Seasonal Abundance of Tea Mosquito (*Helopeltis antonii* Sign.) on Cashew in Relation to Meteorological Factors

G. B. PILLAI,* VIJAY SINGH, O. P. DUBEY and V. A. ABRAHAM***
Central Plantation Crops Research Institute
Kasaragod – 670 124, Kerala, India

Abstract

Seasonal fluctuations in the population density of tea mosquito, *Helopeltis antonii* Signoret, were studied during June 1972 to May 1977 at weekly intervals. The build up of pest population commenced in October – November synchronising with the emergence of new flushes in cashew after the cessation of monsoon showers. The pest population reached its peak in January. Tea mosquito was active in the field in different degrees of intensity till May. The population build up of the pest was found to be negatively correlated with the meteorological factors like minimum temperature, minimum relative humidity and rainfall and positively with sunshine. The most favourable period for the rapid multiplication and population build up of the pest was between December to February. During the monsoon season, tea mosquito population was totally absent.

Introduction

Infestation by tea mosquito, *Helopeltis antonii* Signoret, is considered to be one of the major factors limiting cashew production in India. Adults and immature stages of this tiny bug suck sap from the tender shoots, freshly emerged leaves, floral branches, developing nuts and apples. The tissues around the point of entry of the suctorial stylets of this insect become necrotised and develop characteristic lesions presumably due to the action of phytotoxin present in its saliva, injected into the plant tissues at the time of feeding; the adjoining lesions coalesce and finally the affected plant parts dry up. Abraham (1958) estimated the average damage to be 25 per cent in tender shoots and 15 per cent in tender nuts. The infestation of inflorescences results in 'blossom blight' and causes yield losses exceeding 30 per cent (Pillai and Abraham, 1975; Pillai, Dubey and Vijay Singh, 1976). The

Present address:
* Central Plantation Crops Research Institute, Regional Station, P.O. Krishnapuram–690 533, Kayamkulam, Kerala, India
** Indian Council of Agricultural Research, 'Krishi Bhavan', New Delhi–100 001, India

immature nuts infested by this pest develop characteristic eruptive spots and finally shrivel and fall off.

A thorough knowledge of the trends in population build up and seasonal abundance of the pest has become quite essential for evolving effective control schedules against this major pest of cashew. With this objective, the results of population studies of tea mosquito in relation to meteorological factors, from June 1972 to May 1977 are presented in this paper.

Materials and Methods

Seven cashew trees of age group 15 to 20 years were selected at random, from a total of 140 trees available in the C.P.C.R.I. Farm at Kasaragod, Kerala. Five to eight unit areas, each of 50 cm^2, were selected and tagged with metal labels in each of the seven experimental trees. The number of unit areas per tree was fixed taking into consideration the canopy growth of a particular sample tree. Observations on the total number of shoots, number of tea mosquito infested shoots, total number of panicles, pest infested panicles and the counts on pest population (adults and nymphs) present in each of the unit areas were recorded between 8.00 and 9.30 a.m. at weekly intervals. Observations were recorded with the least disturbance to the shoots/panicles in order to ensure that the adult bugs present on the tree do not fly away and the immature stages do not migrate to the interior of the canopy. The meteorological data such as maximum and minimum temperature, relative humidity, rainfall and the total hours of bright sunshine were also recorded daily. This study was continued upto the end of May 1977 and the results obtained during the five year period of study are discussed.

Results and Discussion

The monthly average population of tea mosquito and the intensity of percentage infestation on shoots and panicles are presented in Table 1. The trends in population build up and the abundance of the pest showed a slight variation between years. In 1972–73 and 1973–74, the build up of the pest population commenced in October itself, whereas in subsequent years it commenced only in November. This could be attributed to the extended monsoon period. The tea mosquito population build up starts synchronising with the emergence of new flushes in cashew and reached its peak in January (except in 1975–76 when the pest population from a low level in Novemebr reached to a peak in February only), three months after the commencement of population build up particularly when the trees were in full blossom. The pest was active in the field in varying intensities till May, as succulent plant parts such as tender shoots, inflorescences, immature nuts and apples in various stages of developement were quite abundant,

TABLE 1. **Population of Adults and Nymphs of *Helopeltis antonii* and Percentage Infestation on Tender Shoots and Inflorescences (1972 - 73 to 1976 - 77).**

Month	*Pest population*		*% infestation*			
	Range	*Mean*	*Tender shoots*		*Inflorescences*	
			Range	*Mean*	*Range*	*Mean*
June	..	..	0.0–53.5	20.66	..	..
July	..	..	0.0–23.8	6.90	..	..
August	..	..	..	..	..	..
September	..	..	..	..	..	..
October	0 – 7	1.60	0.0 – 1.1	0.23	0.0 – 40.6	8.10
November	4 – 41	17.20	0.0 – 23.1	7.24	0.0 – 60.5	19.30
December	13 – 43	27.00	0.4 – 26.6	15.65	0.0 – 61.0	20.00
January	18 – 63	40.60	0.7 – 39.5	13.75	4.7 – 35.7	23.10
February	10 – 67	33.20	0.2 – 36.5	12.38	7.1 – 34.3	18.00
March	5 – 52	21.40	0.4 – 45.2	16.56	6.2 – 36.2	15.60
April	1 – 13	6.80	0. 5– 19.5	9.50	6.3 – 37.5	15.40
May	0 – 6	2.00	0.4 – 19.9	8.48	5.7 – 36.5	13.90

offering ideal sources of food and sites for egg laying and multiplication of pest. Pest population declined from May onwards and it was totally absent during June to September, the south west monsoon season.

The pest population and the monthly counts on intensity of infestation on panicles followed more or less the same trend in all years, the percentage infestation being less than the number of the pests present. When the mean numbers of the pest were 27, 41 and 33 in December, January and February the mean percentages of the inflorescence infestation were 20, 23 and 18 respectively. The mean percentage of shoot infestation also showed nearly the same trend. Eventhough the pest population was totally absent from June to September a mean percentage of 20.66 and 6.90 shoot infestation was recorded during June and July respectively. It is quite possible that infestations in the prior period by the lingering tea mosquito population on the post-harvest flushes might have been available on trees during this period as well.

TABLE 2. **Meteorological Parametres during the Five Year Period of the Study (1972 - 73 to 1976 - 77)**

Month	*Minimum temperature °C.*	*R.H. %*	*Rainfall (mm)*	*Bright sunshine hrs.*
June	23.4*	76.6	784.7	4.8
July	22.9	84.6	832.0	3.0
August	22.7	82.0	626.2	3.7
September	22.9	78.3	297.0	6.0
October	23.1	72.6	176.8	6.5
November	21.7	62.6	76.8	7.9
December	20.2	49.3	140.9	9.0
January	19.4	51.6	..	9.5
February	21.3	59.0	..	9.8
March	23.2	62.0	13.2	9.6
April	25.1	61.6	102.1	9.2
May	24.2	70.6	383.5	7.3

*Mean values

TABLE 3. **Correlation of Meteorological Parameters with Tea Mosquito Infestation**

	Inflorescence infestation	*Pest population*	*Minimum Temperature*	*Minimum RH*	*Rainfall*	*Sunshine*
Shoot infestation	0.414	0.504	−0.231	−0.532	0.116	0.437
Inflorescence infestation	..	0.835**	−0.479	−0.942**	−0.842**	0.907**
Pest population	..	..	−0.782**	−0.875**	−0.719**	0.783**
Minimum Temperature	..	..	..	0.566	0.352	0.314
Minimum RH	..	..	..	..	0.820**	−0.917**
Rainfall	..	..	..	..	..	−0.927**

The monthly variations in the average values of meteorological factors such as temperature, relative humidity, rainfall and hours of sunshine for the entire period of study (Table 2) were correlated with fluctuations in population density of the pest (Table 3). As seen from the data, the population build up of the pest was found to be negatively correlated with factors like minimum temperature, minimum relative humidity and rainfall and positively with sunshine.

There was no pest population from June to September, when relative humidity and rainfall were quite high and the period of bright sunshine was very low. The build up of pest population from a very low level (1.6%) commenced in October and reached its peak (40.6%) in January, when the minimum temperature was very low (19.4°C), minimum relative humidity also was rather low (51.6%), rainfall nil and the duration of bright sunshine was quite high (9.5 hrs). The data also revealed that the most favourable period for rapid muliplication and population build up of tea mosquito was December, January and February, when the mean duration of bright sunshine ranged from 9.02 to 9.8 hrs. Eventhough tea mosquito is known to be an insect which normally shuns bright sunlight, it was observed to continue its destructive activity hiding on the ventral surface of leaves and feeding on the midrib, petiole, tender shoot or panicle. Moreover, it is during this period the host plant also provided an abundant supply of succulent plant parts. However, during the monsoon period, June to September, the relative humidity (76.6 – 82.0%) and rainfall (297 – 832 mm) were quite high, the duration of bright sunshine was too meagre (3–6 hrs) and the succulent plant parts were not normally available on grown up trees, and as such, the tea mosquito population also was totally absent.

Swaine (1959) also observed the absence of *Helopeltis anacardii* Miller during the rainy season and its abundance during the flushing season (July-November) after the monsoon in Tanganyika territory. He reported that the insects were scarce on older trees from December until June, but they were readily found on young trees in December–April as these were putting on a considerable amount of new and succulent growth during this period in addition to the main growth after June.

Another important observtion made from the present study was that the population density of tea mosquito and the intensity of its incidence varied from tree to tree, some trees being heavily infested, others less so, and some others remaining practically free from pest infestation. Some what similar observations have been reported by Fennah (1963) in the case of the red banded cacao thrips, *Selenothrips rubrocinctus* (Giard) infesting cashew trees also in Trinidad, West Indies.

The mechanism which governs the relationship between the host plant and the insects infesting it under varying agro-ecological situations invites further detailed investigations.

Acknowledgement

We are grateful to Dr. M.C. Nambiar, Project Co-ordinator (Spices and Cashewnut) for his keen interest in this investigation and for providing necessary facilities for the conduct of the study.

References

Abraham, E.V. 1958. Pests of cashew (*Anacardium occidentale* L.) in South India. Indian J. agric. Sci. 28: 531–544.

Fennah, R.G. 1963. Nutritional factors associated with seasonal population increase of cacao thrips *Selenothrips rubrocinctus* (Giard) (Thysanoptera) on cashew, *Anacardium occidentale*. Bull. ent. Res. 53: 681–713.

Pillai, G. B. and Abraham, V. A. 1975. Tea mosquito – a major menace to cashew. Indian Cashew J. 10(1): 5–7.

Pillai, G.B., Dubey, O.P. and Vijay Singh, 1976. Pests of cashew and their control in India – A review of current status. J. Plant. Crops, 4: 37–50.

Swaine, G. 1959. A perliminary note on *Helopeltis* Spp. damaging cashew in Tanganiyka territory. Bull. ent. Res. 50: 171–181.

Discussion

R. Russell: You have established the incidence of *Helopeltis* on cashew during certain months of a year. There are times when no *Helopeltis* was found. Where did they go?

G.B. Pillai: *Helopeltis antonii* has a good number of alternate host plants. Guava, cacao, neem, mahogany, cinchona, red gum, apple, grapes, etc. are the more important ones. Moreover, the population of *H. antonii* will be available on young cashew trees/seedlings which will have succulent flushes almost throughout the year.

C.C. Abraham: Did you work out the correlation between mean maximum temperatures and population fluctuations of *Helopeltis?* It is reported that the population build up is positively correlated with sunshine. This may please be explained in the light of the general habit of *Helopeltis* to prefer shady situations inside the canopy during day times.

G.B. Pillai: (1) There was no significant correlation between maximum temperature and pest population. (2) Significant positive correlation between the duration of bright sunshine and population build up of tea mosquito was recorded. Tea mosquito feeds by remaining in shady positions.

A.G. Ibrahim: Do you have any data to show the preference of the mirid to different clones of cashew. Did you consider the populations of the natural enemies i.e. parasites/predators in your trials?

G.B. Pillai: Some studies on the incidence of tea mosquito on different accessions of cashew germplasm assemblage at Vittal are being made. (2) We have not come across any parasitoid of this pest so far of. However, predators like a species of hunter spider and the red ant (*Oecophylla samaragdina*) have been observed feeding on the immature stages of the mosquito.

K.K. Vidyadharan: You have mentioned variation between trees on the incidence of tea mosquito attack. Can this low incidence be associated with any specific leaf character.

G.B. Pillai: This needs further study.

T.K. Lim: Has any work been done in India to extract toxin from *Helopeltis* and inoculate on inflorescence instead of using the insects.

G.B. Pillai: We have already initiated this work at C. P. C. R. I. to use it as a tool in the screening of cashew germplasm.