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Seasonal Incidence of Tea Mosquito Bug, *Helopeltis* spp. in Guava, cv. L-49 at MARS, Dharwad, Karnataka

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ABSTRACT: Tea mosquito bug (TMB) or guava kajji bug, *Helopeltis* spp. (Heteroptera: Miradae) is the most noxious insect pest that assumes major pest status in South and Central India. Major reason for the serious pest problems on guava can be attributed to its wide area of monoculturing and intensive cultivation practices. Adults and nymphs suck the sap from young leaves, tender shoots, flower buds and small fruits. If the fruits are young, they dry up and drop down. Damage to the leaves and shoots cause drying and withering of shoots. On fruits, with the maturation, the feeding punctures expand and results in corky formation affecting the marketable yield. This leads in loss of fruits to an extent of 60-70 per cent. The information with regard to pest status of tea mosquito bug and seasonal incidence in guava is lacking. In light of the above, the present investigations were undertaken. The incidence pattern of tea mosquito bug on guava was studied at Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad, Karnataka. Observations were made on total number of both affected and healthy parts *viz*., young leaves, flower buds and fruits on the plants at fortnightly intervals commencing from June 2019 to May 2021. The data of two years revealed that the pest incidence on young leaves was initiated (3.68 %) during second fortnight of June and peaked (24.82 %) during October first fortnight. Infestation on flower buds was noticed during August first fortnight (7.06 %) and peaked (21.52 %) during second fortnight of October. Fruit infestation was observed (7.49 %) in second fortnight of June, increased gradually over months and peaked (31.21 %) during October second fortnight. Correlation studies on impact of weather parameters on fruit infestation revealed significant negative correlation with respect to maximum temperature. However, relative humidity and rainfall were significantly positive correlated towards fruit infestation.

Keywords: Seasonal incidence, tea mosquito bug, guava, correlation, weather parameters.

INTRODUCTION

Guava (*Psidium guajava* L.) is an important fruit crop of India, commonly called as “apple of the tropics”. It is one of the most delicious as well as popular fruit in tropical and subtropical regions of the world and is extensively grown in similar climatic regions of India. It has gained a considerable place among the growers as well as consumers on account of its high nutritive value with pleasant aroma, good flavour, availability at moderate price and round the year availability.

Among various factors, insect pests are the major constraints in guava production as well as its productivity. Major reason for the serious pest problems on guava can be attributed to its wide area of monoculturing and intensive cultivation practices.

As many as 80 insect pests have been reported on guava (Haseeb and Sharma 2002). Of these, the mosquito bug, popularly known as tea mosquito bug (TMB) or guava kajji bug, *Helopeltis antonii* Sign. (Plate 1) (Heteroptera: Miridae) is the most noxious insect pest that assumes major pest status in south and central India.

Adults and nymphs suck the sap from young leaves, tender shoots, flower buds and fruits. If the fruits are young, they dry up and drop down (Puttarudraiah, 1952). Damage to the leaves and shoots cause drying and withering of shoots (Plate 2). On fruits, with the maturation, the feeding punctures expand and results in corky formation (Plate 4) affecting the marketable yield. Due to this, a maximum of 61.79 per cent fruit loss has been reported (Patil and Naik 2004). Deformation and extensive drying up of flower buds (Plate 3), old and bigger fruits are noticed due to severe bug infestation.

On Guava, the information with regards to seasonal incidence of tea mosquito bug is lacking. Hence, the incidence pattern of tea mosquito bug was studied by making observations in the guava orchard at Main Agricultural Research Station (MARS), University of Agricultural Sciences, Dharwad, Karnataka during 2019-20 and 2020-21.

Plate 1: Adult tea mosquito bug, *Helopeltis antonii* Signoret.

Plate 2: Drying of twigs due to tea mosquito bug.

Plate 3: Healthy (left) and infested (right) flower buds.

Plate 4: Infestation on fruit caused by tea mosquito bug.

MATERIAL AND METHODS

Observations were made on per cent damage inflicted by the bug on various parts of the plant. The methodology for estimation of damage was as follows. In the garden, ten plants were randomly selected and five branches were tagged in each selected plant. Observations were made on total number of both affected and healthy parts *viz*., young leaves, flower buds and fruits of the plants at fortnightly interval commencing from June 2019 to May 2021. Using sweep method, the adult and nymphal populations were also assessed by making 5 sweeps per tree using hand net.

Hence the fortnightly observations were recorded on,

Total number of bugs (Adult + Nymph) per sweep.

Total number of young leaves/ branch

Total number of affected young leaves/ branch

Total number of flower buds/ branch

Total number of affected flower buds/ branch

Total number of fruits/ branch

Total number of affected fruits/ branch

The data so obtained was converted into per cent damage using following formula:

$$\text{Per cent pest damage} = \frac{\text{No. of young leaves/flower buds/fruits damaged}}{\text{Total no. of young leaves/flower buds/fruits observed}} \times 100$$

Data representation was done by plotting the data for parameters observed against time. Correlation among the parameters measured was statistically compared using Pearson Correlation Coefficients and Stepwise regression analysis was performed between *H. antonii* population (dependent variable) and the weather parameters measured using PC-SAS (Anonymous, 1999).

RESULTS AND DISCUSSION

A. Infestation on young leaves

The activity of tea mosquito bug was noticed from June 2019 second fortnight with infestation of 3.82 per cent (Table 1). The infestation level gradually increased and reached its peak (25.53%) during October first fortnight. Thereafter, the infestation level started declining and was last recorded during second fortnight of December (5.33%). No activity of the pest was observed from January 2020 and the crop was totally free from attack of the bug till May 2020.

Similar trend was noticed during 2020-21 as well, with initiation of infestation during June second fortnight (3.53%) which increased gradually and reached the peak infestation of 24.10 per cent during October first fortnight. A declining trend was observed from second fortnight of October and reached the least infestation of 4.81 per cent during December second fortnight. The pooled data of two years revealed that the pest incidence initiated during June second fortnight (3.68 %) and peaked (24.82 %) during first fortnight of October (Table 2).

B. Infestation on flower buds

Infestation on flower buds by the pest was started from first fortnight of August 2019 with 7.19 per cent of damage. Then, the level of infestation started increasing over time and recorded highest infestation (21.88%) during October second fortnight. The pest continued to infest till second fortnight of November with 9.56 per cent of flower bud damage. There was absolutely no flower bud infestation recorded from December month onwards till July 2020.

Infestation on flower bud was again noticed during August first fortnight (6.93%) of 2020. As observed in the previous year, the infestation went on increasing till second fortnight of October (21.16%). The pest infestation registered a decreasing trend from November month and recorded 8.75 per cent by end of the same month. No flower bud infestation was observed during December 2020 to end of May 2021 study period. Observation on two years data showed the initiation of pest incidence during August first fortnight (7.06 %) and peaked (21.52 %) during October second fortnight.

C. Infestation on fruits

The pest started infesting fruits from the beginning of fruit set during second fortnight of June 2019 (8.15 %) which coincided with onset of monsoon. Infestation persisted throughout the fruiting period with peak infestation of 31.67 per cent during October second fortnight coinciding with peak fruiting period. Later, the infestation level presented a declining trend and recorded 7.15 per cent by the end of December. No fresh fruit infestation was observed from January month of 2020, which was end of the fruiting period. The crop was totally free from tea mosquito bug infestation from January 2020 to May 2020.

During the next consecutive year of study period, similar observations were recorded with initiation of fruit infestation during second fortnight of June 2020 (6.82%) which increased gradually. Increasing trend was seen till October second fort night which recorded 30.75 per cent fruit infestation. However, the level of infestation documented a decreasing trend from November first fortnight and was least (6.24%) during December second fortnight. No pest infestation was observed from January 2021 till May 2021 (Table 1). The perusal of pooled data reveals that the activity of pest started (7.49 %) in second fortnight of June, increased gradually over months and peak (31.21 %) infestation was noticed during second fortnight of October (Table 2).

Table 1: Seasonal incidence of *Helopeltis* spp. on different parts of guava, cv. Lucknow-49 at MARS, Dharwad location during 2019-20 and 2020-21.

Year/ Month	Fortnight	Damage on young leaves (%)	Damage on flower buds (%)	Damage on fruits (%)	Adult / Nymphal population / 10 trees (5 sweeps/tree)
2019 June	I	0.0	0.0	0.0	-
	II	3.82	0.0	8.15	-
July	I	9.28	0.0	15.83	-
	II	11.10	0.0	18.67	3
August	I	13.36	7.19	21.33	5
	II	14.15	8.06	22.45	5
September	I	20.38	13.63	25.17	6
	II	22.42	16.45	26.60	7
October	I	25.53	20.36	30.85	8
	II	18.65	21.88	31.67	8
November	I	13.74	15.21	23.56	6
	II	9.31	9.56	14.85	5
December	I	7.23	0.0	9.18	3
	II	5.33	0.0	7.15	3
2020 January	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
February	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
March	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
April	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
May	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
June	I	0.0	0.0	0.0	-
	II	3.53	0.0	6.82	-
July	I	7.68	0.0	14.25	2
	II	10.33	0.0	17.43	2
August	I	12.85	6.93	20.16	3
	II	15.46	8.77	23.81	4
September	I	19.12	15.38	25.22	5
	II	23.66	17.56	27.56	6
October	I	24.10	19.32	29.33	7
	II	17.95	21.16	30.75	7
November	I	11.28	13.74	22.18	5
	II	8.55	8.75	13.30	3
December	I	6.42	0.0	8.66	2
	II	4.81	0.0	6.24	2
2021 January	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
February	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
March	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
April	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-
May	I	0.0	0.0	0.0	-
	II	0.0	0.0	0.0	-

D. Adult / nymphal population of the bug

The adult / nymphal population of *Helopetis* spp. was observed between June and December months of 2019 and 2020. No record of bug population was found during other months of the study period on guava. Peak population of bugs was recorded during October months of 2019 and 2020 (8 and 7 bugs/10 trees, respectively). The population was considerably less (3 bugs/ 10 trees) during July second fortnight and December month of 2019. Similarly, the population was less (2 bugs / 10 trees) during July and December months of 2020 (Table 1).

Correlation studies and regression analysis between fruit infestation and weather parameters

During 2019-20, the average fruit infestation caused by tea mosquito bug was correlated with various weather parameters. Among them, the significant negative correlation was observed for maximum temperature (r=-0.713). However, minimum temperature showed positive correlation (r=0.197) but non-significantly. Relative humidity and rainfall showed significant positive correlation with r values of 0.821 and 0.524 respectively (Table 3).

Table 2: Seasonal incidence of *Helopeltis* spp. on different parts of guava, cv. Lucknow-49 at MARS, Dharwad location (Pooled data of two years).

Month	Fortnight	Damage on young leaves (%)	Damage on flower buds (%)	Damage on fruits (%)
June	I	0.0	0.0	0.0
	II	3.68	0.0	7.49
July	I	8.48	0.0	15.04
	II	10.72	0.0	18.05
August	I	13.11	7.06	20.75
	II	14.81	8.42	23.13
September	I	19.75	14.51	25.20
	II	23.04	17.01	27.08
October	I	24.82	19.84	30.09
	II	18.30	21.52	31.21
November	I	12.51	14.48	22.87
	II	8.93	9.16	14.08
December	I	6.83	0.0	8.92
	II	5.07	0.0	6.70
January	I	0.0	0.0	0.0
	II	0.0	0.0	0.0
February	I	0.0	0.0	0.0
	II	0.0	0.0	0.0
March	I	0.0	0.0	0.0
	II	0.0	0.0	0.0
April	I	0.0	0.0	0.0
	II	0.0	0.0	0.0
May	I	0.0	0.0	0.0
	II	0.0	0.0	0.0

Table 3: Correlation between the average fruit infestation due to *Helopeltis* spp. and weather parameters in Dharwad location during study period of 2019-20.

Sr. No.	Weather parameters	Correlation coefficient	Regression coefficient	R^2 Value	% Contribution	Regression equation
1.	Maximum temperature(X_1)	-0.713**	-1.466	0.719	71.90	Y (Fruit infestation) = [3.257 + (-1.466) **x** var2 + (0.878) **x** var3 + 0.366) **x** var4 + (-0.002) **x** var5 + 6.841
2.	Minimum temperature(X_2)	0.197	0.878			
3.	Relative humidity(X_3)	0.821**	0.366			
4.	Rainfall(X_4)	0.524**	-0.002			

** Significant at 0.05 level

Regression analysis indicated R^2 value of 0.719, inferring 71.90 per cent influence of weather parameters on the infestation level of tea mosquito bug. The multiple regression equation with weather factors and fruit infestation is as follows (Table 3).

$Y = 3.257 + (-1.466) X_1 + 0.878X_2 + 0.366X_3 + (-0.002) X_4 + 6.841$

Similar trend was observed during 2020-21 with significant negative correlation for maximum temperature (r= -0.594). Even though there was positive correlation for minimum temperature (r=0.256) with respect to fruit infestation, it was non-significant. As previous year, both relative humidity and rainfall showed significant positive correlation (r=0.655 and r=0.569 respectively) towards pest infestation on fruits (Table 4).

Regression analysis indicated R^2 value of 0.504, indicating 50.4 per cent influence of weather parameters on the fruit infestation level caused by tea mosquito bug. The multiple regression equation fitted with weather parameters and per cent fruit infestation is as follows (Table 4).

$Y = -20.092 + (0.680)X_1 + (-2.019)X_2 + 0.640 X_3 + 0.061X_4 + 8.825$

Observation for two years revealed that the peak infestation on young leaves (24.82 %), flower buds (21.52 %) and fruits (31.21 %) was recorded during October month (Fig. 1). Correlation studies on impact of weather parameters on fruit infestation revealed that, there was significant negative correlation with respect to maximum temperature. However, relative humidity and rainfall were significantly positive correlated with respect to fruit infestation. These results were true for both 2019-20 and 2020-21 years.

In general, the activity of tea mosquito bug on guava was noticed during June to November months. This period was coincided by presence of preferred plant parts *viz.*, young leaves, flower buds and fruits by the pest. Once the cropping season of guava was completed, the pest switched over to other alternate hosts (December to May months) near the vicinity in order to carry over the life cycle. Once the guava crop started flushing during monsoon, the pest again switched back to the main host and continued their activity.

Table 4: Correlation between the average fruit infestation due to *Helopeltis* spp. and weather parameters in Dharwad location during study period of 2020-21.

Sl. No.	Weather parameters	Correlation coefficient	Regression coefficient	R^2 Value	% Contribution	Regression Equation
1	Maximum Temperature (X_1)	-0.594**	0.680	0.504	50.40	Y (Fruit infestation) = - 20.092 + (0.680) **x** var2 + (-2.019) **x** var3 + (0.640) **x** var4 + (0.061) **x** var5 + 8.825
2	Minimum Temperature (X_2)	0.256	-2.019			
3	Relative Humidity (X_3)	0.655**	0.640			
4	Rainfall(X_4)	0.569**	0.061			

** Significant at 0.05 level

The present findings are in accordance with the results of Onkarappa (1993) and Sunilkumar (2000) who reported that the incidence of tea mosquito bug persisted from July to October on guava. Patil and Naik (2004) observed the maximum pest infestation on guava plant parts during October month, which declined further and no damage was encountered from December onwards. Ganga Visalakshy and Swathi (2016) reported that the pest occurs on guava during flushing and fruiting season from May to November.

The results pertaining to the correlation studies are in line with the findings of Kalita *et al.,* (2018) who reported that, relative humidity, minimum temperature and total rainfall were significantly positive correlated with respect to *Helopeltis theivora* infestation on red cherry pepper. However, maximum temperature was positively correlated but was insignificant.

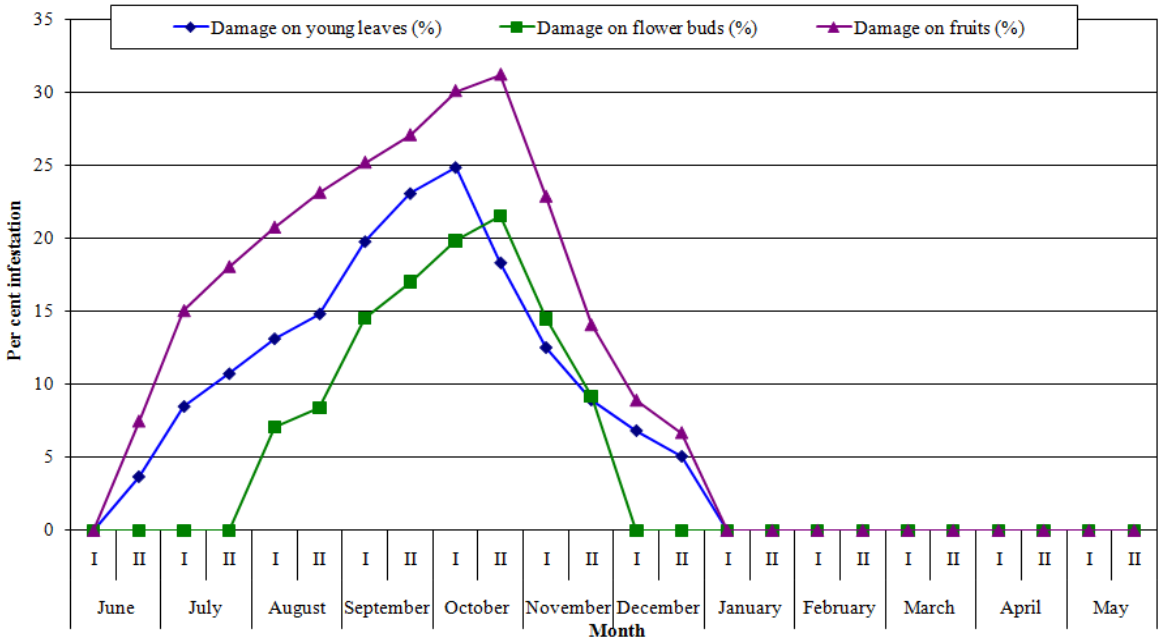

Fig. 1. Seasonal incidence of *Helopeltis* spp. on guava, cv. Lucknow-49 at MARS, UAS, Dharwad, Karnataka during 2019-20 and 2020-21 (Pool data).

CONCLUSION

From the present investigation, it can be deduced that, incidence of *Helopeltis* spp. on guava persisted from June to December months. The peak infestation on young leaves, flower buds and fruits was observed during October month. Correlation studies on impact of weather parameters on infestation level of tea mosquito bug revealed significant negative correlation with respect to maximum temperature. However, relative humidity and rainfall were significantly positive correlated.

Conflict of interest: None

REFERENCES

Anonymous (1999). SAS/STAT 8.01 User's Guide. Cary, N. C. SAS Institute Inc. USA.

Ganga Visalakshy, P. N. and Swathi, C. (2016). Host range and off-season survival of tea mosquito bug, *Helopeltis antonii* Sign. *Pest Management in Horticultural Ecosystems*, *22*(2): 134-136.

Haseeb, M. and Sharma, S. (2002). Insect pest problems of guava in Lucknow region. Abstract; 4th Indian Agricultural Scientists and Farmers Congress, C.S.A. University, Meerut, February 16–17, p. 76.

Kalita, H., Gopi, R., Avasthe, R. K. and Yadav, A. (2018). Bio-ecology of tea mosquito bug, *Helopeltis Theivora* (Waterhouse), an emerging pest of red cherry pepper, *Capsicum annum* Var. Cerasiforme in Sikkim, Himalaya. *Indian Journal of Hill Farming*, *31*(2): 261-

266.

Onkarappa, S. (1993). Insect pests of neem (*Azadirachta indica* A. Juss) with special reference to the biology and management of the tea mosquito bug, *Helopeltis antonii* Sign. (Hemiptera: Miridae). *M.Sc.(Agri.) thesis*, University of Agricultural Sciences, Bangalore, p.143.

Puttarudraiah, M. (1952). Blister diseases of guava fruits. *Mysore Agricultural Journal, 28*: 8-13.

Patil, G. R. and Naik, L. K. (2004). Studies on the seasonal incidence of tea mosquito bug on guava cultivars. *Karnataka Journal of Agricultural Sciences*, *17*(2): 339-40.

Sunil Kumar (2000). Studies on seasonal incidence and loss estimation in guava due to tea mosquito bug, *Helopeltis antonii* Signoret (Hemiptera: Miridae). *M.Sc.(Agri.) thesis*, University of Agricultural Sciences, Dharwad, p.51.

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