

# **The Vegetable & Small Fruit Gazette**

**April 2006**

**Volume 10, No. 4**

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## Schedule for Articles

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## Quote for Thought

It's better to remain silent and let people think you are dumb, than to open your mouth and remove all doubt.

- Mark Twain

## Strawberry Frost Protection by Sprinkling

[George Perry](#), Horticulture Extension Agent, Schuylkill County

It is important to refrain from starting the sprinkler system until absolutely necessary. Soils may become water logged before the frost season is over since each 0.1 acre inch of water represents 2,715 gallons. The critical temperature for blossom and fruit loss is suspected to be about 4°F. Below 32°F, it is suggested that sprinkling can be withheld until temperatures in the canopy drops to 30°F. Cutting the decision this close, however, demands good temperature data taken from an adequate number of thermometers exposed properly, and using nozzles which will rotate in below freezing temperatures. Once the system is started, it is disastrous to stop until melting can be assured. There is incentive to turn off the water as soon as possible, unless soil drainage is good. It may be turned off when the ice is melting and continues to melt after the water has been turned off. Damage from heavy ice accumulations normally is minimal on strawberries because they generally support themselves from the ground through pillars of ice.

Sprinkler heads on the irrigation system should be changed to apply the minimum amount of water but sufficient water to give frost protection. How much water is needed for protection? This answer remains poorly defined even though it is possible to estimate the amount of water needed for given wind, temperature and humidity conditions. It is the coverage of the particular blossom or fruit that must be maintained at a minimum level. Lack of uniformity of coverage creates problems. If uniformity is poor to start with it can become progressively worse with increasing wind drift. One factor in coverage is rotation rate, a compromise between distance and frequency of wetting. In general, the rotation rate of the sprinkler head should be no less than 1 rpm. A second factor in coverage relates to the uniform distribution of water around the sprinkler. Uniformity at the top of the plant canopy may be improved by increasing the overlap of the patterns. Strawberries have a shallow canopy depth which means that fairly good distribution will be maintained throughout the depth of the canopy.

What makes this system work? When a blossom or fruit that is coated with liquid water begins to drop below 32°F., the freezing point of water, the water film begins to freeze liberating heat fusion. Sufficient heat is released to maintain 32°F temperature at the interface between the water and the newly forming ice, even though the air temperature in the vicinity continues to fall. One can count on the temperature on the interface between the water and the ice (water vapor being involved also, so that the so called triple point of water is achieved) being 32°F. The secret is to supply water at least as rapidly as it is being frozen to ice.

Freezing is not the only energy transferring process that may take place when ice and liquid water are exposed to unsaturated air. Evaporation, and energy consuming process, also occurs. When equal amounts of water are evaporated as are frozen, 7½ times as much energy is consumed as is liberated. In other words, if as little as 1/7 of the water evaporates as freezes to ice, the process results in cooling and ceases to be a protection method. Water is the only variable the grower is able to control. Increasing the rate of application while radiation, conductivity, and evaporation remain nearly unchanged will result in increased protection.

It is apparent that for sprinkling to be effective, a **layer of liquid water must be maintained on the surface of the plant or on the surface of the ice layer** which has formed on the plant. The amount

of evaporation is controlled by air dryness and wind speed at the plant level. Fortunately, both decrease with decreasing height. Sprinkled low growing crops show less tendency to be harmed by evaporative cooling than taller growing crops.

Table 1. Precipitation rate in **inches per hour** necessary for frost protection.

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Air temperature at crop canopy	Wind speed in <b>miles per hour</b> (measured at crop height)					
	0-1	2-4	5-8	10-14	18-22	30
27°F	0.10	0.10	0.1	0.1	0.2	0.3
26	0.10	0.10	0.14	0.2	0.4	0.6
24	0.10	0.16	0.3	0.4	0.8	1.6
22	0.12	0.24	0.5	0.6	1.2	
20	0.16	0.3	0.6	0.8		
18	0.2	0.4	0.7	1.0		

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Adapted from Gerber and Martsolf (1965)

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## Chickweed Control in Strawberry

[Timothy Elkner](#), Extension Educator, Lancaster and [Kathy Demchak](#), Department of Horticulture

I've often received calls in early spring from growers that have an infestation of chickweed in their strawberry fields. Unfortunately, there are no herbicides that growers can apply to control this weed at this time so hand weeding is the only control option. How can you keep from getting into this situation in the future?

First, let's discuss the biology of chickweed. There are two types of chickweed – common and mouse-ear. The main type found in our fields is common chickweed. It is a winter annual which means that seeds germinate in the late summer or fall, overwinter as small plants and then start to grow the following spring. Chickweed does not grow in hot weather so it will flower, set seed and die by early summer. However, chickweed seeds also have the ability to germinate through the spring and early summer if weather conditions are right.

Good control of chickweed is dependent upon timely herbicide applications. There are no satisfactory post-emergent herbicides for this weed (2, 4-D will not work!) so seed germination must be prevented using pre-emergent herbicides. There are three materials labeled for use in strawberries – Dacthal, Devrinol and Sinbar.

Dacthal is the easiest to use since it does not need to be watered in and can be applied up to first bloom in the spring. Unfortunately, it is fairly expensive to use and has a short residual.

Devrinol and Sinbar are the two materials that should be the basis of your chickweed control program. Devrinol is an effective material with a good residual but it must be watered in with ½" to 1" of rain or irrigation. There is a limit of 4 lbs active ingredient(ai)/Acre(A)/year and Devrinol can be used up to pre-bloom. Sinbar, besides pre-emergent activity, will also kill newly emerged plants. Like Devrinol, it must also be watered in and growing strawberries can easily be injured by this herbicide so it must be washed off foliage immediately after application to growing plants. Sinbar has a 110 day preharvest interval and there is a limit of 8oz/A/year of actual product.

The following is a suggested chickweed control program for an established strawberry planting:

- Late August/early September: Devrinol (2 lb ai/A) watered in. Note – delay this application (if necessary) until sufficient daughter plants have rooted.
- November (just prior to mulching): Devrinol (2 lb ai/A) + Sinbar (4 oz/A of product).

The following is a suggested chickweed control program for a new strawberry planting (1<sup>st</sup> year):

- Late August/early September: Sinbar (2 oz/A of product) and water in to wash off foliage. Note: Sinbar application at this timing only occurs in the first year of planting.
- November (just prior to mulching): Devrinol (2 lb ai/A) + Sinbar (4 oz/A of product).

A comprehensive weed control program integrates many strategies including preplant and postplant options. For a complete year-by-year management example for various weeds, see page 74 of *The Mid-Atlantic Berry Guide for Commercial Growers*.

Chickweed can be a troublesome weed in your strawberry planting. However, proper herbicide selection and timely applications will control this weed in your planting.

## **Onion Newsletter for 2006**

[Mike Orzolek](#), Department of Horticulture

Starting in April 2006, I will be publishing an Onion Production newsletter for growers in Pennsylvania. The first newsletter will be ready for distribution in April and other issues will be published in May, July and September. If you would like to receive the newsletter as hard copy or electronically, please mail me or [e-mail](#) me your name, address, how many acres and type of onion you are growing and whether you would like to receive the newsletter as a hard copy issue or electronically. I would also like to ask that if you have any articles that would be of interest to onion growers in PA in future issues please send them to me by mail or e-mail to me directly.

If you have any questions, comments or articles related to the 2006 Onion Newsletter, please contact me at 203 Tyson Bldg., The Pennsylvania State University, University Park, PA 16802 or phone at 814/863-2251, or e-mail at [mdo1@psu.edu](mailto:mdo1@psu.edu) Thanks.

## **2006 Pennsylvania Vegetable and Small Fruit Field Day**

[Mike Orzolek](#), Department of Horticulture

The 2006 Pennsylvania Vegetable and Small Fruit Field Day is scheduled for July 19, 2006. It will be held at the Russell E. Larson Research Center, Horticulture Research Farm, Rock Springs, PA located 11 miles west of State College on PA Route 45. The field day will start with registration at 8:00 am and end about 5:00 pm. The tentative program is:

- 8:00 am Registration and Refreshments
- 9:15 am Machinery and Field Demonstrations
- 12:15 pm Lunch
- 1:30 pm Tours of Field Plots
- 5:00 pm Adjourn

Refreshments will be served in the morning and afternoon at the registration area and lunch will be served at the Ag Progress Day site. There will also be a tour of the Center for Plasticulture's High Tunnel Research and Educational Facility.

During equipment demonstrations, those attending the field day will be given the opportunity to ask questions of those representatives that are demonstrating equipment. Of course, the demonstrations are subject to cancellation if the weather is not suitable.

We look forward to your participation in our field day this year at Rock Springs. If you have any questions about the 2006 Vegetable and Small Fruit Field Day, please contact me at 203 Tyson Bldg., The Pennsylvania State University, University Park, PA 16802 or phone at 814/863-2251, or e-mail at [mdo1@psu.edu](mailto:mdo1@psu.edu) Thanks.

## **Indar Section 18 Approval for Mummy Berry in PA for 2006**

[Kathy Demchak](#), Department of Horticulture

The U.S. EPA granted an emergency exemption for the use of Indar 75 WSP (fenbuconazole) to control mummy berry disease in blueberries in Pennsylvania for 2006. The provisions are essentially identical to those in effect for 2005 except that the dates have changed. This exemption is in effect starting April 1, 2006. Fungicide applications should be made starting at early green tip and continuing at 10-14 day intervals through bloom to control the disease effectively. Once flowers have been pollinated no further infection can take place. Indar 75 WSP may be applied by ground at a maximum rate of 2 ounces of product per acre per application, with a maximum of 5 applications permitted, so a maximum of 10 ounces of product can be applied this year. The PHI is 30 days. No adjuvants should be used.

Dow AgroSciences, LLC is the registrant; however, existing stocks of Indar 75 WSP purchased previously from Rohm and Haas may be used. All applicable conditions and restrictions as appearing on the full federally-registered product label must be observed. Applications may not be made within 75 feet of streams, rivers, ponds, lakes or reservoirs. This exemption expires September 1, 2006.

Labels and copies of the letter granting this exemption will be distributed to county Extension offices shortly. This Section 18 label is also expected to be available on the Dow AgroSciences Web site.

## **Slight Change to Stinger Label for Strawberries**

[Kathy Demchak](#), Department of Horticulture

In the past, as part of PA's Special Local Needs Label for Stinger on strawberries, a Waiver of Liability statement had been included that was supposed to be filled out and mailed in to Dow AgroSciences. This Waiver of Liability statement has been removed, and instead, a section on special conditions and risks of use has been added to the label. This doesn't change the use patterns, but does remove the requirement to sign the waiver, and gives the labeling a different look. This is for those of you who wonder where the waiver went. (Say **that** 5 times real fast!)

## **Recycling and Recovery of Energy Stored in Used Plastics**

[William J. Lamont](#), Department of Horticulture, and [James W. Garthe](#), P.E., Agricultural Engineer and Instructor, Department of Agricultural and Biological Engineering

At Penn State University there is a team dedicated to solving one of the world's major environmental problems – what to do with the increasing volumes of plastic waste generated by the world population. Although our efforts have been focused on agricultural plastics, we also view the large consumer plastic waste stream as a potential fuel source. This team has been working on this project since 1995 and is on the verge of making a major contribution to solving this problem. A little background on recycling is in order.

In the March 18, 2005 issue of the Centre Daily Times was an article “You Ought to Know About Recycling”. In the article the author stated “recycling is now an international commodities industry driven by market demand and labor costs.” The author stated “Often programs don't take materials that are available in large enough numbers to make reusing them profitable”. The plastic code is typically identified as triangle of chasing arrows surrounding a number depicting the plastic resin type, such as #1, polyethylene terephthalate or PET, used for making soda and water bottles. The best market for recyclables is the #1 and #2. The demand for these products is insatiable at this point. The bottle caps used on these products are not recycled but removed and enter the trash stream. These are a valuable source of fuel for us.

Although there is strong demand for recycling PET, a soda bottle can be recycled into, for instance, carpet which unfortunately cannot be recycled. The article mentioned garden garbage generated when you buy plants for the garden. But you ask "What does it come in?" The answer is that it comes in a plastic pot or plastic six-pack, and if you buy enough, it also includes a plastic tray or flat to hold the six-packs. You can reuse the pots yourself, of course, and sometimes garden clubs or conservatories need them for plant sales, but most recycling programs do not accept them.

So what are we doing to help solve this problem? We're recovering valuable energy from waste plastic items used in agriculture. Dirty, used or non-recycled plastics can be converted to energy to heat high tunnels, greenhouses, other agricultural structures, commercial buildings, light industrial facilities, or other buildings requiring an environmentally clean, yet safe, fuel. Two fuel-saving technologies are currently being brought to commercial reality.

### **The First Technology: Plastofuel**

A simple process was invented at Penn State University in 1995 to densify waste plastics into a fuel nugget, called Plastofuel. The process, developed in the Department of Agricultural and Biological Engineering, aims to reduce waste plastic buildup on farms around the world. It works by forcing film plastic items, rigid plastic items, or both, through a heated die, thus melting a thin jacket that encapsulates the pieces of plastic and dirt within the extruded material exiting the die. A hot knife cuts the extrudate into dense fuel nuggets that can be easily conveyed, stored and shipped.

The nuggets were originally designed to be co-fired 5-10 percent with coal in existing boilers, allowing the high temperature of coal (around 2000°F or 1100°C) to sustain clean combustion, free of noxious smoke. The end-use is for agricultural boilers or small community boilers designed to burn coal. Plastofuel can be made either on the farm or in small industrial settings, thereby

consuming the energy close to the source. The benefit of the system is that it converts an annoying waste into a valuable fuel, with a minimum of energy expended in the process. Non-recycled consumer plastic food and beverage containers can also be used in the process. Many of the plastics not currently recycled can be used a raw material for the Plastofuel.

At the time of this writing in 2006, the Penn State team is scaling-up the prototype Plastofuel process to a machine that will produce 500 lbs/hr (227 kg/hr) through a grant from the Pennsylvania Department of Agriculture. It will be powered by electricity and a hydraulic power unit, all mounted in a trailer to provide mobility. From an energy perspective, calculations reveal that less than one percent of the heat energy contained in the nugget (when combusted) will be used in the process to form the nugget. This system is being instrumented to measure actual energy expenditures, which will better define the economics of the process compared with competing fuels. This pilot-scale system will also provide Plastofuel in quantity for farm-scale tests and demonstrations.

### **The Second Technology: Korean High Temperature Combustion**

Although blending used plastic with coal continues to be an important way to recover energy from non-recyclable plastic, a new Korean technology is being commercialized. Manufactured by GR Technologies Company, Ltd., this hot water boiler heating system burns pea-sized pellets made from waste mulch film plastic. The system preheats a series of combustion chambers to 1650-2000°F (900-1100°C) for 10-15 minutes using fuel oil or kerosene, then automatically switches to the plastic pellets. Field-testing of a 396, 850 Btu/hr (100,000 kcal/hr) unit for heating high tunnels began at the Penn State Horticulture Research Farm in 2004. Eventually, the pellet-fueled unit will be modified to burn the larger and more energy efficient Plastofuel nuggets.

### **Specifications of the Korean Combustion Unit**

**Preheat fuel:** 2.0 gal (7.6 liters) kerosene or fuel oil for 15 minutes

**Fuel:** For 20 seconds after preheat, burner dual-fuels with kerosene and plastic, then plastic thereafter indefinitely

**Pellet types:** Burns polyethylene (#2, #4) or polypropylene (#5). Note: Polystyrene (#6) & ABS pellets require a 50% barrel length increase, currently not available.

**Plastic fuel feed rate range:** 20 - 33 lb/hr (9-15 kg/hr)

**Dioxin (PCDD/F) emissions:** 0.119 ng-TEQ/sm<sup>3</sup> @ 12% O<sub>2</sub> as confirmed by Korea Testing Laboratory (Note: US EPA allows 5.0 ng-TEQ/sm<sup>3</sup>)

**Boiler type:** Circulating hot water

**Rated capacity:** 396,850 Btu/hr (100,000 kcal/hr) on 19.8 lb/hr (9 kg/hr) with 20,686 Btu/lb (11,500 kcal/kg) plastic fuel pellets

**Thermal efficiency:** 75%. At 150°F water, thermal efficiency goes to 89%

**Combustion chamber operating temperature:** 1652-2012°F (900-1100°C)

**Boiler cut-in temperature:** 140°F (60°C)

**Boiler cut-out temperature:** 176°F (80°C)

**Boiler heating cycle:** 5 hrs comprised of 2 hrs burning & 3 hrs circulating

**Boiler heating rate:** 1 ton water requires 45 minutes heating time (entire heating system will hold 3 tons of water with 2 hours heating time)

**Power needs:** 4 kW@ 110 vac with 208 vac for vacuum fuel supply

**Future boiler sized for Plastofuel:** 7,937,000 Btu / hr (2,000,000 kcal / hr)

### **Air emissions**

Stack testing conforming to U.S. Environmental Protection Agency (EPA) standards were conducted by an independent U.S. testing company in May 2005 that was funded by a grant from the American Plastics Council. The tests compared LDPE (#4) Korean pellets with granulated HDPE (#2) barrels, which had been discarded by a local firm. Three main groups of pollutants were analyzed:

- Gases (sulfur dioxide, oxides of nitrogen, carbon monoxide, carbon dioxide)
- Particulate matter
- Dioxins/furans

Test results proved that this is an extremely clean burning system in all three groups. The Pennsylvania Department of Environmental Protection (DEP) has reviewed the results, noting that combustion units with a heat input rating of 2.5 million Btu / hr or less are exempt from the *plan approval* and *operating permit* requirements. This means the burner and associated boiler can be marketed in the Commonwealth of Pennsylvania now and without restraint. However, sites will still have to comply with the DEP *opacity* regulation, Section 123.41. According to the DEP standard, opacity, or visible air contaminants, cannot be equal or greater than 20 percent for a period or periods aggregating more than 3 minutes in any 1 hour, or greater than 60 percent at any time. For this extremely clean burning system, the opacity regulation testing will most likely not be an issue, hopefully merely a formality.

Please contact us if you are interested in supporting this program or being a part of the program. Bill Lamont, [wlamont@psu.edu](mailto:wlamont@psu.edu) or James Garthe, [jwg10@engr.psu.edu](mailto:jwg10@engr.psu.edu)

## The Organic Way – National Organic Standards Board to Meet in State College

[Elsa Sánchez](#), Department of Horticulture

The next meeting of the National Organic Standards Board (NOSB) will be held at the Ramada Conference Center in State College, PA on April 18 -20, 2006. This is the first time a NOSB meeting will take place outside of Washington, DC. It is an excellent opportunity to attend and provide input on the NOSB recommendations. Current recommendations can be viewed at [www.ams.usda.gov/nosb/NOSBrecommendations/NOSBrecommendations.html](http://www.ams.usda.gov/nosb/NOSBrecommendations/NOSBrecommendations.html). The meeting agenda is below and all parts are open to the public. If you cannot attend the meeting, you can send your comments by April 10<sup>th</sup> to the NOSB by mail, e-mail or fax:

**Mail:** National Organic Standards Board; c/o Katherine Benham; Room 4008 - South Building; 1400 and Independence Avenue, SW; Washington, D.C. 20250-0001.

**E-mail:** [Katherine.Benham@usda.gov](mailto:Katherine.Benham@usda.gov).

**Fax:** (202) 205-7808.

### Agenda

For more information visit [www.ams.usda.gov/nosb](http://www.ams.usda.gov/nosb)

April 18, 2006

9	am	Orientation for new NOSB members
12	pm	Lunch
1 – 5	pm	Organic Dairy Pasture Symposium

April 19, 2006

8	am	Organic Dairy Pasture Symposium (continued)
12	pm	Lunch
1	pm	NOSB Business Meeting – Call to order
1:20	pm	Welcome to incoming NOSB members and appreciation awards to outgoing NOSB members
1:45	pm	National Organic Program report
2	pm	Public comment session on NOSB agenda items
3	pm	Break
3:15	pm	Public comment session (continued)
4:15	pm	Presentation of Aquaculture working group report
4:30	pm	NOSB discussion and vote on acceptance of report
4:45	pm	Presentation on status of Pet Food Task Force
4:55	pm	NOSB discussion and Q & A
5	pm	Recess

April 20, 2006

8	am	NOSB presentations and discussion on deferred sunset materials and action items
10:45	am	Break
11	am	Public comment session on NOSB action items
1	pm	Lunch
2:30	pm	Presentation and consideration of committee action items
3:45	pm	Presentation of committee workplans
4:45	pm	Closing remarks
5	pm	Adjourn

## Upcoming Meetings

If you have a meeting you would like to announce, please send the meeting title, date, location and contact information to [esanchez@psu.edu](mailto:esanchez@psu.edu).

### Local

#### Regional

April 4, 2006. Pennsylvania Certified Organic (PCO) Spring Meeting and Workshop, Lititz, PA. For more information contact PCO at 406 S. Pennsylvania Ave, Centre Hall, PA 16826 or by phone at (814) 364-4431 or email at [pco@paorganic.org](mailto:pco@paorganic.org).

July 19, 2006. 2006 Vegetable and Small Fruit Field Day, Rock Springs, PA. For more information contact Mike Orzolek at 203 Tyson Bldg, The Pennsylvania State University, University Park, PA 16802 or by phone at (814) 863-2251 or e-mail at [mdo1@psu.edu](mailto:mdo1@psu.edu).

#### National

April 18 – 20, 2006. National Organic Standards Board meeting. The meeting will take place at the Ramada Conference Center, 1450 S. Atherton St in State College, PA. For more information visit <http://www.ams.usda.gov/nosb/meetings/meetings.html>.

#### International

To join our distribution list, send an e-mail to: [Gazette-L-subscribe-request@lists.psu.edu](mailto:Gazette-L-subscribe-request@lists.psu.edu). No subject or message text is required. The system picks up the name and address from the e-mail headers. To delete yourself from the list send an e-mail to: [Gazette-L-unsubscribe-request@lists.psu.edu](mailto:Gazette-L-unsubscribe-request@lists.psu.edu). Again, no subject or message text is required.

The newsletter is also posted within three days on the Department of Horticulture Vegetable program website at: <http://hortweb.cas.psu.edu/extension/veg crops/newsletterlist.html>.

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