Plant Archives Vol. 24, No. 2, 2024 pp. 71-74 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2024.v24.no.2.009

SEASONAL INCIDENCE OF LEAF WEBBER ON DIFFERENT REJUVENATED MANGO CULTIVARS IN SUB-HIMALAYAN TERAI REGION OF WEST BENGAL, INDIA

Polu Parameshwar[1]*, Nilesh bhowmick[1] and Shyamal Kr. Sahoo[2]

[1]Department of Pomology and Post-Harvest Technology, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar - 736 165, West Bengal, India.

[2]Department of Agricultural Entomology, Uttar Banga Krishi Viswavidyalaya Pundibari, Cooch Behar-736 165, West Bengal, India.

*Corresponding author E-mail : paripolu@gmail.com

(Date of Receiving-22-01-2024; Date of Acceptance-02-04-2024)

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 cultivars Amrapali, Mallika, Himsagar, Fazli and Langra was studied under sub-HimalyanTerai region of West Bengal during 2019-20 and 2020-21under natural field conditions without any control measures. The high humidity and rain fall at the terai region of West Bengal aggravates the problem of incidence of diseases and pests. The results indicated that the most active period of mango leaf webber in both the years was found during September-December. Peak incidence of leaf webber was observed during first fortnight of November. Cultivar Himsagar (4.75 webs/tree) showed less infestation, while Amrapali (11.38 webs/tree) showed severe infestation and other cultivars *viz*., Langra (10 webs/tree), Fazli (5.88 webs/tree), Mallika (5.75 webs/tree) showed moderate infestation. The differences were statistically significant with different weather parameters like temperature, humidity and rainfall. Correlation results indicated that the maximum leaf webber incidence was negatively correlated with minimum temperature in cv. Himsagar (r = - 0.944 **) followed by Mallika (r = -0.942**), respectively. Whereas, no strong correlation was found with the weather parameters for mango cvs. Amrapali, Fazli and Langra under this study.

Key words : Ecological factors, Leaf webber, Mango, Sub-Himalyan Terai region.

Introduction

Mango (*Mangifera indica* Linn) is the most important fruit of India and is known as “King of fruits”. The mango trees are growing well under a wide range of agro climatic situation in the country and can grow well in all type of soil from alluvial to lateritic, except highly calcareous soils. It does well within temperature ranging from 24-30^{O}C, although it can successfully endure even temperature as high as 48^{0}C during the period of fruit development and maturity. Mango having good nutritional value as every 100 g of mango fruit contains 81.7 g water, 16 g carbohydrate, 0.7 g protein, 0.4g fat and 0.1 g fibres. It is rich in calcium, phosphorus, iron, magnesium, Vitamin-A, B, C and also anti-oxidants. A single fruit can provide up to 40 percent daily dietary fibre needs. Mango fruits having various uses from unripe to ripen stages, unripe mangoes are used for making pickles, marmalade, amchur, tannin, soft drinks etc. while fully ripe mangoes are used for pulp making, jam, squash, candy and *papads* etc. At present in India, mango is cultivated in an estimated area of 2.29 million hectare with 20.44 million tons of fruit production and productivity. Important mango producing Indian states are Uttar Pradesh, Andra Pradesh, Karnataka, Telangana, Bihar and Gujarat. In West Bengal, total area under mango cultivation is about 9074 thousand ha and production is about 836.07 metric tons with 8.54 t ha^{-1} productivity (Anonymous, 2020). In contrast to other mango-producing countries, India productivity is low. This may be due to a variety of factors, including climatic circumstances, the diversity of associated pests and

diseases, traditional planting methods, inadequate orchard management and issues with alternating bearing of mango trees (Biswas and Kumar, 2011).

Rejuvenation and selective shoot pruning of dense mango orchards increases the light interception and air circulation, which improve photosynthetic efficiency, fruit yield and quality as well as decreases the incidence of pest and diseases (Medina *et al*., 2005). More than 250 insect and mite pests have been identified as attacking mango crops at various phases of development, with roughly 10% posing a major threat (Penna and Mohyuddin, 1997). One of the major pests responsible for low production is mango leaf webber (Singh and Verma, 2013). In India, two species, *Orthaga exvinacea* Hampson and *Orthaga euadrusalis* Walker, have been identified as serious pests on mango. In Uttar Pradesh, Bihar and other parts of Northern India, *Orthaga euadrusalis* has recently become a key limiting issue in mango production (Srivastava, 1997). In Uttar Pradesh, Bihar and other parts of Northern India, *Orthaga euadrusalis* has recently become a major limiting issue in mango production (Srivastava, 1997). It was once considered a minor pest, but it is now has attained a major pest. It's also been reported as a serious pest of mango trees in south India on occasion (Ayyar, 1940). The caterpillars webbed two to three leaves together in the early stages and fed on them by cutting the leaves from the edges to the midrib, leaving a network of veins behind. The larvae were seen feeding voraciously and webbing the shoots and leaves together in adult stages. The leaves loosened and detached from their stalks, but remained entangled in the tree's webs. Heavily infested trees give a burnt look and severe infestation result in complete failure of flowering. The present study was undertaken to determine the seasonal incidence and distribution pattern of leaf webber (*O. exvinacea* Hamp.) on mango.

Materials and Methods

The present investigation was conducted at the Instructional Farm, Department of Pomology and Post-Harvest Technology, Faculty of Horticulture, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal during 2019-20 and 2020-21. The incidence of leaf webber was recorded on mango cultivars Amrapali (T_1), Mallika (T_2), Himsagar (T_3), Fazli (T_4) and Langra (T_5) after the rejuvenation. The age of the plant was 23 years old with planting 7-8m distance. Four plants of each variety selected and rejuvenated 150cm from the ground level. Data was recorded at monthly intervals from September to December after the emergence of new leaves. The incidence of leaf webber on rejuvenated mango were recorded from all directions of plant, total number of webs per tree were recorded from each individual cultivar.The distribution pattern of leaf webber in different directions of the tree canopy was then plotted in randomized block design (RBD) with four replications and data was recorded by counting number of webs per tree. The meteorological data *viz*., Maximum temperature, Minimum temperature, Relative humidity and rain fall were collected from Meteorological Observatory, Uttar Banga Krishi Viswavidyalaya of West Bengal. The relationship between the incidence of leaf webber with the weather parameters were examined by the correlation calculation (Kertetta *et al*., 2021) using Microsoft Excel 2007 software.

Results and Discussion

The incidence of mango leaf webber during 2019 - 20 and 2020-21 are presented in Table 1. From the results, it was observed that web formation was not found up to August month after rejuvenation. The incidence of leaf webber was first observed in the month of September on all rejuvenated mango cultivars (pooled data) (Fig. 1) *viz*., Amarapali (5.25 webs/tree), Mallika (4.63 webs/tree), Fazli (3.63 webs/tree), Himsagar (3.13 webs/tree) and Langra (2.75 webs/tree). Thereafter, the population gradually started increasing and the peak incidence was observed during the month of November on Amrapali (11.38 webs/tree) followed by Langra (10 webs/tree), Fazli (5.88 webs/tree), Mallika (5.75 webs/tree). Whereas, minimum incidence was recorded in Himsagar (4.75 webs/tree) in both the seasons during 2019-20 and 2020-21, respectively. The similar findings are reported by Kannan and Rao (2006) after working on eight mango varieties and reported that the peak incidence of the pest was observed during the first fortnight of November (19.4 webs/tree) and the present findings supported with the reports of Kavitha *et al*. (2006), that leaf webber incidence started on second fortnight of July and reached its peak by first fortnight of December. Singh and Verma (2013) noticed that the pest remained active from June to December in mango orchard and completed different over lapping generations in this period and the maximum active period was September-December. Reddy *et al*. (2002) recorded that the mango leaf webber (*O. exvinacea*) was first detected during second fortnight of June.

After second fortnight of December the larval population vanished from the orchards and no further infestation is noticed in the mango orchards. The most active period of the pest is from August-December (Anonymous, 2014). According to Soumya *et al*. (2017)

Table 1 : Incidence of leaf webber on different rejuvenated mango cultivars 2019-2021.

	Amrapali			Mallika			Himsagar			Fazli			Langra		
	2019-20	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**
Sept	2.00	8.50	5.25	2.75	6.50	4.63	2.00	4.25	3.13	4.25	3.00	3.63	1.75	3.75	2.75
Oct	5.00	9.75	7.38	4.00	6.25	5.13	1.75	5.25	3.50	9.50	5.00	7.25	4.75	7.75	6.25
Nov	3.00	19.75	11.38	2.00	9.50	5.75	3.75	5.75	4.75	7.75	4.00	5.88	10.75	9.25	10.0
Dec	1.75	7.00	4.38	2.25	9.75	6.00	3.00	6.75	4.88	1.75	7.35	4.55	4.75	4.75	4.75

Table 2 : Correlation studies between incidence of mango leaf webber and weather parameters in West Bengal.

	T_1(Amrapali)			T_2(Mallika)			T_3(Himsagar)			T_4(Fazli)			T_5(Langra)		
	2019-20	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**	**2019-20**	**2020-21**	**Pooled**
Temp (max)	0.868	0.158	0.664	0.392	-0.814	-0.268	0.084	-0.675	-0.319	0.952*	-0.586	0.857	0.634	0.399	0.542
Temp (min)	0.579	-0.259	0.052	0.617	-0.977*	-0.942**	-0.586	-0.930**	-0.944**	0.706	-0.693	0.151	-0.190	-0.217	-0.272
RH (max)	-0.355	-0.752	-0.686	0.165	-0.590	-0.787	-0.619	-0.591	-0.756	-0.330	-0.254	-0.678	-0.819	-0.901	-0.907
RH (min)	-0.183	-0.636	-0.498	0.267	-0.796	-0.925**	-0.657	-0.782	-0.891	-0.117	-0.451	-0.508	-0.740	-0.729	-0.786
Rainfall	-0.287	-0.335	-0.397	0.150	-0.582	-0.848	-0.568	-0.827	-0.762	-0.191	-0.667	-0.666	-0.705	-0.673	-0.703

**Significant at 1% level *Significant at 5% level df =10

there was a high population during the months of October to December. From January until around April, there was no population on the leaves.

Correlation studies of leaf webber incidence with different weather parameters were done and presented in Table 2. From the pooled data (2019-20 and 2020-21), it was observed that, the maximum leaf webber incidence was negatively correlated with minimum temperature in cv. Himsagar (r = 0.944**) followed by Mallika (r Š§ - 0.942**), respectively. Whereas, no strong correlation was found with the weather parameters for mango cvs. Amrapali, Fazli and Langra under this study. Among the meteorological parameters, minimum temperature was negatively correlated (Fig. 2) with leaf webber incidence for mango cvs. Himsagar (r = - 0.944*); Mallika (r = - 0.942*). Kavitha *et al*. (2006), found same results coincided with the present results that number of webs per tree was negatively correlated with minimum temperature and positively correlated with forenoon relative humidity but not significantly related with evaporation, solar radiation and rainfall. Prasada Reddy (2000) reported that the webber incidence in mango had negative correlation with maximum and minimum temperature but positive correlation with rainfall and relative humidity. The pest completes several overlapping generations from July to December on mango trees. Three distinct peaks can be observed in first fortnight of August, September and October. In the months of August to December were most active for mango leaf webber. The correlation results showed that while there was a negative correlation between all meteorological factors and the leaf webber population, there was a

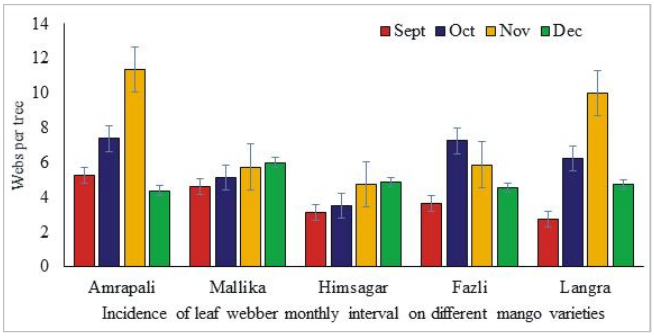

Fig. 1 : Population dynamics of leaf webber on different rejuvenated mango cultivars in West Bengal during 2019-21 (pooled data).

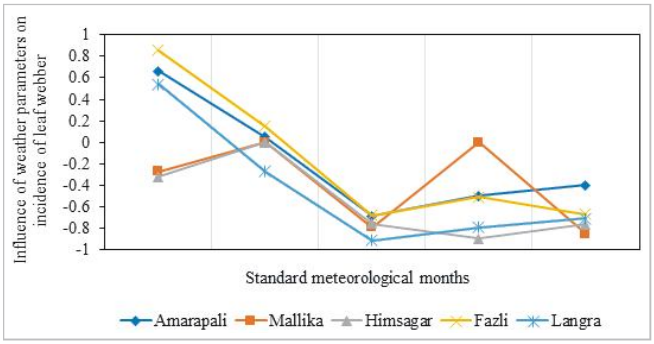

Fig. 2 : Leaf webber incidence on different rejuvenated mango cultivars in West Bengal.

positive significant relationship only between the relative humidity in the morning (Kasar *et al*., 2017). The pest's activity remained at high level from September to December it may be favourable or congenial to increase the insect population.

Conclusion

More number of leaf webs was observed in rejuvenated plants of Amrapali and less number recorded on Himsagar. The high humidity and rain fall at the Terai Region of West Bengal aggravates the problem of incidence of diseases and pests. With this aim the present attempts has been made to determine the incidence of leaf webber and it may be helpful in evolving effective and timely control methods against this rising pest of mango.

Acknowledgement

The authors thankful to the Head, Department of Pomology and Post-Harvest Technology, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch behar, West Bengal for providing necessary facilities and space for research work.

References

Anonymous (2014). *Management of Mango Leaf Webber*. www.cishlko.org

Anonymous (2020). Indian Horticulture Database, National Horticulture Board, Ministry of Agriculture, Government of India.

Ayyar, T.V.R. (1940). *Handbook of Economic Entomology for South India.* Govt. Press, Madras.

Biswas, B.C. and Kumar L. (2011). Revolution in Mango Production Success Stories of some Farmers. *Fertiliser Marketing News*, FAI, New Delhi, 2011, 23.

Kannan, M. and Rao, V. (2006). Ecological studies on mango leaf webber (*Orthaga exvinacea* Hamp.) in Andhra Pradesh as a basis for IPM. *Int. J. Agricult. Sci*., **2(2)**, 308-311.

Kasar, N., Marack J.C., DAS U.K. and Jha S. (2017). Incidence and distributionpattern of leaf webber (*Orthaga exvinacea* Hampson) on mango. *J. Entomol. Zool. Stud.*, **5(2)**, 1196-1199.

Kavitha, K., Lakshmi K.V., Anitha V., Reddy D.R. and Sudhakar T.R (2006). Influence of weather parameters on the incidence of mango leaf webber *Orthaga euadrusalis* Walker. *J. Agrometeorol*., **8(1)**, 130-132.

Kerketta, A., Sharma S., Tomar R., Katlam B. and Chaure R.B.D.N. (2021). Studies on mango leaf webber, *Orthaga* spp. with special reference to seasonal incidence. *The Pharma Innov.*, **SP-10(6)**, 521-529.

Medina, J.R., Opina O.S., de Jesus L.R.A. and Calumpang S.M.F. (2005) Development of an Integrated Pest Management Program for Mango in Palawan, Philippines. *The Philippine Agricultural Scientist*, **4**, 453-461.

Penna, J.E. and Mohyuddin A.I. (1997). Insect pests (Ed.) Richard E. Litz. *The mango botany, production and uses*. CAB International, Willingford, Oxon, UK,327.

Prasada, Reddy C.H. (2000). Studies on mango webbers with special reference to leaf webber, *Orthaga exvinacea* Hampson Pyralidae: Lepidoptera: *M.Sc. (Agri.) Thesis*, Acharya N.G. Ranga Agricultural University, Tirupati.

Reddy, C.H.P., Rejendraprasad P. and Umamaheswari T. (2002). Seasonal occurrence and distribution pattern of mango leaf webber, *Orthaga exvinacea* Hampson (Pyralidae: Lepidoptera). *J. Appl. Zoological Researches*, **13(2/3)**, 129-131.

Singh and Verma (2013). Factors Influencing the Incidence of Mango leaf Webber, *Orthaga euadrusalis* Hampson (Pyralidae : Lepidoptera) in Mango and their Management. *Molecular Entomology*, **4(4)**, 22-25.

Soumya, B.R., Verghese A. and Jayanthi P.D.K. (2017). Diversity andeconomic status of lepidopteran insect-pest on two majorvarieties of mango. *J. Entomol. Zool. Stud.*, **5**, 838-843.

Srivastava, R.P. (1997). *Mango insect pest management*. International Book Distributing Co. 6. (Lucknow, India), 272.