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There's nothing new in biological control

A. N. Sproul*

The insect problems which played a big part in making cotton production on the Ord River an uneconomic proposition, helped to focus attention on biological control. Some of the investigations described in this Journal attest to the Department of Agriculture's efforts to use this form of control against insect pests and their destructive allies.

In fact, Western Australian entomologists were pioneers of what is now known as classical biological control using parasites and predators to suppress accidentally introduced insects which had become pests.



■ A ladybird, one of the first predatory insects introduced to Western Australia.

In 1894 Arthur M. Lea was appointed Western Australia's Government Entomologist. It was not long before he obtained the ladybird, *Harmonia conformis*, from New South Wales to combat woolly aphid *Eriosoma lanigerum*, a serious pest of apple trees. These ladybirds became established in Western Australia and have been observed attacking other aphids as well as the woolly aphid.

From 1901 to 1910 George Compere, a French Canadian, was on contract to the Western Australian and

Californian State Governments to travel the world collecting many parasites and predators, mainly of horticultural pests. His journeys took him from China to Brazil, from the Mediterranean and South Africa to the Pacific.

The number of parasites and predators, many of them still unknown, which he introduced into Western Australia make an impressive list. Among his more notable introductions were the ladybird *Cryptolaemus montrouzieri* which, in the larval stage, resembles the mealybugs, *Pseudococcus* spp., which it attacks, and *Aphytis chrysomphali*, a wasp parasite of the Californian red scale, *Aonidiella aurantii*.

The good work continued through L. J. Newman, originally a horticulturist but appointed Government Entomologist in 1920. In 1923 he introduced *Trissolcus basalis* a tiny wasp which lays its eggs in the eggs of the green vegetable bug *Nesara viridula*. He also obtained a consignment of 500 wasps, *Alysia manducator*, from England and New Zealand to attack the Australian sheep blowfly, (*Lucilia cuprina*). A local species of parasite, *Techinaephagus zealandicus*, was reared in the laboratory and distributed between 1928 and 1931. Both efforts were unsuccessful perhaps because of adverse climatic conditions.

C. F. H. Jenkins was appointed Government Entomologist in 1938 and even after his appointment as Chief of the Biological Services Division, he continued his duties as an entomologist until 1973. Some of the successful introductions during this period were *Aphytis* parasites of Californian red scale and *Pteromalus puparium* and *Apanteles glomeratus*, pupal and larval wasp parasites of the cabbage white butterfly, *Pieris rapae*.

After World War II and for the next 30 years, biological control was overshadowed by the new synthetic organic insecticides. These materials eliminated insects so thoroughly that consumers came to expect blemish and insect-free market garden and orchard produce, which biological control agents could seldom hope to achieve.



■ Woolly aphis, orchard pests which can be 'managed'.

As with all such natural control agents, their existence depends on a continuing low level of survival of the host pests. This level may not be high enough for them to survive if pest control is almost complete. Furthermore, pesticides, if applied heavily enough, could give a high degree of control . . . for a time.

Unfortunately, as the Ord experience amply demonstrated, the pesticides have not been the complete answer. Not only did the new materials kill the pests, but they killed the beneficial insects as well, so spraying of the pests had to be continuous. Then added difficulties appeared, through insect resistance to the chemicals, residue problems and high costs, coupled with more complicated spray schedules.

So entomologists are engaged again in biological control programmes, but with a difference. They never completely rely on the old classical method of biological control, which is uncertain, difficult to evaluate and hard to defend when the beneficial insects fail to turn up at the right time. Now they are complemented with cultural insecticidal and other techniques which are aimed at getting the best out of all worlds . . . the integrated approach.

The table lists some of the main pests, and the parasites and predators which have been successfully and unsuccessfully introduced during the past 80 years.

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