



# GROWING APPLES

## USING AN ORGANIC PHILOSOPHY

*By Av Singh*

**O**rganic pest management is more about prevention than reaction; systems are designed to avoid problems. This works well for apple growers who are starting their orchards from scratch. However, many organic apple producers have transitioned from conventional production and are somewhat bound by previous farming decisions. That being said, organic researchers are taking a holistic approach to dealing with weeds, pests and fungal diseases.

### Weeds

Weeds on the orchard floor not only compete with apple trees for water and nutrients, but may also serve as alternate hosts for pests. In newly established orchards, weed competition can lead to a severe decrease in tree vigour and this can have long-term implications.

Quebec researchers have looked into the benefits of using cellulose-based sheets as mulch. The mulch prevents weeds from emerging, while also preventing pests (i.e., plum curculio and apple sawfly) from entering the soil as larvae. By interrupting their lifecycles, pest populations may be reduced significantly.<sup>1</sup>

In Kentville, N.S., OSC researcher Dr. Julia Reekie is exploring different approaches to managing the orchard floor, including the use of reflective mulches, compost and green manures. To date, her findings

show that using a reflective mulch over a layer of compost controls weeds effectively and promotes both tree growth and fruit production.<sup>2</sup>

### Rosy apple aphid

In conventional orchards, a non-selective insecticide is used if rosy apple aphid populations warrant treatment. As you might expect, many beneficial insects may also die. In a “many little hammers” approach to pest management, OSC researchers in B.C. led by Linda Edwards considered the aphid’s life cycle. She realized the importance of plantain as a necessary intermediary host. Now, researchers have two targets to help achieve control—the aphid and its alternate host (plantain).

Canada’s Organic Science Cluster (OSC) is part of the Canadian Agri-Science Cluster Initiative of Agriculture and Agri-Food Canada’s Growing Forward Policy Framework.

*Growing Forward,  
a federal-provincial-territorial initiative*

The Science Cluster Initiative is led by the Organic Agriculture Centre of Canada (OACC) and the lead industry applicant, the Organic Federation of Canada.

To control the aphids, degree-day (temperature-sensitive) modelling is being used by graduate student Tamara Richardson and other OSC researchers to determine the best timing for spraying organically accepted horticultural oils (i.e., superior dormant oil).<sup>3</sup> Preliminary findings suggest that to be most effective, the spring application should occur after eggs hatch but before larvae start feeding. If it's sprayed later, the leaf curl that results from aphid feeding will protect the larvae from the oil. The researchers are also studying the aphid's fall migration to optimize the timing of autumn oil applications.



*AAFC researchers in Kentville, NS, have evaluated the impact of grazing pigs in orchards to control weeds and collect (devour) drops.*

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## **When it comes to disease, the first step is to plant varieties with resistance.**

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To target the alternate host (plantain), the researchers are removing the weed from the orchard floor by rotovating and reseeding with a grass mix. This appears to lead to a small reduc-

tion in aphid numbers. An alternative approach would be to recognize the plantain as a symptom of a compacted soil and look to alter the soil structure to make grasses more competitive. Applications of compost to the orchard floor may help rebuild soil structure and also provide nutrients to the orchard floor. The compost applications can help with the decomposition of leaf litter,

which, if left, becomes a food source to help apple scab overwinter.

## **Diseases**

When it comes to disease, the first step is to plant varieties with resistance to apple scab and/or fire blight. In conventional orchards, the next line of defence has been the use of fungicides. For organic growers, apple scab is most often controlled through sprays of sulphur, lime-sulphur or Bordeaux mixture (copper sulphate with lime). Unfortunately, these applications must occur after every rainfall from bud break until all of the spores are discharged. This can



*Reflective mulch.*

**To prevent apple replant disease,** OSC researchers are looking to microorganisms for help. Certain types of soil bacteria help saplings take up phosphorus, which aids in root development. See details on page 26.





*Injecting an apple tree.*

damage trees through excessive sulphur and/or copper toxicity.

Another approach is 'induced resistance.' Essentially, the apple tree receives an injection, like a flu shot, containing substances that stimulate its immune system. The use of induced resistance has been successful against apple scab in which immune-boosting substances, often derived from microorganisms, have been sprayed on foliage.

Building upon the notion of induced resistance, OSC researcher Gordon Braun is investigating trunk injections. Compared to foliar sprays, the injections would require much less material, be more efficient to apply, and have a longer lasting effect (see details on pages 56–57).

The organic apple sector is maturing. In the race to meet strong and rapidly growing consumer demand for organic apples, toxic external inputs had been initially replaced with less toxic external inputs. More recently, however, organic ideas that build upon the internal health of the tree and the inter-

connections within ecosystems are building the foundation for this promising sector.

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*Photo credits: Julia Reekie (Honeycrisp on pg. 58 and pg. 59 lower), Janet Wallace (pg. 59 upper), Atlantic Food and Horticultural Research Centre (pg. 60).*

## References:

1. Benoit, DL, C Vincent & G Chouinard. 2006. Management of weeds, apple sawfly (*Hoplocampa testudinea* Klug) and plum curculio (*Conotrachelus nenuphar* Herbst) with cellulose sheeting. *Crop Protection*. 25:331–337.
2. Reekie, J & E Specht. 2012. Orchard floor management affecting the performance of young organic 'Honeycrisp' apple trees. *Proceedings of the 2012 Canadian Organic Science Conference*.
3. Richardson, TA, AE Brown & L Edwards. 2012. Management strategies for control of the rosy apple aphid, *Dysaphis plantaginaea*, in organic apple orchards in British Columbia. *Proceedings of the 2012 Canadian Organic Science Conference*.