



ORCHARD NETWORK

For Commercial Apple Producers

VOLUME #13, ISSUE #3

August, 2011

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Orchard Management

Ready for Apple Harvest 2011?

Leslie Huffman, Apple Specialist, OMAFRA Harrow

Apple harvest has started at a more "normal" timing, but the expected hot temperatures predicted for late August may push maturity ahead. Are you ready?

Here are a few suggestions to prepare for a smooth harvest season:

- Refresh your maturity test kit. Order a fresh batch of **iodine solution** from your pharmacy (Here's the recipe: Dissolve 8.8 g potassium iodide in 30 mL of warm water. Gently stir until properly dissolved. Add 2.2 g of iodine crystals. Shake until crystals are thoroughly dissolved. Dilute mixture with water to make 1.0 L of test solution. Store in a dark bottle).
- Check over your **pressure** tester and **refractometer** to measure firmness and sugars. Obtain starch-iodine charts and protect them from rain. Prepare record sheets to record results on harvest maturity.
- Plan for timely application of **stop-drop** materials. Apply ReTain 4-5 weeks

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This issue of the **Orchard Network Newsletter** was compiled by Client Service Representative, Patti Arts, OMAFRA, Kemptville

before the anticipated harvest— and it's better to be early than late!

Or apply Fruitone-N (NAA) when the first sound apples drop (not push-offs), to hold apples for 7-10 days (allow 1-2 days to take effect). Coverage is important for both products, and moderate (20-24°C) temperatures are preferred.

- Do you have enough **bins**? It takes 2000 apples of 3 1/8" (100-count) to fill a bin. To fill the same bin with 2 3/4" (138-count) fruit, it will require 2760 apples. Read more in "How to Estimate Bin Requirements: Harvesting Efficiently by Having the Right Number of Bins Ready", online at www.omafra.gov.on.ca/english/crops/facts/bin_requirements.htm
- Want to pick more apples on first pass? **Reflective mulch** will help colour fruit, especially in the interior of the trees. Grower experience has shown that this product increases harvest efficiency because most of the fruit can be picked in one pass. Read more in "Using Reflective Mulch for Light Management in Orchards", online at www.omafra.gov.on.ca/english/crops/facts/orchard_mulch.htm.
- Are you ready for **traceability**? You need to be able to do a mock recall to qualify for CanadaGAP and GlobalGAP, so be ready. Assemble bin tags, markers, stapler, staples, and staple pullers. Prepare your daily record book to record what is harvested when, by whom, and where it goes. Many packers are requiring these records, so it's good to get in the habit.
- **Pickers** – do you have enough? Order your harvest labour, and ready their supplies, like boots, rain gear, insect repellants and toilet facilities. Check over picking buckets and ladders, and have extra repair parts on hand. Provide hand washing facilities and records of training.
- Smooth out **laneways** and loading **ramps** – continued rains have been hard on these surfaces, but it's important to prevent bruising in the bins from "rut" damage.

A few preparations can make harvest run smoother and take some of the stress out of harvest. Let's get ready!

Fall Preparations for New Orchards

Leslie Huffman, Apple Specialist, OMAFRA Harrow

Harvest is busy, but if you are planting a new orchard next spring, a few minutes to prepare may help your investment pay off.

September and October are ideal times to control **perennial weed problems**. Scout to determine what weeds are present. If weeds are at susceptible stages, apply glyphosate at the higher rates. Otherwise, mow as soon as possible and wait for regrowth before spraying. Glyphosate is most effective in the fall.

Early September is the best time to **establish grass** for the orchard floor. We've had good experience with a mix of grass species – one example is 40% creeping red fescue, 40% turf-type tall fescue and 20% perennial ryegrass. It may be easier to plant the entire field and spray out the planting rows either fall or spring.

Fall **soil sampling** is important to determine the need for preplant fertilizer. Where soil tests show the need for phosphorus, the ideal time to apply it is either fall or spring before planting. This allows deep placement where the tree roots grow. Also, if soil pH needs adjustment, **fall applications of lime** allows enough time to activate and change pH.

Also, **sampling for nematodes** is most accurate in early fall, when soils are warm and moist. Check with your lab for when and how to deliver these, as populations need to be alive for accurate counts.

Assessing **replant issues** is important, including nematodes and other potential disease and fertility issues. If your site previously grew orchards, it is important to

consider ways of avoiding the potential stunting problems of replant, including siting tree rows to avoid previous tree sites, fumigation or biofumigant cover crops, and addition of organic matter.

And finally, check on **your tree order** and work with your nurseryman to ensure purchase of the best quality trees available. Paying a little more for good quality trees will ensure your investment in new orchard pays off.

Making the Most of Nematode Reducing Cover Crops

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

In recent years there has been growing interest in the use of cover crops to reduce nematode levels. Once they are planted, it can be really easy to leave them to grow and just forget. However, if you want to get the most out of your cover crop investment, they require a bit of maintenance.

For Mustard Biofumigant Cover Crops

1. Since most mustard and oilseed radish varieties are alternate hosts for some nematodes, the key to using them is **mowing** to release the fumigant-like compounds. Be prepared to mow. Chopping and mangling is really what is needed to release the fumigant-like chemicals held within the plant tissues. **Good chopping is critical for incorporation.**
2. **Incorporate the chopped plant material as soon as possible** after mowing, i.e. within an hour or two at most. Two tractors in the field works best.
3. After cover crop chopping and incorporation, the soil may need rolling or a light packing to seal the surface and help to hold the biofumigation action. If soil conditions are dry, you may need to irrigate to seal in the fumigant. Basically, if you can smell rotting cabbage, you are losing some of the effective materials.
4. **Don't forget to soil sample for nematodes** before the cover crop and repeat several weeks after incorporation, at appropriate nematode sampling times – you need to measure to manage!

For Pearl Millet Cover Crops

1. Pearl millet is a non-host for nematodes. It is critical to get a good stand with no weeds.
2. **Mow the pearl millet when it reaches 1 to 1.5 metres, leaving at least 15 cm of millet stubble to ensure regrowth.** Mowing will help to encourage deeper rooting and will also keep the millet actively growing.
3. Pearl millet will grow to over 2 metres if allowed. **Regular mowing is needed.** The residue can become quite resistant to breakdown if allowed to grow to that height.

4. Frost in the fall will kill the millet if you have not already worked the cover crop under.

Primer for Use of ReTain™ in 2011

Dr. John Cline, Associate Professor, Tree Fruit Physiology, University of Guelph Simcoe

Aminoethoxyvinylglycine (AVG) is the active ingredient in Retain™ which interferes with ethylene synthesis and the ripening process of apples. Consequently, ReTain™ influences pre-harvest fruit drop regulation and serves as a harvest management material by inhibiting the production of ethylene in maturing apples. Application of this material four weeks before the anticipated harvest date has shown it to be an effective preharvest drop control agent for apples. ReTain™ may also delay maturity of apples on the tree, allowing a longer harvest window for a particular variety. Although the ripening process in ReTain™-treated fruit is temporarily delayed, treatment with ReTain™ may result in an increase in soluble solids, colour, fruit size, fruit firmness and a reduction in incidence of water core. Fruit treated with ReTain™ should be picked at the same internal maturity (based on starch-iodine tests) as untreated fruit recognizing that there may be a 3-10 day delay from the beginning of normal harvest to the beginning of the harvest of ReTain™-treated fruit.

Use 1 pouch (50 grams a.i., which is 333 g product) of ReTain™ per 0.40 ha (1 acre) plus 0.5-1.0 litre Sylgard® 309 (organosilicone surfactant) in 1000 litres of water. The application must be made 4 weeks before anticipated harvest, adjusted for any seasonal differences that have advanced or delayed the 'normal' harvest date. If this date is elusive, it is better to be early (5 weeks) rather than late (3 weeks). Late applications closer to harvest will not perform well because ethylene production within the plant may have already begun and it is difficult to suppress once initiated. To help determine the beginning of the 'normal' harvest period, refer to historical trends for harvest dates for each cultivar in your area.

When mixing ReTain™ with the surfactant, agitation should be kept to a minimum as Sylgard® 309 has a tendency to foam. To minimize foaming add the Sylgard® 309 last and when the tank is full. Compatibility and performance data for ReTain™ with antifoam products are not available. Surfactants other than Sylgard® 309 are presently not registered with ReTain™ for use in Canada. If the rate of ReTain™ is reduced the Sylgard rate should be maintained at a 0.5-0.1% v/v ratio.

Combination effects and potential interactions between ReTain™ and NAA (naphthaleneacetic acid) or ethephon products have not been thoroughly evaluated in Ontario. Use of these products on ReTain™-treated blocks may negate or reduce the benefits of ReTain™.

Trees that are unhealthy and under drought, insect,

disease or nutritional stress may not respond to treatment with ReTain™. Jonagold, Royal Gala and Gala strains appear to be more responsive to this product in comparison with McIntosh, for example. As a result, treatments made to Gala strains may delay maturity or impede colour development relatively more than other cultivars. ReTain™ can reduce stem end cracking of Gala and greasiness on this and other cultivars, if fruit are harvested at their proper maturity. For multiple pick cultivars such as Royal Gala, time application four weeks from the 2nd harvest pick date for best results. Pre-harvest fruit drop of Honeycrisp can be reduced markedly with the use of ReTain, which can be severe in some years.

For best storage performance, ReTain™-treated fruit should be segregated from fruit that is untreated to reduce exposure to ethylene.

Harvesting Apples at Optimum Maturity

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

For successful long-term storage, apples must be harvested when they are physiologically mature but not ripe. Each cultivar must be harvested at the proper maturity in order to achieve maximum storage life and marketing season. If apples are harvested too early, they are of poor colour, small size and have little flavour, they will fail to ripen or may ripen abnormally, and the overall quality will be poor. High water loss, low sugar content, high acidity, low aroma volatile production, and high starch content are characteristics of immature apples that contribute to inadequate flavour development. Immature apples are also more likely to develop storage disorders like superficial scald and bitter pit. Harvesting apples too late can result in a short storage life. Such apples are too soft for long-term CA storage, and are more susceptible to mechanical injury and disease infection. Over-mature apples may develop poor eating quality and off-flavours, and are more susceptible to watercore and internal breakdown.

For the above reasons, the determination of optimum apple maturity for harvest is essential for maximum storage life and quality, while minimizing postharvest losses. Numerous methods have been suggested for determining harvest date, but no single test is completely satisfactory, and some are too unpredictable, complicated or expensive. Days after full bloom is generally fairly constant, but can vary in any one year. Therefore, days after full bloom should be used as a general reference to indicate the approximate date when apples might reach harvest maturity, which is then confirmed using tests such as internal ethylene concentration (IEC), starch-iodine staining, flesh firmness, and soluble solids content (sugars). In

general, an IEC of 1 ppm is considered to be the ultimate threshold above which fruit ripening and flesh softening are initiated and progress rapidly. Harvest for long-term storage should be completed before 20% of the apples have an IEC higher than 0.2 ppm. Using the starch-iodine test, apples destined for long-term storage should have 100% of the core tissue starch degraded (no stain) with greater than 60% of the flesh tissue still having starch present (stain). However, it is important to note that not all apples mature and ripen in the same manner each year, and often there will be a need to compromise between correct maturity and the required firmness and sugar levels for market.

Apples can be segregated into lots at harvest by their storage potential. The following types of apples should not be designated for long-term storage because of their potential for internal breakdown (or to develop bitter pit): 1) large fruit from lightly cropped trees, 2) fruit from excessively vigorous trees, 3) fruit from young trees just coming into bearing, 4) fruit from interior portions of trees that are heavily shaded, 5) early-picked fruit high in starch, and 6) fruit with a low number of seeds (< 5 per fruit).

After harvest, cool the apples as rapidly as possible. Fruit off the tree ripen much faster and begin to ripen sooner with warmer temperatures. Try to get the harvest from each day into the cooler by nightfall.

August Pruning for Apples

Leslie Huffman, Apple Production, OMAFRA Harrow

Apple trees have grown strongly this year, but have finally set terminal buds. The spring rains and moderate temperatures pushed strong growth, even in areas with little rain through the summer. However, this growth is shading fruit, which may reduce colour at harvest. Even well-pruned trees with open structures have this problem and would benefit from pruning.

Some call this summer pruning, but I prefer to call it "August" pruning. Along with your training system, dormant pruning, and use of Apogee, August pruning is another management tool to manage vigour and improve fruit quality. Think of this as a quick haircut for the trees – removing a portion of the current season's growth around the fruit. This is NOT the time to remove major limbs or make structural changes in the trees – that's next winter's job.

August pruning will reduce vigour in trees – which may be good when vigour is high. Removing leaves now removes energy from the tree, so is not recommended where vigour is low, or when trees have not filled their space. Excessive amounts should not be removed, because it reduces the photosynthetic surface and the fruiting area of the tree. August pruning is best with done with hand shears only, when standing on the ground. Pruning from a ladder is costly, and may cause unnecessary bruising.

Orchard platforms may improve labour efficiency, and our current study should determine how much. Avoid August pruning if diseases like fire blight are present in your orchards. Your tools can transfer the bacteria from infected trees to healthy trees. But some pest problems may be improved with August pruning - where woolly apple aphids are a problem, pruning will reduce populations and open trees for sprays.

Timing of August pruning is important. Prune as soon as terminal buds are set, but do not delay until late August or early September, or fruit may drop and trees may not harden off properly. Varieties like Idared and Jonagold should be pruned early when fruit is smaller and less susceptible to sunburn. Avoid removing too much growth on Jonagold as it may affect the tree's ability to finish the fruit.

Generally, the time invested in August pruning reduces the time required to dormant prune. August pruning is a quick job to remove current season's growth, which will greatly benefit fruit colouring and finish on red apples.

Are You Making Money Growing Apples?

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

Being average in the apple business means chances are you are losing money; at least that is what the 2010 Apple Cost Of Production (COP) report suggests. The average return per lb was 20 cents with total costs per lb weighing in at 32 cents; for a loss of 12 cents per lb.

Table 1 uses the COP results from the report and looks at breakevens at different yield and price levels. The production levels needed to breakeven at the lower price levels are well above the 27,745 lbs per acre average from the report. Moving from left to right, breakeven in the chart doesn't start until a price of 25 cents and production of 50,000 lbs.

Table 1: Estimated Net Returns Per Acre at Various Price and Yield Levels ^[1]

Yield (lbs/acre)	Price (cents/lb)				
	15	20	25	30	35
25000	-6,553.92	-5,303.92	-4,053.92	-2,803.92	-1,553.92
30000	-6,066.42	-4,566.42	-3,066.42	-1,566.42	-66.42
35000	-5,578.92	-3,828.92	-2,078.92	-328.92	1,421.08
40000	-5,091.42	-3,091.42	-1,091.42	908.58	2,908.58
45000	-4,603.92	-2,353.92	-103.92	2,146.08	4,396.08
50000	-4,116.42	-1,616.42	883.58	3,383.58	5,883.58

^[1] Includes annualized establishment costs, does not include land costs.

Higher priced, higher yielding varieties are essential elements to profitability. On the price side, from the 2009 Apple Marketing survey there was only 2 varieties that earned better than 30 cents; Ambrosia and Honeycrisp. What criteria are you using to make your variety decisions? Are there ways you can increase the returns for the apples you are currently marketing?

On the production side, as part of the survey work for the COP report, growers were asked for potential yields. The results ranged from 25,500 lbs to 44,000 lbs per acre. If you are able to increase per acre production, the price needed to make a profit becomes easier to achieve. From Table 1, at 45,000 lbs you breakeven very close to 25 cents a pound but at 25,000 pounds you need in excess of 35 cents to breakeven.

The other piece of the profit equation is your cost of production. Having a lower cost of production than the average will make Table 1 present a completely different picture; there will be more positive price and yield combinations. If you are able to lower your costs, you expand the number of varieties available to be grown at a profit. In the 2009 Apple Marketing survey 9 varieties had returns over 20 cents. It is important for you to know your cost of production not only to help your profitability but also help to make variety selection decisions.

There are apple growers in Ontario making money but they need to be better than average to do it. Better than average yields, prices and cost control are all keys to profitability.

Crop Protection

IPM Project Updates

Margaret Appleby, IPM Systems, OMAFRA Brighton

A number of apple IPM projects were conducted this year in Ontario. Right now, we are in the midst of evaluating the trials and will have reports to Ontario growers on the findings later this year. Here is an overview of the projects.

Apple Scab Fungicide Resistance Project

A 2 year national apple scab resistance project funded through the Pest Management Centre was launched this year. All apple producing provinces are participating; Nova Scotia, New Brunswick, Quebec, Ontario and British Columbia. From across Canada 53 growers agreed to participate in this project and left a small number (6 to 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. Various methods for testing will be evaluated which include the New York's SMOR method and DNA screening. We will have this year results by January 2012. For 2012, a different group of orchards will be sampled for apple scab fungicide resistance.

San Jose Scale Project

San Jose scale has become an issue again in Ontario orchards. A problem in the 70's and 80's, we are seeing again extensive damage to the fruit at harvest. OMAFRA in conjunction with Norfolk Fruit Growers Association have set up traps for San Jose scale adults. These traps are being evaluated as a useful tool to determine the presence of the scale life stages. Weekly monitoring for damage on fruit, and monitoring for crawlers on electrical tape (June and August) was conducted as well. Newer insecticides Movento 240 SC and Assail 70WP have been applied based on crawler activity and will be evaluated on their efficacy for San Jose scale.

Apple Leaf Curling Midge Project

Another new emerging pest that we are investigating is apple leaf curling midge. This is the 2nd year of trials for monitoring the generations of apple leaf curling midge through pheromone traps acquired from the UK. Insecticide treatments of Movento 240 SC and Assail 70WP were applied and will be assessed for their efficacy to manage this indirect pest. The traps worked quite well and this year we were able to get them out earlier and have identified three distinct flights of these midges. Insecticides are being applied based on protocol received from the U.K. and we are comparing the damage over the growing season after each treatment.

GF-120 Project

GF-120 is a unique insecticide recently registered for apple maggot control in Canada. It consists of spinosad, the active ingredient in Entrust and Success, plus a feeding attractant that serves as a bait to draw adult flies to the product. This product has a good fit for organic operations. We are investigating the level of apple maggot control in a conventional orchard. This year, trials were conducted in a conventional orchard setting with the specialized equipment needed for application. Dr. Julia Reekie, AAFC Kentville, N.S., and Ken Wilson are the key researchers on this project funded through the Pest Management Centre.

European Apple Sawfly Project

We are continuing our survey of the westward spread of European apple sawfly in Ontario. We are working with Dr. Charles Vincent, AAFC St Jean-sur-Richelieu, Quebec in releasing and establishing a biocontrol agent for this pest.

Post Harvest

Postharvest Treatment Affects Physical and Sensory Quality of 'Honeycrisp' Apples

Dr. Jennifer DeEll, Fresh Market Quality Program Lead, OMAFRA Simcoe; Dr. Isabelle Lesschaeve & Nicolas Mathieu, Vineland Research and Innovation Centre

To control soft scald and soggy breakdown in 'Honeycrisp' it is common to pre-condition the fruit prior to cold storage with delayed cooling (i.e. 5-7 days at 10°C). Postharvest application of the ethylene inhibitor SmartFresh has also been shown to affect apple quality and reduce certain storage disorders. Therefore, the effects of delayed cooling and SmartFresh treatment on the physical and sensory quality of 'Honeycrisp' after storage were investigated.

'Honeycrisp' apples were harvested in Norfolk County, Ontario on September 9th, 2010. Fruit maturity was measured as: 36 ppm internal ethylene, 14.5 lb firmness, 12.0% soluble solids, 637 mg malic acid (per 100 ml of juice), and 7.1 starch index. Apples were transported to the *Apple Research Storage Lab* in Simcoe within 1 hour of harvest and cooled overnight to ~10°C. Half of the apples were then treated with SmartFresh (1 ppm, 1-MCP) for 24 hours. Three bushel boxes of each treated and non-treated fruit were subsequently held at 10°C for 0, 5, 10, or 20 days. After the appropriate time, all apples were then held in either air at 3°C for 4 and 8 months.

After 4 months of air storage, the largest effect of SmartFresh was reduced greasiness (Table 1). Furthermore, greasiness increased in SmartFresh-treated fruit with longer holding at 10°C after harvest. Apples treated with SmartFresh also had lower internal ethylene and generally higher soluble solids and malic acid, compared to those not treated. The number of days at 10°C had little influence at this time point. There were no storage rots and very few apples developed soft scald.

Complementary sensory evaluations showed that SmartFresh treatment reduced the flavour of “oxidized red apple” in ‘Honeycrisp’ held for 20 days at 10°C before air storage at 3°C. In addition, apples with no delay at 10°C were perceived as having a more intense “green apple” flavour.

Table 1: Quality of Ontario ‘Honeycrisp’ without or with SmartFresh and held at 10°C for 0, 5, 10, or 20 days, followed by 4 months in air storage at 3°C, plus 7 days at ~18°C.

	Internal ethylene (ppm)	Firmness (lb-force)	Soluble solids (%)	Malic acid (mg/100 ml)	Greasiness (1-3) ¹
No SmartFresh					
No Delay	63 ^{BC}	15.0 ^{B-E}	12.9 ^{B-F}	525 ^{C-E}	2.3 ^B
5 days at 10°C	62 ^{BC}	14.9 ^{C-E}	12.3 ^F	503 ^{DE}	3.0 ^A
10 days	71 ^B	14.9 ^{C-E}	12.7 ^{B-F}	492 ^{DE}	3.0 ^A
20 days	95 ^A	14.9 ^{C-E}	12.4 ^F	503 ^{DE}	3.0 ^A
+ SmartFresh					
No Delay	12 ^{EF}	14.8 ^E	14.4 ^A	592 ^{BC}	1.0 ^G
5 days at 10°C	11 ^{EF}	15.0 ^{B-E}	13.4 ^{B-E}	570 ^{CD}	1.7 ^{C-E}
10 days	23 ^E	16.2 ^A	13.8 ^{AB}	659 ^{AB}	1.5 ^{EF}
20 days	41 ^D	15.1 ^{B-E}	13.5 ^{A-E}	536 ^{C-E}	2.0 ^C
Significance ¹	****	****	****	****	****

¹ Greasiness: 1 = none or slight, 2 = moderate, and 3 = severe.

² Means within the same column with the same letter are not significantly different at $P < 0.05$.

**** = significant at $P < 0.0001$

Each value represents the average of 15 apples for ethylene and 30 for other indices.

After 8 months of air storage, SmartFresh-treated ‘Honeycrisp’ continued to have less internal ethylene, higher soluble solids and malic acid, and reduced greasiness. Apples held for 20 days at 10°C were greasier than those from the other regimes. There was still very little soft scald development.

At this time, sensory evaluations revealed an effect of SmartFresh within all storage regimes. SmartFresh reduced the flavour of “oxidized red apple” in all cases, while these fruit were also perceived as more acidic than apples without SmartFresh. SmartFresh-treated apples also had less “rate of melt” (more texture), in terms of the amount of product that melted after a certain number of chews.

Acknowledgements: This study was part of the Canadian Agri-Science Cluster for Horticulture (Growing Forward program) and was supported by the Canadian Horticultural Council, Ontario Apple Growers, Norfolk Fruit Growers’ Association, and AgroFresh Inc. Thanks to Behrouz Ehsani-Moghaddam, Julia Ladner, and Emilea Smith for their technical assistance.

Application of DPA using Aerosol or Eco Fog Technology in Commercial Storages

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

Diphenylamine (DPA) is a registered growth regulator for use on apples to reduce superficial scald development during storage. Currently, there are two DPA formulations registered in Canada: 1) No-Scald DPA EC 283 (31% a.i.) from Decco and 2) Shield DPA 15% Super Refund (15% a.i.) from Pace International. The two products are most commonly applied as a postharvest drench treatment. However, the aqueous application of DPA generates huge amounts of waste, for which disposal is difficult. In addition, reuse and recirculation of the solution leads to accumulation of pathogens in the drencher, which can increase pathogen presence and decay incidence in the stored apples.

Application of DPA as an aerosol or fog can avoid the above problems. Overall, this type of treatment is more environmentally friendly, requires no water drenching, and releases no condensates during the application. There is also no need for subsequent product disposal, and the process eliminates fruit decay caused by the accumulation of pathogens in a drencher.

Research permits were granted by the Pest Management Regulatory Agency to treat 16 commercial storage rooms with the Decco DPA Aerosol and three storage rooms with the Pace International EcoFog-100 (DPA) during the 2010 harvest season. Company personnel made the applications, following the product label rates and requirements. Pace treatments also included EcoFog-160 (pyrimethanil), which is a fungicide used to control of storage rots.

In each DPA-treated storage room, up to five different grower lots were sampled. From each grower lot, apples were treated with 1) DPA Aerosol or EcoFog, 2) DPA drench, or 3) no DPA. The DPA drench was that being used commercially at the particular storage operation. After several months of standard CA storage, DPA residue levels and disorder development were evaluated.

DPA residues were well below minimum after treatment and upon fruit removal from storage. External CO₂ injury was found on apples at a few locations and it was often controlled by DPA regardless of the application method. Incidence of storage rots was higher in some cases when a DPA drench was used, but this was not a consistent effect. High incidence of storage rots were found in 'Delicious' and the EcoFog-treated fruit had significantly less than those that were drenched (14 vs. 37%).

Decco No Scald DPA Aerosol has just been granted registration by the PMRA, so it will be available for

commercial use in Canada this season. Pace EcoFog should be commercially available for the 2012 harvest season.

Acknowledgements: This study was part of the Canadian Agri-Science Cluster for Horticulture (Growing Forward program) and was supported by the Canadian Horticultural Council, Decco U.S. Post-Harvest Inc., Pace International LLC, Ontario Apple Growers, and Norfolk Fruit Growers' Association. Thanks to Behrouz Ehsani-Moghaddam, Emilea Smith, Maude Lachapelle, George Burkholder, Jean-Pierre Riopel, and Cathy Mous for their technical assistance, as well as to the 14 commercial storage facilities across Canada that participated in the trials.



Figure1: Decco DPA Aerosol treatment

Getting Ready To Make Apple Cider Checklist

Paul Bailey, Risk Identification and Management Coordinator, OMAFRA Guelph

The 2011 apple cider season is almost here. Before the first press, cider makers need to make sure they're fully prepared.

Use the following checklist as a tool to help you minimize food safety risks.

Water

- Send a sample from the water source used for apple washing, cleaning and sanitizing activities to an accredited laboratory for testing to ensure that it is potable (e.g. 0 cfu/g coliforms and 0 cfu/g generic *E.*

coli). A list of Ontario labs licensed to perform drinking water tests may be accessed at www.portal.gov.on.ca/drinkingwater/dw_el_prd_042275.pdf

- Check, clean and, if necessary, replace water filtration system filters.
- Where water is being treated, calibrate the chemical delivery system according to manufacturer's directions to ensure the correct amount of chemical is being delivered.
- If a UV water treatment system is used, follow the manufacturer's maintenance schedule to ensure optimum performance.

Cider Making Facility

- Remove clutter and debris from around the building perimeter to discourage pest harbourage.
- Make sure building perimeter pest control traps are in place and baited.
- Clean and sanitize the walls, ceilings and floors of the areas where cider is being manufactured.
- Inspect interior to ensure windows are sealed or equipped with close fitting screens, walls are tight and doors are close fitting to prevent pest entry.
- Check lights to ensure bulbs are protected against breakage and are of sufficient intensity and quality to permit effective visual inspection of apple and cider.
- Check drains to ensure they are clean and functioning.
- Ensure that an adequate number of hand-washing stations are in place, that they are clean and equipped with hot and cold running water, hand cleaner and towels (preferably single-use).
- Make sure there are an adequate number of leak-proof containers for non-food waste, food waste (e.g. pomace) and garbage.

Cider Making Equipment

- Thoroughly clean and sanitize all cider making equipment. Disassembly of some equipment may be required for some hard-to-reach areas.
- Where feasible, replace equipment and utensils that are difficult to clean and sanitize with equipment and utensils with surfaces that are smooth, non-corrosive, non-absorbent, non-toxic and free from pitting, cracks or crevices (e.g. stainless steel or food grade plastic).
- Inspect press cloths for wear and tear. Discard those that have outlived their usefulness.
- Wash and air-dry press cloths.
- Service/calibrate UV unit or pasteurizing equipment.

Apple Coolers

- Inspect and service cooling units to ensure they are in good working order and are capable of rapidly cooling the daily volume of apples being put into storage.
- Inspect cooler unit drip pans and drain lines to ensure no condensate drips on stored apples.
- Inspect, calibrate and (if necessary) service cooler

temperature measuring devices.

- Make sure cooler doors are tightly closed to prevent rodent and insect access.
- Clean cooler walls, ceilings and floors.

Apple Bins

- Inspect wooden bins for soundness (e.g. holes, splinters). Discard those that cannot be adequately repaired.
- Thoroughly clean and sanitize apple bins and containers used to transport and/or store apples.
- Where feasible, replace wooden bins that are difficult to clean with plastic bins.

Transport Equipment

- Clean and sanitize apple bin transport vehicles.

Workers

- Provide training to apple pickers and cider facility workers regarding proper personal hygiene practices, hand-washing techniques and (where applicable) sanitary glove use.
- Post hygiene rules in prominent areas to remind employees of proper personal hygiene practices.

Harvesting

- Observe withdrawal periods prescribed on pesticide labels before apple harvest.
- Pick only sound, ripe apples from the tree for cider manufacture. Never use grounders!

Additional Apple Cider Food Safety Assistance

- For additional apple cider food safety information and/or no-cost environmental swabbing to check the in-season effectiveness of your cleaning and sanitation program, regardless of where you are in the province, contact an OMAFRA Risk Management Specialist:

◇ Bengt Schumacher in Midhurst
(705.725.7295 or bengt.schumacher@ontario.ca)

◇ Peter VanWeerden in Vineland
(905.562.1671 or peter.vanweerden@ontario.ca)

◇ Paul Bailey in Guelph
(519.826.4380 or paul.bailey1@ontario.ca).

New and Simplified Requirements for Ontario Apple Growers

Paul Bailey, Risk Identification and Management Coordinator, OMAFRA Guelph

On July 1, 2011, the Ontario government introduced a new regulation which affects the sale, packaging, labelling, transportation and advertising of apples packed or repacked in non-federally registered facilities in Ontario. Ontario Regulation (O. Reg.) 119/11, Produce, Honey and Maple Products under the *Food Safety and Quality Act, 2001* replaces Reg. 378 - Grades – Fruit and Vegetables under the *Farm Products Grades and Sales Act*.

The new regulation contains changes for Ontario apple growers and packers including removal of several requirements from the previous regulation. The requirements do not apply to apples that are minimally processed or otherwise processed or used in the manufacture of other products. Apples that are grown or harvested for personal use or consumption are also exempt from the new regulation.

It should be noted that apple producers and packers that are federally registered must still follow requirements of the *Canada Agricultural Products (CAP) Act*.

Food Safety

Unlike the previous regulation, O. Reg. 119/11 specifically addresses food safety. Under the new regulation, apples are considered to be contaminated if:

- they contain or have been treated or exposed to substances not permitted by, or in amounts in excess of limits prescribed under the *Canadian Environmental Protection Act, 1999* the *Food and Drugs Act* (Canada) and the *Pest Control Products Act* (Canada)
- they contain or have been exposed to a hazard, which is defined as a biological, chemical or physical agent or factor, a condition of a food or an agricultural commodity or the environment in which a food or an agricultural commodity is produced, processed, handled or stored, if the agent, factor, condition or environment, as the case may be, may directly or indirectly cause the food or agricultural commodity to be unsafe for human consumption in the absence of its control.

Grade Standards

Grade standards for apples have been eliminated. Therefore, apple producers are no longer required to grade apples.

Packages, Containers and Labels

Apples may be packed in any package that is suitable for apples. There are no specific package size requirements. The apple variety name is no longer required on packages or master containers. However, producers may include them if they wish.

Labels must be applied to every package or master container of apples. The labelling requirements in this section are in addition to any other requirements of the *Consumer Packaging and Labelling Act* (Canada) or the *Food and Drugs Act* (Canada). Every label must include:

- the name and full address of
 - ◊ the packer or,
 - ◊ if the packer packs the produce on behalf of a retailer, producer or other person, the person on whose behalf the produce is packed;
- the country or province in which the apples were grown or harvested
 - ◊ if the apples were grown or harvested in a country other than Canada: use the words "Product of", "Produce of", "Grown in" or "Country of Origin" followed by the name of the country in which the apples were grown or harvested (e.g. "Product of U.S." or "Grown in Mexico");
 - ◊ if the apples were grown or harvested in Canada: use the words "Product of", "Produce of", "Grown in", "Country of Origin" or "Province of Origin" followed by the word "Canada" or the name of the province in which the apples were grown or harvested (e.g. "Product of Canada" or "Province of Ontario");
- the word "apples" if they are packed in such a manner that they are not readily visible and identifiable;
- the same size print as is required under the *Fresh Fruit and Vegetables Regulations* under the *Canada Agricultural Products Act* for similar information.

Labels on previously used apple packages or master containers must be completely removed or information on the previous labels that do not meet O. Reg. 119/11 requirements must be completely obliterated. New labels with correct information must be applied.

If labels on packages of apples in master containers are easily and clearly discernable, no label is required on the master container.

Labelling requirements do not apply:

- to packages of apples filled by the consumer from a bulk display
- to produce intended to be processed, minimally processed or used in the manufacture of other foods

Advertising

Advertisements, whether written or otherwise, require:

- the country or province of origin of the apples
- the net quantity, if the apples are packaged

Retail Displays

A sign must be present on or immediately over a retail display of apples. The sign must include the following information:

- the country or province in which the apples were grown or harvested
 - ◊ *if the apples were grown or harvested in a country other than Canada:* use the words “Product of”, “Produce of”, “Grown in” or “Country of Origin” followed by the name of the country in which the apples were grown or harvested
 - ◊ *if the apples were grown or harvested in Canada:* use the words “Product of”, “Produce of”, “Grown in”, “Country of Origin” or “Province of Origin” followed by the word “Canada” or the name of the province in which the apples were grown or harvested
- if the apples are sold by weight, the price per unit of weight

The print on the retail sign must be readily discernable and of a size reasonable in proportion to the size of the sign.

Misrepresentation

False or misleading information on any label, package or master container of apples, or in any advertisement or on any retail display sign is prohibited. Specifically, there cannot be misrepresentation of:

- the name and full address of
 - ◊ the packer or,
 - ◊ if the packer packs the produce on behalf of a retailer, producer or other person, the person on whose behalf the produce is packed
- the place in which the apples were grown or harvested
- the amount of apples in a package or master container

This article contains general information only regarding O. Reg. 119/11. It is not intended to be an all-inclusive review of the regulation. The full O. Reg. 119/11 text is available at www.e-laws.gov.on.ca/html/regs/english/elaws_regs_110119_e.htm.

OMAFRA will offer various infosheets and education sessions regarding O. Reg. 119/11. Refer to www.omafra.gov.on.ca/english/food/inspection/fs_food_plant.htm for information as it becomes available.

Staff is also available to answer your questions. You are welcome to contact Suzete Moniz (1-888-466-2372 ext 6-4655, suzete.moniz@ontario.ca) or Paul Bailey (1-888-466-2372 ext 6-4380, paul.bailey1@ontario.ca) for additional information.

Food Safety Snippets

Checklist for Worker Policies Training

When training your workers in policies on the farm, especially for work during crucial productions times such as harvest and final packing, it is necessary they are aware of all the food safety risks and are trained appropriately.

Areas that need to be addressed during Worker Policy Training are:

Worker Practices – designated areas for eating, drinking, smoking, medications and other personal belongings

- **Hand Washing** – ensure training on proper hand washing techniques, using potable water, soap, hand wipes and sanitizing gel
- **Clothing and Footwear** – suitable clothing, footwear (and safety equipment) for the expected task is available, clean, intact, and there is separate storage space for work clothes
- **Injuries and Illness** – any open wounds, cuts or individuals displaying symptoms of an illness are not in contact with food without taking the appropriate measures to prevent contamination.

Keep in mind, a “worker” is any individual on the farm associated with the farm processes and production of the commodity.

Harvest and Worker Hygiene

We are nearing the time of harvest, which undoubtedly is one of the most crucial times for adhering to safe food practices. During this time, it is imperative to ensure that all workers have been trained in safe food handling practices, and have a clear understanding of the food safety risks with improper personal hygiene. Although there are many areas of worker hygiene that need to be addressed during training, the most important practice is that of **proper hand washing**, especially when dealing with ready to eat (i.e. pome fruit) and high risk commodities (i.e. berries, tomatoes and leafy greens). Evidence of this training, understanding and acknowledgement of this practice is imperative during an audit. There are step-wise procedures, posters and training resources (hand washing easels) available to you, free of charge, to assist in training your workers in proper practices.

For these and other resources, call 1-877-424-1300, or visit our website www.ontario.ca/good-ag-practices. Food safety questions? Ask us. We can help.

Announcements

AAFC Vineland Research Station Celebrates 100 years of Agricultural Research (1911-2011)

You are invited to attend an Open House on Saturday, September 10, 2011 from 11:30 am to 4:30 pm as a part of Agriculture and Agri-Food Canada's Vineland Research Station's 100th anniversary. The Open House will start with lunch, an official opening ceremony and conclude with lab and farm tours.

www.agr.gc.ca/AAFC/Vineland

Dates to Remember for Apple Growers 2011-12

Royal Agricultural Winter Fair Apple Competition
Exhibition Place, Toronto (Kelly Ciceran 905-688-0990)
November 3, 2011

Essex County Associated Growers Convention
Leamington, ON (Jillian 519-326-4481)
Nov. 22-23, 2011 (Fruit program Nov. 23)

Great Lakes Fruit, Vegetable and Farm Market Expo
www.glexpo.com
Grand Rapids, MI (Roger Brook, 517-281-9370
brookr@glexpo.com)
Dec. 6-8, 2011

International Fruit Tree Association <http://ifruittree.org/>
Santiago, Chile
Jan. 8-22, 2012

Ontario Fruit & Vegetable Growers Association
Convention www.ofvga.org
Niagara Falls (Deanna Hutton 519-763-6160-ext 116)
Jan. 9-11, 2012

Ontario Apple Growers Annual Meeting www.onapples.ca
Niagara Falls (Kelly Ciceran 905-688-0990)
January 9, 2012

Ohio Produce Growers & Marketers Congress
www.ohiofruit.org
Sandusky, OH (opgma@ofa.org, 614-487-1117)
Jan. 16-18, 2012

Guelph Organic Conference www.guelphorganicconf.ca
Guelph, ON (705) 444-0923 organix@georgian.net
Jan. 26-29, 2012

N.A. Farm Direct Marketing Conference
www.nafdma.com
Williamsburg, VA (Charlie Touchette 413-529-0386)
Feb 10-16, 2012

Ontario Fruit & Vegetable Convention www.ofvc.ca
Niagara Falls, ON (Glenna Carnie 905-688-0990)
Feb. 22-23, 2012

Information Sessions on Risk Management Programs

Here are the dates and locations for information sessions for the new Risk Management Program. Presentations by experts from the Ontario Ministry of Agriculture, Food and Rural Affairs and Agricorp will provide an overview of how the program works and what you need to do to participate. The meetings run from 7:00 p.m. – 9:30 p.m.

Please pre-register for the session(s) you plan on attending. The form is at:
www.omafr.gov.on.ca/english/RMPInfoSessionRegForm.htm

Fruit and Vegetables

August 31 – Alliston
Red Pine Inn & Conference Center
497 Victoria St. E.

September 6 – Chatham
Travelodge Hotel
555 Bloomfield Road

September 7 – Delhi
Knights of Columbus Hall
307 Main St.

September 8 – Vineland Station
Prudhommes Inn
3305 North Service Rd.

For more information

Toll Free: 1-877-424-1300
Local: (519) 826-4047
E-mail: ag.info.omafr@ontario.ca



Agricultural Information Contact Centre: 1-877-424-1300
E-mail: ag.info.omafr@ontario.ca
Northern Ontario Regional Office: 1-800-461-6132

www.ontario.ca/omafr