

## Pineapple scale (*Diaspis bromeliae* (Kerner)) distribution and seasonal history

D. A. H. Murray, M.Sc.

### Summary

A survey conducted to ascertain the distribution of *Diaspis bromeliae* (Kerner) found that it was widely distributed in south-eastern Queensland. Studies on its seasonal history at two sites near Nambour between June 1977 and October 1978 showed that the percentage of living adult female scales was highest during June, September and December 1977 and August 1978. Combined mortality from parasitism and predation averaged 40.7% and 37.8% respectively, at the two sites studied.

### 1. INTRODUCTION

In Queensland, pineapple scale, *Diaspis bromeliae* (Kerner), was first recorded infesting pineapples near Brisbane in 1942 (Jarvis 1944) although Tryon (1928) had earlier reported it infesting plants of the pineapple family in the Brisbane area. Since then *D. bromeliae* has spread to many districts in south-eastern Queensland. Although it is not considered a major pest of pineapples, Brimblecombe (1955) suggested that occasional severe infestations could have serious repercussions in the industry if the insect were to spread. At that stage, *D. bromeliae* was not recorded from the main pineapple growing areas such as the Beerwah, Glasshouse, Wamuran, Mary Valley and Yeppoon districts. Proclamations prohibiting the removal of pineapple planting material from scale-infested districts were rescinded in 1974 after it became apparent that the quarantine was ineffective. There is now no restriction on the movement of pineapple planting material out of scale-infested districts.

Following requests by the pineapple industry in 1976, a survey was undertaken to determine the distribution of *D. bromeliae* in pineapple-growing areas in Queensland. In 1977-78 its seasonal history and incidence of natural enemies were investigated.

### 2. METHODS

#### Distribution

The distribution of *D. bromeliae* was ascertained by Department of Primary Industries Horticulture Branch Officers. Farms were visited and the owners questioned about the presence or absence of pineapple scale on their farms. Inspections were made only to confirm the presence of pineapple scale.

### Seasonal history

Studies of the seasonal history of *D. bromeliae* were conducted on two pineapple farms near Nambour, one at West Woombye and the other at Keils Mountain about 10 km away. Monthly samples of 15 scale-infested leaves were taken at random from a 1 ha block of pineapples var. Smooth Cayenne at each farm. Both blocks were in their first ratoon crop cycle. Samples were taken from June 1977 to October 1978. All adult female scales were counted and classed as living or dead, and were examined for the presence of eggs. In calculating the percentage of live adult female scales, currently parasitized scales were not regarded as living.

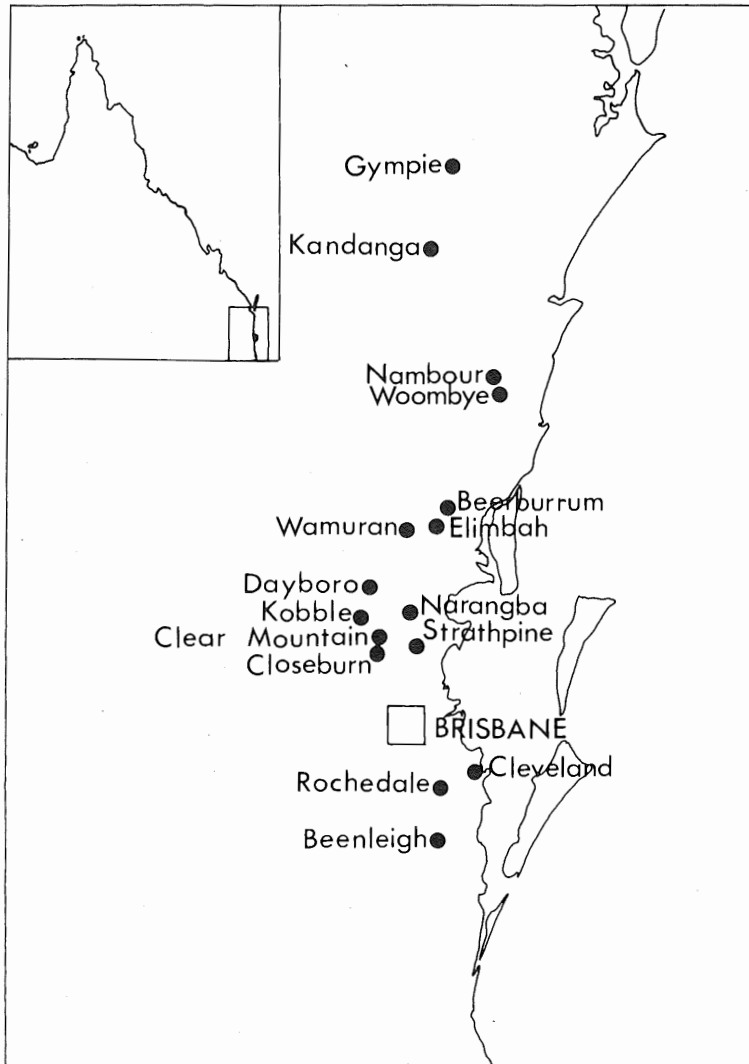


Figure 1. The distribution of *Diaspis bromeliae* in Queensland.

### Incidence of natural enemies

From the above samples parasites and predators were identified where possible and their incidence determined. Counts were made of live adult female scales with live parasites (larvae or pupae). Current parasitism was calculated as the percentage of live adult female scales with live parasites, from a total of live unparasitized scales plus scales with live parasites. Predator activity was assessed by counts of damaged scales identified by irregular holes chewed in the scale coverings.

## 3. RESULTS AND DISCUSSION

### Distribution

Before 1976, infestations of *D. bromeliae* had been recorded from Beenleigh, Brisbane, Cleveland, Dayboro, Rochedale and Strathpine districts (Department of Primary Industries Records). The survey in 1976 showed that *D. bromeliae* occurred throughout the entire Dayboro district (Clear Mountain, Closeburn, Kobble and Narangba). It was also found on one farm near Beerburum and on a number of farms in the Woombye-Nambour area. Subsequent to the 1976 survey, *D. bromeliae* was found at Wamuran (one farm) and Elimbah (one farm) in 1977 and at Kandanga in the Mary Valley (one farm) in 1979. In 1980, it was also found at Gympie on plants of the pineapple family (Bromeliaceae). The available information on the distribution of *D. bromeliae* (Figure 1) shows that it occurs on some farms in all the main pineapple-growing districts except those around Yeppoon.

Natural spread of *D. bromeliae* is slow. Observations on its distribution on pineapple farms in the West Woombye area indicated that wind was important in its dispersal over short distances. However, it is easily spread over large distances by the movement of infested planting material. There are many pineapple farms on which *D. bromeliae* has not been found. If growers on these properties must use planting material from another source, care should be taken not to introduce this pest with the planting material.

### Seasonal history

Fluctuations in the total number of adult female scales (dead and living) at West Woombye and at Keils Mountain were similar, and data from West Woombye only are presented (Figure 2). Highest numbers were recorded in September 1977 and June and October 1978. Numbers also remained relatively high during spring and summer (September to February). Peaks in the percentage live adult female scales occurred in June, September and December 1977 and August 1978. These findings are similar to those of Brimblecombe (1955) who found peaks in summer (December) and early winter (June). At no time during the present study did severe scale infestation develop in the trial blocks.

Live adult female scales with eggs were recorded in every month of this study. However, most egg laying, as judged by the percentage of total adult female scales which were living and laying eggs, occurred during June and December 1977 and June and September 1978.

### Incidence of natural enemies

#### *Parasites*

Two parasites were recorded from *D. bromeliae*. One was an ectoparasite, *Aphytis* sp., parasitizing adult female scales. The other was an endoparasite, *Aspidiotiphagus* sp., parasitizing second instar and adult female scales as well as male scales. Figure 3 shows the fluctuations in percentage current parasitism at West Woombye. Average percentage current parasitism was 13.0% at West Woombye and 15.4% at Keils Mountain. At West Woombye, where both parasites were active, 65.2% of the parasites recorded were *Aspidiotiphagus* sp. However, at Keils Mountain only *Aspidiotiphagus* sp. was recorded parasitizing *D. bromeliae*. Despite

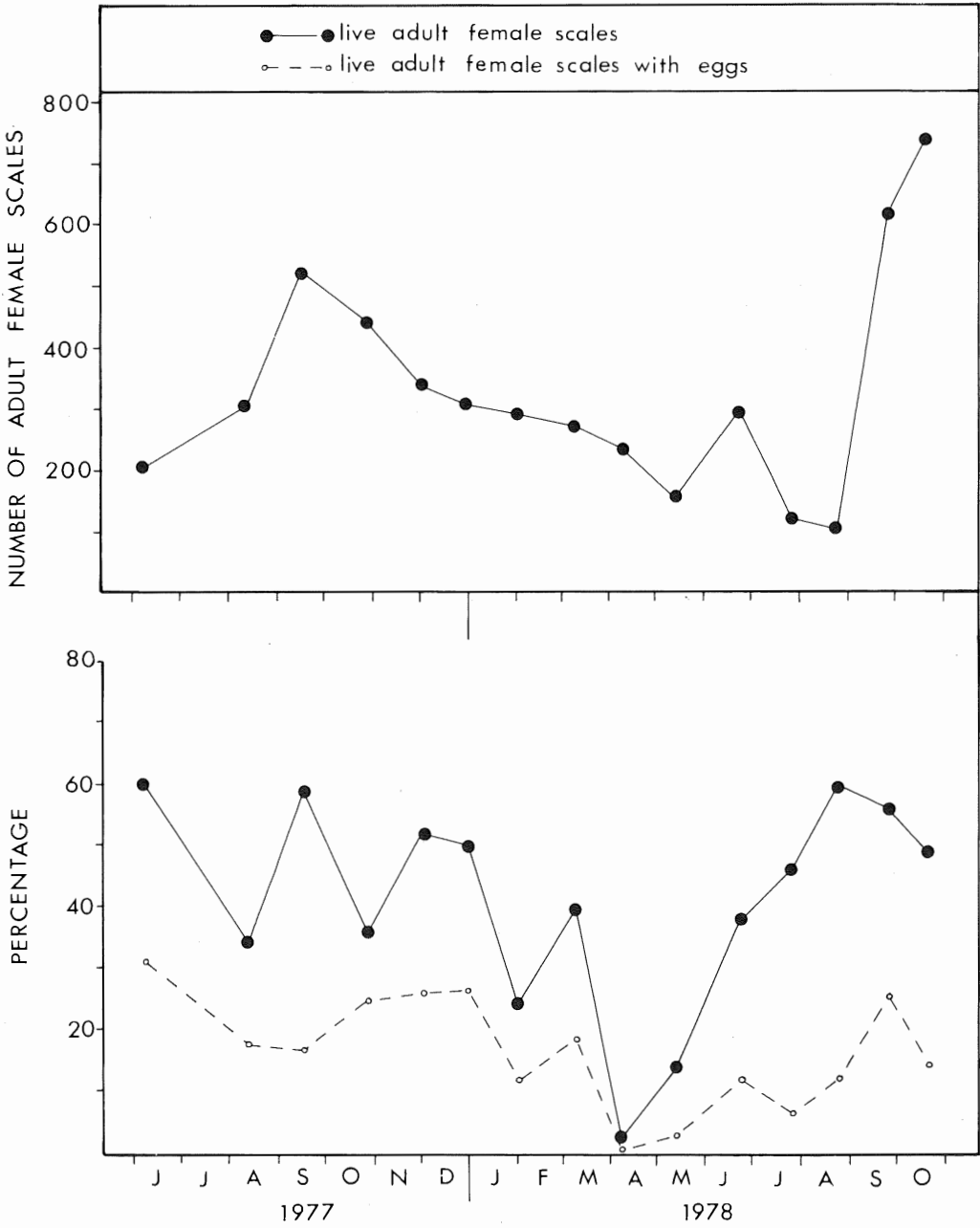


Figure 2. (a) Seasonal fluctuations in the total number of adult female *Diaspis bromelliae* at West Woombye. (b) Seasonal fluctuations in the percentage of live adult female *D. bromelliae* and the percentage of live adult female *D. bromelliae* with eggs.

many collections at this trial site as well as on two adjacent farms, no *Aphytis* sp. was collected. Possibly *Aphytis* sp. did not become established when *D. bromeliae* was first introduced into this area. Although Brimblecombe (1955) records only *Aphytis* sp. from *D. bromeliae*, *Aspidiotiphagus* sp. was also recorded in Department of Primary Industries records at that time.

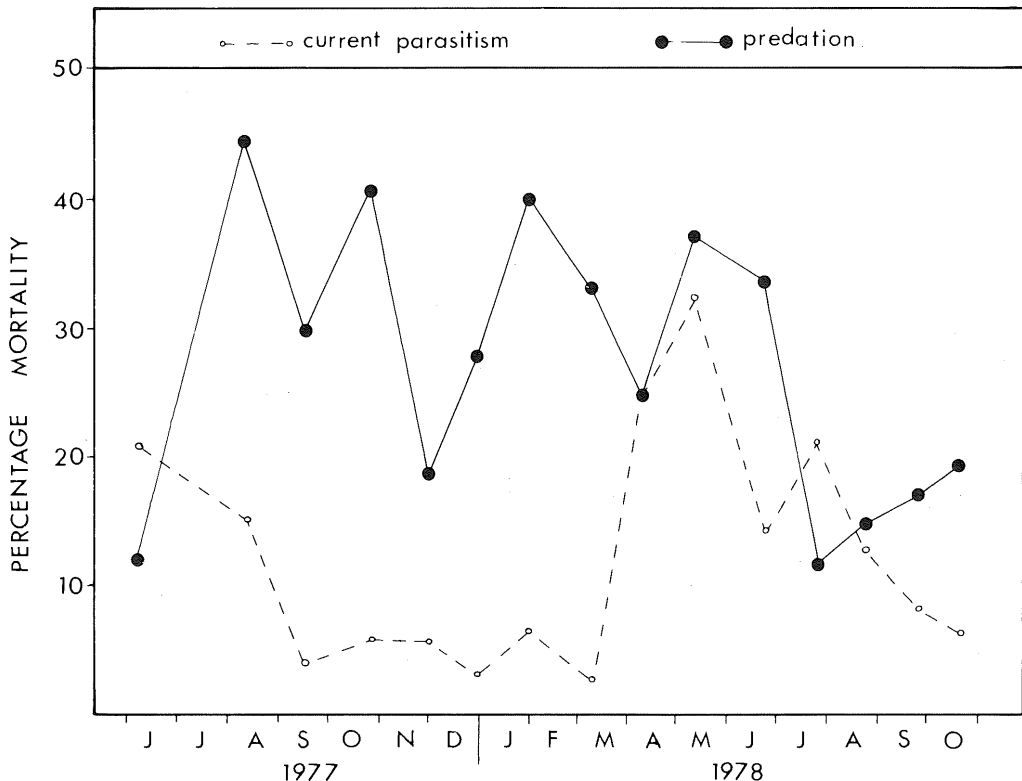


Figure 3. Seasonal fluctuations in the percentage mortality due to current parasitism and predation of adult female *Diaspis bromeliae* at West Woombye.

### Predators

Brimblecombe (1955) noted *Rhizobius* sp. and *Orcus* sp. as important factors reducing the percentage of living insects. In this present study the most common predator was *Lindorus lophanthae* (Blaisdell). It was consistently active at both sites and fluctuations in the percentage predation at West Woombye are shown in Figure 3. Predators killed an average of 27.7% and 22.4% of mature female scales at West Woombye and Keils Mountain, respectively.

The average combined total of parasitism and predation was 40.7% and 37.8% at West Woombye and Keils Mountain, respectively. While parasitism and predation were recorded at all times of the year these natural enemies were not able to eliminate infestations of scale.

## References

- Brimblecombe, A. R. (1955), 'Pineapple scale investigations'. *Queensland Journal of Agricultural Science* **12**(3), 81-94.
- Jarvis, H. (1944), 'Pineapple scale'. *Queensland Agricultural Journal* **59**, 26-29.
- Tryon, H. (1928), 'Pineapple disease investigations. Interim Report'. *Queensland Agricultural Journal* **30**, 26-34.

(Received for publication 12 December 1980)

The author is an entomologist in the Division of Plant Industry, Queensland Department of Primary Industries, and is now stationed at Emerald, Q. 4720.