California Red Scale

study of prospects for biological control of pest in orange and lemon groves of San Diego County

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Citrus growers in San Diego County have a very good chance—possibly the best chance of any citrus area—of obtaining biological control of the California red scale, *Aonidiella aurantii* (Mask.).

The conditions are particularly favorable for orange growers in the Escondido area.

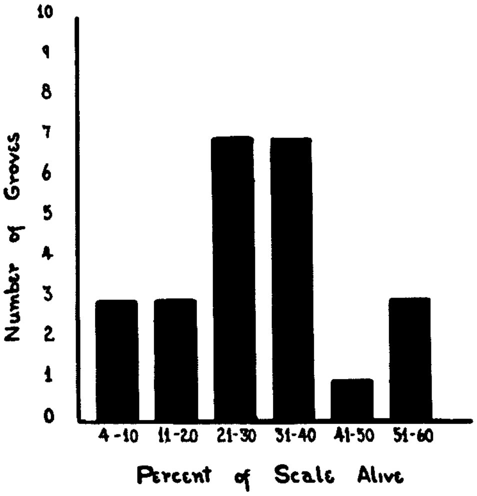
Continuing studies since 1948 in orange and lemon plots at Escondido, Vista and El Cajon—listed in the table below—have confirmed that parasites were responsible for the satisfactory biological control of red scale in these untreated groves.

Elimination or reduction of parasite populations on certain trees proved that the red scale would have increased to the point of extensive damage—sometimes within a six-month period—had it not been for the work of the parasites.

Red scale parasites occur abundantly around Escondido. *Aphytis chrysomphali*, the golden chalcid, is by far the dominant parasite, although *Comperiella bifasciata* plays an important supporting role. In samples from 22 groves untreated for two years or longer, a total of 829 *Aphytis* and 381 *Comperiella* were found. *Comperiella* attacks mature scale which *Aphytis* can not do.

Approximately 50 groves in the Escondido area have been left untreated during the last two to five years without receiving any aid in the form of colonization of insectary-reared parasites. Three surveys showed good parasite populations in all groves and no sufficiently heavy red scale populations to cause alarm, except where ants or dust were adversely affecting the parasites.

Per cent of California red scale alive in 24 Escondido citrus groves. These groves had been untreated for from two to five years.



Natural mortality of red scale caused by these parasites occurs throughout the year. In areas where red scale parasites and predators are scarce, 50% to 80% of the scale are alive at any given time. Laboratory counts of field samples were taken from 24 groves in the Escondido area. In three groves less than 8% of the scale were alive; the average grove only had 29% alive; the range was from 4% to 53% alive. In 20 out of 24 groves over 60% of the scale were dead at the time of sample.

Red Scale Studies in Orange and Lemon Plots at Escondido, Vista, and El Cajon

Grove and locality		Last treated	Red scale infestation and notes	
			When first observed	1951
Lemons	**Vista**	**Never (13 yrs. old)**	**1948 heavy ant induced infestation**	**Light-ants controlled**
Oranges	**Escondido**	**1940**	**1948 generally very light-medium to heavy where ants and dust present**	**All very light. Ants controlled**
Lemons	**Escondido**	**1947**	**1949 heavy where ants present, otherwise very light**	**Very light except few trees on which ants not controlled**
Oranges	**Escondido**	**1949**	**1950 light-medium where ants present**	**All very light. Ants controlled**
Oranges	**El Cajon**	**1947**	**1948 medium (*Aphytis* colonized) ants present**	**Commercially clean 1950. Fair ant control**

The commercial status of the red scale infestation was investigated in 30 citrus groves which had been untreated for two to five years. Of the 30 groves, 23 were found commercially clean, three were lightly infested, and four were not commercially clean. Of the 23 clean groves none was ant-infested while all four of the noncommercially clean groves were ant-infested.

Favored Area

The principal reasons why the Escondido area is particularly suitable for biological control of the red scale appear to lie in: *1*, a mild climate seldom exhibiting extremes of temperature and humidity which might reduce parasite populations, and *2*, a scarcity of pests which have become established without adequate natural enemies. The relative lack of air-borne dust on the trees in most groves is also a favorable condition.

In most other areas various factors act adversely to the parasites. In the interior, combinations of very high temperatures with very low humidities caused by desert winds destroy many red scale parasites. Very low temperatures are also detrimental. And air-borne dust on trees may hamper delicate parasites.

In coastal areas the climate is mild and favorable for red scale enemies, but the purple scale, having no effective enemies, necessitates the use of chemicals about as drastic as those used against the red scale.

Honeydew-seeking ants constitute a stumbling block for natural enemies in all areas, and must be controlled, if abundant.

The possibilities for complete biological control on lemons in the Escondido area are not as good as on oranges, because of the citrus bud mite's preference for lemons. The rust mite may also complicate matters on occasion. Tests are underway to determine if bud mite can be controlled chemically without upsetting the natural balance of the other insects and mites. The possibility for natural control of the bud mite is also under study.

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