

Final part of a two-part series

Producing apples free of Black Spot

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The Department of Primary Industries and Fisheries, Queensland (DPI&F) is trialling new Black Spot (*Venturia inaequalis*) resistant apple varieties suitable for organic orchard systems.

The project is also supported by Horticulture Australia Ltd (HAL), Apple and Pear Australia Ltd (APAL) and the Rural Industry Research and Development Corporation (RIRDC).

Part one of the research findings published in the last issue of *Australian Organic Journal* covered diseases and organic control measures. This second and last part of the series covers weed control, nutrition, insect pest control, biodiversity and references.

WEED CONTROL

Weed control can be difficult during the orchard establishment phase and must be achieved using an integrated approach. No single treatment or cultural practice will do the job on its own.

Managing the problem is the key to success, rather than trying to eliminate the weeds totally. In the commercial organic trial block, weeds have been controlled by:

- applying organically certified sugar-cane mulch along rows to suppress weeds and maintain soil moisture;
- planting permanent sod in inter-rows;
- planting soil-building crops such as legumes (lucerne or *Dolichos lab lab*) to suppress weeds on fallow ground;
- mowing and slashing to prevent weeds from seeding and reduce the "seed bank" (dormant seed) of weeds in the soil; and
- selective hand-chipping of problem weeds before they establish and develop into a much larger problem.



The yet-to-be-named black spot resistant variety which is hoped to be commercialised and released.

NUTRITION

Pre-plant liming and adding of organically certified compost and trace elements was based upon soil analyses before planting. Leaf and soil samples are still taken each season to monitor tree and soil nutrient status.

Organically certified compost has since been applied as a soil amendment under the sugar-cane mulch along the tree rows. As calcium is a relatively immobile element and essential for developing apple fruit, last season three Biomin Calcium sprays were applied between early December and harvest.

Tree prunings are also chipped and re-incorporated into the soil as a valuable source of nitrogen. Similarly, using white clover (*Trifolium repens*) as ground cover helps maintain the nitrogen balance of the orchard.

INSECT PESTS AND CONTROL

The commercial organic trial block produced its first crop of apples last year. While the pest problems experienced in the first crop may not be definitive, they can be used as a guide to potential problems.

Major insect pests found at the site have been:

- Codling Moth (*Cydia pomonella*);
- Light Brown Apple Moth (*Epiphyas postvittana*);
- Heliothis (*Helicoverpa spp.*); and
- Queensland Fruit Fly (*Bactrocera tryoni*).

Codling moth damage in the 2004/5 season was less than 1%. Isomate CTT dispensers for mating disruption were used in the orchard. These prevented the codling moth laying eggs on the trees.

The dispensers are distributed throughout the orchard before the moths fly in late September, and before apple blossoming. Codling Moth Granulosis Virus (CMGV) applied as a spray is another potential control option.





Fruit picked in March 06 from the trial organic apple block.

In the absence of any control measures last season, Light Brown Apple Moth (LBAM) damaged almost 50% of fruit, and *Heliothis* damaged more than 18% of fruit numbers.

But Entrust Naturallyte (800 grams a kilogram Spinosad) will be used for LBAM control in future seasons. Entrust, a spray registered as an allowed input for use on certified organic apples and pears to control LBAM, will also control *Heliothis*.

Queensland Fruit Fly (QFF) damaged about 5% of fruit last season. Monitoring traps had low counts for most of the season. The bait spray Naturalure (0.24g/L Spinosad) is now registered as an allowed input and will be used in the 2005/06 season.

Woolly Apple Aphid (*Eriosoma lanigerum*) is another major pest of apples worldwide but is not expected to be a significant problem at the organic site. The orchard is clean and isolated, and all trees are on MM.106 rootstock, which has resistance to Woolly Apple Aphid.

BIODIVERSITY

Ongoing monitoring is used to identify beneficial and pest species in the organic block as well as compare the biodiversity

of the organic planting with an adjacent conventionally managed apple orchard.

Of particular significance, two wasps (*Hyposoter bombycivorum* and an unidentified *Ichneumonid* wasp) that parasitise the pupa of the Painted Apple Moth (*Teia anartoides*) pest have been found in the organic orchard.

CONCLUSION

A high-quality, Australian-adapted, Black Spot-resistant apple variety will be a key driver for successful organic apple production into the future.

Organic apple production also requires ongoing regular attention to pest and disease monitoring, and integrated management of the orchard as a total biological system of many components, none of which can be considered or manipulated in isolation from the other components.

These components include soil health, structure and fertility; tree physiology; pests and diseases; above and below-ground beneficial species; weeds; groundcover plants; soil pathogens; and climate. ■

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