions.

All the eight varieties screened were found infestation with the mango leaf webber (Figure 1), the infestation ranged from 7.80 to 29.47 webs/tree, 5.82 to 22.55 leaves/web and 1.92 to 29.47 larvae/tree. Variety Neelum showed less infestation (7.80 webs/tree, 5.82 leaves/web and 1.92 larvae/web) while Bangalore showed severe infestation (29.47 webs/tree, 22.55 leaves/web and 8.35 larvae/web), the other varieties viz., Neelshan (8.02, 7.92 and 6.66),

Table 1 : Seasonal incidence of leaf webber, *Orthaga exvinacea* on mango

Standard weeks	Number of webs/tree	Standard weeks	Number of webs/tree
26 July	2.6	42	18.2
28	3.5	44 November	19.4
30 May	4.8	46	16.1
32	6.5	48 December	13.0
34 September	10.7	50	9.2
36	13.7	52	8.3
38	15.4	2 January	5.9
40 October	16.7	4	3.2

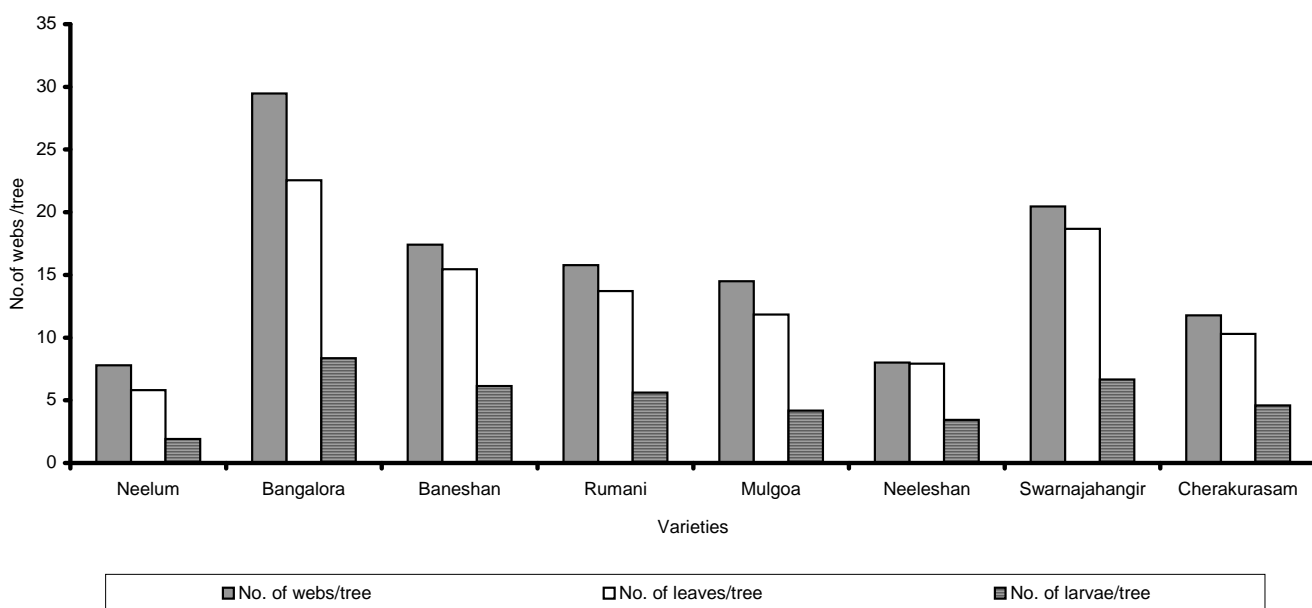
Table 2 : Relationship between weather parameter and leaf webber incidence

Correlation coefficient	temperature		Relative humidity		Rainfall
	Minimum	Maximum	Morning	Evening	
r	0.1778 <sup>NS</sup>	- 0.1375 <sup>NS</sup>	0.1374 <sup>NS</sup>	0.4354	0.5043

Critical value rate at 5% = 0.2734

1% = 0.3541

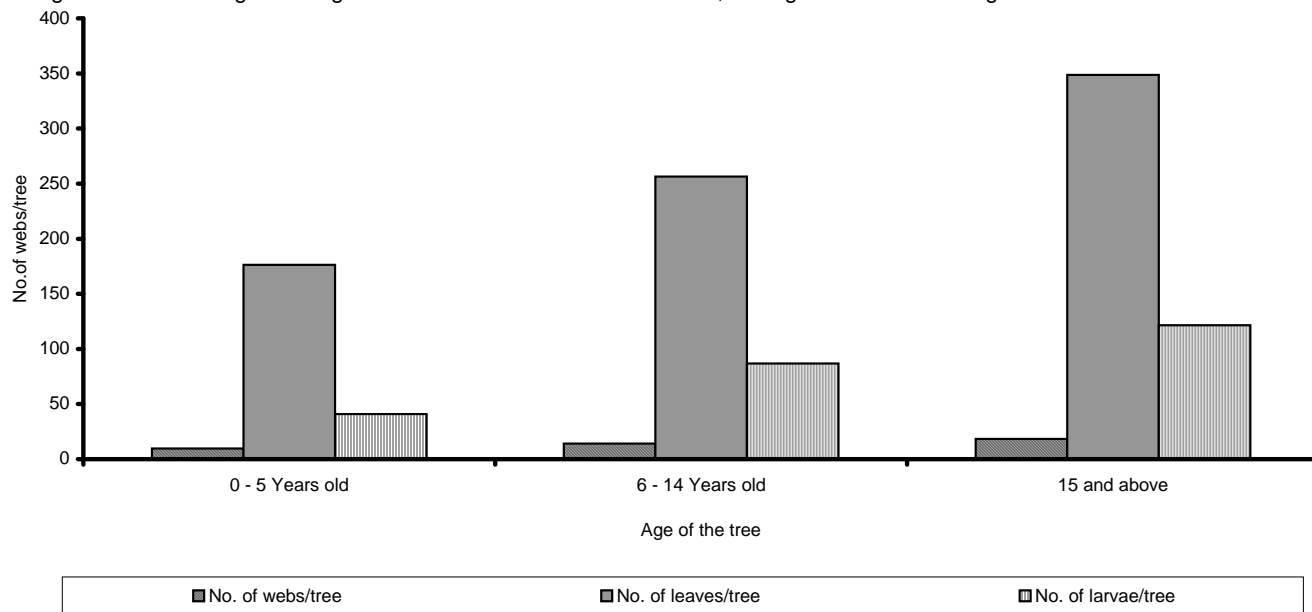
NS = Non significant

Fig. 2 : Relative incidence of leaf webber, *Orthaga exvinacea* in different mango varieties

Cherakurasam (11.78, 10.30 and 4.60), Mulgoa (14.50, 11.83 and 3.44), Rumani (15.77, 13.72 and 5.61), Baneshan (17.41, 15.45 and 6.13) and Swarnajahangir (20.47, 18.67 and 6.60 webs/tree, leaves/web and larvae/web, respectively) have moderate infestation. The result of the present investigation are in agreement with the finding of Prasada Reddy (2000), who reported that Neelum, Swarnajahangir and other cultivars viz., Bangalore and Panchadarakalasa X Willard were highly susceptible to leaf webber.

The results of the present study reports that the older mango

trees (15 and above years old) were more susceptible to leaf webber damage (18.26, 348.75, 121.61) (Figure 2). Similarly, young mango trees (0-5 years old) were less susceptible to leaf webber infestation (9.61, 176.34, 40.94, webs/tree, webbed leaves/tree and larvae/tree, respectively). The results of the present study are in confirmation with the findings of Shaw *et al* (1996) and Prasada Reddy (2000), who reported that matured grown up trees (20 years and above) were more susceptible than young trees (below 10 years old).

Fig. 3 : Influence of age of mango trees on the incidence of leaf webber, *Orthaga exvinacea* in mango

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