BIOLOGICAL SERVICES

Aphytis

Aphytis melinus

Aphytis melinus (Aphytis) is a parasitoid of armoured scale insects, including red scale (*Aonidiella aurantii*), oriental scale (*Aonidiella orientalis*) and oleander scale (*Aspidiotus nerii*).

Description and biology

Aphytis are tiny yellow wasps capable of short flights within a tree, or from one tree to the next. They will slowly spread over longer distances. Adult wasps are only about 1 mm in size, just large enough to develop underneath a red scale insect.

The adult female wasp lays her eggs under the scale cover onto the body of second-instar and unmated mature female scales. After hatching, the developing Aphytis larvae feed on the scale insects, ultimately killing them. The next generation of Aphytis emerges about 15-21 days later to mate and continue the cycle. Adult wasps also use scales as a food source, killing them by direct feeding (host feeding).

Each wasp will live for about 2 weeks under field conditions and each female is capable of laying over 100 eggs. Aphytis pass through approximately three generations for every generation of red scale.

Aphytis is well adapted to hot summers and low humidity. The ideal temperature range for development is between 25-30 °C, but they can tolerate temperatures in excess of 35 °C. Temperatures above 38° C for several consecutive days (e.g. heatwave conditions) are not conducive to parasite activity but will not eliminate parasites. However it is recommended that parasites be reintroduced after such events, to maintain good levels at all times.

Suitable crops

Citrus is the main crop attacked by red scale, but other hosts include passionfruit, olives, walnuts, roses and ivy. Papaws and a wide range of ornamentals, such as palms and ferns, are hosts for oriental and oleander scales. Aphytis wasps prefer healthy, well-foliaged trees, which help to provide shelter from extremes of environmental conditions.

Female Aphytis parasitising a red scale.

Red scale on citrus fruit.

Dust is harmful to most beneficial insects and mites, so effective pest management is unlikely in dusty areas such as along roadways. Irrigation can help to minimise dust. Citrus trees less than 5 years old are usually poor candidates for biological control because they offer little natural shelter for beneficial organisms.

When to release

Aphytis should be released in September/October in mild spring conditions to restore parasite levels after winter. Releases can continue through summer after pesticide applications and heat waves. Releases in March/April after extreme heat has passed are also beneficial.

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How to release

If temperatures are expected to be high on the day of release place Aphytis on the southeast side of the tree early in the morning or late in the evening. Keep remaining cups in a cool location (i.e. under a tree in the esky) until they are released. Release parasites at 6-8 release points per acre. This can be achieved by travelling every third row and releasing some wasps every 25 metres.

- Open cup and allow some wasps to fly out onto the foliage (1 release point).
- Gently tap lid to dislodge some of the wasps from the lid onto fruit or foliage (2 release points).
- Tap cup to dislodge wasps from the rim of the cup onto fruit or foliage (2-4 release points).
- Place the shredded paper into the tree canopy (1 release point).
- Place cup into tree or tap wasps out of cup onto fruit or foliage (final release point).

This releasing plan is only a guide, the important thing is to ensure that the Aphytis are spread throughout the grove.

Monitoring control success: It is difficult to detect the adult wasps after release as they disperse throughout the orchard. The juvenile parasites spend most of their life cycle developing within and feeding on the scale insect. Regular monitoring by an experienced scout is recommended to check that the wasps are established. With some experience, the level of parasitism can be assessed with the aid of a microscope.

Release rates

Three releases (spring/summer/autumn) per season to ensure constant parasite activity are advised per orchard. Where scale levels are high an oil spray at high volume may also be advised.

Citrus: Minimum 25,000 wasps per hectare (2.5 cups per hectare)

Pawpaws/passionfruit/ornamentals: Minimum 50,000 wasps per hectare (5 cups per hectare)

Tips for success

Farm practices that reduce wind, increase humidity and minimise dust in the orchard will help the Aphytis to establish. Even though parasites can survive hot/dry conditions they will perform better when conditions are optimal. Windbreaks and overhead irrigation are effective means of aiding these conditions. Under-tree irrigation is less effective in increasing humidity but still valuable. Weeds and cover crops between rows also increase humidity and help lower temperatures within the orchard. Some plants can also be useful as a supply of nectar for adult Aphytis to feed on. Large populations of ants interfere with parasites and reduce their performance. In these situations ants should be controlled by baiting or be excluded from the crop. Travel slowly on tracks to reduce dust and cover with sand/gravel or seal tracks where dust is a problem.

Quality control

Inspect cups on arrival. Many live parasites will be on the lid, sides of the cup, and on shredded paper within the cup. A small number of perished wasps may be present at the base of the cup. This is normal as long as good activity is noted with the majority of wasps on the lid and sides of the cup. If there is low or no activity when cups are opened contact Biological Services straight away.

Storage

Aphytis are usually delivered to the orchard or dispatched by overnight courier, and should be received within 2 days of dispatch. Honey is smeared under the lids of the cups to provide food for the wasps in transit. They should be released as soon as received. If the temperature is greater than 35 °C when received they can be stored in a cool location at approximately 15-20 °C (not a refrigerator as this is too cold) until the following morning.

Chemical use

Aphytis wasps are very effective parasites of scale insects but they are delicate organisms and are easily harmed by pesticides. Copper fungicides, nutritional sprays and some miticides are safe for use with Aphytis. However, highly residual insecticides such as synthetic pyrethroids should never be used. Organophosphate and carbamate insecticides are also toxic and must be avoided; if they have to be used, you should never spray your entire orchard and allow at least 4 weeks to elapse before releasing parasites. If a clean-up spray is warranted for scale control, an application of narrow-range petroleum spray oil is recommended. Drift of pesticides from neighbouring blocks should also be prevented.

Ordering and accounts

Orders are sent via express courier services on Monday or Tuesday of each week, and usually arrive within a couple of days. Orders received after noon on Tuesday are sent the following Monday. Freight is charged at cost.

Accounts are sent at the end of each month, and can be paid by EFT, BPay, cheque or postal order.