



ORCHARD NETWORK

For Commercial Apple Producers

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Orchard Management

Apple Harvest - Enough Rain for You?

Leslie Huffman, Apple Specialist, OMAFRA Harrow

Whew! Most growers finished up apple harvest, slogging through as much rain and mud as anyone can ever remember. There was lots of mud in 1992, but likely not this bad. Fortunately, many growers report large fruit size and better yields than expected. Some crop was downgraded due to scab, and a bit of russetting, but not as bad as expected.

Fruit quality seems quite good, with good flavour and firmness, and hopefully few storage issues. Those really hot days in July and August were hard on farmers and workers, but the trees took advantage and made sugars and filled cells.

Did you take a good look at the health of your trees, your soil and your crop? This fall was a good chance to observe and think about what season-long water can do for apple growers. Where drainage was adequate, tree growth and health was very good (in addition to forming good fruit buds for next year).

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**This Newsletter is brought to you by
the Ontario Apple Team:**

Leslie Huffman, Harrow
ONNL Editor
Apple Production
(519) 738-1256
leslie.huffman@ontario.ca

Dr. Jennifer DeEll, Simcoe
Fresh Market Quality
(519) 426-1408
jennifer.deell@ontario.ca

Dr. John Cline
University of Guelph, Simcoe
(519) 426-7127, ext. 331
jccline@uoguelph.ca

Paul Bailey, Guelph
Risk Identification and Management
paul.bailey1@ontario.ca
(519) 526-4380

Kristy Grigg-McGuffin, Simcoe
Pome Fruit IPM
(519) 426-4322
kristy.grigg-mcguffin@ontario.ca

Margaret Appleby, Brighton
IPM Systems
(613) 475-5850
margaret.appleby@ontario.ca

Hannah Fraser, Vineland
Horticultural Crops Entomology
(905) 562-1674
hannah.fraser@ontario.ca

Michael Celetti, Guelph
Plant Pathologist, Horticultural Crops
Program Lead
(519) 824-4120 ext. 58910
michael.celetti@ontario.ca

Christoph Kessel, Guelph
Horticulture Crop Nutrition
(519) 824-4120 ext. 52480
christoph.kessel@ontario.ca

Anne Verhallen, Ridgeway,
Soil Management (Hort Crops)
(519) 674-1614
anne.verhallen@ontario.ca

Dr. Jason Deveau, Simcoe,
Application Technology
(519) 426-8934
jason.deveau@ontario.ca

John Zandstra
University of Guelph, Ridgeway
(519) 674-1500 ext. 63627
jzandstra@ridgewaync.uoguelph.ca

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letter** was compiled by Client Service Rep-
resentative, Patti Arts, OMAFRA, Kemptville

Many growers harvested a larger crop than expected. These observations have prompted me to think about the role of irrigation in achieving high yields. Perhaps we should be targeting irrigation earlier in the year. Many apple growers (and researchers) don't think irrigation is necessary, but as we move to more intensive orchards, higher costs and the drive for higher yields, maybe it's time to reconsider the need for irrigation. Love to hear your thoughts!

Man versus Machine Apple Labour Savings Study - Orchard Platforms

*John Molenhuis, Business Analysis and Cost of Production, OMAFRA
Brighton*

Many progressive growers in Ontario are seeing the merits in planting tightly spaced, uniform canopies in orchards. Faster attainment of higher yields, good fruit quality, and the potential for higher labour efficiency are a few of the driving factors behind increasing the number of trees per acre.

Uniform canopies lead to a higher potential for using mechanical orchard aids such as platforms.

A project looking at the labour savings that can potentially be realized by adopting self-propelled platforms for pruning and thinning practices is currently underway.



Preliminary results of the project from six cooperating growers are seeing significant labour savings through use of the platform. Using the platform to hand thin the upper portion of the trees that could not be reached from the ground saw a 41% reduction in the hours of labour required compared to the use of ladders. The same type of savings is being seen in summer pruning. Although given the tree structure of these higher density plantings, many of the orchards in the study did not require summer pruning.

The machinery cost per acre for the platform is dependent on the size of orchard but using the 60-acre orchard size of a recently completed Apple Cost of Production study conducted by the Ontario Apple Growers, the per-acre cost estimate is around \$158 / acre. With the hand labour rate of \$13.86 used in the COP study, a grower would need a time savings of just over 11 hours per year to justify the platform. Looking at the hours required for hand thinning and pruning, 11 hours represents a savings of 16%, which from the results seen so far should be achievable.

Future plans for the project are to collect dormant pruning data this winter/spring. Orchard tours to demonstrate the equipment are being planned as well.

This project, coordinated in co-operation with Ontario Apple Growers and the Ontario Ministry of Agriculture, Food and Rural Affairs, was funded in part through Growing Forward, a federal-provincial-territorial initiative. The Agricultural Adaptation Council assists in the delivery of several Growing Forward programs in Ontario.

Evaluating the Tall Spindle Apple System for use With Platforms

John Zandstra, Research Horticulturalist University of Guelph, Ridgetown Campus

Production economics are challenging for apple producers and any technique to reduce input costs should be considered. Recently, the use of platforms to enable workers to move through the orchard is looking promising. Pruning costs may be reduced up to 30% using platforms.

Tree architecture must be suitable for platforms to be used successfully. Dr. Terence Robinson (Cornell University) recently described the "Perfect Orchard", based on his years of pomology research, and the Tall Spindle tree seems well adapted to platform efficiency. Trees are trained to a tall spindle on a trellis, grown into a tall narrow hedgerow. Planting well feathered trees, which are tied below horizontal, will promote fruiting in the second year, and reduce extension growth. Large lower scaffolds are eliminated, and crop left on new laterals pulls them horizontal and reduces growth. As the trees mature, limbs are removed rather than shortened, replaced by new weak, laterals to keep the tree calm and fruiting.

To evaluate this system, a research/demonstration trial was established in 2009 at the University of Guelph's Cedar Springs Research Station near Blenheim ON. Ambrosia/B9 and Honeycrisp/B9 were established in 12 ft rows at three in-row spacings:

- 2 ft (1814 trees/acre)
- 3 ft (1205 trees/acre)
- 4 ft (907 trees/acre)

The trees are supported individually with bamboo, which is attached to a 3 wire trellis. The experimental design is randomized complete block with 12 replicates; each plot consisting of 5 trees. Unfortunately, well-feathered trees were not available, so whips were planted and cut back to 30". Developing laterals were trained once they reached the desired length.

In 2011, 4 different pruning and training methods were superimposed on all variety/density treatments in the trial:

1. Removing 1 large lower branch (>3/4 the diameter of the leader) but do not train the upper laterals horizontal
2. Removing 1 large lower branch, and train upper laterals horizontal
3. Removing all large lower branches (>3/4 the diameter of the leader) but do not train the upper laterals horizontal
4. Removing all large lower branches and train the upper laterals horizontal.

A small crop of Ambrosia was harvested in 2011, and a larger crop is expected in 2012. Information will be

collected on growth, cropping and pruning requirements for each training technique. This planting should provide information to evaluate the productivity of Honeycrisp and Ambrosia in this system, and the suitability for using platforms.

The Ruts are Still There - Right?

Anne Verhallen, Soil Management (Hort Crops), OMAFRA Ridgetown

Soil conditions for much of the season were far from ideal for getting equipment across the orchard. We had ruts in the spring, not surprisingly we still see ruts after this fall – and ruts just don't go away.

So let's look at something on the bright side. The ruts are generally in the tracks and especially at the row ends where you are turning and driving repeatedly. The tree row usually retains lovely soil structure which supports good root growth and access to moisture. If you have had tractors sliding and rutting close to the trees – you need to address that. It often means the row is on a slope or there may be a bit of a spring in that area. Consider the best way to remove excess water. French drains – trenches filled with gravel, usually installed over or near drainage tile - can help to remove excess water quickly.

What about the rest? Your packed traffic area will tend to shed rainfall due to the tighter soil structure which in turn means that water will collect in any depression or low area. The compaction problem itself is not so much the weight and axles under any one load or pass. It is the sheer number of trips under wet soil conditions that eventually causes the soil structure to fail.

For a start, this winter - take a look at your tires. Compaction work with field crops has shown that if the tire pressure can be reduced to 10-15 psi, that there will be less compaction. However, check your tire specifications and consult your dealer first to maintain the tire warranty. Also to be realistic – if you are driving over that area again and again, treating it as a road; tire pressure is not going to be the miracle worker.

Which brings us to – the roadway – create a better landing area for your tractors. Fix any ruts caused this spring/fall – grade or scrape to even things out after soils have dried down a bit. Consider adding some gravel as a back fill or in the really bad spots you may have to excavate and build up with gravel to make a decent road bed.

Gravel is not cheap but neither is the wear and tear on your tractors, tires, trees and people.

Records - Are Yours Adequate?

Leslie Huffman, Apple Specialist, OMAFRA Harrow

Congratulations to the many growers who completed a food safety audit this harvest season. For many it was the first time, with much preparation required. Those who are experienced at audits report that it become part of your daily management task. This was the first year to run a mock recall scenario. This exercise highlighted whether your records are adequate to allow access to the information that others might require.

No one likes doing paperwork, well, mostly no one except maybe those in accounting or other such careers. But generally growers do not like paperwork. But hopefully you can see the benefits of keeping records that can provide the information you need.

Make sure that your record system also provides you the information you need to make good management decisions. Can you tell which blocks produce the most yields, and which cost the most to produce? Good records help pinpoint blocks that are no longer profitable and should be removed. If you have to keep records for others, be sure to also make them work for you.

Crop Protection

Welcome New Pome Fruit IPM Specialist

Kristy Grigg-McGuffin has been appointed as acting Pome Fruit IPM Specialist for OMAFRA in Simcoe. Kristy replaces Kathryn Carter who is on parental leave with her new son.

Kristy will be working with apple growers, researchers and industry to provide them with information on managing insects and diseases in Ontario orchards. Her research will involve the following projects:

1. National apple scab and powdery mildew resistance survey
2. Management of apple leaf curling midge and San Jose scale
3. GF-120 in conventional orchards for apple maggot control
4. Status of brown marmorated stink bug in Ontario orchards, and
5. Insecticide resistance testing of codling moth and mites.



Kristy received her MSc in Environmental Biology and Toxicology from University of Guelph, where she studied the susceptibility of codling moth in southwestern Ontario apple orchards to currently recommended insecticides. Prior to her MSc, Kristy worked with OMAFRA in 2008 as the acting vegetable crop specialist for cole crops, root, bulb and leafy vegetables.

Welcome Kristy to the OMAFRA Apple Team, and congratulations to Kathryn Carter.

Pre-Bloom Spray for Apple Leaf Curling Midge

Kristy Grigg-McGuffin, Pome Fruit IPM Specialist, OMAFRA Simcoe; Margaret Appleby, IPM Systems Specialist, OMAFRA Brighton

The apple leaf curling midge (ALCM), *Dasineura mali*, a European pest that arrived in North America in the 1960's, is increasingly becoming a pest in Ontario orchards. Although these insects are not considered to be an economic pest of mature apples, we have been seeing increased levels of damage in orchards. As well, high insect populations in nurseries or on young plantings can stunt growth of terminal shoots. In the past, ALCM has likely been controlled by broad spectrum insecticides (eg., OP insecticides) applied against key pests. As we move away from using broad spectrum insecticide programs, many growers are looking for ways to manage this insect.

The ALCM overwinters as pre-pupae or pupae in silken cocoons in the soil, or in curled leaves. Adults only 1.5 to 2 mm in length begin to emerge in late May to early June in Ontario (Figure 1). Pheromone trap data from this year suggests that there are at least 2-3 generations of ALCM with adult emergence beginning as early as pre-bloom.

Eggs are laid on apple leaves that are partially unfolded. After hatch, emerging maggot-like larvae feed on the upper surface of leaves for 2-3 weeks before dropping to the ground to pupate. The margins of infested leaves are rolled in towards the mid-vein and the leaves become purple or red and brittle before dropping from the tree (Figure 2). Generally, a curled leaf contains 20-30 larvae. However, as many as 500 larvae can be found in an infested leaf. Apples are the only host of the ALCM. Varieties with lush terminal growth may be preferred due to the availability of egg laying sites, though all cultivars are susceptible to infestation.



Figure 1. Adult apple leaf curling midge



Figure 2. Apple leaf curling midge damage on leaf.

Research conducted last year showed that the use of Movento has the potential to reduce damage from ALCM. Studies were conducted again this year to determine whether applying pre-bloom sprays of Movento or Assail could manage this pest effectively in orchards.

Two orchards were sprayed in 3 acre blocks as soon as 10 adults were caught in pheromone traps (pre-bloom). A 2nd spray was applied 7-10 days later. Untreated blocks were used as controls.

Terminal assessments indicated that infested terminals were present in the orchard immediately after monitoring began. In general, there was significant reduction in the % of terminals infested with ALCM in the Movento vs untreated blocks (Table 1). Assail was not an effective control product in the treated orchards. This trial also suggests that severity of infestations were reduced in the Movento treated blocks as compared to the Assail and untreated blocks

Table 1. Percent of infested terminals by apple leaf curling midge in treated orchard blocks.

2011	% Infested Terminals					
	Orchard 1			Orchard 2		
	Movento	Assail	Untreated	Movento	Assail	Untreated
May 24	1.0	1.0	0.0	n/a	n/a	n/a
June 3	4.0	1.0	15.0	n/a	n/a	n/a
June 8	1.0	10.0	13.0	n/a	n/a	n/a
June 16	8.0	17.0	13.0	12.0	29.0	17.9
June 29	4.0	11.0	15.0	10.0	24.0	19.3
July 5	6.0	11.0	14.0	19.0	25.0	28.7
July 13	7.0	16.0	16.0	31.0	43.0	68.0
July 20	21.0	25.0	26.0	11.0	56.0	40.7
July 28	27.0	10.0	14.0	25.0	35.0	41.3
August 10	11.0	20.0	26.0	n/a	n/a	n/a
MEAN	9.0	12.2	15.2	18.0	35.3	36.0

Although this trial showed that ALCM can cause considerable damage to terminals, further research needs to be conducted to evaluate the impact of this damage on the crop. However, it appears that pre-bloom applications of Movento may help to reduce the severity of terminal damage in orchards. For growers that don't have access to trap information, the application of Movento at petal fall targeting San Jose scale will likely provide some control of ALCM. Apply a second application 7-10 days later, where monitoring indicates the need.

Post Bloom Control For San Jose Scale

Kristy Grigg-McGuffin, Pome Fruit IPM Specialist, OMAFRA Simcoe; Margaret Appleby, IPM Systems Specialist, OMAFRA Brighton

San Jose scale (SJS), *Quadraspidiotus perniciosus* (Comstock) has been an issue in Ontario apple orchards again this year. In the past, fruit damage by this pest has been minimal. The increase in populations in orchards and damage to fruit is likely a result of changes in the products used in our IPM program (e.g. reduced use and loss of broad-spectrum OP insecticides).

Generally, SJS starts on one or two trees, and gradually spreads to surrounding areas in the orchard over a few years. Once scale has become established in orchards, it can be very difficult to eradicate. So, where there was damage on fruit this year, it would be wise to manage SJS more aggressively next season.

Dormant applications of oil (eg. Superior 70 Oil, Spray Oil 13 E) in the spring is the best time and cheapest way to manage scale. Coverage and timing is essential with the use of oils, since they smother the overwintering scale. The most effective timing is delayed dormant from silver tip to ½ inch green, although some may be controlled with the later oil applications for European red mite. Applying oil in the spring can be challenging in some years due to concerns with frost (do not apply oil within 48 hours of a frost), and issues with phytotoxicity (do not apply oil within 14 days of Captan).

Insecticide applications to control the crawler stage during the growing season are tricky to time. OMAFRA, in conjunction with Norfolk Fruit Growers Association, set up pheromone traps and black electrical tape (sticky side out) to monitor SJS adults and crawlers, respectively, this summer. Unfortunately, neither trapping method proved to be effective in determining timing for post-bloom sprays.

Alternatively, degree-day models have been developed to time applications for crawlers. First generation crawler emergence occurs at 278 DDC, base 10°C from March 1st. This is generally 29 days from the petal fall of McIntosh but can have a variation of +/-12.5 days. Late post-bloom applications timed against first emergence of 2nd generation crawlers are best timed at 806 DDC, base 10°C, which generally occurs in mid July.

Along with investigating trapping and degree-day models, preliminary research this year evaluated two post-bloom insecticides for SJS control: Movento 240 SC at petal fall and Assail 70 WP at 278 DDC, base 10°C. (Note: Assail is not registered for scale in Canada but is used in the U.S. for this pest.) Due to variable results in the treated areas and the check treatments, we cannot make conclusions about these treatments yet, but are hoping to continue this research in 2012.

Bitter Rot of Apples

Michael Celetti, Plant Pathologist (Hort Crops), OMAFRA Guelph

The hot weather during the summer of 2011 may have resulted in the development of diseases of apples that are more common in the Southern regions of North America than in the temperate regions such as Ontario. Recently I was brought samples of McIntosh fruit that had developed an uncommon rot. Close inspection of the spores and development of the rot under the microscope confirmed that the rot was caused by the fungus *Colletotrichum gloeosporioides*. Several *Colletotrichum* spp. can infect apples and cause the disease known as Bitter Rot (Figure 1). This disease is more common in the hot regions of the Southern US where it can cause significant damage to fruit if not kept under control.

The Bitter rot pathogen can be found almost anywhere apples are grown in the world. It can also cause diseases in strawberries, pears, peaches, grapes and a few other fruits and vegetables under the right conditions. In apples, the pathogen can cause cankers on limbs and leaf spots but these are very rare. The fungus over-winters in infected mummified fruit left in trees from chemical thinning or that had dropped to the orchard floor. It has also been found to over-winter in cracks and crevasses in bark or in cankers caused by the pathogen itself or other pathogens. Spores are disseminated by rain splashing almost all season long.

Although fruit can become infected anytime during the growing season starting at petal fall, most severe infections occur between midseason and harvest. Early infections appear as tiny grey or brown spots that do not enlarge until much later in the summer when the fruit begins to mature. Later infections appear as small circular sunken brown spots that become larger as the season progresses.

The optimum conditions for infection and rot development include wet, humid weather during temperatures around 26°C. The spores require free water to germinate and can infect through the skin of the apple directly or through a wound. A red halo may develop around the small circular spots particularly on yellow skin varieties. When lesions become about 25 mm (1 inch) in diameter, pin head size black fruiting bodies often arranged in concentric rings may appear in the center giving the lesion a “target spot” appearance. During wet or extreme humid conditions, masses of orange, pink to salmon coloured spores are produced on the surface of the lesions (Figure 2). Epidemics of this disease occur when warm to hot weather occurs early in the growing season together with rainy periods that extend into the later part of the season. As the fruit lesions enlarge, a diagnostic V-shape rot progresses towards the core (Figure 3). Bitter rot is often more severe on early than late maturing varieties and can show up in the orchard or in storage.

Other common fruit rots such as White rot caused by *Botryosphaeria dothidia* and Black rot caused by *B. obtusa* do not cause sunken lesions with orange, pink to salmon coloured spore masses and do not develop a V-shaped rot towards the core which distinguishes them from Bitter rot. Blue mold caused by *Penicillium expansum* and Grey mold caused by *Botrytis cinerea* are common post harvest storage rots that develop in wounds and do not usually cause sunken lesions and produce either bluish or grey spore masses.



Figure 1. Sunken lesions on McIntosh apples caused by the Bitter Rot fungus *Colletotrichum gloeosporioides*



Figure 2. Orange, pink to salmon coloured spores are produced on the surface of the sunken Bitter rot lesions



Figure 3. Bitter rot lesions develop a diagnostic V-shaped rot that progresses towards the core.

Most apple cultivars are susceptible to Bitter rot however; Empire, Freedom, Golden Delicious, Fuji, and Granny Smith are particularly susceptible. Management of Bitter rot is through good orchard sanitation. Removing old cankers of other disease such as Fire blight and Black rot cankers as well as mummified fruit left in the trees from chemical thinning will remove the primary inoculum from the orchards. Mulching or removing fruit on the orchard floor will also reduce inoculum and the potential of infection. Some fungicides registered for the management of apple scab and summer diseases may provide some protection against infection from the Bitter rot fungus if used later in the season.

New Herbicide Alion™ Will be Available for 2012 Season

Kristen Callow, Weed Management (Hort),
OMAFRA Ridgetown

An innovative herbicide, Alion (active ingredient indaziflam) from Bayer CropScience, has been granted regulatory approval in Canada by the Pest Management Regulatory Agency (PMRA), an agency of Health Canada. Alion was developed primarily for use in perennial crops such as citrus, tree nut, pome and stone fruit. The market launch of Alion in Canada is planned for 2012.

Alion controls a broad spectrum of weeds and provides excellent crop safety. It can be used pre-emergent and applied alone or in a tank mix with post-emergent, burndown herbicides (e.g. Ignite® and glyphosate). Another advantage for the farmer is the low application rate. Because of the long-lasting residual control and the broad spectrum of activity, the number of herbicide applications required per season will be reduced. Furthermore, Alion will be an effective tool to manage weed populations that are resistant to other modes of action.

Alion 200 SC

Active Ingredient: Indaziflam 200 g/L

REI: 12 hours

Rainfast: n/a (soil residual)

Timing: pre-emergence to the weeds, apply to soil before weeds germinate. If weeds have emerged, Alion may be tank-mixed with a burndown herbicide (registered with Ignite or glyphosate).

Notes/Precautions:

- May be applied at anytime throughout the growing season when the ground is not frozen or covered with snow.
- Excessive crop or weed debris present on the soil surface at time of application may prevent uniform product distribution reaching the soil and reduce weed control.
- APPLY ONLY ONCE PER GROWING SEASON.
- Apply only to crops that have been established for at least three full growing seasons.

Crops: Apples, Pears, Peaches, Nectarines, Plums, Cherries (sweet/sour), Apricots, Almonds, Hazelnuts, Filberts, Walnuts, Chestnuts and Japanese Heartnuts

Rate: 375 mL/ha (152 mL/ac)

Labeled Weeds: Barnyard grass, Giant foxtail, Green foxtail, Italian ryegrass, Large crabgrass, Wild proso millet, Yellow foxtail, Annual sow-thistle, Black mustard, Common groundsel, Field bindweed, Lamb's-quarters, Prickly lettuce (suppression only), Redroot pigweed, suppression only), Shepherd's purse, Spotted spurge, Stork's-bill, White sweetclover, Wild mustard.

Update on Apple Scab Fungicide Resistance Project

Margaret Appleby, IPM Systems Specialist, OMAFRA Brighton; Kristy Grigg-McGuffin, Pome Fruit IPM, OMAFRA, Ridgetown

A 2-year National Apple Scab Resistance Testing Project was launched this year, and funded through AAFC's Pest Management Centre. All apple-producing provinces are participating; Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia.

53 growers across Canada agreed to participate in this project and left a small number (6-8) of trees unsprayed for disease until apple scab lesions appeared. These scabby leaves were collected and sent to the University of Guelph's Pest Diagnostic Lab for testing for resistance to both Group 3 (Nova 40W, Nustar & Inspire) and Group 11 (Sovran, Flint 50 WG and Pristine WG) fungicides. Two methods for testing were used; a modified SMOR method developed at Cornell University, as well as the DNA screening developed at Michigan State University.

We will have this year's results by January 2012. In the spring of 2012, a different group of orchards will be sampled for apple scab fungicide resistance.

The second part of this national project was to investigate the resistance to Group 3 & 11 fungicides to powdery mildew. This part of the project was approved in September 2011, and is funded through Canadian Agricultural Adaptation Program (CAAP). This 2-year project will be starting in 2012. Samples of powdery mildew will be taken from orchards sites from all apple producing provinces, and tested at the Okanagan Tree Fruit Lab in British Columbia. Both bioassay method and DNA testing will be used to evaluate the samples. For 2012, samples of powdery mildewed tips will be collected from 50 orchards sites across Canada.

This is a large and challenging project sponsored by the Ontario Apple Growers, with the OMAFRA Apple Team providing leadership. We are hopeful that this project will provide growers with information needed to make fungicide choices, as well as develop the ability in our laboratories to do resistance testing in the future.

Slow Down To Improve Airblast Spray Penetration

Dr. Jason Deveau, Application Technology, OMAFRA Simcoe

Airblast spray operators are always pressed for time and a common practice is to drive faster to complete the job more quickly. Studies have shown that it takes time for spray-laden air to displace the air in the plant canopy. Therefore, airblast applicators have been told that slower

travel speeds generally improve spray penetration and deposition. This is not welcome news for many operators, and it was decided to demonstrate the principle.

Using a three-point hitch airblast sprayer with a 24" fan (see Figure 1), two apple tree varieties with different morphologies (Red Delicious and McIntosh) were sprayed from one side at two different travel speeds: 2.5 km/h and 5.5 km/h.

The sprayer was re-nozzled between speeds so that the same spray output (600 L/ha) was emitted. Water sensitive paper was placed across the width of the tree, facing the sprayer, as an indicator of spray



Figure 1: Spraying Reds with a 3-pt hitch (see Figure 2).

The papers are yellow until contacted by spray, whereupon they turn blue (see Figure 3). Cards were digitally scanned and analyzed for total percent-coverage and droplet density. The trees were sprayed in August and again in early November.

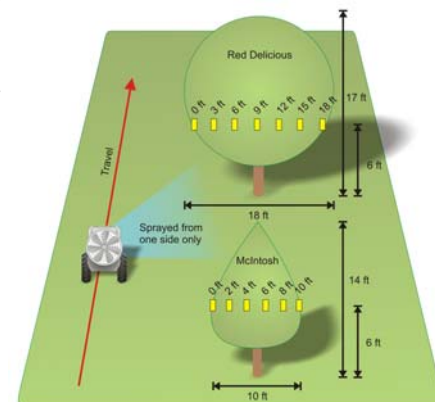


Figure 2 Experimental Design

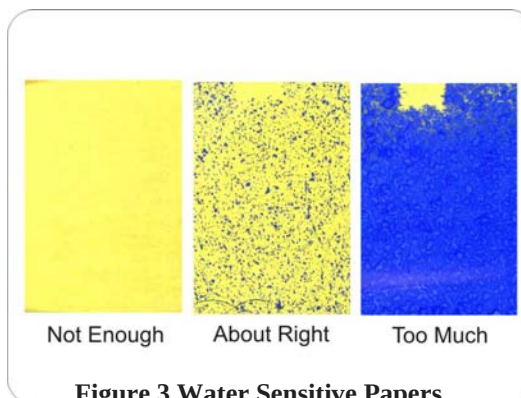
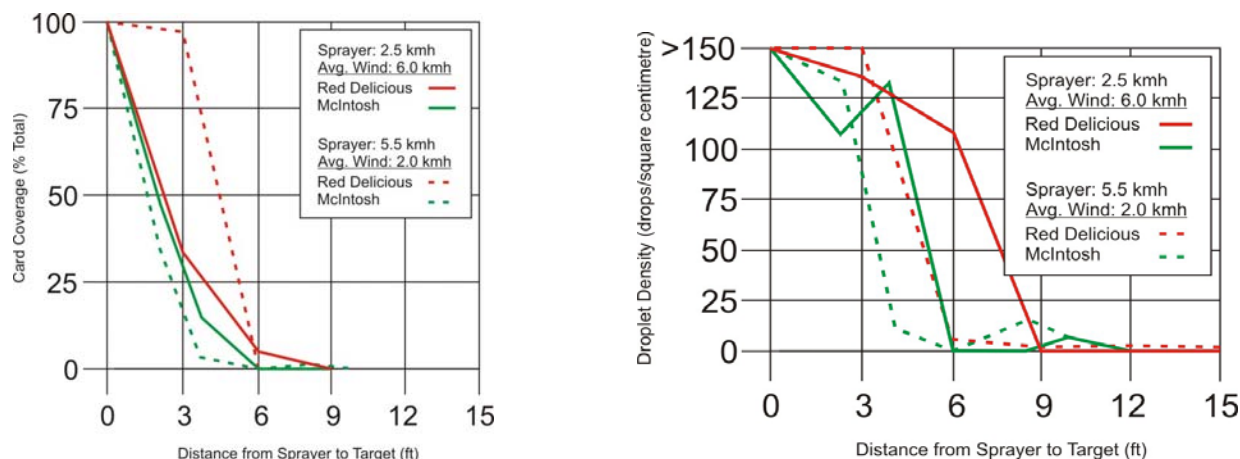


Figure 3 Water Sensitive Papers

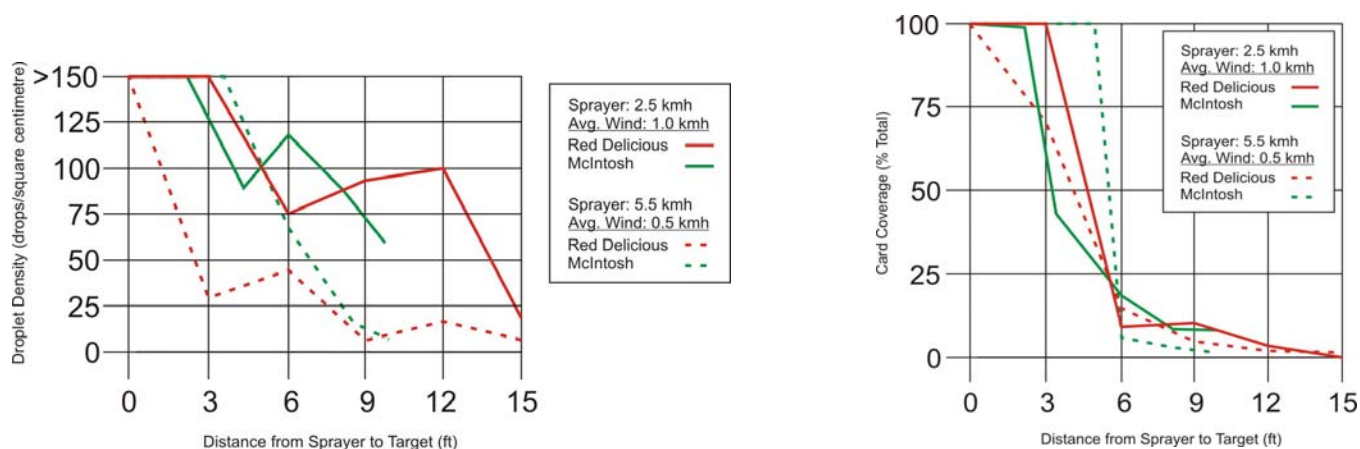
During the August trials, the wind was blowing directly into the spray, making canopy penetration difficult for such a small sprayer. The wind was low (2.0 km/h) during the 5.5 km/h travel speed, and much higher (6.0 km/h) during the 2.5 km/h travel speed. Interestingly, spray

penetration depth, and percent coverage appeared similar for both speeds (see graphs 1 and 2). Intuitively, the higher winds should have prevented spray from penetrating as deeply. From graph 2, it appears that a greater number of droplets made it into the tree at the slower travel speed. From this, it can be inferred that **slower travel speed will counteract opposing wind to some degree.**



Graphs 1 and 2: Card Coverage (left) and Droplet Density (right) for August trials with variable wind.

In the November trials, the wind remained low and constant for both travel speeds. Both applications penetrated deeper into the canopy than in the August trials. This might be because the wind was lower, and/or because the leaves had begun to senesce. Surprisingly, there still did not appear to be a difference between the two travel speeds as far as total card coverage was concerned (see Graph 3). However, once again, the slower, 2.5 km/h speed gave a higher droplet density much further into the canopy compared to the faster 5.5 km/h application (see Graph 4).



Graphs 3 and 4: Card Coverage (left) and Droplet Density (right) for November trials with constant wind.

From this, it can be inferred that **slower travel speed permits higher numbers of small droplets to make it further into the canopy, improving coverage.** This can be especially important when using contact products or spraying for disease where a higher droplet count per square centimetre means a better chance of impinging on a target.

This work was made possible through a grant from Horticulture Crops Ontario and the generous use of the Bell Brother's orchards.

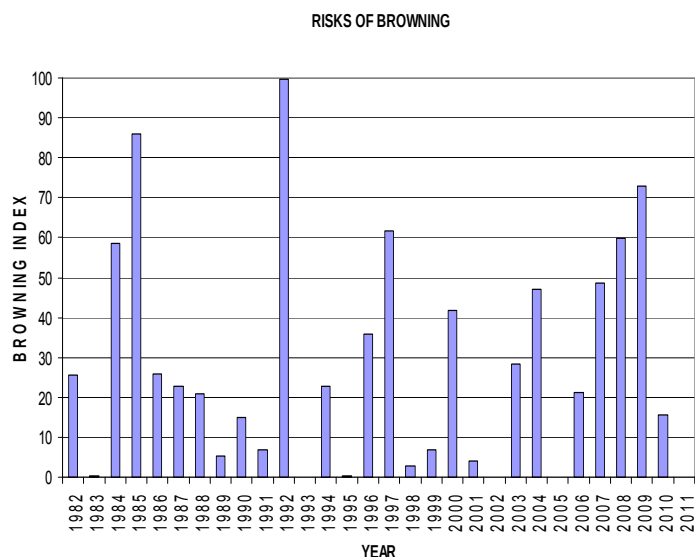
Postharvest

Low Risk of Chilling Disorders for 2011-12 Storage Season in Ontario

Dr. Jennifer DeEll, Fresh Market Quality Program Lead, OMAFRA Simcoe

CIPRA is a computer-based program developed by the research team of Dr. Gaétan Bourgeois (AAFC-QC) that uses weather data to predict the risk susceptibility of apples to certain storage disorders (Bourgeois, DeEll, and Plouffe). According to the CIPRA program, the figure below shows the results from 1982 to 2011 using weather data from **Norfolk County, Ontario**.

The model indicates that there is **<1% risk of chilling-related disorders developing during the 2011-2012 storage season** (i.e. flesh browning, low temperature breakdown, soft scald). Although the risk is low, it is still important to use the recommended storage temperatures for all cultivars. 'Empire', 'McIntosh', and 'Honeycrisp' are especially susceptible to chilling-related disorders.



Multiple SmartFresh Treatments on 'McIntosh' and 'Empire' Apples

Dr. Jennifer DeEll, Fresh Market Quality Program Lead, OMAFRA Simcoe

This past summer the Canadian SmartFresh label for apples was expanded to allow multiple applications. SmartFresh has been historically applied within 1-5 days after harvest, to provide delayed ripening benefits during subsequent shelf-life and storage. Repeat applications of SmartFresh are now possible, such that rooms being filled over several days can be treated more than once in order to have all fruit treated at the optimum time. A maximum of four applications may be made to any one lot of apples. For fruit stored in controlled atmosphere (CA), any repeat application must be made within 240 days of harvesting.

Data from our research program was used to support this label expansion and the results are summarized below. Three grower lots of 'McIntosh' and 'Empire' apples were obtained from a local commercial storage facility in April 2010. The 'McIntosh' fruit had been harvested on Sept. 14, 2009, and the fruit firmness ranged from 13.7 to 15.1 lb. 'Empire' fruit had been harvested on Sept. 27-28, 2009, and the firmness at ranged from 17.3 to 19.6 lb. All apples had been initially treated with SmartFresh (1 ppm for 24 hours) within 2 days of harvest, prior to the establishment of CA storage. All apples were held in standard CA storage for ~7 months. After removal from CA storage, 100 fruit from each grower lot and cultivar were treated with SmartFresh (1 ppm for 24 hours at 3°C). Corresponding samples of fruit were not treated with SmartFresh and these were designated as the control samples. All apples were then held for 14 days at ~21°C and periodically evaluated for quality.

A second SmartFresh treatment after storage significantly reduced ethylene, firmness loss, and senescent breakdown in 'McIntosh' apples during holding at 21°C (Table 1). After 14 days, one grower lot of 'McIntosh' treated with SmartFresh also had significantly higher soluble solids and acidity than the corresponding control fruit.

SmartFresh treatment after storage also significantly reduced ethylene and firmness loss in 'Empire' apples during holding at 21°C. However, these effects were less pronounced than those found for 'McIntosh'. This is likely due to the fact that 'Empire' produces less ethylene than 'McIntosh' and thus tends to respond better and longer to a single SmartFresh application. After 14 days at 21°C, one grower lot of 'Empire' treated with SmartFresh also had significantly higher acidity than the corresponding control fruit.

(Continued on page 11)

Table 1: Effects of second SmartFresh treatment after CA storage on the quality of 'McIntosh' and 'Empire' apples during subsequent holding for 2 weeks at ~21°C (data are the averages during this time). All apples had been initially treated with SmartFresh within 2 days of harvest.

	Internal ethylene (ppm)	Firmness (lb-force)	Soluble solids (%)	Malic acid (mg/100ml)	Senescent breakdown (%)
<u>McIntosh</u>					
SmFr at harvest	1006	12.4	10.8	608	9 ^A
SmFr at harvest + after storage	610	13.2	11.0	583	5 ^B
<i>Significance</i>	****	****	NS	NS	*
<u>Empire</u>					
SmFr at harvest	138	17.1	11.5	584	0
SmFr at harvest + after storage	79	17.3	11.6	589	0
<i>Significance</i>	**	***	NS	NS	-

NS, ****, ***, **, * = not significant or significant at $P < 0.0001$, $P < 0.001$, $P < 0.01$ or $P < 0.05$, respectively

In conclusion, there appears to be some benefit in using multiple applications of SmartFresh to better maintain apple fruit quality post-storage.

Announcements

Calling all Ontario Cider Producers

Last year, 13 Ontario cider producers submitted their best sweet cider to our **1st Annual Ontario Sweet Cider Competition**. Our judges chose the best cider by Thomas Wilson and Nicole Judge of Spirit Tree Estate Cidery, and they have agreed to share their story at our workshop.

We hope to see more entries at the **2nd Annual Ontario Sweet Cider Competition** at the Ontario Fruit & Vegetable Convention, on **February 22, 2012**.

Bring two 4L jugs of your cider on Feb. 22 to our new location at the Niagara Falls Convention Centre. This competition is open to all Ontario cider makers, including those using a custom presser.

Ciders will be judged on Feb. 22 (afternoon). Judging is open to the public. Winning entries will be announced at the Apple Session on February 23, and will be available to taste before the session.

Apple Cider Workshop (Sweet and Hard Cider), February 22, 2012.

9:30 am	The New York Apple Cider Industry Dr. Randy Worobo, Cornell University, Geneva, New York
10:00 am	Making Cider at Spirit Tree Estate Cidery Thomas Wilson and Nicole Judge, Caledon, Ontario
10:30 am	Trends in the Ontario Beverage Industry Peter Illyckjy, Business Development Consultant, Ontario Ministry of Agriculture, Food and Rural Affairs, Guelph
11:00 am	Research Developments in Cider Production Dr. Randy Worobo, Cornell University, Geneva, New York

New Zealand Grower to Visit Ontario Orchards

Raoul Crasborn, of the Crasborn group in New Zealand, will be speaking at the Ontario Fruit and Vegetable Convention in Niagara Falls in February, talking about growing quality fruit to export to over 30 countries around the world.

He is keen to visit some orchards, packers and nurseries in Ontario, so we have invited him to talk to apple and pear growers in several locations around Ontario.

We are working on a schedule for orchard visits both before (Feb. 20-21, likely in Durham and Georgian Bay area) and afterwards (Feb. 24-25, likely in Niagara and Norfolk). Although the locations and times are not yet finalized, please keep those days open. We will be talking about pruning to maximize yields and quality, growing and planting good nursery trees and packing the quality fruit the export market demands.

Read more about their business at www.kiwicrunch.com and watch for announcements from the Ontario Apple Growers about times and locations.

Food Safety Snippets

Maintaining Farm Buildings to Prevent Pest Entry

Wayne Du, Food Safety, OMAFRA

As the harvest season is winding down it is time for producers to think about farm building maintenance before the winter arrives. Proper farm building maintenance is a key to a successful pest control program, which plays an important role for food safety. Pests that inhabit farm buildings can cause contamination of food products. Here are two simple steps for getting the job done.

Conduct a building and pest assessment by checking for

- cracks or openings around the foundations, walls, door frames and under doors
- missing or broken screens for vents, eaves and windows
- broken roof, wall and siding
- signs of pests, including droppings, nesting and feeding opportunities, burrows, gnaw marks, sounds and odours inside and around buildings
- any other potential routes of entry by pests

Make repairs to prevent entry by

- sealing cracks or openings around the foundations, walls, door frames and under doors
- repairing broken windows, walls, siding and roof
- installing screens for vents, eaves and windows

Making repairs as you go is the easiest way to keep up to date on building maintenance. As the harvest season comes to an end, schedule in some time to do your repairs.

February 23, Apple Program: Ontario Fruit & Vegetable Convention 2012

New Zealand and Chile have focused on high quality fruit production for more than a decade, so let's learn from their experience. Back home, we are planting new cultivars so let's talk about what Ontario consumers like, as well as how to store these new apples. Improving pest management begins with optimal sprayer performance and learning how new pesticides perform under rainy conditions.



Thursday, February 23, 2012 - Room 203

Chair: Leslie Huffman

- 9:30 a.m. **KiwiCrunch: Growing Quality Apples in New Zealand**
Raoul Crasborn, Hawke's Bay, New Zealand
- 10:15 a.m. **Rain and Insecticides: How long do they last?**
Dr. John Wise, Michigan State University
- 10:45 a.m. **Panel: Improving Sprayer Performance**
Moderator: Jason Deveau, OMAFRA Simcoe
Bill Medel, Medel Orchards, Ruthven
Robbie Montgomery, Wilmot Orchards, Newcastle
John Ardiel, Ardiel Orchards, Thornbury
- Lunch & Trade Show**
- Chair:** Kristy Grigg-McGuffin
- 2:00 p.m. **The New Zealand Apple Industry**
Raoul Crasborn, Hawke's Bay, New Zealand
- 2:30 p.m. **Storage Research with New Cultivars**
Dr. Peter Toivonen, AAFC, Summerland
- 3:00 p.m. **What Kind of Apples do Ontario Consumers Like?**
Dr. Isabelle Lesschaeve, VRIC, Vineland
- 3:30 p.m. **Apple Growing in Chile, Argentina and Brazil – IFTA 2012**
Cathy McKay, Port Perry and Art Moyer, Grimsby