SEASONAL ABUNDANCE OF THE RUTHERGLEN BUG *(NYSIUS VINITOR)* ON SUNFLOWERS AND WEEDS IN NORTH-EASTERN VICTORIA.

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ABSTRACT

The abundance of Rutherglen bug was monitored on sunflower crops in north-eastern Victoria during the 1979 — 80 and 1980 — 81 seasons. In both seasons, the earlier sown crops (mid-November) were invaded by adults during the budding and flowering stages and nymphs developed during seed development (22 — 39 bugs/head). Bugs were not as numerous on the later sown crops (8 bugs/head). Generally, the number of bugs on the heads declined rapidly prior to harvest but large numbers of both adults and nymphs aggregrated on the ground, on dry stems and around certain prostrate weeds. Between seasons, bugs were found on several weed species, moving from one to the next as the host senesced. In each weed host, breeding and nymphal development was associated with flowering and seed development. Wireweed *(Polygonum aviculare)* supported bugs from April to August. During this period, breeding ceased, and all nymphs developed into adults until only adults formed the overwintering population. In September, the bugs moved to stone crop *(Crassula* sp.*)* and capeweed *(Arctotheca calendula)*. As these spring weed senesced in December the bugs again invaded budding sunflower crops.

INTRODUCTION

The Rutherglen bug, *Nysius vinitor* Bergroth (Hemiptera: Lygaeidae) is a pest of fruit, vegetable, oilseed and other cultivated crops throughout Australia (French, 1918; Smith, 1927; Newman, 1928; Nicholls, 1932; Woodward, 1964). In Victoria, it is the most important pest of sunflowers with serious outbreaks occurring every few years.

Populations of *N. vinitor* can survive and develop on a wide range of plant species (Smith, 1927) especially those of the families Gramineae and Compositae (Kehat and Wyndham, 1972). Many host species occur as weeds in pastures and waste grassland and, *N. vinitor* adults invade the cultivated crops when their hosts senesce in summer (Kehat and Wyndham, 1973). Forrester (1980), and Broadley and Rossiter (in press) reported similar patterns of infestation of *N. vinitor* in sunflower crops in N.S.W. and Queensland, respectively.

This paper examines the seasonal incidence of *N. vinitor* on a succession of weeds and sunflower crops in north-eastern Victoria.

MATERIALS AND METHODS

N. vinitor populations were monitored in sunflower crops and weed hosts in the Numurkah district of north-eastern Victoria. Sampling took place from December 1979 until August 1981. In the first season, both sunflower crops studied were planted in mid-November. In the second season, one crop was sown in mid-November, and the other in mid-December. Sampling of the weeds began in June, 1980 with wireweed *(Polygonum aviculare* L.*)*, and later (August-October) progressed to stone crop *(Crassula* sp.*)* and capeweed *(Arctotheca calendula* (L.) Levyns*)* as the populations of *N. vinitor* moved into these spring hosts.

Crops were sampled at weekly intervals from the first appearance of adult bugs during budding, until harvest. On each sampling occasion twenty sunflower heads were collected from each crop. Each head was covered with a plastic bag, the stem cut at about 20 cm below the head, and the plastic bag was then sealed. Adults and nymphs of *N. vinitor* were separated from the heads by hand and the number recorded. For sampling of the weeds, a paddock of unimproved pasture was chosen which contained the suitable species. Using a portable suction apparatus, ten 0.4 m^2 quadrat samples were taken each fortnight. Samples were representative of that weed host. All the insects and plant debris suctioned from each quadrat were placed in a plastic bag. In the laboratory, *N. vinitor* adults and nymphs were separated from the plant debris by heat extraction into 70% ethanol using a modified Berlese funnel (Southwood, 1966).

Over the entire sampling period, the presence of other *Nysius* spp., particularly *N. clevelandensis* Evans and *N. turneri* Evans, was noted.

RESULTS

The pattern of infestation in sunflowers was similar in both seasons, although densities were consistently lower in the first season (Fig. 1). Adult densities increased from budding to late flowering and seed set, when nymphs first appeared. During seed development, the total number of *N. vinitor* increased and then declined rapidly prior to harvest. Subsequently, adults and nymphs appeared to aggregate on the ground, on dry stems and around certain prostrate weeds, particularly wireweed and common purslane *(Portulaca oleracea* L.*)*. This aggregation was also evident after harvest.

In the second season, the infestation in the later sown crop was markedly lower than those in the earlier sown crops.

Increasing numbers of *N. vinitor* were observed in wireweed from March until June 1980, when regular sampling commenced (Fig. 2). Over the same period in 1981, adult numbers increased rapidly followed by at least one generation of nymphs. Throughout the late autumn-winter period in both years, the proportion of younger to older nymphs decreased towards spring. The final samples from wireweed (August-September) contained low numbers of adults and only a few nymphs of the fifth instar. The invasion of stone crop and capeweed took place immediately after flowering in October and the densities of *N. vinitor* increased rapidly. Similarly there was a sudden increase in nymphal densities within two weeks of the adult invasion, coinciding with seed development.

Although the sampling of capeweed ceased when adult *N. vinitor* were found on neighbouring sunflower crops, investigations afterwards suggested a reduction in densities had occurred near the end of the sampling period.

Fig. 1 The seasonal abundance of *N. vinitor* in sunflowers in north-eastern Victoria December — April 1979 — 80, 1980 — 81 — adults . . . nymphs.

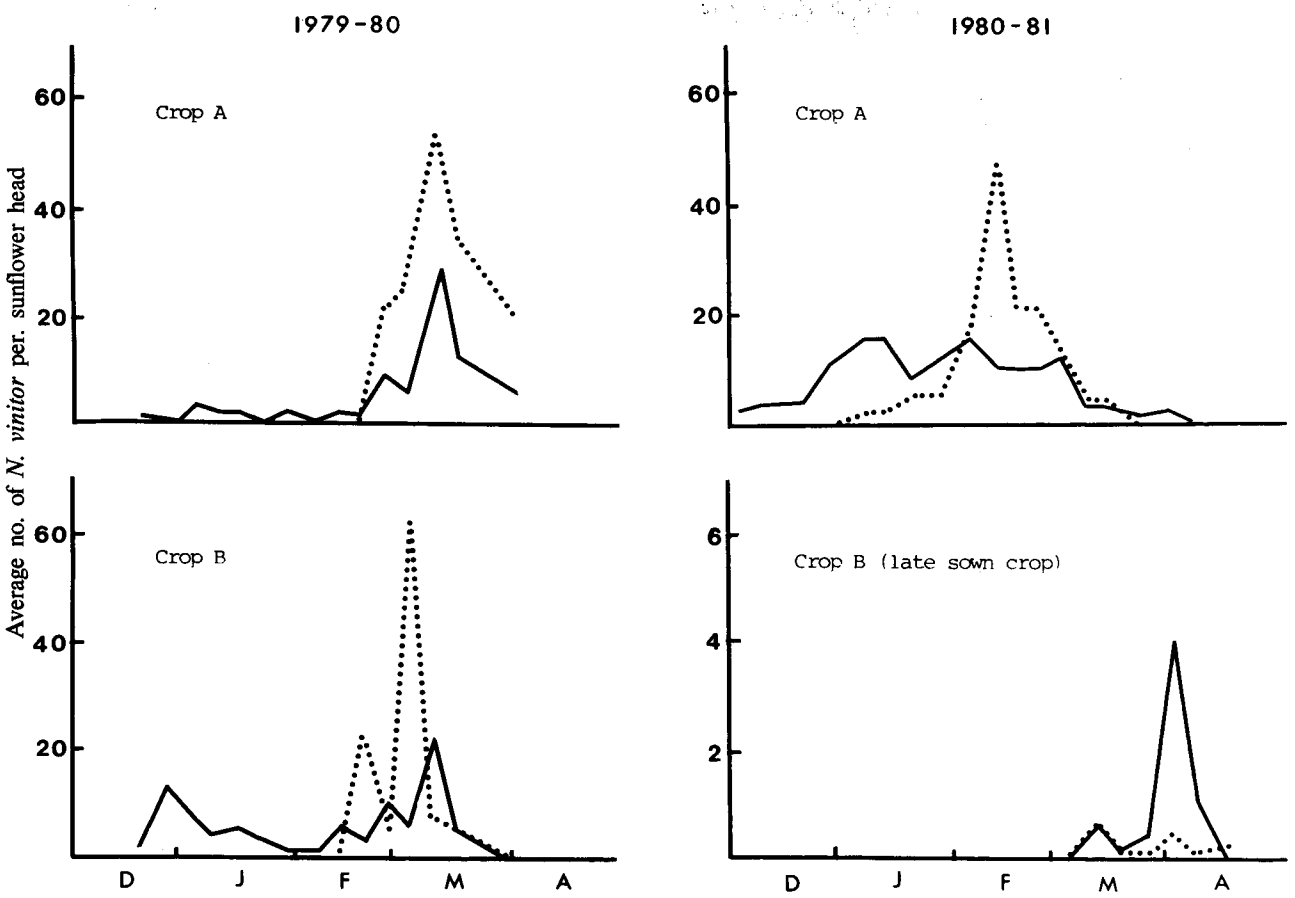
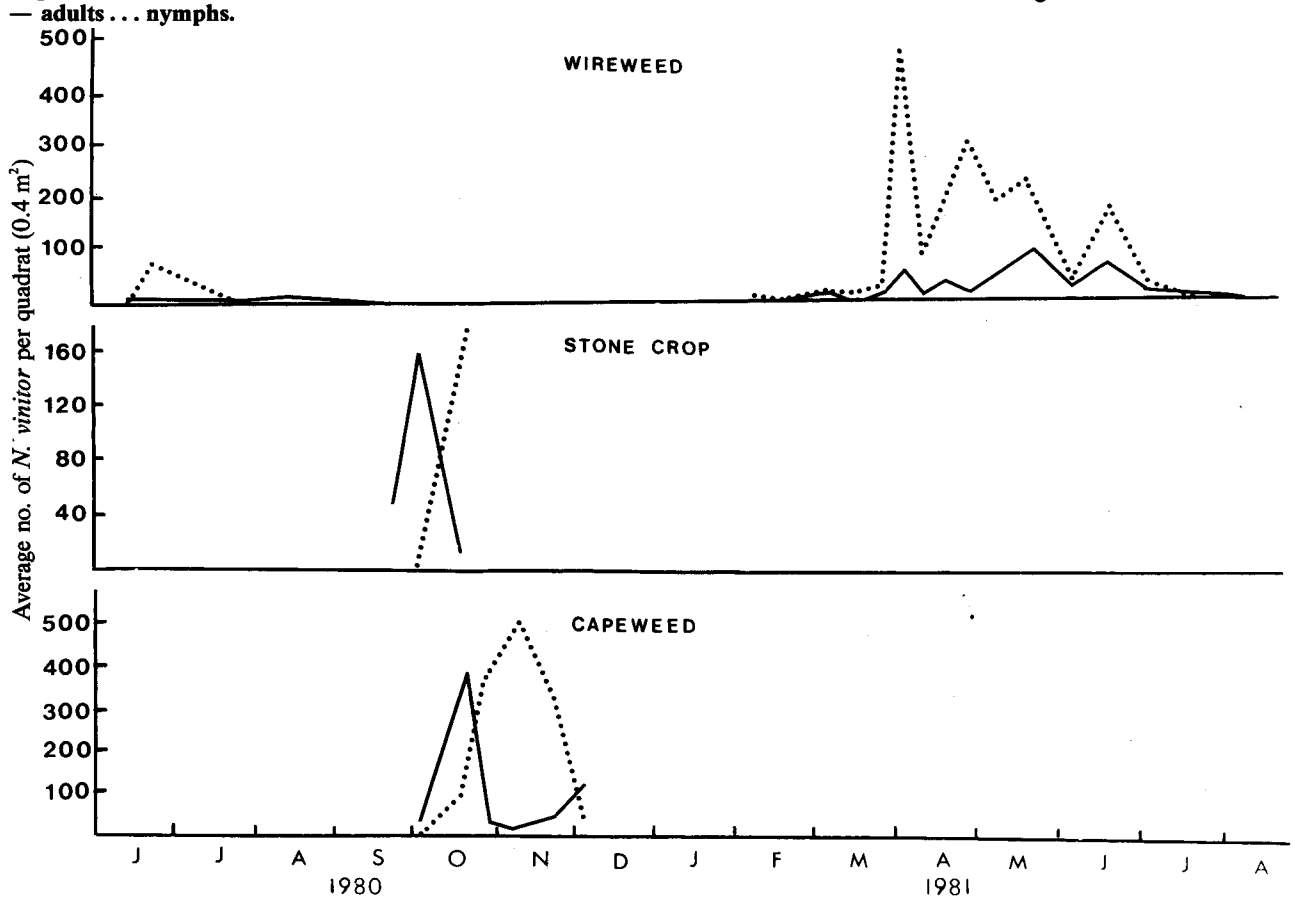


Fig. 2 The seasonal abundance of *N. vinitor* in weeds in north-eastern Victoria June 1980 — August 1981 — adults . . . nymphs.



DISCUSSION

The pattern of infestation of *Nysius vinitor* in sunflowers, observed in this study, is consistant with those described by Forrester (1980) and Broadley and Rossiter (in press). Adults invaded the crop at the budding/flowering stage but nymphs did appear until seed development. Seeds appear to be essential for egg production and nymphal development (Kehat and Wyndham, 1972; Attia and Elshafie, 1974). As the plants senesce and dry off, there is generally a decline in the numbers of adults and nymphs on the heads. Presumably adults begin to disperse away from the crop in search of overwintering hosts. This usually occurs prior to harvest.

Between sunflower seasons the bugs are found on a succession of weed hosts. The summer weed, wireweed, attracts large numbers of *N. vinitor* during and after its flowering period. The pattern of infestation is similar to that in sunflowers with nymphal production coinciding with seed production of the weed. The steady decline in nymphal numbers over winter may be due to mortality, but can also be attributed to the development of nymphs into adults. Kehat and Wyndham (1974) suggest that most eggs and nymphs will die and only the adults survive the winter temperatures.

Stone crop and capeweed are undoubtedly the main hosts for rapid population growth in spring. The sudden appearance of *N. vinitor* on these prostrate weeds during flowering, followed by the rapid increase in numbers of nymphs during seed development, is similar to the infestation patterns observed on wireweed and sunflowers.

The dispersal of *N. vinitor* from the successive hosts appears to be a response to adverse conditions in the habitat, such as food or water shortage (Kehat and Wyndham, 1973). The movement from weeds on to sunflowers in summer appears primarily to be a response to water shortage. However, the decline in numbers of adults and nymphs on the sunflower head prior to harvest could also be due to changing climatic factors, such as reducing photoperiod and temperature.

In the second sunflower season, the later sown crop had a lower infestation than the earlier sown crops. As yet, the reasons for this trend are not clear. *N. vinitor* adults readily move into the summer weeds such as wireweed, but do appear to be attracted to the late sown crops. In addition, the lack of suitable weed hosts during mid-summer and, probably the harsh, dry conditions, result in smaller populations in autumn than are found in spring. Therefore, the scale of migration from outside "reservoirs" of *N. vinitor* into crops is very much lower during autumn. Forrester (1980) attributed the lower numbers of *N. vinitor* in later sown crops in N.S.W. to the activity of an egg parasite, while Broadley and Rossiter (in press) in Queensland suggest the reduction in photoperiod may influence reproduction in *N. vinitor* populations. There may well be obvious advantages in selecting sowing times to minimize the chance of large infestations of *N. vinitor* in sunflower crops.

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