

# Biological Control of Fig Scale

from 67% to 100% of scale on twigs sampled in 1954 at colonization sites was found to be parasitized

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Two small colonies of *Aphytis* "C," a wasp parasite of the fig scale—*Lepidosaphes ficus* (Signoret)—released in the San Joaquin Valley, one at Merced and the other near Fresno, demonstrated what is almost an axiom in biological control work: if a parasite is destined to succeed, it will take hold immediately after an adequate release on susceptible hosts.

*Aphytis* "C" was first colonized on March 10, 1949, and eight days later—March 18—after an unfavorable period of wind and heavy rains, the wasps were observed to be active on scale-infested fig trees. Dissections of hosts at that time showed that the fig scale had been attacked and that *Aphytis* "C" had deposited eggs.

One month after colonization, the adult progeny of the introduced stock was abundant at the release sites and could be easily observed as they searched the trees for suitable hosts.

During the summer months, the leaf and fruit forms of the fig scale did not appear to be attacked by *Aphytis* "C." However, the parasites did manage to survive in small numbers until late fall and then began to increase slowly on the overwintering population of fig scales.

Although the greatest activity of the *Aphytis* "C" seems to be restricted to the scales on the twigs, the parasite through a steady process of attrition has been able to reduce the fig scale populations. For example, in a colony of parasites released at a new site in December 1950, samples taken during the spring of 1951 consisted of 296



Fig scale which has been attacked and killed by *Aphytis* "C." The hole is cut by the wasp when emerging from the scale. Greatly magnified.

scales, of which 21.2% were attacked by *Aphytis* "C." A similar twig sample from the same site in 1954 contained a total of only 25 fig scales, of which 96% were parasitized.

The first attempts in California to establish imported natural enemies of the fig scale were made in 1940 when small lots of an internal parasite—*Phycus testaceus* Masi—from Italy were liberated at Clovis. No recoveries of this parasite were made, and subsequent efforts to establish it were unsuccessfully repeated from 1948 to 1953. Several additional species of imported beneficial insects—including two species from China, *Aspidiotiphagus* sp. and *Telsimia* sp., and two African coccinellids, *Chilocorus wahlbergi* Mulsant, and *Lotis nigerrima* Casey—were colonized on fig scale during 1948 and 1949. As in the case of the *Phycus*, none of these species have been recovered.

In 1949, a species of *Aphytis* was bred from *Lepidosaphes conchiformis* (Gmel.) infesting a shipment of elm twigs from France. This *Aphytis* resembles the cosmopolitan species *mytilaspidis* (LeBaron), but as differences were suspected, it was designated as *Aphytis* "C."

The establishment of *Aphytis* "C" on the fig scale in California is viewed as an important and valuable adjunct to the fig industry's efforts in suppressing this pest, because samples collected in 1954—at other colonization sites—yielded parasitism records ranging from 67% to 100%.

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The attempts to establish the parasite *Phycus testaceus* Masi in California in 1940 were conducted by S. E. Flanders, Professor of Biological Control, University of California, Riverside.

## CODLING MOTH

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For most efficient control, treatments should be thoroughly applied—under favorable weather conditions—just before the first brood of caterpillars begins to enter the developing nuts.

Although the spray date varies from year to year and from area to area, the treatment will be properly timed if it is applied when the average cross sectional diameter of developing Payne walnuts measures from  $\frac{3}{8}$ " to  $\frac{1}{2}$ ". This timing does not hold for Franquetts. Information in regard to Franquetts is not

complete, but where destructive infestations have occurred, it is believed that best control will result when a single spray is applied between June 15 and 20.

When effective equipment is available and treatments are thoroughly applied and correctly timed, a single spray should give adequate control of the codling moth for the season. When these conditions can not be met or when an orchard has suffered serious infestation during the previous season, a second application might be desirable. The second treatment should be applied between the 15 and 25 of June, which is prior to the time that the second-brood caterpillars make their appearance.

The important factor in codling moth control—as far as the dosage of DDT is concerned—is the application of approximately eight pounds of DDT, 50% wettable powder, per acre.

Insecticides used in the control of walnut insects are poisonous and care must be exercised in handling and applying them. Particular caution should be exercised with parathion, and directions given on the containers should be followed exactly.

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