

ORCHARD NETWORK

For Commercial Apple Producers

VOLUME #12, ISSUE #3 December, 2008

In this issue...

Orchard Management

From the Editor

Leslie Huffman, Apple Specialist, OMAFRA, Harrow

The end-of-harvest season brings a different kind of busyness for apple growers, with final shipments, orchard clean-up, year-end bookkeeping, and equipment maintenance and repair. I'm sure many of you have had that question from non-apple growers – "What keeps you busy after the picking is done?" I'd like to know your standard replies for future reference.

Educational opportunities are a large part of the winter season, and our paths have crossed at some meetings already. I just returned from the Great Lakes Fruit, Vegetable and Farm Market Expo in Michigan, and found many presentations of interest to apple growers. A full-day symposium on apple thinning and return bloom, in honour of Dr. Art Mitchell, who was one of the pioneers in growth regulator research,

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This issue of the **Orchard Network Newsletter** was compiled by Client Service Representative, Marian Desjardine, OMAFRA, London.

highlighted the accumulated knowledge on apple tree response to crop load management. A take-home message was a goal for crop load – aim for 4-6 fruit/cm^2 of trunk cross-sectional area (hint: ask for a set of calipers for Christmas to measure the cross-sectional area of tree trunks next spring!). The Ontario Fruit & Vegetable Convention in February promises good information for apple growers – be sure to get your registration in and make your room reservations soon.

For now, we hope that the season brings health, happiness and peace to you and your families. Enjoy your personal time before the next "busy" season starts again.

Apples and Cover Crops

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

Apple growers who are removing orchards and/or planning new orchard plantings could benefit from cover crops to improve soil health, while reducing soil erosion, and improving nutrient cycling. Cover crops can have numerous other benefits including improvement of soil quality, pest management, fertility management, water availability, landscape diversification, and wildlife habitat.

A newly launched website by The Midwest Cover Crop Council (MCCC) brings together information from many areas including Ontario. The website features a wealth of cover crop information including:

- links to extension and research reports
- information on individual cover crops
- grower experiences with cover crops
- Cover Crop Survey
- Cover Crop Selector (in development)

If there is more Ontario cover crop information that you would like to see on the site contact Anne Verhallen, OMAFRA Soil Management Specialist (519) 674-1614 or anne.verhallen@ontario.ca or Christine Brown, OMAFRA Nutrient Management Specialist (519) 537-8305 or christine.brown1@ontario.ca .

Midwest Cover Crops Council (MCCC) is a diverse group from all aspects of agriculture from research and extension to producers and crop input suppliers. They have been working together since 2006 to address soil, water, air, and agricultural quality concerns in the Great Lakes and Mississippi River basins (including Illinois, Indiana, Iowa, Manitoba, Michigan, Minnesota, North Dakota, Ohio, Ontario, and Wisconsin) through increased adoption of cover crops in all production systems. Check out this new cover crop site at http://www.mccc.msu.edu/

Congratulations to Marian Desjardine who is retiring at the end of this month after a 31 year career with OMAFRA at London. She has been compiling the Orchard Network Newsletter since 2002 and we appreciate her assistance. Best wishes for a happy retirement, Marian.

Postharvest

Beware of Apple Flesh Browning!

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

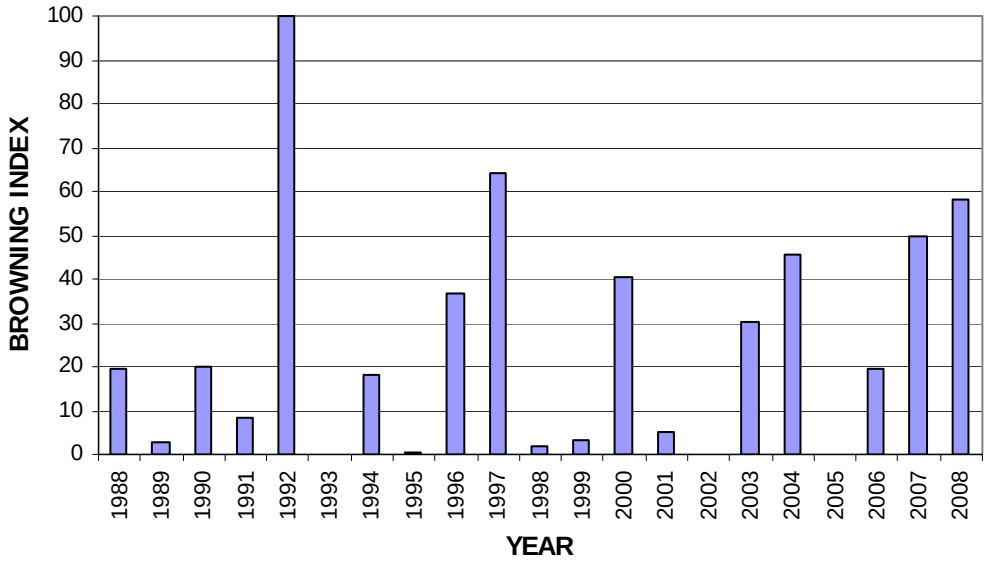
CIPRA is a computer-based program used to predict disease and pests of several horticultural crops, based on weather data. The program was developed by the research team of Dr. Gaétan Bourgeois, Agriculture and Agri-Food Canada, St-Jean-sur-Richelieu, Québec. More recently, CIPRA has been expanded to predict the risk susceptibility of apples to certain storage disorders (Bourgeois, DeEll, and Plouffe).

A risk model was developed for low-temperature disorders using CIPRA, based on weather data observed during July and August.

The figure below (created by D. Plouffe, AAFC – Québec) shows the results from 1988 to 2008 using weather data from the Simcoe-Delhi area in Ontario. The model indicates that there is a **58% risk of low temperature disorders (a.k.a. flesh browning) developing during storage this year.** This is the third highest risk index during the 30 years noted and it is primarily due to colder than normal temperatures in August and higher than average rainfall during the summer.

As such, it would be wise to watch your apples closely this year. Take samples from storage whenever possible and check for flesh browning. In addition, be sure to use the recommended storage temperatures for all cultivars. 'Empire', 'McIntosh', and 'Honeycrisp' will be especially susceptible.

RISKS OF BROWNING



Crop Protection

Potential Impacts of 2008 Weather on Fire Blight in 2009

By Kathryn Carter, Pome Fruit IPM Specialist, OMAFRA, Simcoe

The 2008 apple growing season was a huge challenge for growers. Early frosts reduced crop size, and hail throughout the province during the summer also reduced yields. Research indicates that these weather patterns may impact tree susceptibility to fire blight next year.

Researchers at Ohio State examining impacts of differing crop loads found that crop load can increase tree susceptibility to fire blight in subsequent years. In a 3 year experiment on Golden Delicious (which is not considered to be very susceptible to fire blight), many of the trees which were completely deflowered were severely infected with fire blight.

When flowers were removed for three consecutive years, trees had elevated carbohydrate levels in their tissues. These excessive carbohydrates resulted in thicker leathery leaves, which provided an optimal growth medium for the fire blight bacteria. As a result many of the deflowered trees were killed by fire blight.

Young non-bearing trees that are growing rapidly also develop high levels of carbohydrates which may make them more susceptible to fire blight. Late spring frosts or freezing create similar conditions, making the trees more vulnerable to fire blight.

As a result, growers in Ontario that experienced frost damage that removed flowers should be aware of the increased risk for fire blight in 2009. Monitor carefully for fire blight cankers in the orchards this winter, and monitor weather conditions in the spring, to be ready with control measures where necessary, especially on susceptible cultivars.

Surveys for Resistance in Codling Moth Populations in Ontario

By Dr. Ian Scott, AAFC, London

A codling moth (CM) insecticide-resistance survey in southwestern Ontario apple orchards found elevated levels of resistance to the organophosphate (OP) insecticide, Guthion, (azinphos-methyl) and the neonicotinoid, Calypso (thiacloprid).

Testing was conducted in 2008 on trapped male moths during the June and August flight periods. Sampling was conducted in Essex/Kent and Norfolk counties, with a total of 13 orchards surveyed. Male moths were attracted with pheromone lure-containing traps and captured on sticky sheets. The moth was dosed with either a solvent control or the technical grade insecticide.

The results of the survey indicated that OP and neonicotinoid resistance levels were higher in moths collected during the first flight in June in both regions. In several orchards, the OP's caused less than 10% mortality to treated moths. Abandoned orchard populations of CM were more susceptible to OP's and Calyspo with mortality typically greater than 90%.

Follow up studies with CM neonate larvae collected from both insecticide-managed and abandoned apple orchards will be used to confirm these results.

Managing OFM in Apples with New Products

Hannah Fraser, Entomology Program Lead – Horticulture, OMAFRA Vineland

The tool box for managing oriental fruit moth (OFM) in apples continues to be filled with new products, offering growers more options for pest management. While these new insecticides are efficacious, their timing of application may differ from older conventional products targeting newly hatched larvae. Many reduced-risk products must contact the target insect life stage directly or be ingested. Good coverage, timing, and accurate monitoring are all essentials in managing pests in apple orchards today, and this certainly applies to a serious direct pest such as OFM.

In the past, recommendations for timing application of insecticides have been based on pheromone trap catch data, between 3 and 6 days following peak activity (6-10 days following rapid upswing in numbers) depending on the time of year. Several of the new products need to be applied much earlier – in some cases shortly after adults emerge and begin to lay eggs, or before eggs begin to hatch. For this reason, the use of degree day developmental models and egg hatch prediction models are now required to ensure appropriate timing.

Recall that there are 3 generations of OFM in Ontario. A partial fourth generation may develop in some years, with adult flight and egg-laying activity extended into October. The insect overwinters as a late stage (4^{th} or 5^{th} instar) larva within a cocoon under bark scales, crevices and other protected areas on the tree or on the ground. They pupate in the spring and emerge as adults in late April or early May. Pheromone traps are used to track their emergence and flight.

Fluctuating spring temperatures can affect trap catch data. Just as there is a base temperature below which no development occurs in larvae, there is also a minimum temperature required for activities including adult flight, searching for a mate and egg-laying. During cool nighttime periods often experienced early in the growing season, adult OFM may not be active in the orchard for periods of several days. When warmer temperatures resume, so does flight activity. This may give the impression that the flight of the second generation has begun,

when in fact the activity represents a split or bimodal peak of the overwintering generation. Bimodal peaks often carry-over to the next generation.

Pheromone traps will provide information on insect activity, but to understand what is actually happening at a population level also requires the use of degree-day models to verify that enough heat units have been accumulated to drive the pest to the next generation. A phenology model to predict development of OFM from egg to adult (generation time) is available. Oriental fruit moth have a base developmental temperature of 7.2ºC and require an accumulation of approximately 550 DDC base 7.2ºC to go from an egg to an adult (generation time). If you are seeing a fresh flush of adults but have not yet accumulated enough heat units, then the new activity likely represents a bimodal peak rather than the beginning of the next generation.

A degree day-model to predict the percent egg-hatch for OFM is also available. Both models have been used with success in apple IPM programs in several production areas to help time insecticide sprays. Note that while degree day models can provide important information for predicting the timing of insecticide applications, they are not a replacement for continued monitoring of pest activity with pheromone traps and field scouting for damage.

When using the OFM model, begin accumulating degree days (base 7.2ºC) at the first sustained moth catch (biofix) of the overwintering generation in pheromone traps placed in apple orchards and continue to calculate these for the remainder of the season.

The timing of insecticide applications varies depending on the products being used. For products targeting newly hatched larvae such as Delegate, Calypso, Assail, Altacor, timing is approximately 194-208 DDC for the first brood (generation), 805-833 DDC for the second brood, and for the third brood two applications at 1361-1389 and 1611-1667 DDC to cover extended activity (where required). Check residual activity of products and re-apply as required where extended flight occurs. For products that need to be applied before eggs are laid (residues under eggs) such as Rimon, application should occur at least 100 DDC earlier for each generation. For products that need to be applied prior to egg hatch (residues over eggs and /or timed for first hatch) such as Intrepid or Altacor, application should occur 50-80 DDC earlier for each generation. Note that Altacor is effective for either larvae and eggs. Monitor flight for each generation, check residual activity for each product and re-apply product if necessary.

Keep in mind that larvae enter the fruit within 24 hours of hatching. Rapid entry into the fruit means that there is a very narrow window of opportunity for contact with insecticides on the surface, and many newer products must be ingested. Adequate spray rates and good coverage are essential for growers using insecticides to manage OFM.

When using insecticides, each generation should be managed as separate units. Use products from a single chemical group to manage a given generation of a pest. If emergence and/or activity for that generation is prolonged (for example, due to bimodal or split peaks), apply a second application of the same product. This exposes each generation to only one chemical group. Rotate to another chemical group for each subsequent generation.

Mating disruption of Oriental fruit moth is a highly effective alternative to insecticides. The technology is readily incorporated into IPM programs for apples, offering season-long protection against OFM damage (depending on product choice), and without the need to time insecticide spray applications. Dispensers must be applied prior to flight. Mating disruption is a key tool in preventing / delaying the development of resistance to insecticides.

New Apple IPM Guide: Available Late March 2009

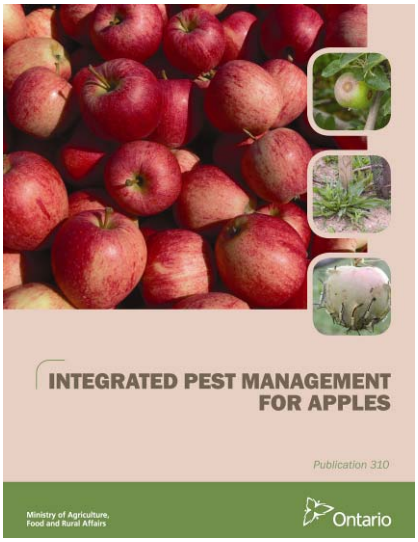
By Kathryn Carter, Pome Fruit IPM Specialist, OMAFRA, Simcoe

A full revision of OMAFRA Publication 310, Integrated Pest Management for Apples, will be available in late March 2009. This updated manual will cost $50, and will help Ontario apple growers to continue to adopt advances in IPM.

The Ontario Ministry of Agriculture, Food and Rural Affairs promotes the adoption of IPM, including using reduced-risk pesticides as well as alternative approaches. Our goal is to ensure that all apple growers use an IPM program, using pesticides only when necessary, and in ways that minimize possible impacts on people and the environment. This manual provides growers and consultants with the information they need to implement a successful

IPM program including pest identification, biology, monitoring, thresholds and management.

Stay tuned for Grower IPM Workshops in April 2009 for the launch of this updated resource.



Novel New Products Help Manage Fire Blight in Canadian Orchards

by Bernie Solymár, EarthTramper Consulting Inc.

Fire blight, caused by the bacterium *Erwinia amylovora*, is a devastating disease of apples and pears. Many of our current cultivars and rootstocks are highly susceptible to fire blight. Combined with warmer, wetter springs, the risk of fire blight in any given year can be significant.

Until recently, apple and pear growers in Canada have been limited to the antibiotic streptomycin, in conjunction with cultural methods (e.g. Apogee, pruning, vegetative growth management) to manage fire blight. The potential for resistance to streptomycin is a growing concern. Copper sprays at green tip to reduce bacteria have been of questionable effectiveness and pose a phytotoxicity risk to the tree.

Two new bioantagonists, Bloomtime Biological FD and Blightban C9-1, were registered in Canada in 2007 for fire blight. These products both contain strains of a commonly occurring bacterium, *Pantoea agglomerans*, which compete with the fire blight bacteria on floral surfaces. Given sufficient time to colonize the blossoms, they prevent fire blight bacteria from establishing on those sites.

Once established, populations of bioantagonists become partially self-sustaining by spreading from blossom to blossom via insects and rain. To be effective, the antagonistic bacteria must stay active for at least 5 to 7 days during bloom.

In 2007 and 2008, EarthTramper Consulting Inc. conducted on-farm commercial trials in Ontario and Nova Scotia to demonstrate Bloomtime and Blightban. These products were applied at 20% and 75% bloom using airblast sprayers. Control blocks were untreated. Streptomycin was applied to all treatments where Cougar Blight and MaryBlyt showed “high” or “extreme” blossom blight risks.

Half the demonstration orchard sites showed a marked difference between the bioantagonist-treated sites and the control sites:

In 2008, Bloomtime was commercially available, at a cost about $130/acre for the recommended 2 applications. The reduction of the incidence and severity of blossom blight may well merit the price tag, especially during a warm, wet spring.

Bloomtime and Blightban C9-1 offer a valuable new approach to combat fire blight. These bioantagonists provide an effective alternative to copper, and complement the Cougar Blight and MaryBlyt models, streptomycin treatments and sound horticultural practices in an integrated approach to fire blight management in today’s orchards.

Figure 1 - Shoot Blight (Courtesy of Bernie Solymar)

Funding for this project was provided by Agriculture and Agri-Food’s Pest Management Centre (Project PRR07-340), www.agr.gc.ca/prrmup .

Table 1. Comparison of the use of bioantagonists on incidence of blossom blight.

2007		Blossom Blighted Clusters (per 25 Trees)		
Location	**Cultivar**	**Bloomtime***	**Blightban***	**Control***
Kentville, NS	Gala	16	0	3
Canning, NS	Idared	1	1	37
Kingsville, ON	Gala	0	0	0
Kingsville, ON	Gala	0	0	0
Dunnville, ON	Bartlett	0	0	0
St. George, ON	Jonagold/Gala	1	2	1
Delhi, ON	Idared	4	4	36

2008		Blossom Blighted Clusters (per 25 Trees)	
Location	**Cultivar**	**Bloomtime***	**Control***
Kentville, NS	Gala	2	5
Canning, NS	Idared	8	1
Beamsville, ON	Mutsu	0	0
Beamsville, ON	Golden Glory	5	18
Beamsville, ON	Gingergold	2	10
Beamsville, ON	Bartlett	3	21
St. George, ON	Jonagold/Gala	0	4
Windham Centre, ON	Gala	0	0
Delhi, ON	Idared	0	0

***Streptomycin was applied where models called "high" or "extreme" fire blight risk.

European Apple Sawfly Update

Margaret Appleby, IPM Systems Specialist, OMAFRA, Brighton

Growing apples is a complex enterprise with 39 different insects and diseases to contend with in order to produce a quality apple. Fortunately not all have to be dealt with at once. Some are cultivar specific such as blister spot on Crispin and some geographical in nature such as European apple sawfly, (EAS). So what's happening with European apple sawfly? This pest as its name implies comes from Europe, arrived in Long Island, New York in the late 1940's and has been moving slowly westward. Damage from EAS in Ontario has been concentrated mainly in the apple-growing area east of Brockville and the Ottawa Valley. In 1998, European apple sawfly was documented in the Kingston area and by 2008 European apple sawfly has spread westward and become established as far west as Port Hope.

A pre or post bloom insecticide is needed to manage this pest and azinphosmethyl (Guthion or Sniper) is the only registered product. With the phase out of this chemistry, IPM strategies for EAS are being developed in two ways. For the last 3 years new reduced risk insecticides are being tested to manage this pest with good results. Also researchers from Agriculture and Agri-Food Canada have initiated a classical biological program. The species specific larval parasite *Lathrolestes ensator* (Brauns) has been introduced to Quebec and Eastern Ontario orchards. Once this parasite is established at these sites, these sites will be used as seed orchards to disseminate the larval parasite to sawfly infested orchards. This is not a stand alone method of control but can be used in conjunction with reduced risk pesticides and cultural methods to reduce the population of European apple sawfly.

Announcements

More Than Kicking the Dirt!

Soil Fertility Workshop at 2009 Ontario Fruit & Vegetable Convention, St. Catharines, ON

Thursday, February 19, 2008
Morning session: 9:30-12:00
Afternoon session: 1:30-4:00

Soil testing is the most cost effective way to plan and manage your soil and crop's fertility program.

Too often soil testing is overlooked because:

- the reports are too hard to understand,
- it's not relevant to my farm, or
- it isn't necessary, we already grow good crops.

In this workshop, hosted by Christoph Kessel, OMAFRA, you will dig deeper to demystify soil reports. You will learn why soil testing can benefit all farming operations and how to use a soil report to make good crops even better.

Whether you grow fruits or vegetables, have been growing for 3 or 30 years, develop your own fertilizer program or work with a crop advisor, this hands-on workshop takes you from the field to the soil report and fertilizer recommendations.

Each participant receives a workshop manual, OMAFRA Publication 611 *Soil Fertility Handbook, Best Management Practices: Managing Crop Nutrients* and a free soil analysis from A&L Canada Laboratories Inc.

You must pre-register for the workshops. Each workshop is limited to 20 people. To pre-register, please phone the OMAFRA Vineland Resource Centre at **905-562-1631** by **Friday February 13, 2009**. There is no additional registration fee.

These workshops are sponsored by A&L Canada Laboratories Inc.

Apple Program: Ontario Fruit & Vegetable Convention, 2009

Apple growers have faced challenges from the weather, rising labour costs, a changing pest complex, growing new cultivars and using new storage technologies. This session takes aim at all of these issues, with leading experts from across Canada and the U.S. to guide us to solutions and improve our competitiveness in this global marketplace.

Thursday, February 19, 2009
Room 204

9:30 a.m. **Innovative Orchard Management**
Tara Baugher, Penn State Cooperative Extension

10:00 a.m. **Fertigation & Bitter Pit Management in Apples**
Dr. Gerry Neilsen, AAFC, Summerland, B.C.

10:45 a.m. **Panel: Ready for the Weather**

Hail Netting: *Paul Frankis, Sugar Apple Orchards, Kingsville*

Hail Cannon: *Robbie Montgomery, Wilmot Orchards, Newcastle*

Frost Protection: *Mike Downing, Downing Orchards, Simcoe*

Lunch & Trade Show

2:00 p.m. **How SmartFresh has changed the Washington State Apple Industry**
Dr. Jim Mattheis, USDA, Washington

2:30 p.m. **What we know about storing Honeycrisp**
Dr. Jennifer DeEll, OMAFRA

3:00 p.m. **Strategies for the control of codling moth**
Dr. Ian Scott, AAFC, London

3:30 p.m. **Orchard Planting Considerations based on Cultivar Susceptibility to Pests and Diseases**
Bernt Solymar, EarthTramper Consulting, Simcoe

Pre-registration for the Ontario Fruit & Vegetable Convention is now open. Free lunch and a ticket to the Fine Food & Wine event are provided for those who pre-register. Full details are available on the convention website at www.ofvc.ca.