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MAKING USE OF A PARASITE TO CONTROL RED SCALE
IN SOUTH AUSTRALIA.

A study of methods of disseminating Aphytis melinus
DeBach, and its establishment on populations of
Aonidiella aurantii Mask.

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SUMMARY.

An ectoparasite, Aphytis melinus DeBach, of red scale, Aonidiella aurantii Mask., was imported to the Riverland and released in a few citrus orchards. Variable degrees of success in colonisation were recorded. Experiments showed that, as the number of adults of A. melinus in the initial release into any one tree was increased from 10 to 100 and then 1,000, the number of times that colonisation succeeded showed an approximately two-fold increase for each ten-fold increase in the number of adults. It was shown that the number of hosts present had no effect on the number of times that successes were recorded, and that if releases were made in the third tree in each third row before March, A. melinus would most probably be present in all trees in the orchard by July.

It is suggested that there is an upper limit to the number of adults in any release, above which no increase in the ratio of successes to failures (in colonisation) will be achieved and that this limit is reached with 100 adults released from December to April inclusive but that in October, November and May, the limit is 1,000 adults. It is suggested that in any programme to release A. melinus the above numbers be released in the nominated months and that it is not commercially feasible to make releases during winter.

Experiment showed that there was no effect of the size of the initial population of red scales on the time required to achieve control. Populations ranging from 264 to 1,253 on 150 leaves were reduced to less than ten living red scales in a period of 14 months. It is suggested that the time at which control is achieved is best described as the end of the summer after the one during which A. melinus was released. Despite control being achieved in the same time, it is suggested that the initial population of red scales should be as small as possible to reduce to a minimum the commercial losses in the two harvests immediately after release.

The degree of control achieved is shown to be adequate for an indirect but not a direct pest and it is suggested that red scale can be classified into either type. Control in less than three years suggests, but does not promise, that permanent control will be achieved.

The time of weathering required, before a residue of a Maldison, Oil or Omethoate spray killed less than 50% of adults confined above it for four hours, was determined. It was shown that the value for Maldison decreased from 48 days in late winter to 41 days in October, and 27 days in mid-summer. It was

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shown that the period for oil was $2\frac{1}{2}$ days and suggested that this would vary from three days (32 to 35°C) to three weeks (16 to 21°C) but that as soon as the visible traces of oil on leaves were lost, it was safe to release A. melinus. These results suggest that it is possible to reduce the size of a population of red scales before A. melinus is released, provided that the appropriate time - lapse is observed between spray and release.

Experiments showed that the most commonly used nutrient spray had no effect on adults of A. melinus.

The number of adults which could be reared from the red scales on one orange was shown to be greater when that orange came from a basket of 50 oranges under a tree (25.6 adults) than when it was free hanging on the tree (9.4 adults). A technique was described to use such a basket to spread A. melinus around an orchard.

Experiences gained in handling and rearing A. melinus showed that, if the source of A. melinus for release was the insectary, adults were the most economic stage, but that if A. melinus was collected from the field, immature stages (in red scales on oranges) were more easily collected.

DECLARATION.

The work presented in this thesis is my own,
unless otherwise acknowledged in the appropriate place;
it has not been previously published or submitted to
this or any other University for the award of any
degree.

(Malcolm M. Campbell)

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