



ORCHARD NETWORK

For Commercial Apple Producers

VOLUME #15, ISSUE #1

February, 2011

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Orchard Management

Don't Miss the Apple Program: Ontario Fruit & Vegetable Convention 2011

If you are removing old orchards and planting new, fine-tuning your production and storage systems, learning how to use the new IPM products, wondering about tree dieback problems or wishing that robots could do some of your orchard work, come to Brock on Feb. 24 to find out more.

When: Thursday, February 24

Where: Brock University, St. Catharines, Room 202

Come early and taste the winning ciders!

9:30 a.m.

What We've Learned about McIntosh Dieback in Michigan

Dr. Nikki Rothwell, Michigan State University, Traverse City

10:00 a.m.

Apple IPM is Changing: Emerging Pests and New Issues

Kathryn Carter, OMAFRA, Simcoe

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Ministry of Agriculture,
Food and Rural Affairs

 Ontario

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This issue of the **Orchard Network
Newsletter** was compiled by Client
Service Representative, Patti Arts,
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10:30 a.m. **Panel: Ideas on Orchard Renovation**
Keith Wright, Wrightland Farms, Harrow
Harold Schooley, Schooley Orchards, Simcoe
Chris Hedges, Simcoe
Dr. Ron Perry, Michigan State University

Lunch & Trade Show

2:00 p.m. **Growing Great Gala**
Leslie Huffman, OMAFRA, Harrow

2:30 p.m. **Updates on McIntosh and Empire Apple Storage – A New York
Perspective**
Dr. Chris Watkins, Cornell University, Ithaca, New York

3:00 p.m. **Enhancing the Storability of Fresh Apples**
Dr. Jennifer DeEll, OMAFRA, Simcoe

3:30 p.m. **Vision Robotics for Orchards**
Tony Koselka, Vision Robotics, California

Planning for New Plantings

Leslie Huffman, Apple Production, OMAFRA Harrow

Many apple growers are looking hard at making the investment in new orchards. With the large investment of money and management required to be successful, it is important to plan well and consider all details. Any mistake made at the beginning about site selection, choice of rootstock or cultivars, pollination needs, soil preparation, training system, etc, may have long term detrimental effects on the orchard's performance and profitability. This means planning for a new orchard begins well in advance of the actual planting.

There is much talk about new technologies of high density plantings, designing orchards for mechanization, and the latest cultivars and rootstocks. But it is really the horticultural basics that will make or break a new orchard. Here are the decisions that need to be made:

1. Choosing the location – near bodies of water, minimum temps of -34C
2. Choose the site – consider slope, elevation, wind movement, soil type and condition, drainage,
3. Choosing the cultivars – what will sell? what will pollinate?
4. Choosing the rootstocks – what will grow well on my site? most are planting M9/B9 size
5. Choosing the tree density and training system – row width narrowing may require change in machinery, see my comments on density in the next article
6. Choosing the support system – Required in planting year! - trellis is more economical than single stakes at higher densities

Although these seem to be basic questions, they are the first step to making your investment in new orchards successful. Let's get these right first, and in future columns, we can talk about site preparation, nursery stock, time of planting, laying out the orchard, and first year care.

Thoughts on Density

Leslie Huffman, Apple Production, OMAFRA, Harrow

The public has noticed that orchards are being removed, and that new plantings are going in. Orchards are now doubled or tripled in tree density, approaching 1000 trees/acre. Trees are on fully-dwarfing rootstocks, requiring support with trellis or stakes, and supplemental irrigation, and precise tree training techniques. The Ontario apple industry is moving towards "Doing Density".

It is obvious that these new orchards require a large investment and a commitment to management, with less room for errors. So why should we be "Doing Density"?

Market demand for **new cultivars** like Gala, Ambrosia and Honeycrisp is one of the drivers. New orchards can produce fruit in the 2nd or 3rd year, which return better prices. The market also demands **higher quality fruit**, and apples on dwarf trees are more exposed to the sun for better size and flavour.

Orchard efficiency is another driver, especially as Ontario labour costs have risen drastically. Labour is required for pruning, tree training, thinning and harvesting, but intensive orchards require less hours. Use of ladders is reduced, speeding operations and reducing worker fatigue. In the future, platforms will be used in intensive orchards for pruning, thinning and harvesting. Research on robotics for orchards may also hold promise for reducing labour.

But **the key factor is that early yields in the first five years** are needed to pay back the investment in a new orchard. Intensive orchards can also produce the high yields and the quality fruit needed to make growing apples profitable. Apple growers are learning new skills to be "Doing Density" successfully, and many attended the Ontario Apple Academy on February 8-9 at Orangeville.

Consumers can look forward to enjoying the fruits of our investments in "Doing Density" as these new orchards come into production.

Apple Cost of Production

Leslie Huffman, Apple Production, OMAFRA Harrow; John Molenhuis, OMAFRA Brighton; Sarah Marshall, Ontario Apple Growers

More information is coming out of the **Apple Cost of Production** study. The final results are a bit staggering. The total cost to produce apples in mature orchards is **32¢/lb.** This includes cash inputs, depreciation, amortized cost of establishment, and interest, but does not include land costs. We based this on Ontario average yields of 27,745 lbs/acre (2007-2009).

Here is how it breaks down:

Labour	28%
Establishment	17%
Pest Mgmt	15%
Ins., Int, fees	11%
Machinery, fuel	10%
PGRs	9%
Overhead	8%
Fertility	2%
Bees	0.7%
Irrigation	0.7%
Bins	0.4%

At 32¢/lb., higher yields will be needed to be profitable than the current Ontario average of 27,745 lb/ac. Many growers with newer intensive orchards are achieving higher yields. In fact, in the Cost of Establishment study, the average expected yield is 33,952 lb/ac, with some growers reporting higher than that.

For our **Cost of Establishment**, we used this orchard system:

- One pre-plant year to prepare the site
- Tile drainage newly installed
- 622 tree/acre (14' x 5') with trellis support
- Trees on M9 rootstock or equivalent
- 1% loss of trees replaced in Years 2 & 3.

Growers reported 6 years needed to bring orchards to full production, so we used these expected yields:

- Year 1 - Defruit
- Year 2 - 3 %
- Year 3 - 17 %
- Year 4 - 36 %
- Year 5 - 61 %
- Year 6 - 84 %
- Year 7 - 100 % of mature yield

Total cost to plant a new orchard and care for 6 years is **\$44,164/acre.**

Crop Protection

New Information on Pesticide Drift and Reducing Buffer Zones

Dr. Jason S.T. Deveau, Application Technology Specialist, OMAFRA, Simcoe

Many years ago (in a galaxy far, far away) the Pest Management Regulatory Agency had an idea to develop a webpage that would provide the reader with clear and concise information on pesticide drift. Specialists were called in, third-party consultants were engaged and the information was hammered into a very nice explanation of what drift is and how applicators can minimize it.

Then someone had the idea to mix buffer zones into the explanation and everything ground to a halt.

Here's why.

In the UK, spray applicators register their spray equipment with government authorities. They sign off on their travel speed, the exact make of their nozzles, their operating pressure, and any drift-reducing modifications they make to their sprayers. When all this information is plugged into some rather complicated formulas, along with weather conditions and the proximity of environmentally sensitive areas, they may be allowed to reduce the labelled buffer zones.

This system is called LERAP (Local Environmental Risk Assessment for Pesticide) and it's been in place for a long time. Why not in North America? Because we don't have the same equipment or all the data that makes buffer zone reduction reliable... until now.

I'm very happy to announce the drift mitigation web pages are finally on the PMRA/HC website. They can be accessed by selecting the **For Growers and Commercial Users** tab on the sidebar and then choosing **Drift Mitigation**. This will take you to the main page. From there you can go to the **Buffer Zone Calculator and Glossary of Terms**.

The direct link is:
<http://www.hc-sc.gc.ca/cps-spc/pest/agri-commerce/drift-derive/index-eng.php>

This new method for adjusting buffer zones isn't quite as sophisticated as the LERAP system, but it's a great first step. The user will be asked to answer a series of questions about their sprayer, the environmental conditions at the time of spraying, and the proximity of any environmentally sensitive areas. If the applicator is using equipment that is known to reduce drift, and sprays in conditions that reduce the potential for drift, they are rewarded with discount factors that reduce the labelled buffer zones.

I suggest you visit the site and try the calculator. If you're still interested in learning more about pesticide drift, OMAFRA has just finished a new factsheet: "Pesticide Drift from Ground Applications" Order No. 11-001. It will be printed in full colour and ready in time for the Ontario Fruit and vegetable Convention. Swing by the OMAFRA booth and pick up a copy.



New Products for Apple Growers

Kathryn Carter, Apple IPM Specialist, OMAFRA, Simcoe

The new 2011 Publication 360 Supplement is now available from local OMAFRA Resource Centres or online at <http://www.omafra.gov.on.ca/english/crops/pub360/sup/p360sup2010.pdf>

The Ontario Apple Growers will be mailing a copy to their members soon. Here are the new products for apples included in this publication:

Bloomtime (*Pantoea agglomerans*, strain E325)

For suppression ONLY of **fire blight** (this product does not provide control). Apply 375–500 g/ha at bloom in a minimum of 1,000–2,000 L water/ha. Make first application at 15%–20% bloom, second application at full bloom to petal fall. Product has specific handling and storage requirements, see label.

PHI: 0 days; **REI:** 4 hr; **Maximum # applications:** 2 per season

Clutch 50 WDG (clothianidin 50%)

For control of **green apple aphid**, **rosy apple aphid**, **white apple leafhopper** and **tentiform leafminer** at 140–210 g/ha. For control of **plum curculio** at 210 g/ha. This product provides suppression for codling moth and Oriental fruit moth. **PHI:** 7 days; **REI:** 12 hr; **Maximum # applications:** 2 per season.

Entrust (spinosad)

For control of **apple clearwing moth** (this pest is not widespread in Ontario). Apply as a special summer spray when monitoring indicates the need. Apply in 1,500 L water/ha as a directed spray to cover lower tree trunk, graft union and pruning cuts. Make the first application within 10 days of adult emergence and repeat at 7–10 day intervals while moths are active.

PHI: 7 days; **REI:** when dried; **Maximum # applications:** 7 per season

Microthiol Disperss (sulphur 80%)

For control of **powdery mildew**. Apply 22.5 kg/ha in orchards from Green tip to Half-inch green, at Half-inch green to Tight cluster, at Tight cluster to Pink and in non-bearing orchards. Follow a regular protective schedule.

PHI: 1 day; **REI:** 24 hr; **Maximum # applications:** 8 per season

We are anticipating several late registrations for products not included in this supplement. Watch for an additional supplement will be available in late April/early May. For more information on using these new products in your IPM program, please join us for the Apple session at the OFVC on Feb. 24.

Postharvest

Maintaining the Quality of “Northern Spy” Apples during Long-Term Storage

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

‘Northern Spy’ is a major apple used for processing and it has become the feature in certain Ontario apple products. The success of this business is based on the availability of fresh ‘Northern Spy’ apples during 12 months of the year. Since postharvest handling and storage technology are important components in keeping apples fresh for long-term, the following project was developed to address this need.

Part 1: SmartFresh

‘Northern Spy’ apples were harvested twice and either treated or not treated with SmartFresh (1 ppm 1-MCP) for 24 hours at 3°C. Apples were then held in air storage at 0-1°C for 2, 4, and 6 months or in controlled atmosphere (CA) storage (2.5% O₂ + 2.5% CO₂) at 0-1°C for 6, 9, and 12 months.

Results

SmartFresh substantially reduced the internal ethylene, with less than 1 ppm present in treated fruit after 12 months of CA storage. Apples treated with SmartFresh also retained greater firmness throughout storage, but the effect became more pronounced with longer storage times (Figure 1). There was an overall higher incidence of core browning (Plate 1) in SmartFresh-treated apples and the incidence increased substantially with time in storage. Fortunately, the presence of diffuse core browning would probably not pose a problem for processing, as the core section is discarded. SmartFresh-treated apples had significantly lower incidence of flesh browning (Plate 1) (1% vs. 11-37%) after 9 and 12 months of CA storage. Storage scald (Plate 2) was observed after 12 months of CA storage in apples not treated with SmartFresh (12%), whereas SmartFresh-treated fruit had no scald.

Little external CO₂ injury (Plate 2) developed and there was no significant effect of SmartFresh on that disorder. The overall incidence of storage rots was reduced by SmartFresh.

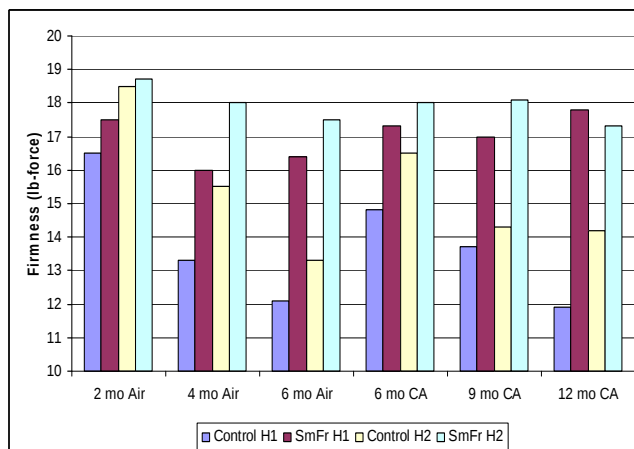


Figure 1: Firmness of ‘Northern Spy’ apples from two harvests (H1, H2) after Air or CA storage at 0-1°C, with or without SmartFresh (SmFr) within 2 days of harvest.



Plate 1: Core browning (left) and flesh browning (right) in ‘Northern Spy’ apples



Plate 2: Storage scald (left) and external CO₂ injury (right) in ‘Northern Spy’ apples.

Part 2: Cooling

Cooling Rate

‘Northern Spy’ apples were harvested twice and either cooled to 0°C within 2 hours of harvest (rapid cooling) or cooled slowly over 3 days (slow cooling). Apples were then held in air storage at 0-1°C for 4 months or in CA storage at 0-1°C for 8 and 14 months. The rate of cooling had the largest effect on fruit firmness. After storage at 0-1°C in air for 4 months or CA for 14 months, apples from the second harvest that were cooled rapidly generally had ~1 lb greater firmness than those cooled slowly. This study only represents one regime of slow cooling, but nonetheless shows that faster cooling can benefit fruit

firmness retention during storage. There was little effect of cooling rate on other fruit quality attributes or incidence of storage disorders.

Cooling Delay

'Northern Spy' apples were either cooled to 0°C within 2 hours of harvest or remained in the orchard for 8 hours prior to transport and cooling. Temperature in the orchard was 14-15°C and there was a mix of sun and cloud throughout the day. Apples were then held in air storage at 0-1°C for 4 months or in CA storage at 0-1°C for 8 and 12 months. Similar to the previous experiment, delayed cooling had the largest effect on fruit firmness. After 12 months of CA storage, apples with delayed cooling had ~1 lb less firmness upon removal from storage than those transported quickly. However, this effect on firmness was lost after holding the fruit for 7 days at 20°C. This study only represents one scenario of delayed cooling, but again it shows that faster cooling can benefit fruit firmness retention during storage. There was little effect of delayed cooling on other fruit quality attributes or incidence of storage disorders.

Part 3: Maturity and Quality Relationships

'Northern Spy' apples from multiple harvests were stored in CA at 0-1°C for 9 months. Correlation analyses revealed the following relationships:

- higher internal ethylene (IE) at harvest, more senescent breakdown (Plate 3, SB) after storage
- higher starch index at harvest, more SB and core browning (CB) after storage
- higher IE after storage, less CB
- softer apples after storage, more SB
- greater firmness loss during storage, more SB



Plate 3: Senescent breakdown in 'Northern Spy' apple after storage.

Acknowledgements

Thanks to Chudleigh's, Ontario Apple Growers, and AgroFresh Inc. for their support in making this project possible.

Strategies to Minimize the Presence of Patulin in Apple Cider and Juice

John Henderson, Risk Identification Specialist, OMAFRA, Brighton; Loree Saunders, Compliance Programs Coordinator, OMAFRA Guelph,

Patulin is a mycotoxin produced by fungi (or molds) commonly found on apples. Patulin can be harmful to humans and continues to be an issue in Ontario apple cider. Positive samples are found each year by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) under its Food Safety Monitoring Program for foods of plant origin.

In the 2010 season, 41 percent of samples tested contained detectable levels of patulin. The detectable level (greater than 10 parts per billion) is the level of patulin that the lab test can detect in the cider sample using approved methodology.

This number of positive results demonstrates that it continues to be important for producers to monitor their fruit quality very carefully and to develop programs to reduce the risk of patulin contamination. The mild and wet fall conditions in 2010 contributed significantly to mold growth. If apples were not stored properly this could have resulted in patulin production in apples used for cider.

The table below shows the number of samples of Ontario apple cider since 2006 that contained patulin at levels above Health Canada's guideline of 50 parts per billion (ppb).

When sample results are above 50 ppb, the ministry immediately notifies the producer and the Canadian Food Inspection Agency (CFIA). The CFIA takes the lead on follow-up action. Depending on the patulin level and volume of product available in the market place, follow-up action could include: resampling, an on-site visit or a product recall. OMAFRA staff works with the producer to determine the cause of contamination and advise on ways to prevent future occurrences.

Year	Total Number of Samples Tested	Number / Percentage of Samples with Patulin Greater than 50 ppb*
2010**	49	6 / 12%
2009	56	2 / 4%
2008	80	6 / 8%
2007	80	8 / 10%
2006	58	0 / 0%
TOTAL	323	22 / 7%

*ppb = parts per billion

** As of February 1, 2011

There are many factors that can increase the risk of patulin contamination. The following control strategies are provided in the U.S. Juice HACCP Guidance document:

- **Avoid using fallen fruit** — Apple juice made from apples that include fallen fruit is more likely to contain high levels of patulin.
- **Ensure apples are in good condition at the time of harvest** — Juice made from apples with visible damage (for example damage from birds or insects, mold or rot) is more likely to contain high levels of patulin. Proper agricultural control practices (including insect control, anti-fungal applications when needed, etc.) can assist in minimizing mold growth and rot on apples.
- **Ensure apples are handled properly** — Patulin production can occur during the storage of apples, particularly in apples that are bruised by handling prior to and during storage.
- **Ensure apples are stored in right conditions** — Apples stored without proper temperature and atmospheric control of the storage environment are more likely to contain high levels of patulin than apples stored under controlled conditions.
- **Monitor for core rot during storage** — Patulin production in stored apples can be caused by core rot that is not visible by observation of the exterior of the apple. Apples that develop core rot may be identified by cutting and cross-sectional examination. Eliminating apples with high levels of core rot from the juice production stream will reduce patulin levels.
- **Cull or trim apples prior to juice production** — Growth of patulin-producing molds is evidenced frequently by the appearance of visible mycelia (fungi filaments) or rot on the apple. Culling or trimming apples just prior to juice production to eliminate damaged, bruised, moldy, and rotting apples will reduce patulin levels in the juice.

There are many good reference articles that explain how to implement an apple management program to reduce the likelihood of patulin in cider or juice. Several articles have been presented in past editions of the *Orchard Network News*. For additional information on material presented in this article, please contact the Food Inspection Branch, Ontario Ministry of Agriculture, Food and Rural Affairs at fpo.omafra@ontario.ca or refer to:

OMAFRA Fact Sheet: Patulin- A Chemical Concern for Apple Producers and Processors
<http://www.omafra.gov.on.ca/english/crops/facts/04-043.htm>

U.S. Juice HACCP Guidance Document
<http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/Juice/ucm072557.htm>

Code of Practice for the Prevention and Reduction of Patulin Contamination in Apple Juice and Apple Juice Ingredients in Other Beverages.
http://www.codexalimentarius.net/download/standards/405/CXC_050e.pdf

Announcements

Reminder to Ontario Cider Producers

We are looking forward to tasting Ontario's best sweet ciders at the **1st Annual Ontario Sweet Cider Competition**. Bring two 4L jugs of your cider at the Ontario Fruit & Vegetable Convention, St. Catharines on **February 23, 2011**. This competition is open to all Ontario cider makers, including those who use a custom presser.

The competition is sponsored by the Ontario Apple Growers who are providing a Champion trophy, and plaques to the top 3 winners. Come and watch as we train our 9 judges in how a great cider should look, smell and taste. Winning ciders will be available for tasting before the Apple Session on Thursday, Feb. 24.

Cider makers will want to attend this workshop as well, the morning before the judging.

Apple Cider Workshop, February 23, 2011.

- | | |
|----------|--|
| 9:30 am | Michigan's Sweet Apple Cider Industry
Dr. Bob Tritten, Michigan State University |
| 10:00 am | Developing a Sweet Cider Business in Michigan
Mike Beck, Uncle John's Cider Mill, St. John's, Michigan |
| 10:30 am | Best Management Practices for Ontario's Cider Producers
Paul Bailey, OMAFRA, Guelph |
| 11:00 am | Starting a Hard Cider in Michigan
Dan Young and Nikki Rothwell, Tandem Ciders, Suttons Bay, Michigan |

Cider is an important value-added product for many Ontario growers, and we hope that this workshop and competition will inspire a growing market for this quality product.

Ontario Agricultural Irrigation Conference (March 1-3, Ingersoll).

Get more production out of your irrigation applications by learning new techniques at the Ontario Agricultural Irrigation Conference (March 1-3, Ingersoll).

This new event features the very popular drip irrigation course by Ted VanderGulik from the BC Ministry of Agriculture, Food and Fisheries (March 1). Innovative ideas for fertigating, increasing irrigation efficiency and developing more robust water supplies will be the focus of multiple talks by cross-Canada experts on March 2nd. The story of how 14 farmers worked together to form the 36km Leamington Irrigation pipeline will be presented as a special feature by farmer/LADII chair, Wayne Palichuck in the water supply session. The conference concludes with a Permit To Take Water workshop by George Shearer, the water scientist with the OF&VGA (March 3). The conference includes an irrigation trade show on all 3 days. Register for one day or the entire conference

This is your answer to all irrigation questions in just 3 days at the beautiful Elm Hurst Inn, Ingersoll.

For more information contact Mary Margaret McDonald, 519-674-1500 ext 63592, mmcdonal@ridgetownc.uoguelph.ca
For the registration form see www.ofvga.org/events.php

Apple Growers Conference Call – A Province-Wide Discussion Group

If you participated in one of our first four “Virtual” Study Group calls, you know that topics like new cultivars, tree spacing, training, and plant growth regulators are hot topics. The format is a noon-time conference call (about 45 minutes), where the Ontario Apple Growers provide a toll-free number to call, and each grower can talk and/or listen as they wish. The Ontario Apple Growers will be sending a fax/email reminder to all their members. Please join us and share your experiences and questions. Our next call will be in March.

IFTA Annual Conference, Feb. 26- Mar. 2, Washington

This annual information meeting will be in Pasco, Washington, starting with an Intensive Workshop on Economics, Horticulture and Technology. Orchard tours plus two full days of presentations follow, and if you want, a post-conference tour to “Cherry County”. See www.ifruittree.org for details.

Sprayer Workshops – March 30 (Ruthven), April 6 (Newcastle), April 13 (Thornbury)

Dr. Jason Deveau will be presenting a workshop series on optimizing sprayer coverage. Look for more information from the Ontario Apple Growers.

Apple IPM Scout Training

Here is a head's up on our annual scout training for apple IPM. This workshop offers in-class and in-orchard training on pest identification and proper scouting techniques for apple orchards.

Date: Tuesday, May 3, 2011

Place: Simcoe OMAFRA Office, 1283 Blueline Rd, Simcoe ON

Time: 9 am – 4 pm

Cost: None, please pre-register at 1-877-424-1300

Who can attend: Pest scouts, growers, industry

Bring: OMAFRA publications Pub 310 and Pub 360 if possible



Agricultural Information Contact Centre: 1-877-424-1300

E-mail: ag.info.omafra@ontario.ca

Northern Ontario Regional Office: 1-800-461-6132

www.ontario.ca/omafra