

# **The Vegetable & Small Fruit Gazette**

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## Schedule for Articles

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## Quote for Thought from **Pete Ferretti**

*He who lives in a glass house should change clothes in the basement.*

*~The Lion, May 2007*

## **Need Pesticide Credits? Check the New PaPlants Web Site**

[Emelie Swackhamer](#), Extension Educator, Horticulture, Penn State Cooperative Extension

The Pennsylvania Department of Agriculture (PDA) has recently updated their computer systems for keeping track of your pesticide credits, along with a lot of other information about the Bureau of Plant Industry in the state. The new system should provide a lot of features that will help improve the way people can access information, but at the moment it is a work in progress and we are all trying to get used to using it. This new Web site replaces the system that was housed within the Penn State Department of Pesticide Education. If you try to access your information on the old site, you will be directed to the new site.

Go to <http://www.paplants.state.pa.us> to view the homepage. On the left hand side of the screen, you will find several selections in a gray box. Click "Pesticide Programs" to find out where and when recertification courses are being offered, to find out where certification exams are offered, to apply for credits for a course you are offering, or to check your credit information. Most of these features include search features, so you can quickly find local information, relevant to your needs.

There has been a lot of interest at Penn State and PDA in developing online courses for people to get their pesticide update credits. Did you know there are already 49 online or CD-based programs approved by PDA for recertification? Under the "Pesticide Programs" selection, "Recertification Course Locator," click the middle button that says "Online" under Search Criteria. At this point, you can narrow your search by category if you want to. PDA says you are allowed to get all your credits online, but you can only take a course once.

To access even more information about your certification, such as the specific recertification meetings you attended with the number of credits received, you must register on the PaPlants Web site. To do this, you need your PaPlants ID and PIN ID. These numbers will be included on all future correspondence you get from PDA regarding your license, so you should watch your mail for them. If you want to register now, call your regional PDA office to get your ID codes.

For a fact sheet that includes phone numbers for all the PDA regional offices, and detailed instructions of how to register on the PaPlants Web site, go to this link -- [http://www.pested.psu.edu/resources/handouts/PaPlants\\_Navigation.pdf](http://www.pested.psu.edu/resources/handouts/PaPlants_Navigation.pdf) -- or call your local county extension office to get a copy.

## **Visiting Professor from the University of Hawaii Conducting Research at PSU's High Tunnel Facility**

Bernie Kratky, a Horticulturist with The Tropical Plant and Soil Science Department at The University of Hawaii and based at The Beaumont Agricultural Research Center in Hilo, Hawaii has joined his old friends, Mike Orzolek and Bill Lamont for a 6 month sabbatical leave at The Center for Plasticulture from June through November.

There are many similarities between vegetable growing technology in The Center for Plasticulture's high tunnels and Hawaii's rainshelters. Thus, a sabbatical at Penn State University should provide learning opportunities for all parties involved.

He is conducting research in plastic tunnels at the Rock Springs Farm on simple hydroponic techniques. His main project is to improve a float-support method for growing lettuce in raceways containing non-aerated nutrient solution. No additional nutrients and water are needed after their initial application prior to transplanting. No weeding, thinning, electrical power or pumps are necessary and water use efficiency should be less than 2 gallons/head. His first crop is already growing.

A second planned project is to develop a fluid drilling method to plant very tiny (155,000 seed/oz) watercress seeds in net pots and to grow ratoon crops of watercress by a suspended pot, non-circulating hydroponic method. Watercress is a very nutritious crop which is well liked by Hawaii consumers. Currently, watercress in Hawaii is vegetatively propagated and most is grown in flooded soil beds and some upland watercress is also grown. However, yields have been decreasing in recent years and other production methods need to be developed.

Bernie's experience in Tropical Agriculture gives Penn State an opportunity to react to global warming by experimenting with tropical crops requiring longer growing seasons which the combination of global warming and plastic tunnels might provide. He is setting up sub-irrigated tanks of edible ginger, taro, papaya, Gogi berry and wax apple. This will give students and visitors exposure to these tropical crops.

In addition, Bernie plans to interact with Horticulture faculty and students, conduct library research, attend several classes and meetings and present a seminar.

Bernie is occupying Pete Ferretti's office (Tyson 222) and can be reached by email at [kratky@hawaii.edu](mailto:kratky@hawaii.edu) or [bak22@psu.edu](mailto:bak22@psu.edu).

## Small Fruit in High Tunnels at PSU – What Have We Learned?

Kathy Demchak, PSU, Horticulture

A few weeks ago, we removed the single-bay high tunnel raspberry and blackberry plants from the first tunnel that we had planted in 2000 because the plants were in decline. What finally was responsible? It appeared to be a viral problem in the end – blistered, crinkled leaves in the spring, vigor going downhill, and crumbly fruit. I didn't submit a sample for a virus test, but I was certain the plants had a virus of some sort. Apparently, the somewhat constant travels of aphids, whiteflies, thrips, bees, and other assorted insects between the raspberries in the woods nearby, and our planting finally resulted in infection. In the tunnels, we were using only biocontrols for insect management (part of a pesticide-free growing attempt), but as we always tell growers, when you're protecting a crop from viruses, the threshold for insect vectors is low, and we apparently exceeded it.

So, what did we learn from it all, besides the fact that we needed to protect the plants from insects? For primocane-bearing raspberries, the yield increase in high tunnels can be tremendous, along with almost no gray mold. If managed only for the fall crop, I'm comfortable saying that a yield increase of at least double the yields from the field can be expected. If also managed with a summer crop, 2.5 – 3 times as much yield is reasonable, though the plants are likely to shift the majority of their yield to the summer unless some significant floricanes thinning takes place in the spring. Leaving only two to three floricanes per foot works well. For blackberries, tunnels made the difference between no crop in central PA, and the equivalent of 25,000 lb per acre of marketable fruit on average. Keeping the rows far enough apart – preferably 7' to 8' at least, is important in keeping the foliage dry, and in decreasing disease incidence. We tried them closer together, and pulled that planting out in a little over a year. Some growers tell me that 7' to 8' apart is a minimum spacing and if anything, we should be recommending keeping the rows further apart than that. At this point, we're attributing the yield increases to 2 things: 1) a decrease in stress and photosynthesis shutdown from wind, and 2) adding 3-4 weeks of frost-free growing season onto each end of the season, increases frost-free growing time by 50% in central PA. The plants can do a lot with that.

We grew both raspberries and blackberries similarly to how we did in the field, and it worked pretty well. However, there are a few things I would have changed if I had it to do over again. I would have used a fertilizer balanced in nitrogen and potassium from the start, or maybe slightly higher in potassium as compared to nitrogen, instead of starting out following our usual recommendation of applying only nitrogen after initial fertilizer adjustments because the plants had a higher need for potassium compared to in the field. I think it would have helped to remove the cover from the tunnel at least once every 3-4 years over the winter. This would have helped with leaching of salts from fertilizer, and allowing the soil to freeze over the winter, which would have helped with management of some soil-dwelling insects. We were building up a nice population of ants our raspberry/blackberry tunnel, and had sowbugs and earwigs in our strawberries. The blackberries hosted quite a crop of crown borers – so many that we dug out the blackberries three years ago. This was one way to get rid of the crown borers, but the blackberries came back with a vengeance, though they didn't produce any fruit for a year. This is one instance where a tunnel that has the plastic removed for the winter, like a Haygrove tunnel, would have its advantages. We also had two-spotted spider mites, which I expected to see in high numbers. Management of two-spotted spider mites on brambles was easier than I thought it would be (it was a different story with strawberries), with only two releases of predatory mites needed during life of the planting.

As far as varieties go, from what I could see both in our high tunnels and on growers' farms, I never saw a red raspberry variety that didn't work well in a tunnel, so if you like the characteristics of a particular variety in the field, you'll probably like it in a tunnel. Berry size does increase in tunnels somewhat. It still makes sense to me to grow a cultivar that has a long harvest season, like a primocane-bearer, as long as you have a market for the fruit in the fall.

In strawberries, a plasticulture system in the tunnel worked well. We managed the plants just like we did our field plasticulture field plantings, with a couple of differences. For one, plugs could be planted later – for us, mid-September instead of mid-August. This made the frequent late availability of plug plants less of an issue. The other was that narrower beds of plastic were used (beds were 18" wide at the top), and beds were closer together than in the field (4 beds were in a 17'-wide tunnel). With strawberries, management of spider mites was more problematic than with brambles, so we planted the double rows on the plastic closer together (8" apart), and plants within each row further apart, at 18". We planted in the fall, but didn't release predatory mites until the spring after we took the row covers off. Closer scouting during the fall, and possibly any scouting during the winter, might have inspired us to release predatory mites sooner, when we still could have gotten them under control (maybe). A miticide could have been used, as long as the label didn't restrict the use from protected culture. Strawberries also were the crop where sowbugs and earwigs moved in (never saw THAT before...), but the tunnel had stayed closed over the previous winter, and had numerous other crops in it before the strawberries were planted. After trying an assortment of strawberry cultivars, 'Chandler' was still my favorite. 'Sweet Charlie' didn't work at all, blooming in January. There's a day-neutral that is expected to be released from Jim Ballington's breeding program at NC State in the next year or two, which worked well for us, and I'm looking forward to that one being on the market also. While we saw yield increases as compared to field production (1.25 lb per plant, as opposed to slightly less than 1 lb per plant in the field), they weren't as large as the yield increases we saw with brambles, but as growers point out, you never lose a crop because of rain when you're in a high tunnel. The crop also ripens about three weeks earlier than in field production, giving you the early-season advantage. For frost protection, we'd roll down the sides in late afternoon, and apply either one layer or two of a 1.25 oz/sq. yd. row cover, depending on expected lows. We used supplemental heat one year, but the row cover was a much easier option, so we never used the supplemental heat again.

So, where to from here? Folks have always asked about black raspberries in tunnels, and I always thought the harvest season was too short to make it worth growing them in a tunnel. But, we're giving them a try, comparing the performance of 'Jewel' to a primocane-bearing black raspberry from Pete Tallman, a private breeder, in Colorado. I'll let you know how it goes.

## **Penn State Advice for Protecting Bees**

UNIVERSITY PARK, Pa. - In the midst of one of the most alarming die-off of honey bees ever documented, Penn State Entomology Extension offers advice for beekeepers and growers of bee pollinated crops.

The recent die-off of more than a quarter of the country's 2.4 million bee colonies has left many beekeepers devastated and growers wondering how they will pollinate their crops this season. The affliction, called Colony Collapse Disorder (CCD), was first discovered in November 2006 after a Pennsylvania beekeeper reported that more than 50 percent of his bee colonies he was overwintering in Florida had collapsed, meaning that the tens of thousands of bees that are supposed to be in each hive had simply disappeared. "Since the beginning of the year, beekeepers from all over the country have been reporting unprecedented losses," said Maryann Frazier, apiculture extension associate in entomology at Penn State's College of Agricultural Sciences.

According to Frazier, symptoms of CCD include the sudden reduction or disappearance of the adult bee population without evidence of dead bees. "The hive will contain brood pollen and honey, with little evidence of robbing, wax moth or small hive beetle attack."

Researchers from Penn State, other universities, government agencies and other institutions formed the CCD working group to determine what factors are responsible for these unprecedented colony losses. The cause of CCD is still largely a mystery with several factors such as a compromised immune system, poor nutrition, parasites, new viral or fungal diseases and chemical contamination being investigated. Researchers have collected samples in several states and have begun doing bee autopsies, chemical, and genetic analysis and say that a definitive answer for CCD could be months away.

Until there are answers, Frazier recommends a precautionary strategy on the part of beekeepers and growers in need of pollination services to reduce bee exposure to parasites, diseases and chemicals. "Chemicals include those being used within the hive for mite and disease control as well as pesticides used on crops that may inadvertently find their way into hives," Frazier explains.

- \* Know the pesticides you are using and their toxicity to bees (do not depend on a third party to provide this information).
- \* Read the pesticide label and follow label directions.
- \* Never use a pesticide pre-bloom, just before bees are brought in to pollinate. If a pesticide must be used, select one that has a lower toxicity to bees and apply only when bees are not foraging, preferably late evening.
- \* Do not apply pesticides post-bloom until after the bees have been removed from the crop.
- \* Avoid applications on a non-blooming crop if there is a risk of drift onto blooming crops and weeds while bees are in the area. If a spray must be applied, use the least toxic materials and apply when bees are not foraging.
- \* In the pre-bloom period, avoid the use of pesticides that are long-lived in or on the plant, such as some of the systemic pesticides.
- \* Protect water sources from contamination of pesticides. Provide bees a clean source of water close to colony locations.

Frazier says growers should be prepared to cope with a potential shortage of pollination services and plan well ahead. "If growers have an existing contract or relationship with a beekeeper, they should contact that beekeeper as soon as possible to ascertain if the colonies they are counting on will be available," she advises.

For more information on honey bees and CCD, visit the Mid-Atlantic Apiculture Research and Extension Consortium Web site at [www.ento.psu.edu/MAAREC/ColonyCollapseDisorder.html](http://www.ento.psu.edu/MAAREC/ColonyCollapseDisorder.html). You may also contact Frazier at (814) 865 4621 or e-mail [mxt15@psu.edu](mailto:mxt15@psu.edu).

Established in 1963, Penn State's Department of Entomology has grown into a well-balanced department providing undergraduate education, graduate student training and extension outreach education focusing on both domestic and international issues. Twenty faculty and more than thirty graduate students work on a variety of research topics providing insights into insect ecology, behavior and molecular biology as well as integrated pest management. The department is part of Penn State's College of Agricultural Sciences. For more information about solving insect problems, descriptions of research and education programs or admission to the graduate program, visit Web site at [www.ento.psu.edu/](http://www.ento.psu.edu/) or contact the department at (814) 865-1895.

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## **NASGA 10<sup>th</sup> Annual Summer Tour**

From NASGA

NASGA's 10th Annual Summer Tour, August 14 & 15, will be based in Niagara Falls, Ontario touring Ontario farms from Niagara to Simcoe, and the Niagara Region of New York. Highlights will include a tour of Strawberry Tyme Farms in Simcoe, a nursery plant producer as well as producer of short day and day neutral strawberries. Strawberry Tyme Farm is also a large producer of raspberry and grape tomatoes grown under Haygrove tunnels. We will tour several other farms and fascinating stops, including an opportunity to see the giant wind machines at RosaFlora, in Dunnsville, Whitty Farms, Tigchelaar Farms, and the Vineland Research Station. The second day of tours will take us to the Niagara region of New York, touring Coulter Farms, Orchard Dale Farms, Brown's Berry Patch, Marjim Manor, and the beautiful Krull Park. In addition to learning from these successful businesses, you'll also enjoy network with peers aboard the buses and during evening hours.

The full, two day tour is on \$225 per person, which includes bus transportation, all tour stops, lunch/snacks/beverages for both days, Tuesday's dinner, and other amenities. As an option, you can join us on Tuesday only, for \$150 per person (which includes dinner), or Wednesday only, for \$130 per person. Registration does not include travel to or from the conference, or your hotel reservations. (Incidentally, passports are only required if you are crossing the border by airplane.)

Our headquarters hotel will be the Sheraton Fallsview, directly overlooking the Niagara Falls. Our room rates are \$149 (Canadian). Be sure you tell them you are attending the NASGA Summer Tour.

Additional information on NASGA and the tour, including registration forms and reservation info, can be found at <http://nasga.org>, or can be obtained by calling NASGA at 613-258-4587.

## **Weeds, Insects and Pumpkin Viruses**

Tim Elkner, Extension Educator, Lancaster County

Over the years I have visited many pumpkin fields in Lancaster County that have had various levels of virus infection. Viruses can cause severe crop damage if the infection occurs early in the season and I have seen some plantings that were essentially a total loss. This problem is certainly not unique to Lancaster County as I have talked with several other extension educators who report the same thing in their counties. The problem is also not limited to pumpkins – all vine crops are susceptible to viruses so what I talk about in this article can apply to growers producing cucumbers, zucchini, etc.

The symptoms of a virus infection in a pumpkin crop are rather distinct. New foliage will have a mottled appearance but older foliage will show no symptoms. By mottling I mean a mixture of light (yellow-green) and dark (normal) coloration in the leaves. In addition, viruses will cause a change in leaf shape with the new leaves being more strap-shaped, puckered, blistered, cupped, or generally just not ‘normal’. Fruit symptoms are generally not obvious on immature (green) fruit but when the pumpkins start to mature the orange coloration will be uneven with green mottling and in some cases obvious green rings on the rind. Plants infected early in the season may fail to set fruit or any fruit that does mature will be mottled and/or lumpy.

Where did the virus come from that infected the pumpkins? Only one virus is seed-borne (squash mosaic) and this disease generally does not occur here. The other major viruses – cucumber mosaic, watermelon mosaic, papaya ringspot and zucchini yellow mosaic - generally all survive in weeds in or nearby production fields. In addition, nearby vegetable crops can sometimes be host to a virus as well.

Which weeds should be eliminated on your farm to help reduce virus infection of your pumpkins? Just how good is your whole-farm weed control program? Sit down when you read this (if you are not already) because the list is extensive. Over 80 weeds common to the northeast US serve as hosts to viruses that can infect your pumpkin crop! The list includes weeds that I see on or near almost every farm such as redroot pigweed, Canada thistle, yellow rocket, shepherd’s purse, common chickweed, lambsquarter, teasel, white clover, purple deadnettle and common purslane. A very common crop plant – alfalfa – and a common roadside plant – crown vetch – also made the list.

Viruses need a living host in order to survive. You may have noted that some of the weeds listed above are annuals. However, these plants can become infected during the growing season and will then serve as a source of viruses until they are destroyed or die at the end of the season. The perennials on this list are the most troublesome of the group. They can serve as a host for the virus for a long time without dying or in many cases even showing any visible symptoms. The only way to ‘cure’ them of their virus infection is to kill them.

Realistically, I know that eliminating any possible weed-source of a virus is impossible on a farm. However, I have seen many weedy farms that could potentially reduce virus problems with a better weed control program. This includes off-season control of perennial weeds as well as in-season control of annuals (and newly establishing perennials like Canada thistle). Certainly any crop that itself can host viruses should be plowed-down or killed as soon as harvest is completed. And weeds should be controlled in fields that have had a crop harvested and are no longer producing as well. Anything you do on your farm to reduce the possible sources of virus infection will certainly help.

So how does the virus get from an infected weed or crop to your pumpkin field? I bet you already know the answer – insects. Many growers have asked me if cucumber beetles are the culprit. While these beetles are known to transmit bacterial wilt, they are only ‘possibly’ linked to the spread of cucumber mosaic virus (CMV) and not known to spread the other important viruses – zucchini yellow mosaic virus (ZYMV) and watermelon mosaic virus (WMV). Cucumber beetles are capable of severely damaging young pumpkin vines by their feeding alone and growers should scout fields and apply appropriate control methods when necessary.

So who’s to blame for virus transmission? Aphids! Aphids can damage a crop in three ways – direct feeding, secretion of honeydew, and by infecting the vines with a virus. There are two ‘types’ of aphids: the colonizing aphids such as melon aphids and the transient types that move through fields feeding on plants but never settling and forming colonies. Insecticides are effective in controlling the first type of aphid but are relatively ineffective on the second type. One problem with expecting insecticides to prevent virus infection of your pumpkin crop is the time factor for aphid control. If you sprayed an insecticide on your field this morning and an aphid lands on a vine and starts to feed this afternoon, by the time the residual chemical can kill the aphid it could have infected the vine with a virus. Virus infection can take place in less than one minute during aphid probing and/or feeding. There are no insecticides that can act fast enough to kill the insect (short of direct contact during spraying).

So how do you manage viruses in your pumpkin fields? Start by controlling weeds, especially perennials. Next – if your fields have a history of virus infection then maintain a regular aphid control program in your pumpkin crop, especially early in the growing season. While this will not guarantee you a virus-free pumpkin field, it may help slow the spread of disease in your field. Later vine infections will not affect yields as much as an early infection will. Be sure to get thorough coverage of the vines with your sprays. And whenever possible, establish pumpkins as far as possible from existing cucurbit plantings.

## **Need for Change in 2007 to the Powdery Mildew Management Program for Cantaloupe and Other Cucurbits**

Margaret Tuttle McGrath, Plant Pathology, Cornell University

Recent developments in cucurbit powdery mildew management necessitate changes to the guidelines for 2007. Research conducted in 2006 on Long Island, New York, revealed that the pathogen has become more resistant to the DMI fungicides. Powdery mildew is much more severe on resistant melon varieties this year in Georgia than in the past suggesting occurrence of a new pathogen race. A new fungicide, Quintec, has been registered for use on melons. However, EPA has denied requests for emergency exemption from registration for Quintec on other non-edible-peel cucurbit crops in NY and other states for 2007. Fungicides and resistant varieties are the only management options for this disease.

The cucurbit powdery mildew pathogen, which is known to be prone to developing resistance to fungicides, appears to have finally developed a higher level of resistance to Nova and Procure, which are DMI fungicides (FRAC Group 3). Resistance to this group is quantitative. Moderately resistant pathogen strains have been present for years. The first DMI registered for this use, Bayleton, is ineffective against these strains, which was documented in 1990. Nova (at 5 oz/A, highest label rate) and Procure (at 6 oz/A, the intermediate rate) were ineffective and moderately effective, respectively, when tested on pumpkin on Long Island in 2006, in sharp contrast with the previous year when they were among the most effective products in a similar experiment. Fungicide sensitivity testing revealed that some individuals in the pathogen population were able to tolerate a higher concentration of Nova than found in previous years, providing evidence that control failure was due to resistance. 2006 was the seventh growing season since Nova was granted Section 3 registration and the ninth year of use in NY and other states where a FIFRA Section 18 Emergency Exemption was approved in 1998 and 1999.

A new race of the cucurbit powdery mildew pathogen appears to be present in GA that is able to infect melon varieties with resistance to races 1 and 2. Melon varieties resistant to these races have provided a high level of control in the past, with symptoms often difficult to find. And there are varieties with very good (desired) horticultural characteristics. Consequently these varieties have been grown widely. They include 'Athena', 'Aphrodite', 'Goddess', 'Lil' Loupe', 'Maverick', 'Rockstar', 'Sensation', and 'Wrangler'. Races of this pathogen have only been defined on cantaloupe as the pathogen evolved to overcome genetic resistance in the host. Resistance genes have not been overcome yet in the other cucurbit crop types. Several years ago only race 1 of the pathogen was evident and varieties like 'Eclipse' with resistance to just this race performed well. Recently both race 1 and 2 have been present. It is likely but not certain that this new race will spread to NY this season. A variety trial with powdery mildew resistant melons underway on Long Island will enable this to be determined. Resistant varieties of other cucurbit crop types are not anticipated to be susceptible to this suspected new race because they do not have this same gene for resistance. Trials with resistant squash and pumpkin varieties are also underway on Long Island. Powdery mildew is also affecting watermelon in GA. This suspected new race also may be more resistant to fungicides than strains present in the past based on reports of poor control with fungicides.

Quintec (FRAC Group 13) is a valuable new fungicide for managing powdery mildew, but unfortunately it is only registered for use on melons in 2007. It has provided excellent control on upper and lower leaf surfaces in fungicide efficacy experiments. Its activity is limited to powdery mildew. There is risk of resistance developing, therefore Quintec needs to be applied tank-mixed with a protectant fungicide and alternated with other mobile fungicides with resistance risk.

Changes needed to the management program that was recommended for powdery mildew last year include frequently inspecting resistant as well as susceptible varieties of all cucurbit crop types (including watermelon) for powdery mildew, applying Procure at the highest label rate (8 oz/A), and using Quintec only on melon. The standard management program has been to select resistant varieties

when possible, to apply fungicides every 7 days (14 days with a resistant variety) beginning at the IPM action threshold (1 of 50 older leaves with symptoms) or preventively, to alternate among mobile fungicides tank-mixed with protectant fungicides, and to inspect the undersurface of leaves to assess the success of the management program. During the 2007 growing season, if there are reports of powdery mildew being more severe than it should be on resistant melon crops in other states, then a 7-day spray interval may be prudent in NY on these resistant varieties after disease onset to ensure effective control. This pathogen's demonstrated ability to overcome fungicides as well as resistant varieties documents the need for an integrated program to help slow pathogen evolution. The fungicide program recommended for 2007 is Pristine (combination of FRAC Group 7 and 11) plus a protectant fungicide applied in alternation with Procure at its highest label rate (8 oz/A) plus a protectant. It may be prudent to use Pristine at its highest label rate (18.5 oz/A) to ensure effective control in case resistance has started to develop to the Group 7 component of this product. Quintec plus protectant can be added to the program for melons for a 3-way alternation. Quintec and Procure have narrow spectrum activity. Therefore it is critical to monitor crops for other diseases. When other diseases are a concern, use broad-spectrum protectant fungicides like chlorothalonil and copper rather than sulfur or oil. Melons are sensitive to sulfur; there are tolerant varieties. Resistance to QoI fungicides (FRAC Group 11) and resistance to MBC fungicides (FRAC Group 1) were common again in 2006, therefore Flint, Cabrio, Topsin M and other fungicides in these groups are no longer recommended. A critical component of a management program is inspecting the crop to assess efficacy of the management program, and reporting to a local extension specialist poor control that cannot be due to poor timing.

Please Note: The specific directions on fungicide labels must be adhered to -- they supersede these recommendations, if there is a conflict. Any reference to commercial products, trade or brand names is for information only; no endorsement is intended.

## Steps to Effective Control of Powdery Mildew in Cucurbits

Margaret Tuttle McGrath, Plant Pathology, Cornell University

1. Select resistant varieties. Races are defined in melons.
2. Apply protectant fungicides (e.g. sulfur, chlorothalonil, oil, copper) just before fruit start to enlarge to slow initial disease development (optional).
3. Scout for initial symptoms starting when fruit begin to enlarge. Look at both surfaces of at least 50 older leaves throughout a field. Stop when symptoms found. Inspect resistant varieties as well as susceptible ones. Note that the powdery mildew fungus does not require leaf wetness for infection; hot, dry conditions are favorable.
4. Start applying mobile fungicides when symptoms found or at the beginning of fruit production when scouting not done.
5. Alternate among the following mobile fungicides tank-mixed with a protectant fungicide. Use a 7-day interval; can be extended to 14-day with resistant varieties.
  - Quintec (FRAC Group 13) for melons only
  - Procure (FRAC Group 3) at the highest label rate (8 oz/A); efficacy of lower rates affected by resistance.
  - Pristine (combination of FRAC Group 7 and 11) recommended at highest rate.
6. Check extension newsletters for updates on management guidelines. Changes will occur when the pathogen develops additional fungicide resistance or a new race able to overcome resistant varieties. This is especially a concern in 2007 following reports of poor control with fungicides and resistant melon varieties in GA.
7. Regularly inspect crops to assess control focusing on lower leaf surfaces. Promptly report poor control despite following these guidelines to local extension specialist.
8. Disk early affected crops ASAP after harvest to remove this source of inoculum for later plantings.

## **High Tunnel Tour - Ag Progress Days, Rock Springs, PA**

[Mike Orzolek](#), PSU, Horticulture

Growers are invited to tour the Penn State High Tunnel Research and Education Facility at this year's Ag Progress Days, August 14 to 16, 2007. The high tunnel tour bus leave the Ag Progress Day site at 9:30 am and 1:30 pm each day. Featured this year at the high tunnel complex will be a hydroponic system for growing lettuce in high tunnels. This work is being conducted by Dr. Bernie Kratky from the Department of Horticulture, University of Hawaii who is on sabbatical leave at Penn State for 6 months. In addition to the hydroponic lettuce, specialty crops are being featured in 2007 and include, papaya, goji berries, taro, guava, and wax apple. It appears that high tunnels enable the production in Central Pennsylvania of some very exotic vegetables and fruits.

## **Red, White and Blue Potatoes for the 4<sup>th</sup> of July**

Bill Lamont, Department of Horticulture, Penn State University

For the roadside or direct marketer having “new” or fresh potatoes for his/her customers can mean the opportunity to make some pretty good money early in the season. If the potatoes are sold in conjunction with fresh garden peas and pearl onions you have the potential for some really big bucks. With that thought in mind we have pursued the use of plasticulture (high tunnels, plastic mulches, drip irrigation and row covers) to provide early potatoes for the direct marketer. As part of the research efforts at the High Tunnel Research and Education Facility we are developing cropping schemes that include double and triple cropping in the high tunnels.

For several springs now we have been planting potatoes in one of our 17’ by 36’ high tunnels around late March/early April each year. We have chosen ‘Villetta Rose’, red-skin/white flesh that only makes B size potatoes from the Wisconsin Potato Breeding Program; ‘Eva’ - a white skin/white flesh from the Cornell Potato Breeding Program; and ‘Michigan Purple’ - a purple skin/white flesh from Michigan State Potato Breeding Program in order to have some red, white and blue skinned potatoes for the 4<sup>th</sup> of July.

Each year the ground was prepared, and fertilizer was broadcast at the rate of 1,200 lbs of 13-13-13 per acre and incorporated prior to laying four rows of black plastic mulch with drip irrigation using a small plastic mulch/drip irrigation applicator mounted on a 21 HP tractor. The drip tape was placed down the center of bed and buried 3 inches deep. The beds were spaced 44 inches apart and the top of the bed was 18 inches wide. The potatoes were hand-planted on double-rows 13 inches apart, with the potatoes spaced 8 inches apart in the row. The high tunnel was divided in thirds, so each variety had 4 rows with 30 plants per row or a total of 40 feet of row. Potatoes were irrigated as needed and in the 6 years that we have been doing this have never been sprayed with any pesticides.

The potatoes are usually dug by hand around the later part of June each year so as to be ready for the 4<sup>th</sup> of July market. On the average ‘Villetta Rose’, a replacement for ‘Red Pearl’, has yielded 120 lbs of potatoes, the ‘Eva’ yielded 100 lbs of potatoes and ‘Michigan Purple’ yielded 139 lbs of potatoes. The number of tubers with any defects is usually less than 10 tubers. ‘Villetta Rose’ yields around 375 tubers/30 plants or 12.5 tubers per plant. ‘Eva’ yields 112 tubers/30 plants or 4 tubers per plant and ‘Michigan Purple’ yields 90 tubers/30 plants or 3 tubers per plant.

The skin colors were excellent on all varieties. To take advantage of the skin colors of the potatoes and the 4<sup>th</sup> of July holiday we constructed an American flag (3’ wide by 5’ long) and took pictures of it back in the first year. These potatoes lend themselves to marketing in small baskets, in attractive displays, in poly bags, and can command a high price. If a person had a 17’ by 96’ high tunnel and grew these varieties alone in 4 rows at the same spacing the yields would be ‘Villetta Rose’-1,104 lbs. of potatoes, ‘Eva’- 920 lbs. of potatoes and ‘Michigan Purple’- 1,278 lbs. of potatoes. We have been testing the pricing of these potatoes at our student run Cellar Market and have been selling the excellent tasting ‘Villetta Rose’ for \$2.50 a quart which is around 0.7 of a lb. We have sold them all. Unless you want to make a “Spud Flag”, I would suggest that you plant the ‘Villetta Rose’ since people associate “new potatoes” with small red ones. All the varieties, ‘Villetta Rose’, ‘Eva’ and ‘Michigan Purple’ are excellent tablestock varieties and you can make mashed, smashed with the skins left on, potato salad and many other creations for the 4<sup>th</sup>. Once the potatoes are harvested then a

cucumber crop could be planted, followed by a fall broccoli crop. One could even do a late season crop of potatoes in the high tunnels. Have a great 4<sup>th</sup> of July. I bet that Thomas Jefferson used a high tunnel in order to have red, white and blue potatoes for his 4<sup>th</sup> of July gatherings...

## **Penn State Grower Field Day at Biglerville**

UNIVERSITY PARK, Pa. - Pennsylvania tree fruit and wine grape growers will learn about the latest research from Penn State University's Fruit Research and Extension Center in Biglerville, Pa. during a grower field day taking place July 12.

According to Jim Travis, center director and professor of plant pathology at Penn State's College of Agricultural Sciences, concurrent research and educational sessions will be held throughout the day. "Participants will have a choice of attending presentations on topics such as orchard establishment and maintenance, biorational and alternative methods of controlling pests, diseases and weeds as well as updates on organic apple production and vineyard establishment," Travis explains.

Participants will also tour the center's facilities and research plots. "Our focus is on alternative methods of pest control, so there will be something for everyone with an interest in integrated pest management (IPM), organic or sustainable agriculture," says Travis.

Registration is \$15 per person, and includes educational handouts, drinks during breaks, and a BBQ dinner at 5 p.m. The registration deadline has been extended to July 5. To register, call the center at (717) 677-6116, ext. 0. You can also visit Web site <http://frec.cas.psu.edu/GrowerDay07.htm> to download the field day agenda and registration form. For more information about the field day, contact Dr. Greg Krawczyk at (717) 677-6116, ext. 5, or e-mail at [gxk13@psu.edu](mailto:gxk13@psu.edu).

The Penn State Fruit Research and Education Center, based in the heart of Pennsylvania's apple and peach producing region, is a fully equipped research facility including more than 200 acres of research orchards. The center is part of the research and extension division of Penn State's College of Agricultural Sciences. In addition to providing site-specific conditions for research, the facility increases opportunities for growers, consultants, consumers, and students from Pennsylvania and other states to observe experiments and to consult with scientists. Extension specialists apply experimental findings to local conditions and make suggestions to scientists about new research needs in entomology, horticulture, plant pathology, nematology and other areas. For more information on the center, see their Web site at <http://frec.cas.psu.edu/about.html>.

The Pennsylvania IPM program is a collaboration between the Pennsylvania State University and the Pennsylvania Department of Agriculture aimed at promoting integrated pest management in both agricultural and urban settings. For more information, contact the program at (814) 865-2839, or Web site <http://www.paipm.org>.

Editors Contact:

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## **Vegetable Alert – Cucurbit Downy Mildew!**

Andy Wyenandt, Extension Specialist Plant Biology and Pathology, Rutgers

Pest: Cucurbit Downy mildew

Found: cucurbit Downy mildew is now widespread in the south and mid-west on cucumber crops

Crop(s) at risk: all cucurbit crops.

Potential impact: Significant losses will occur if not controlled properly

What growers should do: Control of Downy mildew begins with regular scouting, recognizing symptoms and regular protectant fungicide applications. The following are the most effective materials.

**Once Downy mildew has been detected in states surrounding the mid-Atlantic region, basic fungicide maintenance programs for cucurbit crops should be adjusted to include Downy mildew control.**

Tank mix one of the products listed below with a protectant fungicide such as chlorothalonil (M5), or maneb (M3), or mancozeb (M3) (see label for rates and specific crop uses):

Ranman (cyazofamid, 21) at 2.1 to 2.75 fl. oz. 400SC/A, or  
Previcur Flex (propamocarb HCL, 28) at 1.2 pt 6F/A, or  
Gavel (zoxamide + mancozeb, 22 + M3) at 1.5 to 2.0 lb 75DF/A (some muskmelon may be sensitive)  
Curzate (cymoxanil, 27) at 3.2 oz 60DF/A, or  
Tanos (famoxodone + cymoxanil, 11 + 27) at 8 oz 50WDG/A

Remember that downy mildew materials should always be tank mixed with a protectant fungicide and rotated weekly with fungicides from a different FRAC code to reduce the chances for fungicide resistance development. For more information on Downy mildew control for specific cucurbit crops please see the 2007 Commercial Vegetable Production Recommendations Guide for your state.

**All abandoned cucumber and summer squash fields should be gramoxoned or disced under immediately after use to kill the foliage! Abandoned fields left unattended after use will only serve as a source of inoculum for other fields once downy mildew makes it way into our area!!!**

**If you suspect downy mildew on your farm, please contact your county extension educator so we can confirm its presence.**

To track the progress of cucurbit downy mildew in the eastern US and to keep up with reports of Downy mildew from other states please visit North Carolina State University's Cucurbit Downy Mildew Forecasting Center at <http://www.ces.ncsu.edu/depts/pp/cucurbit/>.

## More Herbicides Registered for Sweet Corn

Dave Johnson, PSU, Southeast Research and Extension Center

Dwight Lingenfelter, PSU, Weed Science

Dow AgroSciences has received registration in sweet corn for several brands of herbicides containing acetochlor. The products FulTime, Keystone, Keystone LA, Surpass, and TopNotch can now be used for preemergence weed control in sweet corn. These new labels will give sweet corn growers more options for annual grass and broadleaf control. (Please note that other herbicides containing acetochlor, including Harness, Harness Xtra, Degree, Degree Xtra, Volley, and Volley ATZ are NOT registered for sweet corn.)

Surpass and TopNotch contain the single active ingredient, acetochlor, while FulTime, Keystone, and Keystone LA also contain atrazine. All of these products are classified as restricted use, so you will need your pesticide license to purchase and use them.

The active ingredient acetochlor is in the same chemical family as the active ingredients in Dual, Lasso, and Outlook, and will control annual grasses small-seeded broadleaf weeds such as pigweeds and eastern black nightshade, plus provide some control of lambsquarters, including triazine-resistant (TR), biotypes. Grasses controlled include foxtails, crabgrass, and barnyardgrass. The formulations that contain atrazine (Keystone, Keystone LA, and FulTime) will add cocklebur, morningglory, ragweed, smartweed, and velvetleaf to the weeds controlled. These products also give some yellow nutsedge control, but should be incorporated for best activity on this weed.

The new labels state that these products can only be used early preplant (up to 30 days prior to sweet corn planting), preplant incorporated, or preemergence. They can NOT be used early postemergence in sweet corn. As is true with most herbicides, activation (rainfall or irrigation) is necessary for best results when used preemergence.

The table below shows use rates based on soil characteristics and amounts of atrazine provided at the use rates.

Product	Use rate range (qt/a) <sup>1</sup>	atrazine provided (lb/a)
FulTime	2.6-4.0	1.0-1.6
Keystone	2.5-3.0	1.4-1.7
Keystone LA	1.8-2.4	0.7-0.9
Surpass	0.75-1.25	N/A
TopNotch	2.0-3.0	N/A

<sup>1</sup>Use lower rate for sandy, lower organic matter soils, and higher rate for clayey, higher organic matter soils. See specific product labels for details.

As with all residual herbicides, growers must be careful of rotational crop planting restrictions. For all of these products, corn can be planted at any time after application, but only sorghum, soybeans, and tobacco can be planted the following year. Wheat can be planted 15 months after application. For all other crops, growers must wait until the second year after application for planting.

# Weed Management in Berry Fields with Cultural Practices

Elsa Sánchez, PSU, Horticulture

Good cultural practices can reduce many weed problems. All options should be carefully evaluated for suitability on your farm prior to using them.

## Site Selection

Good site selection is an important weed management strategy. Select a site with minimal weeds and manage the weeds on the site prior to planting. It is especially important to manage difficult perennial weeds before planting your small fruit crop.

Green manure crops are good options for weed suppression. Select green manures that establish quickly and have large above ground canopies, such as sudangrass or hairy vetch. For more information on selecting a green manure crop see Chapter 2 of the Mid-Atlantic Berry Guide (<http://pubs.cas.psu.edu/FreePubs/pdfs/agrs97.pdf>).

Site selection also influences the health of the planting. Vigorous plants can out compete many weeds.

## Mechanical Management

Timely cultivation can be used to manage most weeds; through there are a few cautionary notes. It is important to identify the weeds in an area before using tillage. In one trial, repeated tillage was very effective for managing Canada thistle, while in minimally tilled plots, Canada thistle became dominant. However, in some instances, a weed problem can be made worse by being spread by tillage equipment as is the case with yellow nutsedge. Another factor to consider before using cultivation is the location of crop roots. Avoid damaging shallowly-rooted crop roots with cultivation; strawberry and blueberry roots are especially shallow. Also, take into account that tillage generally has a negative effect on soil health for several reasons, including decreasing the organic matter content of the soil.

Repeated mowing is another cultural tool for managing weeds. Mowing works by decreasing the competitive ability of weeds and also can prevent weeds from producing seeds when timed correctly. Mowing should take place before weeds set seed, or else much of the benefit of mowing will have been lost.

## Manage Weeds during Critical Times

Mechanical means for managing weeds are often more effective when weeds are small. This is also a good stage for managing weeds because they do not have the chance to become established.

Critical times during the growing season for managing weeds in matted-row strawberries have been studied. As you may have guessed, a key time for weed management is in the first few months during plant establishment. When weeds were not managed for longer than one month following planting, yield and runner production were lower than when plots were kept weed-free during the same time. When weeds were not managed late in the growing season (September) there was little effect on yield and the number of runners compared to when plots were kept weed-free during the same time. While this indicates that early-season weed management is most critical when establishing a new planting,

key times of the year for weed management may vary depending on the weed species typically encountered and on soil moisture levels. In the study predominant weeds included yellow nutsedge, common groundsel, purslane and numerous grass species. If, for example, common chickweed was predominant, it's possible that late-season weed management may have been equally as important as early-season weed management.

In no case should weeds be allowed to go to seed. Many weeds can produce thousands of seeds per plant that will survive in the soil for many years. Also, suppress perennial weeds, regardless of the time of year, to prevent them from establishing.

### **Mulches**

Mulches can also be effective for managing weeds. In one study, commercially available Planter's paper was found to be effective for suppressing weeds during the establishment year of matted-row strawberries compared to not using mulch. The plastic used in for plasticulture strawberry production can be effective for managing weeds within the strawberry row. Be aware that some transparent plastics are not effective for managing weeds without the use of fumigant prior to laying the plastic. In a trial using a semi-transparent blue plastic, weeds grew so well that they levitated the plastic resulting in the strawberry plants being swallowed underneath the plastic. Fabric weed barriers also are a good option for suppressing weeds and are used by a number of blueberry, black raspberry and blackberry growers. Plastic mulches could be used similarly. Consider other options for red and purple raspberries because of their spreading nature. Another option is placing straw in the alleyways of strawberries in the spring in order to offer some weed control. Straw is also commonly used in bramble planting during the establishment year to manage weeds. Straw should be removed from these planting after the first year because it can promote moisture around the roots which in turn can promote root rots. Applying four to six inches of an organic mulch (for example, rotted saw dust) at the base of the plants is a common practice in blueberry production. In addition to regulating fluctuating soil moisture, the mulch suppresses weeds.

### **Alleyway Management**

The alleys between rows of plants are well suited to the use of a living mulch for managing weeds. A living mulch is created when a plant is broadcast seeded in the alleyways. When selecting what species to use as a living mulch, choose a plant that will out compete weeds, but will not creep or spread into the row of small fruit plants. Some grass species, such as hard fescue, meet these criteria and have been used successfully as living mulches in bramble and blueberry production. For more information on types of grass and seeding rates Chapter 5 of the Mid-Atlantic Berry Guide (<http://pubs.cas.psu.edu/FreePubs/pdfs/agrs97.pdf>).

Sudangrass, tall fescue or marigolds were direct seeded during renovation to test their suitability as living mulches for matted-row strawberry production. Researchers found sudangrass to be the best of the three living mulch species because it rapidly established, was relatively drought tolerant and had a low fertility need. A disadvantage to the sudangrass was that it grew taller than the strawberry plants. However, to contend with this problem, it was mowed as it exceeded the height of the strawberry plants. Another drawback to using sudangrass was that a high level of strawberry clippers was observed compared to the other treatments.

## 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

- ✓ July 14, 2007. **PASA Field Day – Living on Your Land, Leaving a Small Footprint.** Matre Manoeuvre Farm, Fulton County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ July 25, 2007. **Kutztown Produce Auction Meeting**, Fleetwood, PA. For more information contact John Berry at (610) 391-9840 or [jberry@psu.edu](mailto:jberry@psu.edu) or Mena Hautau at (610) 378-1327 or [mmh10@psu.edu](mailto:mmh10@psu.edu).
- ✓ Aug 1, 2007. **PASA Field Day – The Impact of Soil Quality on Productivity.** Ran Gargas Farm, Lawrence County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ Aug 8, 2007. **Integrated Pest Management for Greenhouse Growers**, Still Pond Nursery, Earlville, PA. Presented by The Pennsylvania Women's Agricultural Network, Pennsylvania Department of Agriculture's Outreach & Assistance Program and Pennsylvania Landscape & Nursery Association. Register online at <http://wagn.cas.psu.edu/Register9-7.html>. For more information contact Linda moist at [lsm9@psu.edu](mailto:lsm9@psu.edu) or (814) 865-7031.
- ✓ Aug 22, 2007. **Twilight Potato Meeting**, Forest Wessner's farm located at Church and Reservoir Rd., near Germansville, PA. For more information contact Bob Leiby at (610) 391-9840 or [rel5@psu.edu](mailto:rel5@psu.edu).
- ✓ Aug 23, 2007. **PASA Field Day – Small Scale Sustainable Farming.** Fresh From the Vines, Crawford County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ Sept 6, 2007. **PASA Field Day – Science-Based Organic Grape Production.** Penn State Grape Center, Erie County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ Sept 15, 2007. **PASA Field Day – Urban Farming.** Greensgrow, Philadelphia County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ Sept 22 and 23, 2007. **Mother Earth Harvest Fair.** Spoutwood Farm, Glen Rock, PA. For more information call 717-235-6610 or visit [www.spoutwood@supernet.com](http://www.spoutwood@supernet.com).

- ✓ Sept 27, 2007. **Pumpkin Variety Demonstration**, Franconia, Montgomery County. For more information contact Andrew Frankenfield at (610) 489-4315.
- ✓ Sept 28, 2007. **PASA Field Day – Bio-Diesel & Compost on the Farm**. Briar Patch Organic Farms, Union County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ Oct 3, 2007. **PASA Field Day – The Nuts and Bolts of Organizing and Packing a Choice CSA**. Red Earth Farm, Schuylkill County. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).
- ✓ Oct 8, 2007. **PASA Field Day – New and Beginning Farmers: Small Group Tour with the Nordells**. For More information call (814) 349-9856 or visit [www.pasafarming.org](http://www.pasafarming.org).

## Regional

- ✓ July 11-14, 2007. **The Second National Conference on Facilitating Sustainable Agriculture Education**. Cornell University's Alice Cook House, Ithaca, NY. Contact Kathi Colen Peck, Conference Coordinator at [kscp@turbonet.com](mailto:kscp@turbonet.com) for more information.
- ✓ Aug 6-18, 2007. **Permaculture Design Course**. Three Sisters Farm, Sandy Lake, PA. For more information, call Darrell Frey at 724-376-2797.
- ✓ August 14-16, 2007. **Ag Progress Days**, Rock Springs, PA. For more information call (814) 865-2071 or visit <http://apd.cas.psu.edu>.
- ✓ Nov 8-11, 2007. **Farm Education Symposium**. Shelburne Farms, Shelburne, VT. For more information visit [www.farmbasededucation.org](http://www.farmbasededucation.org) or call Brooke Redmond at 617-306-0090.
- ✓ Jan 15 – 17, 2008. **NJ Annual Vegetable Meeting** at the Taj Mahal in Atlantic City. For more information contract Mel Henninger at [henninger@aesop.rutgers.edu](mailto:henninger@aesop.rutgers.edu).
- ✓ Feb 7-9, 2008. **Pennsylvania Association for Sustainable Agriculture (PASA) 17<sup>th</sup> Annual Farming for the Future Conference**. Penn Stater Conference Center, State College, PA. For more information visit [www.pasafarming.org](http://www.pasafarming.org).

## National

- ✓ June 18 – Aug 10, 2007. **Ecovillage & Permaculture Certificate Program**. Lost Valley Educational Center, Eugene, OR. For more information, call 541-937-3351 x112 or visit [www.lostvalley.org/epcp](http://www.lostvalley.org/epcp).

- ✓ August 14-15, 2007. **North American Strawberry Growers Associations (NASGA) Summer Tour.** For more information contact Kevin Schooley at [kconsult@allstream.net](mailto:kconsult@allstream.net) or visit [www.nasga.org](http://www.nasga.org).

## **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>.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Cooperative Extension is implied.

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