FIELD POPULATIONS OF *NUMICIA VIRIDIS*, MUIR

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The green leaf sucker *Numicia viridis*, Muir (Homoptera: Tropiduchidae) was first regarded as a pest of sugarcane when there was an unexepected build-up in its numbers. Affected cane turned yellow and appeared flaccid and drooping (Dick 1963). The most conspicuous outbreaks were recorded from Swaziland and Pongola (Eastern Transvaal), but at about the same time considerable numbers were recorded also from the Natal south coast. When a "new pest" of this sort is first noted the impression may be received that its numbers are going from strength to strength, and owners of damaged cane may well wonder where its activities will cease The immediate and understandable reaction is to employ emergency insecticidal measures, so bringing an end to the infestation artificially. This is what happened with *Numicia.*

Since the first noted outbreaks of 1962 it has been possible with subsequent outbreaks to study the form they have taken, and in many cases no insecticide has been used to effect control. It has been possible also to make studies of population numbers under normal field conditions, and this has shown that where no insecticide is used fluctuations in numbers follow a seasonal pattern. At present *Numicia* is regarded as a pest of inland irrigated cane rather than of coastal areas, where numbers have been too small to justify regular population assessments.

From data collected in cane fields of a large Swaziland sugar estate (10,000 acres of inland irrigated cane) it has been possible to study *Numicia* population fluctuations since January 1964. Initially assessments were made of nymph and adult numbers only, but since August 1964 figures for eggs also have been available.

Numbers of nymphs and adults are assessed by shaking growing cane vigorously over a yard square plastic sheet on which there has been smeared molasses, to which the fallen insects adhere and are counted. On each occasion this is done in ten places per field, fifteen fields being sampled each time. At the same time from each of ten fields 100 leaves are collected and the numbers of *Numicia* eggs in them are noted. Preferably, leaves are sampled by walking between cane rows and at every third pace picking the nearest and lowest green leaf until 100 are collected; but where cane is badly lodged this method may be modified. Any leaves which contain no eggs are discarded and the rest are forwarded to the Experiment Station at Mount Edgecombe, where they are counted, and the eggs carefully examined and divided into various categories depending on whether they are hatched, unhatched, parasitised, etc. (Carnegie 1966). Initially these counts were done at weekly intervals, but as the insect became better understood and there was no longer any fear of a sudden build-up, the intervals were changed at first to a month and more recently to two weeks.

Figures for each field are then plotted. For any field, sampling begins when the cane is about four to five months old and ends when the cane is cut. Means of all fields sampled are shown graphically in Figure 1. (Graphs for individual fields reflect the same general pattern, which is considered a fair representation of overall populations.) In the figure egg numbers are plotted to a scale different from the logarithmic one used for nymphs and adults.

From data so far available various points may be noted.

Relative numbers of each stage of the life cycle (egg, nymph, adult) followed an expected pattern. A fall in numbers of unhatched eggs was followed by an increase in numbers of nymphs, which in turn was followed by an increase in adult numbers. There was a decrease in adult numbers following copulation, oviposition and death. In all but one case (April-May 1965) peaks in adult numbers were always lower than corresponding peaks in nymph numbers, which can be explained by natural mortality during the nymphal stages. In the one exceptional case the inversion is thought to be due to sampling errors, the only alternative possibility being a migration of adults from surrounding grasses which is considered most unlikely.

In the three years for which figures are available there have been three generations each year, with peaks in adult numbers occurring in February, May and October, which indicates that breeding rate was more rapid during the hotter, more humid months. There is little overlap of the various stages of the life cycle, which is probably governed by climatic factors.

Over the last three years, during which very little insecticidal action has been taken, overall numbers have remained fairly constant. Numbers of nymphs, and subsequently adults, were particularly high from August to October 1965, the mean being raised by one field in particular, in which exceptionally high numbers occurred two and a half months after aerial dusting with malathion. But during 1966 the pattern was much the same as it had been during 1964, and this suggests that there has arisen some state of overall equilibrium, which must be governed by natural factors. *Numicia* populations contain approximately equal numbers of males and females and, in the insectary, one female lays between 150 and 200 eggs (Anon. 1964). The potential therefore for population increase is enormous, and the fact that numbers fluctuate only within certain limits means that control by natural factors must be extremely effective. In cane it has been found that during the egg stage up to 60 per cent of eggs may be destroyed by the activities of two hymenopterous parasites, *Ootetrastichus beatus* (Eulophidae) and *Oligosita* sp. (Trichogrammatidae), and that some perish from physical causes. In grass hosts natural egg mortality is even higher (Carnegie 1966). But in cane it is the early nymphal stage which is the most vulnerable. Young nymphs hop when disturbed and, should they land on the ground or on lower dry leaves, may die before they are able to feed again. They are the easy victims of various predators, and may be destroyed also by adverse climatic conditions.

In August of each year adult numbers reached an exceptionally low level. This could be coincidental or in some way related to the more slowly developing winter generation. The possibilities of adult migration to and from grasses are being investigated, but it is felt that if any purposeful or induced migration does occur it would be least expected at this time of year when there is a minimum of green grass available. Since cane sampled is usually more than four months old, a migration of adults to younger cane might cause a drop in numbers of those sampled, but there is at present little evidence that such a migration occurs. In any form of integrated control which might become policy these periods of low adult numbers could prove important, because at this time one would expect a minimum number of unhatched eggs, a stage in the life cycle which is immune to insecticide.

From observations made of *Numicia* populations in indigenous grasses, including regular weekly counts which have been in progress for nine months, it is evident that the same pattern is repeated. It is possible that as *Numicia* becomes better adapted to life in permanently green irrigated cane this pattern of three generations a year may change, although so far there is no indication that this is happening.

Summary

Studies of field populations of the green leaf sucker of sugarcane, *Numicia viridis*, Muir (Homoptera: Tropiducidae) made over three years have shown that there are three generations a year with peaks in adult numbers occurring in February, May and October. There is little overlapping of the various stages (egg, nymph and adult) and during the period of study there has been no alarming overall increase in numbers. When planning control measures, advantage might be taken of regular periods of low adult and, therefore, low egg numbers. Observations to date indicate that a similar pattern of population fluctuations exists in indigenous grass communities.

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References

Anon. (Dick, J.) 1964. Rep. Exp. Stn. S. Afr. Sug. Ass. p. 55.

Carnegie, A. J. M. 1966. The progress of an untreated outbreak of *Numicia viridis*, Muir. Proc. S. Af. Sug. Technol. Ass. pp. 319-327.

Dick, J. 1963. The green leaf sucker of sugarcane *Numicia viridis*, Muir. Proc. S. Af. Sug. Technol. Ass. pp. 153-157.

For discussions on this paper see page 183.

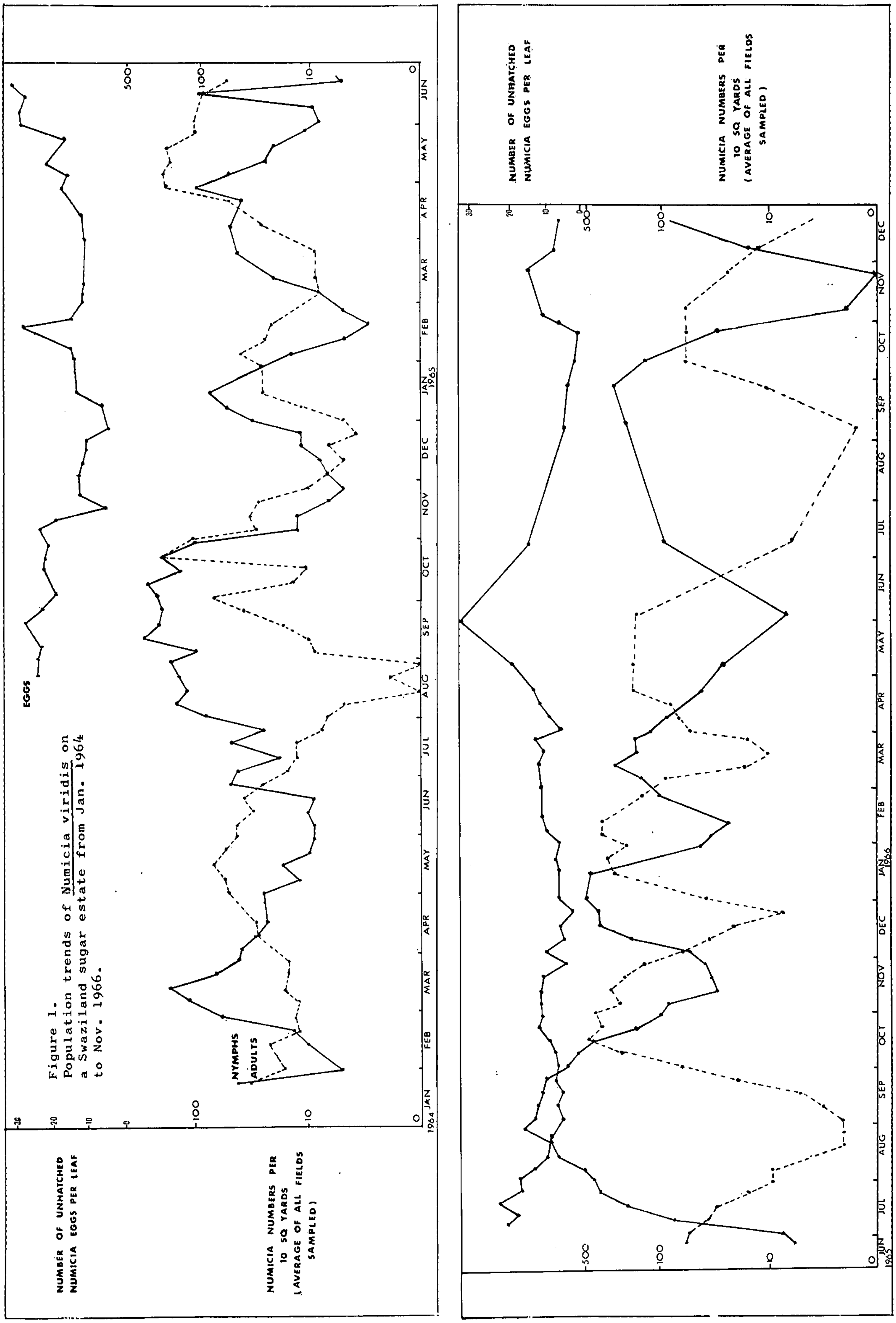

Figure 1.
Population trends of *Numicia viridis* on a Swaziland sugar estate from Jan. 1964 to Nov. 1966.