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SEASONAL POPULATION CHANGES OF *HELOPELTIS ANTONII* (HETEROPTERA : MIRIDAE) IN CASHEW

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The mirid *Helopeltis antonii* Sign. (Heteroptera : Miridae) is a major pest of cashew in Sri Lanka, India, and Tanganyika, Its biology, pest status and control were reviewed by Pillai *et al*. (1976). Both the adults and nymphs of this pest feed on the sap from tender shoots, leaves, floral branches and developing nuts and fleshy peduncles called apples. Abraham (1958) estimated that on the average 25% of the tender shoots and 15% of the tender nuts were damaged.

Swaine (1959) observed the absence of *Helopeltis anacardii* Miller during the rainy season and its abundance during the flushing season (July-Nov) after the monsoon in Tanganyika. He reported that the insects were scarce on older trees from December to June but were present on young trees in December-April due to the development during this period of fresh succulent growth. Our objective was to develop (a) estimates of the pest population (b) procedures for control that would supplement natural control for use during the pests life cycle.

Materials and Methods

Three procedures for studying the pest were used from 1976-1977 in Kondachchi Cashew Plantation, Chilawathurai and they were (a) light trap sampling (b) studying the development of the population from an artificial infestation and (c) observing and recording *H. antonii* and associated factors influencing the natural population.

A 125 watt Robinson UV light trap was located along young cashew plants about 6-10 years old, close to the research laboratory.

Forty mature trees in an area within the plantation with wind belts in north and southward directions, were pruned to a height of about 2-2½ m in March, 1975. With the onset of development of regenerative shoots a heavy mirid population began to develop and was present in November. Population counts on pest present on samples were made at weekly intervals and the stages of the pest present were recorded. Plant parts were examined when counts were made, but it is possible that the numbers of the first instar might have been underestimated.

From 1976 to 1977 faunal relationships of different cashew areas and various types of forest were studied by recording a range of insect spp and physical factors in 5 x 5 m sampling squares. These cashew areas provided a contrast between cashew grown in the traditional way with wind belts and that it was under more artificial conditions with forest entirely cleared. Two hundred and fifty nine of these squares were in Kandachchi Cashew Plantation and records included, presence or absence of *H. antonii* on those parts of the trees that were accessible for inspection from the ground. These data have been used to indicate, changes In which plots used for other sampling merhods were included.

The rainfall, relative humidity, and temperature figures were obiained from the meteorological records maintained by the Research Division of the Kondachchi Cashew Plantation where the experiment was conducted.

Results and Discussion

Light trap capture

The presence of the pest in the traps in October (Fig. 1) coincided with the population build up in the plantation. High trap captures during the flushing season declined with leaf maturing in April. The peak of the population occurred in January, and coincided with full bloom. However, the males that were present in small numbers were not trapped from April to September.

Artificial mirid pocket

Although large populations of young nymphs were present in early September on the new growth of pruned trees, the numbers that transformed were reduced as a result of heavy showers by the end of the month. Between October and February the population went through a more predictable cycle with the number of mature insects declining less between peaks. Although adults increased in March this increase was short lived (Fig. 2).

The total number of sample squares examined each month and the percentage in which *H. antonii* was present are given in Fig 3. The frequency of occurrence of *H. antonii* between November and December increased.

The number of *H. antonii* present appeared to be proportional to the availability of food eg, the type of leaf tissue - leaves, stem, nuts and floral branches.

Initially the insect life cycle appeared to be closely synchronized with the development of the plant and varied less. But in the later stages indicated by the cessation of the October-November monsoon the population increase coincided with the new growth flushes. The field activity of the pest differed in intensity until May when there was an abundance of succulent plant parts such as tender

shoots, floral branches, immature nuts and apples. The fastest build up of the population was in January-February period. With the onset of sunny conditions in January and February, the host plant provided a good supply of succulent plant parts for the pest to build up.

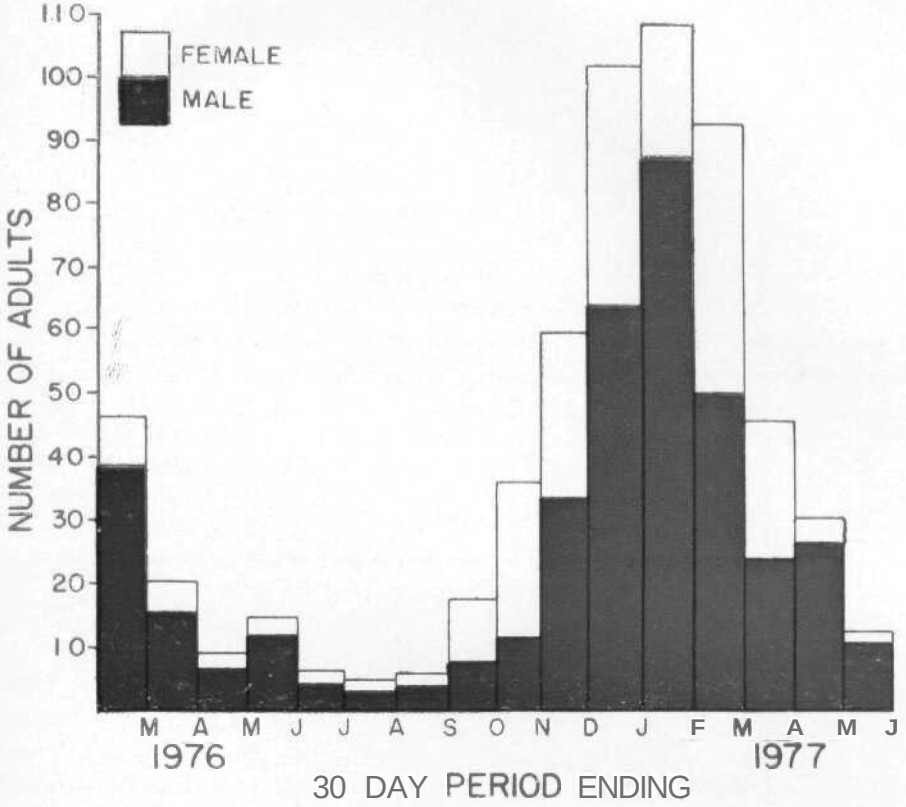
The rainfall was relatively high during the wet monsoonal season from September to March, when more than 75% of the total annual precipitation was received. However, the mean annual rainfall rarely exceeded 1200 mm (Table 1). In some years, June to August was entirely without rain (Muller and Dombois, 1968) The pest population increased with precipitation from September with monsoon showers reaching a peak in January and the count was negligible during the dry period from July to September (Fig. 1). The rainfall during April-June also gave rise to an increase in pest population (Fig. 1)

Table 1

Climatological data of Mannar Meteorological Station for the period 1966–1978

Months	J	F	M	A	M	J	J	A	S	O	N	D
Mean monthly max. r	29.5	31.0	32.5	34.0	33.5	32.9	32.1	31.0	29.9	29.0	28.5	28.2
Mean monthly min. r	24.5	24.8	25.0	26.5	27.0	28.5	27.0	26.6	25.0	24.8	24.6	24.3
Mean monthly rainfall	0	40	15	40	110	0	15	25	35	300	280	275
Mean monthly rainy days per month	3.5	3	3	4.5	7.5	0	1	2	3	20	18	16

Seasonal changes in the cycle of growth of a plant are known to influence its nutritional suitability for some insects. Mittler (1958) showed that aphids change the concentration of soluble nitrogen in the phloem sap at different stages in the host's plant growth during leaf expansion, maturation and senescence accompanied by changes in the insect's ability to develop successfully. A more extensive literature exists to show that comparable effects may result from adverse growing conditions of the host plant. Water stress in particular is often accompained by increased nitrogen content of the phloem sap following premature hydrolysis in the leaves (Kennedy, 1958). Perhaps, changes in chemical composition of sap as found in phloem may influence mirid feeding and nutrition in cashew.



Fig, 1 *Helopeltis antonii* sampled by light trap; daily catches grouped into 30 day periods

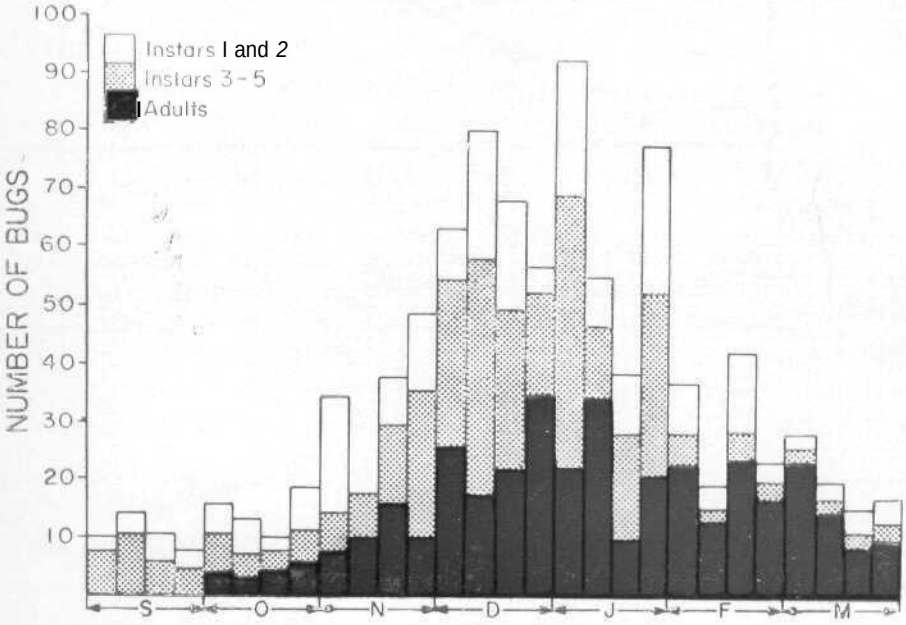


Fig. 2 *Helopeltis* numbers in artificial pocket during October to May; direct counts on regenerative basal shoots of 50 pruned cashew trees

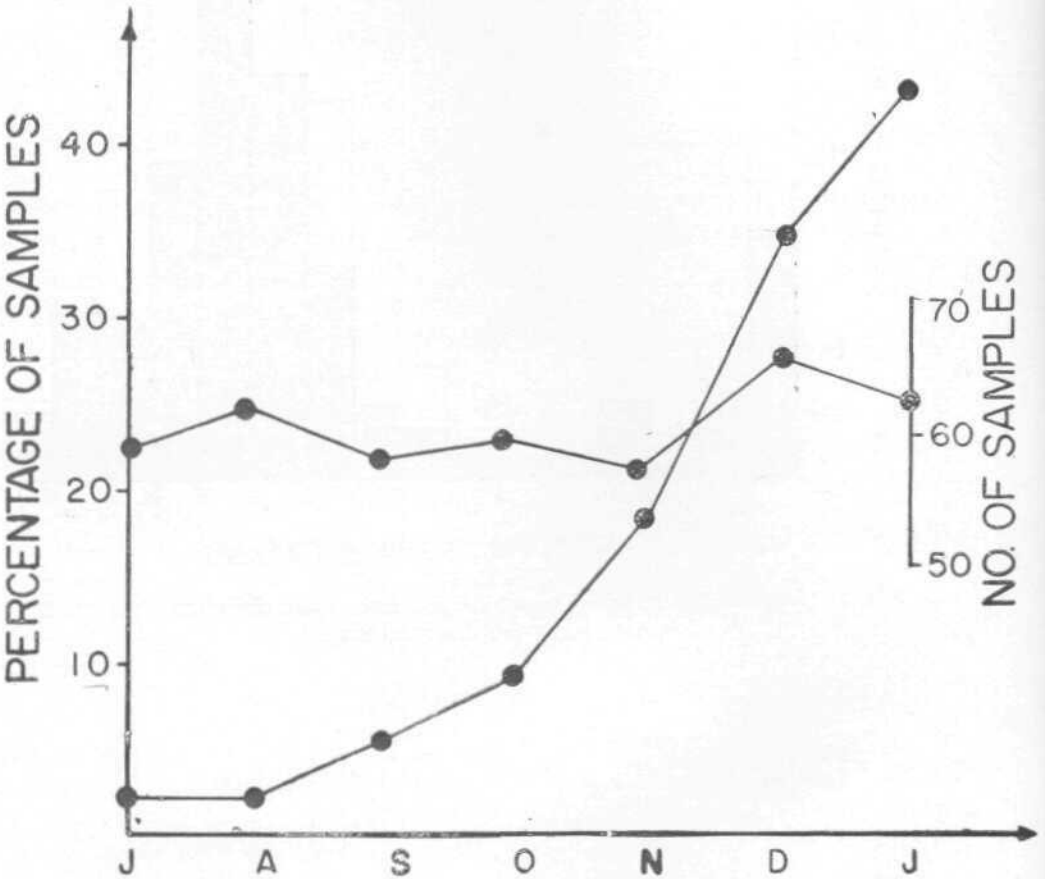


Fig. 3 Distribution of *Helopeltis antonii* at Kondachchi Cashew Plantation during selected months. Proportions of 5 x 5 m inspection squares, randomly selected each month in wide collections of cashew that contained the mirid.

The three techniques reported here for sampling populations of mirid *H. antonii* gave comparable results. The pest population reached the peak in January coinciding with the blossom period. Our data suggest that the most important single period for protection of mature cashew occurs just after the monsoon showers in September or October. We are unable to suggest economic threshold of damage for *H. antonii* because this is dependent on numerous factors such as rainfall, growth stage, cultural practices (pruning) and other environmental conditions and presence of other destructive insects.

Summary

Populations of cashew mirid *Helopeltis antonii* Sign. were studied in 1976–1977 by sampling with a light trap, following the development of an artificial infestation, and observations of the presence or absence of the insect were made in randomly selected squares. A population build up in mature cashew accompanies appeared to be directly dependent on development of tender leaves and inflorescence from September or October to February coinciding with the monsoonal rainfall, reaching a peak in January. The pest was not present on cashew from April to September. Our data suggested that the extent to which the mirid utilized vegetative tissues varied and depended on the age and nutritional changes occurring in the external parenchyma tissues which were the source of their food.

സംഗ്രഹം

ശ്രീലങ്കയിലുള്ള ചില കശുമാവിൻതോട്ടങ്ങളിൽ തേയിലക്കൊതുകിന്റെ ആക്രമണ സ്വഭാവത്തെ സംബന്ധിച്ച് ചില പഠനങ്ങൾ 1976–77ൽ onടത്തുകro^ffrrsooon . കൃ(finlai ആക്രമണമുണ്ടാകുവാനായി നേരത്തെ തോട്ടങ്ങളിൽ തുറന്നുവിട്ട പ്രാണികളുടെ സാമ്പിൾ ശാസ്ത്രീയമായി തിരഞ്ഞെടുത്ത പ്ലോട്ടുകളിൽ നിന്നും വിളക്കുകെണി ഉപയോഗിച്ചു ശേഖരിച്ചാണ് പഠനം നടത്തിയത്. വളർച്ചയെത്തിയ മരങ്ങളിൽ കൊതുകുപെരുകുന്നത് സെപ്റ്റംബർ–ഒക്ടോബർ മുതൽ ഫെബ്രുവരി മാസം വരെയാണ്. ഇത് ഈ സമയങ്ങളിൽ ഉണ്ടാകുന്ന മഴയേയും പുതുതായി ഉണ്ടാകുന്ന പൂങ്കുലകളേയും തളിരിലകളേയും ആശ്രയിച്ചിരിയ്ക്കുന്നു. ഏറ്റവും കൂടുതൽ ആക്രമണം കാണുന്നത് ജനുവരി മാസത്തിലാണ്. ഏപ്രിൽ മുതൽ സെപ്റ്റംബർ വരെ കശുമാവ് കീടവിമുക്തമായി കാണപ്പെട്ടു. മരങ്ങളുടെ പ്രായവും പുറം പാരൻകൈമ കോശങ്ങളിലുണ്ടാകുന്ന മൂലകങ്ങളുടെ വ്യതിയാനങ്ങളുമനുസരിച്ചാണ് അവയുടെ ആക്രമണം എന്നു പഠനം തെളിയിച്ചു.

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