The Pest Management Regulatory Agency (PMRA) recently announced the approval of a minor use label expansion for PRISTINE fungicide (boscalid + pyraclostrobin) for suppression of powdery mildew and gummy stem blight on greenhouse cucumbers in Canada. Pristine fungicide was already labeled for use on a range of Canadian specialty and minor crops in the field; however this is the 2nd full registration of this product in greenhouse food crops.

This minor use submission was sponsored by the Agriculture & Agri-Food Canada, Pest Management Centre (PMC) in response to minor use priorities identified by greenhouse cucumber producers in Canada.

Disease management has been a high priority for greenhouse cucumber producers and several years of emergency use registrations have been necessary to avoid serious crop losses. The registration of Pristine fungicide will provide greenhouse cucumber producers with an effective and useful disease management and resistance management tool.

Pristine fungicide can be applied at a rate of 1.3 kg product per ha in a minimum water volume of 250 litres per ha. Do not apply Pristine more than once per crop cycle. The pre-harvest interval for greenhouse cucumbers is 0 days.

Pristine fungicide should be used in an integrated disease management program and in rotation with other management strategies. Follow all other precautions and directions for use on the Pristine fungicide label.

This minor use submission was sponsored by the PMC as a result of priorities established in consultation with producers. We also wish to thank the personnel of BASF Canada Inc. for their support of this registration and the personnel of the Pest Management Regulatory Agency for evaluating and approving this important pest management tool.

For copies of the new minor use label contact Gillian Ferguson, OMAFRA, Harrow (519) 738-1258 or visit http://www.agsolutions.ca
Ready for the Spring?
Leslie Huffman, Apple Specialist

We’ve been waiting for spring, and now it seems like we are already behind. While there is still some time, here’s a short list to help you get ready:

- **Fertility program** – consult your leaf analysis results, and adjust from last year’s rates; also planning for foliar calcium sprays on bitter pit-prone cultivars like Honeycrisp and Red Delicious
- **Pruning follow-up assessment** – vigorous or heavily-pruned trees may benefit from Apogee, summer pruning may help poor colouring cultivars
- **Sprayer set-up** – invest in new nozzles for your airblast sprayer and redo your calibration for each size/shape of tree or block; set up a separate weed sprayer and do the calculations for each size of weed-free strip; get a wick wiper or hand sprayer ready for spot treatments of problem weeds
- **Weather monitoring equipment** – be ready to track maximum/minimum temperatures for calculation degree days for pest thresholds; be ready to track temps starting at green tip for CougarBlcyt and MaryBlcyt
- **Pesticide storage** – ensure that all requirements are met for the Pesticides Act – locked, ventilated, no drainage, proper signage, spill clean-up kit and emergency numbers at hand
- **Pesticide labels** – update your set of labels and MSDS with the most current, including new products that you may use
- **Permit to take water** – check your expiry date, or begin the process to apply for a new permit. Be ready to record your water usage for your reports.
- **Irrigation & fertigation equipment** – check pumps, lines and sprinklers, as well as injectors – irrigation season may not be far away, some years in early May
- **Worker’s safety training** – be sure to post the proper signage, and have records that workers sign that they have received proper instruction for ladder use, chemical handling, power equipment, machinery, etc. Make sure your first aid kit is up-to-date, and that emergency numbers are at hand.
- **Support structure maintenance** – check your tree trellises and/or staking
- **Hail and frost protection** – identify which sites might benefit from the installation of wind machines for frost; assess the potential of hail netting or hail cannons, and how that fits in with your crop insurance
- **Plans for IPM scouting** – whether you plan to hire a scouting service or do it yourself, write down your needs – number of scoutings per week, traps and how to record them, prepare orchard maps showing “hot spots” for various insects, diseases or weeds, assemble reference materials – and sign up for scouting workshops (see below)
- **Paperwork** – make up sheets on clipboards, binders, folders – whatever works for you. Records are more apt to be kept up to date where it is convenient. Be sure to assess results from last year eg. Packout records, scouting reports, financial comparisons
- **Planning for orchard removal** – applying for OVTP funding, ordering trees for 2010 and 2011
- **Food safety program** – most growers received a binder with the latest apple food safety program. Take a minute to read through and start on documenting your great safe crop of apples. This record will show your due diligence in the event of any unfortunate incidences.

I’m sure you can add something else that needs to be ready as this season starts. The list may seem long, but it’s all important.
Tips for Successful Planting
Leslie Huffman, Apple Specialist

The investment in a new orchard is large, so it’s very important to do things right, beginning with the planting year. Here are some tips to plant successfully:

- **Site preparation:** It usually takes 1-2 years to get a field ready for planting. For orchard replant sites, it might take more, maybe up to 5 years. This is the time to improve drainage, add organic matter (cover crops, manure), adjust soil pH with lime if required, apply phosphorus, and control perennial weeds (which may take 2 to 3 years).

- **Nursery stock:** It’s important to work with your nursery to ensure good quality trees delivered when you are ready. Trees should be kept dormant until planted, and roots should not be allowed to dry out. If planting is delayed, trees should be heeled into the soil, or kept in cold storage. Avoid keeping trees in storages where apple fruit have been stored, as the ethylene can severely damage trees.

- **Time of planting:** This is pretty simple – the earlier the better. This allows the tree to establish new roots before the warm weather begins pushing the tree’s growth and drawing large reserves of moisture. For some sites, fall planting can also be successful if site preparation is good, weather is in your favour, and nursery stock is available.

- **Method of planting:** Hand or mechanical planting can be successful as long as roots are given adequate room in the planting hole or trench. The most important part is to re-adjust the tree height to ensure that the graft union is a uniform height above the soil line – after soil has settled.

- **Care after planting:** The soil needs to come in intimate contact with moist soil after planting. This usually requires physical movement of soil in the root area, as well as generous amounts of water. This first watering can also include plant starter fertilizer, mixed as directed, to avoid root burn. Avoid putting dry fertilizer or fresh manure in direct contact with roots.

- **Pruning vs. training:** I was taught that the top of the tree needs to be cut back to balance with the loss of roots due to digging the nursery tree. However, with advances in nursery production (which produces better, more compact root systems), and the need for early apple production (which is delayed with every pruning cut), many newly planted apple trees should not be pruned. The focus instead is on tying down all usable feathers, and providing the tree with all the water it needs from Day 1. In short, keep those pruners in your back pocket (exception if there is one dominant lateral – cut it off!)

Give Food Safety a Helping Hand
Jan Schooley, On-farm Food Safety Specialist

One of the “big three” factors in on-farm food safety is hygiene. The hands that touch berries can carry hitchhikers that could cause foodborne illness. Both Salmonella and E. coli can be transferred from hands to berries. These two hitchhikers come from only one place - feces – or as your kids would say ‘poo’. Your defence against this insidious traveller is relatively simple. Make sure that all employees who handle fruit have adequate, easily accessible handwashing facilities. Are there toilet facilities readily available – are they clean – do they have soap, water, paper towels and a garbage bin? Is there hand sanitizer within easy reach when needed? To help you remind employees about the need to wash hands, OMAFRA is making available laminated posters in English and Spanish. Just call Kelley in Guelph at 519-826-3289 or Jan in Simcoe at 519-426-5694.
Options for Grape Berry Moth Management in Ontario Vineyards

Wendy McFadden-Smith, Tender Fruit & Grape IPM Specialist, OMAFRA
Hannah Fraser, Entomology Program Lead, Horticulture Crops, OMAFRA

Until 2008, grape growers relied primarily on synthetic pyrethroids for management of grape berry moth (GBM). These products are contact nerve poisons that are effective on all larval stages. They are applied around peak male moth flight as indicated by pheromone trap catches. Peak activity usually occurs within 1 week of “upswing” in pheromone trap catches, which is when numbers of male moths start to increase rapidly following sustained flight. Upswing in numbers corresponds to early egg-laying activity by females and subsequent egg-hatch. If you have attended the OFVC in the last few years and have read other articles in this newsletter, you likely know that the biology of GBM makes management a challenge. Maintaining good coverage has always been key to reducing damage.

Two “new” synthetic pyrethroid products are UP-Cyde (same active as Ripcord) and Perm-UP (same active as Pounce). Pyrethroids have a short period of effectiveness (7 days, less if daytime temperatures are higher than 25 C) so will likely have to be applied more than once per generation. Other “old” products registered for use include the OPs Guthion, Diazinon and Imidan, and the carbamate Sevin. Sevin is not commonly used because of residue problems (by LCBO standards) if it is applied after the bunch close stage. Guthion/Sniper has an extended re-entry period of 28 days, precluding any hand work or other activity in the vineyard. Imidan has a 14-day re-entry / pre-harvest period.

Fortunately, two new products were made available for use in vineyards in 2008: Delegate (Dow AgroSciences) and Altacor (DuPont Crop Protection).

- **Delegate** belongs to Group 5 of insecticides, the same group as Success. It is a nerve poison, but works in a different way than OPs or pyrethroids. Delegate works primarily by ingestion. Delegate has longer residual activity than Success, another Group 5 insecticide that is registered for GBM management. While Delegate and Success are labeled for suppression of GBM, in AAFC field trials, they provided control comparable to commercial standards. Delegate is not recommended for third generation of GBM. For Delegate, the PHI is 7 days and the REI is 12 hours.

- **Altacor** is a Group 28 compound. Products in this group have a different mode of action from other insecticides that affect the insect nervous system because it affects the muscles of the insect. Once the larva eats the insecticide, it stops feeding almost immediately and dies within a few days. The PHI is 14 days and the REI is 12 hours.

Altacor and Delegate (and Success) work primarily by ingestion against GBM and therefore must be eaten by the insect to achieve rapid knockdown of the pest. They are most effective on young larvae. Therefore, they will be most effective if applied after egg deposition but before the larvae exit the eggs. Because the products must be consumed, the timing is a lot more critical than it was for the older contact products. Altacor and Delegate should be applied earlier than more conventional products, and before peak flight of GBM occurs. A combination of regional and site-specific trap catches and degree day accumulations will be used to help time these products.

Another thing to consider is that since these new products must be eaten by the target pest, coverage is critical. GBM eggs are laid on the berries and the only thing outside the berry that the emerging larva eats is the “shell” of its egg when it exits – it spits out the bites of berry skin before it enters the berry. In order to ensure they ingest a lethal dose of insecticide, excellent coverage is required. Make sure to apply the products at recommended rates and with sufficient water volumes.

There are several benefits to using these new products.

- **They are from new chemical families that are different from pyrethroids**, OPs and carbamates, so they are useful rotation partners for resistance management. This is particularly important in preserving pyrethroids for pre-pick sprays, as they have the shortest pre-harvest interval.

- **Very rainfast.** Altacor and Delegate are absorbed into the waxy layer of plant tissues and are not removed with rainfall about 1 hr after spraying.

- **Not affected by temperature.** The effectiveness of pyrethroids is significantly reduced with temperatures greater than 26 C while Altacor and Delgate work consistently regardless of temperature.
• **Long residual activity.** The interval between sprays of Altacor or Delegate is 10-14 days while that for pyrethroids is 7 days. Fewer sprays of these newer products will be required; in fact, depending on trap catches, a single application may take care of an entire generation.

• **Short re-entry period.** The re-entry period for Altacor and Delegate is 12 hours.

Our suggested strategy for integrating these products is to use Altacor for second generation, Delegate for third generation and reserve pyrethroids for pre-pick sprays. As other insecticides that will replace synthetic pyrethroids become registered for use in grape in the (hopefully) near future, our recommendations for managing GBM will change – so stay tuned!

The alternative to juggling insecticide timings is to use mating disruption. Mating disruption works best when used in an area-wide program; a minimum of 2 ha is required but larger blocks are recommended. Isomate-GBM Plus is effective for 150 days. It should be applied prior to moth emergence in the spring (immediate pre-bloom, flower cluster with floret separation). In areas where large sources of mated females may migrate into the vineyard (areas with significant wild grape, poorly managed adjacent sites), supplemental insecticides may be required along border rows.

The following table summarizes the cost of a single treatment per ha based on the manufacturer’s suggested retail price.

<table>
<thead>
<tr>
<th>Product</th>
<th>$/ha/application</th>
<th>Residual (days of effectiveness)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guthion</td>
<td>35</td>
<td>14 (28 day re-entry)</td>
</tr>
<tr>
<td>Imidan</td>
<td>93</td>
<td>14 (14 day re-entry)</td>
</tr>
<tr>
<td>Sevin</td>
<td>89</td>
<td>None listed</td>
</tr>
<tr>
<td>pyrethroids</td>
<td>20-36</td>
<td>7 for most (less if temp is higher than 26 C)</td>
</tr>
<tr>
<td>Altacor</td>
<td>126</td>
<td>7-10</td>
</tr>
<tr>
<td>Delegate</td>
<td>87</td>
<td>14</td>
</tr>
<tr>
<td>Success</td>
<td>118</td>
<td>7-10</td>
</tr>
<tr>
<td>Isomate GBM Plus</td>
<td>163</td>
<td>150</td>
</tr>
</tbody>
</table>

The pyrethroid insecticides are useful to cover the pre-pick period since they have such a short pre-harvest interval and also provide control of lady beetles. But they are also vulnerable to the development of resistance. While more expensive, rotation with one of the new products that are available is an investment in keeping the pyrethroids for when we need them most. Mating disruption appears expensive if looked at this technology only in terms of the cost per ha. However, at least some of this cost is compensated for by not having to worry about spray timing, no re-entry interval, no pesticide residues, no pre-harvest interval, fewer non-target effects and long-term resistance management.

NEW! Interactive online IPM training

OMAFRA has introduced a new training tool for growers and ag personnel working in vegetable and small fruit crops. [Ontario CropIPM - Integrated Pest Management Training](http://www.ontario.ca/cropIPM) is available both online ([www.ontario.ca/cropIPM](http://www.ontario.ca/cropIPM)) and on CD.

Ontario CropIPM includes modules for tomatoes and peppers, as well as brassicas, cucurbits, strawberries, and sweet corn. There is no charge to use the online version, at [www.ontario.ca/cropIPM](http://www.ontario.ca/cropIPM). A CD version is also available. The CD can be ordered online at [www.serviceontario.ca/publications](http://www.serviceontario.ca/publications) or by phone at 1-800-668-9938 ($10 + tax, order # AF141).
The Hidden Cost of Damaged Nozzles
Dr. Jason S.T. Deveau, Application Technology Specialist

Many factors contribute to a successful spray application: sprayer mechanics, application method, weather conditions, nature of the target, product applied and the aptitude of the operator. All of these factors converge when the spray leaves the nozzle. It is therefore surprising that the most critical part of the sprayer, the nozzles, are so often neglected. Monitoring nozzle performance pays financial dividends because tip damage has a direct impact on product effectiveness and cost (see Table 1). If the application is seriously compromised, the operator might have to re-spray, which incurs additional labour, time, fuel, and wear-and-tear on equipment.

The Potential Impact of Damaged Nozzles

<table>
<thead>
<tr>
<th>Nozzle Damage</th>
<th>Result</th>
<th>Possible Causes</th>
<th>Potential Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worn Nozzle</td>
<td>Over Application</td>
<td>Regular Use (particularly with wettable powders)</td>
<td>Higher Product Cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Phytotoxicity (particularly on heat or moisture stressed plants)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unacceptable Residue level</td>
</tr>
<tr>
<td>Plugged Orifice</td>
<td>Under Application</td>
<td>Debris</td>
<td>Inadequate Protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dirty Carrier Water</td>
<td>Increased Risk of Resistance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product Build-up</td>
<td>Increased Risk of Resistance</td>
</tr>
<tr>
<td>Distorted Orifice</td>
<td>Uneven Application</td>
<td>Regular Use</td>
<td>All of the Above</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Improper Cleaning</td>
<td></td>
</tr>
</tbody>
</table>

The solution lies in proper maintenance and early detection. Tip orifices have delicate edges, so clean them with a soft-bristled brush or using a can of compressed air. Even a wooden toothpick can distort some plastics, so imagine what a wire does. Better still, carry spares for quick field replacements and clean them later in the workshop where they won’t get lost. Be sure to clean nozzle screens with a brush as well because flushing does not dislodge build-up. Nozzle performance should be tested during each calibration (before and mid-way through the season at minimum) or whenever damage is suspected. Testing is simple, quick and inexpensive:

1. Temporarily install a pressure gauge on the boom behind the nozzle (commercial or home-made);
2. Adjust the regulator to compensate for the pressure change between the pump and nozzle to accurately set nozzle pressure;
3. Use a graduated container or commercial tip-tester to measure the discharge of clean water over a one minute interval;
4. Compare the rate to the manufacturer’s rate <OR> compare the flow rate from the used tip to the flow rate of a new tip of the same size and shape.

If the flow rate is 10% (or even 5%) more than the ideal rate, replace ALL nozzles, not just the ones that appear damaged. Replace them once a year or at the first signs of deterioration, whichever is first. The cost of renewing an entire set of nozzles is a fraction of the potential cost of wastage and potential crop damage:

Example:
An airblast sprayer with 16 nozzles sprays a product that costs $150/hectare (~$60/acre).
Nozzle tips are worn by an average 10%, which sprays an additional $15/hectare ($6/acre).
16 new ceramic hollow cone tips and gaskets cost $80 at $5 each.
The nozzles pay for themselves in 5.3 hectares (13.3 acres).

The rate of tip wear depends on spray pressure, product sprayed, and the material of which the nozzle is made. Upgrading to a harder, more durable tip can reduce maintenance costs. Never mix nozzle materials on a boom; from softest to hardest: Brass < Stainless Steel < Plastics < Hardened Stainless Steel < Ceramic.
Inevitably, all nozzles wear out so be sure to include regular nozzle maintenance and replacement in every spray program.
New Products for Berry Growers
Pam Fisher, Berry Crop Specialist, OMAFRA

**Product:** Admire 240 F (imidacloprid 240 g/L)
**Registrant:** Bayer CropScience
**Chemical family:** Group 4 insecticide (neonicotinoid)
**Crops:** strawberries, raspberries, saskatoon berries
**Pests:** aphids (strawberries), raspberry cane borer, red-necked cane borer, white grub larvae, aphids, potato leafhopper suppression (raspberries) and woolly elm and apple aphids (saskatoons)
**Bee toxicity:** highly toxic

**Product:** Allegro 500F (fluazinam 500 g/L)
**Registrant:** Syngenta Crop Protection Canada Inc.
**Chemical family:** Group 29 fungicide
**Crops:** blueberries
**Pests:** suppression of mummyberry, suppression of phomopsis fruit rot, suppression of anthracnose fruit rot
**Bee toxicity:** relatively non-toxic

**Product:** Delegate WG (spinetoram 25%)
**Registrant:** Dow AgroSciences Canada Inc.
**Chemical family:** Group 5 insecticide (naturalyte)
**Crops:** blueberries, raspberries, strawberries
**Pests:** spanworm (blueberries), obliquebanded leafroller (raspberries), thrips suppression (strawberries)
**Bee toxicity:** highly toxic

**Product:** Silencer 120 EC (lambda-cyhalothrin 120 g/L)
**Registrant:** Makhteshim Agan of North America
**Chemical family:** Group 3 insecticide (pyrethroid)
**Crops:** strawberries
**Pests:** strawberry clipper weevil, tarnished plant bugs
**Bee toxicity:** highly toxic

**Product:** Up-Cyde 2.5 EC (cypermethrin 250 g/L)
**Registrant:** United Phosphorus Inc.
**Chemical family:** Group 3 insecticide (pyrethroid)
**Crops:** strawberries
**Pests:** strawberry clipper weevil, tarnished plant bugs
**Bee toxicity:** highly toxic

**Product:** Surround Crop Protectant
**Registrant:** United Phosphorus Inc.
**Chemical family:** particle film product
**Crops:** strawberries, raspberries
**Pests:** leafhoppers
**Bee toxicity:** non-toxic, may be an irritant to bees

**Product:** Oberon (spiromesifen 240 g/L)
**Registrant:** Bayer CropScience
**Chemical family:** Group 23 insecticide
**Crops:** strawberries
**Pests:** two-spotted spider mite
**Bee toxicity:** relatively non-toxic