



## Weekly Update

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### Greenhouse plants damaged during cold snaps

In the last couple of weeks we have been receiving calls about unusual damage to greenhouse plants. These issues started popping up right around the time when night time temperatures were plunging below freezing at night. Aside from the obvious frost damage near the edges of houses, damage was also being caused by the heaters brought in to protect the plants.

Supplemental heaters running on propane, oil, gas, or kerosene almost always vent directly into the greenhouse or high tunnel. If the heaters aren't burning clean (completely burning the fuel), harmful products such as carbon monoxide, ethylene, and sulfur dioxide may be released into the house. Kerosene and fuel oil heaters are commonly considered to be the dirtiest options, but propane and natural gas heaters with dirty filters or operating in low-oxygen environments may also emit high levels of damaging gasses.

Tomatoes are the most sensitive vegetable crop to ethylene in particular, with damage appearing as yellowing and drooping of plants, even when they have enough water. Older plants may drop flowers or fruit as

well, though this has not been an issue with the young plants we have seen. Susceptible plants like tomatoes may be affected by as little as 1 part per million ethylene gas.

Fuels high in sulfur may release sulfur dioxide, which will cause the leaves of a wide variety of plants to curl or cup and may leave spots or browning on the leaves.

The best way to avoid these problems is to vent your heaters to the outside. This is tough to do with temporary space heaters, but if there is the option to hook them up to exhaust systems, we would recommend it. Some people try to conserve heat by venting into the greenhouse, but the savings in energy aren't worth the possible side effects. If you can't vent exhaust to the outside, try to select cleaner burning fuels such as propane, and make sure the filters on your heater are clean. Also make sure there is a way for oxygen to enter the greenhouse so that the heater doesn't burn up all the oxygen in the greenhouse. Finally, send someone with a good sense of smell out to the greenhouse as often as possible. If you can smell the heater, the levels of damaging gasses are probably too high. -CLS



## Propane4Farms Frequently Asked Questions

Last week this section of the article on propane was inadvertently left out of the Weekly Update. These Frequently Asked Questions may help you make a decision about whether the program is right for you.

- **How It Works** By combining the purchasing power of all of our members we have negotiated the most competitive purchase agreement available. This exclusive agreement with Ferrellgas will provide you with cost savings.
- **Is pricing different for customers that own their tanks vs. those customers that use Ferrellgas' tanks?** Pricing has been set at 35 cents over the cost of propane for all members. For those customers that own their tank(s), Ferrellgas will complete a complimentary system safety check prior to filling tank. If you decide to use Ferrellgas tanks, there is no charge for installation (which includes up to 15' of copper line, if needed, and a system safety check). No tank rentals for members of our group.
- **Is there a contract to be signed?** There is no contract to be signed. Once you complete our application, there is a code placed on your account, which identifies you as a Propane4Farms member. Each time you order propane, your pricing is set at 35 cents over the cost of propane.
- **How do I order gas & who do I call in case of an emergency?** To place an order, or for service please call Ferrellgas @ 800-437-4856. You may set up your account on automatic delivery (ie delivery once a month) or call when you need a delivery (please call 5 days in advance of when delivery is needed.) If you are drying crops, please let Ferrellgas know how frequently you would like deliveries made during drying season.
- **To whom do I make payment?** Please send payments to Ferrellgas @ 5859 Rt 31, Verona NY 13478. Ferrellgas offers 2 payment options; 30 day terms (if credit qualified) or Pay in Advance for Delivery.
- **Once the application is completed, how does the process work?** Once Propane4Farms receives your application, you will be contacted by Ferrellgas to schedule a system check or installation. Please allow 2 - 3 weeks for the scheduling of system check or installation.

### Worker Protection Standard Checklist

By Maire Ullrich, Printed in Muck and Mineral, April 2012

Be prepared for inspections this season by reviewing WPS requirements now:

#### Information at a Central Location

Is the following information displayed where it is easily accessible and can be easily seen and read by workers before a pesticide is applied?

- ◆ Pesticide-specific application information
- ◆ Emergency medical information
- ◆ Pesticide safety poster

#### Does the pesticide application information include the following?

- ◆ Location of treated area
- ◆ Product name
- ◆ EPA registration number
- ◆ Active ingredient(s)
- ◆ Time and date pesticide is to be applied
- ◆ Restricted-entry interval (REI)

Is the pesticide application information displayed until at least 30 days have passed since the pesticide was ap-

plied or REI has been in effect?

#### Training for Workers

Have workers received complete WPS training prior to the sixth day of their entering any treated areas and every five years thereafter?

- ◆ Are EPA-developed or equivalent training materials used in training?
- ◆ Is safety information presented in a manner that workers can understand?
- ◆ Can you document that workers were trained?

#### Decontamination Supplies

Is there at least 1 gallon of water available for each worker for routine washing and emergency washing of the entire body?

- ◆ Are there enough single-use towels and soap available?
- ◆ Are decontamination sites within ¼ mile of the work site?
- ◆ Are decontamination sites provided for 30 days following the end of the REI (7 days with REIs of 4 hours or

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less)?

### Field Location, REI & Postings

Have you provided treated site location and entry restriction information to hired commercial pesticide applicators when required?

- ◆ Are workers kept out of treated areas during the REI?
- ◆ Are workers who do early-entry tasks provided with personal protective equipment and training?
- ◆ Are workers given oral and/or posted warnings according to label requirements?

### Are oral warnings

- ◆ Given in a manner that workers can understand?
- ◆ Given that include the location of the treated area, the time during which entry is restricted, and instruction not to enter during the REI?

### Are warning signs:

- ◆ Posted at all usual entry points to treated areas?
- ◆ Posted not more than 24 hours prior to treatment and removed within 3 days following the end of the REI?

### Emergency Actions

Is emergency transportation promptly available?

Is the following information promptly available to medical personnel upon request?

- ◆ Product label information
- ◆ Description of how the pesticide was being used
- ◆ Circumstances of worker's exposure to pesticide

This checklist is not all-inclusive. Please review your WPS handbook if you have questions (<http://www.epa.gov/pesticides/health/worker.htm>). It is mainly for field workers on produce farms. Other types of farms may have additional requirements.

## Berry Update

### Frost Damage and Some of the Implications

Last weekend was the worst case scenario for berry growers. With bud development accelerated 2-3 weeks ahead of normal, berry growers in many areas fought temperatures in the low 20's. Many growers irrigated for frost protection, most growers also used row cover and some combined the two for the best possible effect. There are many different tricks to combating frost, and many of them were presented in weeks prior to this situation, but because each frost/freeze event is so different it is very hard to prepare.

I have been seeing damage in strawberries for the past several weeks. Some of the damage occurred while buds were still in the crown. Some growers feel that the plants early activity in March, despite not seeing emerged buds, still left the plant open to more significant damage even at temperatures that normally would not have resulted in loss. The other probable cause is that after that very warm spell, farmers, like plants, were lulled into thinking we were further along in the season than we really were. Normal temperature dips seemed to catch them unaware, and that is when a lot of the damage has occurred.

Below are a few photos of frost and freeze damage to strawberries, from left on the newly expanded leaves – sometimes you might see just tip or edge browning and curling, but in this photo, large portions of the leaf are injured. Then in the center are the common black centers that indicate bud death, and on the right are less well known frost injury that probably occurred to the green developing berry. This is commonly confused with insect injury.



Photo on left, courtesy of N. Nourse and photo on right courtesy of OMAFRA  
<http://www.omafra.gov.on.ca/english/crops/hort/berry.html>



Frost damage, continued from page 4....Below are two photos of a local berry growers' blueberry planting. This farm lacks the high risers necessary for irrigation, so in preparation for the weekend freeze, they used row cover. To help the dry ground give off as much of the retained heat as possible, they thoroughly watered the ground before covering. Ideally one would cover during the mid-day trying to trap as much heat as possible, but due to the windy conditions this was not possible. Still, the

few degrees protection the cover provided may be all that was needed.



Despite best efforts, I still anticipate loss for most blueberry plantings to be somewhere around 20, for strawberries it's much more location dependent. This is again a rough estimate after visiting several farms throughout the region.

Growers may wonder how to determine the % loss on their crop. If you lose king blossom on strawberries and 1st blossoms on blueberries you could lose a relatively high percentage of overall weight yield because those berries are always the largest. If these buds were lost early, say while buds were still in the crown, there is a decent chance that the plant will have time to compensate, shunting energy reserves to those 2<sup>o</sup> and 3<sup>o</sup> blossoms. But, when frost injury happens to open flowers, as is often the case, this leaves less time for the remaining flowers to get larger in response to that injury. This is the reverse of clipper damage which has been shown to happen early enough that 2<sup>o</sup> and 3<sup>o</sup> berries can compensate. Blueberries experience plant compensation from pruning, but this again may not be true for frost damage just because of the length of time needed to allow for the plant to recalibrate.

Some growers may have even seen emerging primo-cane raspberry shoots frosted off. Those canes will resprout from the crown, but they will be so much later and cane density will be much less. Yields will definitely be impacted and if this situation exists for you, consider covering the rows with row cover to try to speed regrowth.

Botrytis flower blight and fruit rot caused by the *Botrytis cinerea* is likely to be a problem this year. Strawberry and blueberry plantings that experienced freeze and/or frost injury like we did last weekend, and then having several days of cooler, wet weather leaves us open to a lot of disease pressure. The fungus infects blueberries through damaged flowers, and may kill the entire fruiting twig. This fungus is well known for fruit infection in strawberries at harvest, the same can happen to blueberries.



Photos courtesy of NC State University: <http://ncblueberryjournal.blogspot.com/>. Notice the water soaked blossoms on the near left which are susceptible to infection and, if you look closely you can see the sporulating fungus on the damaged buds on the far left.

For blueberries, growers that have had problems with Botrytis, or if the weather suggests, like this year, usually begin spraying at green tip. Many conventional fungicides are labeled for this disease including Captan, Switch, Elevate, Pristine and Ziram. Organic products include Serenade MAX and Actinovate.

In strawberries, most growers begin spraying every season at early bloom with many of the same materials as listed above. There are even more fungicides to choose from and as the spray is repeated on a 7-10 day schedule depending upon the weather it's good to rotate fungicides. There are a few more organic products labeled including JMS Stylet Oil and Oxidate, but Serenade MAX is not labeled for botrytis control on Strawberries.

For information on control of Botrytis, please refer to the Berry Crop Guidelines, <http://ipmguidelines.org/BerryCrops/>.  
-LGM

### Upcoming meetings and notices

**Friday, May 18: Recipe to Market workshop- 9:30 am. to 3:30 pm at Proudfit Hall on Route 22 in Salem, NY.** For more information about the workshops and the Battenkill Kitchen, Inc. visit [www.battenkillkitchen.org](http://www.battenkillkitchen.org) or call Trish Kozal at 518-854-3032 or Steve Hadcock, Cornell University Cooperative Extension at 518-380-1497.

**Saturday, May 19: Good Manufacturing Practices for the Production of Acidified (Pickled) Foods- 8:30 am to 4:00 pm at the Battenkill Kitchen, Inc., 58 East Broadway, Salem, NY.**

For more information about the workshops and the Battenkill Kitchen, Inc. visit [www.battenkillkitchen.org](http://www.battenkillkitchen.org) or call Trish Kozal at 518-854-3032 or Steve Hadcock, Cornell University Cooperative Extension at 518-380-1497.

Weekly and Seasonal Weather Information						
Site	Growing Degree Information Base 50 <sup>o</sup> F			Rainfall Accumulations		
	Weekly Total 4/18—4/24/12	Season Total 3/1 - 4/24/2012	2011 Total 3/1—4/24/2011	2012 Weekly Rainfall 4/18—4/24/12 (inches)	2012 Season Rainfall 3/1—4/24 (inches)	2011 Total Rainfall 3/1—4/24 (inches)
Albany	1.0	173.1	99.0	0.39	4.57	8.83
Bennington, VT	0	136.4	83.5	0.82	4.35	6.20
Clifton Park	0	164.0	82	0.58	6.08	6.86
Glens Falls	0	105.2	69	0.38	5.69	8.08
Guilderland	0	145.0	66	0.62	4.21	9.61
Granville	1.8	126.4	90.5	NA	5.56	3.57
Hudson	5.0	222.0	98.5	0.10	4.54	10.07

Cornell Cooperative Extension and the staff assume no liability for the effectiveness of results of any chemicals for pesticide use No endorsement of any products is made or implied. Every effort has been made to provide correct, complete, and current pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly and human errors are still possible. These recommendations are not substitutes for pesticide labeling. Please read the label before applying any pesticide. Where trade names are used, no discrimination is intended and no endorsement is implied by Cornell Cooperative Extension.

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