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THE SEASONAL HISTORY OF *GASCARDIA DESTRUCTOR* (NEWSTEAD) IN QUEENSLAND

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SUMMARY

Two generations of white wax scale *Gascardia destructor* (Newstead) were found to occur annually on citrus in Queensland.

Oviposition extended from September to January and from March to August. Ray stages occurred on the foliage from October to February and from April to September. Peak stages occurred on the twigs from November to April and from June to November.

Temperatures above 40°C caused mortality of all stages of development. Frosts also caused mortality particularly of young scales.

There are two important times in the seasonal history when spray materials should be applied. These are at the first appearance of summer peak stages during late November—early December and at the last emergence of summer crawlers during late January—early February.

I. INTRODUCTION

White wax scale (*Gascardia destructor* (Newstead)) was first recorded in Australia by Zeck (1932) and in Queensland by Summerville (1935). At this time it was economically unimportant but by the 1950s Manfield (1955) regarded it as a major scale pest of citrus in coastal districts of southern Queensland. In addition, Brimblecombe (1956) recorded it on a wide range of introduced and native shrubs and trees. *G. destructor* continues to be a major pest in coastal Queensland from Byfield to the Lockyer Valley and has increased in importance in coastal north Queensland and in the central Burnett region.

The biology of the scale has been described by Cilliers (1967) who showed that *G. destructor* has three nymphal instars, and Smith (1970) who discussed its developmental stages in relation to control. Manfield (1955) indicated that, in Queensland, there is a prolonged emergence of crawlers beginning in September and continuing until early January, with minor hatchings occurring at other times of the year. Gellatley (1968) stated that, in the main coastal citrus districts of New South Wales, there is one important generation per year with regular hatching, but that additional generations and irregular hatching can occur in the northern part of the State.

Control of the scale in Queensland has not been satisfactory except where excessive numbers of spray applications have been used. A detailed seasonal history study was therefore made as a basis for establishing effective control measures.

II. METHODS

Four locations in Maroochy Shire were selected for the study—

1. A natural stand of groundsel-bush (*Baccharis halimifolia* L.) at Tanawha.
2. A block of 10 Washington Navels at Palmwoods.
3. A block of 10 Late Valencias at Landershoot.
4. A block of 30 Washington Navels on the Maroochy Horticultural Research Station at Nambour.

All the blocks were unsprayed.

From each location, 10 small branches carrying mature scale and each bearing at least 10 leaves, were harvested weekly and examined in the laboratory. On each of the sampled branches, the number of ray stages on 10 leaves was counted. Counting finished when all 10 leaves were examined or when the count reached 100. On twigs, the first 100 scales examined were placed in three groups—ray plus peak, globular and adult. Of the first 25 adult scales counted, the number living, and the number living with eggs and/or crawlers, were recorded. At Nambour, globular stages were included with adults and a total of 50 scales (instead of 100) were counted on each branch.

Sampling periods were as follows: Tanawha, 26 February 1964 to 11 November 1965; Palmwoods, 11 February 1964 to 25 August 1965; Landershoot, 12 May 1965 to 25 January 1966; Nambour, 24 November 1965 to 23 February 1967.

During 1964–1973, observations were made in orchards in other citrus areas of south-eastern Queensland. In June 1971, orchards in the north of the State were also inspected.

III. RESULTS

The scale counts at the four locations are shown in Figure 1. Three of the sampling groups are represented: percentage peak plus ray stages on the twigs, number of ray stages on the leaves (number per leaf is given), and percentage of adult scales with eggs and/or crawlers. At Nambour the first group is percentage peak stages rather than percentage peak plus ray stages.

IV. DISCUSSION

Seasonal history

Two generations were found to occur annually, with some overlapping in August–September and in February. The first generation was completed in 5 months, and the second generation in 7 months. This pattern has been observed throughout south-eastern Queensland citrus areas and also in the north of the State.

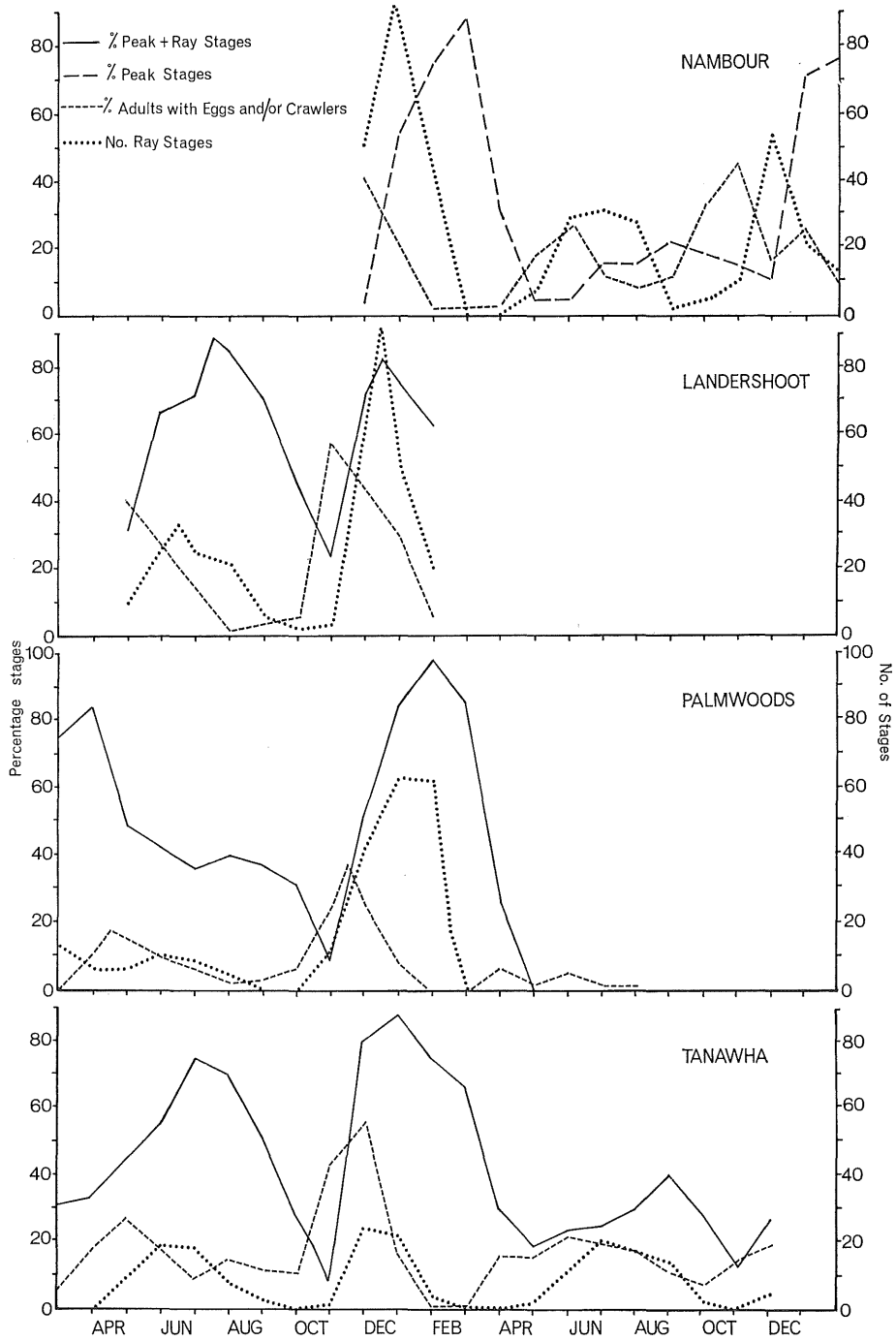


Figure 1: Scale counts at four locations.

Major oviposition occurred between mid September and the end of January. Adults ovipositing had been young stages the previous autumn and winter. Scales maturing from these eggs were ovipositing from early March, through winter to the end of August.

The emergence of summer-generation crawlers began in mid October, reached a peak in November–December, and ended by early February. At Nambour two peaks in crawler emergence rate occurred: in late October–November and in December–January. Ray stages on the leaves reached maximum numbers from late November to early January.

The emergence of winter generation crawlers occurred between early April and September, with maximum numbers of ray stages on the leaves during June–July.

Summer generation peak stages were present from late November to April with maximum numbers occurring in January–February. Winter generation peak stages were present from June to November.

Effect of weather on seasonal history and abundance

Observations have shown that extremes of temperature affect the seasonal pattern. High temperatures can exert natural control by causing high mortality of all stages. High November temperatures killed many summer generation crawlers and in such conditions twigs remained free of peak stages until late December. Adult mortality, particularly on the northern side of the tree, was observed at Palmwoods in April 1965.

Temperatures above 40°C in December 1972 caused mortality of all stages of the scale throughout southern Queensland orchards; for 12 months infestations were difficult to find and control measures were generally not necessary until December 1973. One exception observed was on citrus on the Blackall Range where the elevation (400 m) resulted in lower temperatures. The effect of high temperatures and low humidity in reducing populations accounts for the lesser importance of the pest in the central Burnett and for its economic unimportance at Charters Towers. Where frosts were experienced in late winter, mortality of all stages, particularly the young, was recorded. A clearer separation of the winter and summer generations resulted.

Relevance of seasonal history to control

Smith and Ironside (unpublished data) found that available spray materials give effective control of *G. destructor* scales only up to 8 weeks old.

There are therefore two important stages in the seasonal history of *G. destructor* when spray materials should be applied. These are the first appearance of summer peak stages during late November–early December, and the last emergence of summer crawlers during late January–early February. A spray application should be delayed until late November–early December. As crawler emergence continues, a further spray will be warranted after 8 weeks, that is, in late January–early February when crawler emergence has ceased.

Current recommendations for the timing of control of *G. destructor* (Smith 1970) in Queensland are based on these findings.

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