

The Vegetable and Small Fruit Gazette

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Horticulture Department
The Pennsylvania State University

In this Issue:

[Comments from the Editor](#)

[Quote for Thought from Pete Ferretti](#)

[Schedule for Educator Articles](#)

[Chemical Control of Triazine Resistant Weeds in Sweet Corn](#)

[Direct Marketing Pennsylvania Grown Edamame to Professional Chefs in Metro-Philadelphia: Edamame as a Recipe Ingredient](#)

[The Organic Way- Organic Methods for Blueberry Nutrition](#)

[2004-2005 Honey Bee Colony Winter Losses High](#)

[Maintaining Drip Irrigation Systems](#)

[An Opportunity for Value-Added Grants for Growers](#)

[Soil Test Summaries for Potatoes in Pennsylvania](#)

[Indar for Mummy Berry in PA for 2005](#)

[Attention Raspberry Growers!](#)

[Job Announcements](#)

[Upcoming Meetings](#)

Comments from the Editor

Elsa Sánchez, Department of Horticulture

I want to thank Eric Oesterling for his excellent article, **Chemical Control of Triazine Resistant Weeds in Sweet Corn**, and look forward to George Perry's article for the May issue. I also want to thank everyone who contributed articles to this issue and I want to encourage others to join us in upcoming issues.

It was brought to my attention that the list serv was not working correctly by not allowing individuals to join. A setting in the system was changed and the problem should now be fixed. Thank you to those of you who brought the issue to my attention.

As new feature, starting in this issue, we are devoting a section of the Gazette to Job Announcements. If you have a job announcement or an upcoming event that you would like to advertise, please send it to me (elsa-sanchez@psu.edu). As always, the Vegetable and Small Fruit Gazette Team encourages your feedback so that we can better serve your needs and address your concerns.

[Back to top](#)

Quote for Thought from Pete Ferretti

Pete Ferretti, Department of Horticulture

*Remember every kindness done to you whatever its measure.
Remember praise by others won and pass it on with pleasure.
Remember every promise made and keep it to the letter.
Remember those who lend you aid and be a grateful debtor.
Remember all the happiness that comes your way in living.
Forget each worry and distress; be joyful and forgiving.
Remember good, remember truth, and you will find through
age and youth, true joys and hearts to love.*

-ΕΣΦ- National Honorary Fraternity

[Back to top](#)

Schedule for Agent Articles

Elsa Sánchez, Department of Horticulture

May– George Perry	June– Jeff Mizer
July– Scott Guiser	August– Tom Butzler
September– Lee Young	October– Cheryl Bjornson
November– John Esslinger	December– Andy Muza

[Back to top](#)

Chemical Control of Triazine Resistant Weeds in Sweet Corn

Eric Oesterling, Horticulture Extension Educator, Westmoreland County

We have relied on triazine herbicides for broad spectrum weed control in field corn, sweet corn and other crops for many years in Pennsylvania. The triazine family includes atrazine (Aatrex), simazine (Princep), cyanazine (Bladex – no longer available) and metribuzin (Sencor or Lexone). All of these materials are chemically related and work on the same site in plants to disrupt photosynthesis. Since these herbicides have been used for so long and so widely we have selected for weeds that they don't control. Triazine resistant lambsquarters and pigweed have been around for some time. Ragweed also seems to have become more difficult to control with triazine herbicides. A weed is defined as being resistant to an

herbicide if it was once controlled by that herbicide but now is not controlled by labeled rates of that same herbicide. Triazine resistant lambsquarters is fairly common throughout Pennsylvania, triazine resistant pigweed is less common but still widespread and ragweed, if not resistant, is becoming more of a problem as an escape weed.

We still rely on atrazine for pre emergent broadleaf weed control in sweet corn, usually mixed with a pre emergent grass controlling herbicide such as s-metolachlor (Dual II Magnum), alachlor (Lasso, Microtech, Partner), or other related products. These combinations are widely applied as the premix products, Bicep and Bullet. Metolachlor and alachlor are fairly good on pigweed, so they can control the triazine resistant pigweed but they are rated only fair for lambsquarters control and their ragweed control is poor.

So how do we control the triazine resistant lambsquarters? There is not one easy answer but there are a number of options now and hopefully some better ones in the near future.

Pendimethalin (Prowl, Pendimax) is fairly good against lambsquarters. Adding Prowl to the program can reduce lambsquarter emergence but will not help much with ragweed problems. But pendimethalin can injure sweet corn. Seed must be planted at least 1 ½ inches deep so the roots of the corn seedling do not contact the pendimethalin – not good for early planting. Pendimethalin is more likely to injure sweet corn when soil is cold and wet. The best time to apply Prowl to minimize injury is as the corn is just spiking through the soil, although the label states that it can be used pre emergence and can be tank mixed with other materials such as Bicep and Bullet. Pendimethalin has no post emergent activity on the weeds, it must be present as the seeds germinate to be effective. Pendimethalin requires rainfall within seven days to activate the chemical but should not be pre-plant incorporated because of the risk of contacting the corn seed and roots. It should not be used under plastic mulch. Check the label for other restrictions.

We can also use post emergent sprays or cultivation to clean up escaped broadleaved weeds. Currently labeled post emergent herbicides include 2, 4-D amine, Aim and Basagran (or Laddok S-12, a combination of atrazine and Basagran). All of these materials will control at least small emerged lambsquarters, but they must be used at the right stage of growth to control the weeds and minimize injury to the corn.

2,4-D amine can be used on corn up to 8" high and will control emerged lambsquarters, pigweed and ragweed. However 2,4-D can injure sweet corn, especially larger corn and when weather is warm and wet. Avoid cultivation for 7 – 10 days after application. Avoid drift to sensitive crops like tomatoes and grapes. 2,4-D is very hard to completely clean out of sprayers.

Aim is a newer material that is effective on lambsquarters and pigweed less than 3" tall. It is only fair on ragweed. Include a non-ionic surfactant according to the label and make sure coverage is complete. Aim can burn leaves of corn but plants should grow out of the damage. Damage varies from one variety to another – test it carefully with new varieties.

Basagran is a material that has been around for many years and gives fair to good control of emerged lambsquarters less than 2" tall, it is weak on pigweed though. Thorough coverage is required for good control with any of these materials.

Those are not perfect options but they are labeled now and effective if used correctly. We may get a couple of new tools that will help with sweet corn weed control. I just talked to the folks and Syngenta about mesotrione (Callisto). Syngenta hopes to have a sweet corn label for Callisto in the next couple of weeks - in time for this season. Callisto can be used either pre-emergence or post emergence on field corn. It controls lambsquarters, pigweed and many broadleaf weed problems. Used pre-emergence in combination with Bicep or Bullet, it would allow us to reduce atrazine rates and control many broadleaf weeds including resistant lambsquarters, even in corn under plastic.

I also asked Bayer about Option, a post emergent corn herbicide. They are hoping for a sweet corn label for that product for next year. It is in the IR-4 pipeline, definitely will not be ready this year but hopefully in 2006. Option is fair to good on lambsquarters and a number of other important broadleaf weeds but is even better against a range of grasses. We could really use some help with post emergent grass control in sweet corn.

Remember neither of these chemicals is cleared on sweet corn as of the end of March. Check back with your Extension people and/or dealers about the label situation on Callisto. Hopefully it will be available in time for this season but there are no guarantees.

Use any pesticide strictly according to instructions on the label.

[Back to top](#)

Direct Marketing Pennsylvania Grown Edamame to Professional Chefs in Metro-Philadelphia: Edamame as a Recipe Ingredient

Dru Montri, Kathleen Kelley and Elsa Sánchez, Department of Horticulture

This is the final of four articles in the series on direct marketing edamame to professional chefs.

Determining how a product will be used at a specific restaurant is an important step in developing a marketing plan. It directly relates to handling requirements prior to delivery (e.g. shelling) and should be discussed in detail with the chef.

The final aspect of this edamame consumer-research study focused on developing an understanding of how chefs would use edamame at their restaurants. Chefs were asked to create a recipe using edamame as an ingredient. They then used a scale of one to seven (one being very unlikely, four being neutral and seven being very likely) to rate how likely they would be to use edamame as an ingredient in a recipe again. All chefs awarded this question with a four (neutral) or higher, with 10 of the 18 chefs indicating that they were "very likely" to use edamame as an ingredient in a recipe again.

Edamame proved to be a versatile ingredient. Chefs created a variety of original recipes covering an array of courses and a multitude of ethnic origins that required different levels of preparation. Appetizers included Edamame Pancakes, Spicy Edamame Dip, Vegetarian Soong and Sautéed Edamame with Tomatoes and Spicy Oyster Sauce. Soup recipes were created for a Moroccan Edamame Soup, Asian Tomato and Bean Soup and an Edamame Vichyssoise Garnished with Crème Fraiche. An adaptable salad recipe was created and entitled Edamame Bean and Radish Salad (recipe included below). Recipes were also created for main dishes such as Sesame Crusted Ahi Tuna with a Saffron-Ginger Beurre Blanc and an Edamame-Shiitake Sauté, Edamame with Prosciutto and Pecornio Romano, Linguini with Zucchini and Fresh Edamame, Edamame Cakes with Sweet Chili Vinaigrette, and a variety of risotto recipes. This diversity suggests that edamame is an appropriate product for many different types of dishes.

If edamame is not currently on the menu at a certain restaurant, do not disregard them as a potential buyer. Think of it as an opportunity to build a relationship with a new customer who may be willing to try a new product. Restaurants are often looking for new dishes or sides to keep up with the trends and set them apart from their competitors. Provide recipes and information about the product and be sure to provide a sample. You may also want to provide a list of dishes that can be created such as those listed above or a sample recipe like the one included below.

Recipe cards are also an ideal marketing tool for selling a product through retail channels and many chefs

are often willing to provide recipes for this type of promotional activity. This is particularly true if the card includes their name and the name of the restaurant they work for (Miles and Alleman, 2001). These types of recipe cards can be created inexpensively to provide consumers with the information they need to prepare a new vegetable item they are unfamiliar with. These types of cards can be used in direct marketing ventures such as farmers markets, Community Supported Agriculture farms, roadside stands or grocers. The following is an example of a simple and versatile edamame recipe that could be provided to first-time edamame consumers:

<p>Edamame Bean and Radish Salad From the Kitchen of Rich Landau Horizon's Café, Willow Grove, Pennsylvania</p>	
<p>Ingredients: 12 ounces fresh, inshell edamame ¼ cup diced daikon radish 2 Tbsp diced red onion 1 tsp of grated ginger ¼ cup diced cucumber diced pre-smoked or baked tofu (optional)</p>	<p>1 tsp rice wine vinegar 1 tsp tamari soy sauce 1 tsp toasted sesame oil pinch of sugar pinch of salt black pepper to taste</p>
<p>Preparation Instructions: Cook edamame in boiling water for four to six minutes. Drain the water, chill the beans for at least ½ hour, and then remove beans from the pod. Meanwhile, toss all the other ingredients in a large mixing bowl. Next, toss in the chilled edamame. Let the dish marinate for at least ½ hour. Serve over lettuce as a salad, in a wrap or over your favorite rice. For a special touch, add diced pre-smoked or baked tofu.</p>	

Overall, results from this consumer-research study are promising and should provide basic guidance for those wishing to pursue the production and marketing of edamame as a specialty crop. Results from the follow-up survey, as discussed in the third article of this series, indicate that there is a demand for edamame among chefs who participated in this study and that the majority of chefs were interested in obtaining edamame from small-acreage growers in Pennsylvania for use in their restaurants. Their interest may be prompted by attributes they value such as freshness, great flavor, special care and personal service (Gibson, 1991).

Most importantly, this type of direct marketing approach offers advantages for small-acreage growers including a reliable market throughout the growing season, a larger share of the food dollar and greater product flexibility (Gibson, 1991). For more information on direct marketing to restaurants, please see the websites included below.

Selling to Restaurants. ATTRA. <http://www.attra.ncat.org/attra-pub/sellingtorestaurants.html>

Direct Marketing. ATTRA. <http://www.attra.ncat.org/attra-pub/directmkt.html>

Selling Directly to Restaurants and Retailers. University of California Sustainable Agriculture Research and Education Program. <http://www.sarep.ucdavis.edu/cdpp/selldirect.pdf>

For more information on similar consumer-research studies with a focus on professional chefs, please see the articles listed below.

[Back to top](#)

Nitrogen Requirement for Vegetable Crops Grown in Pennsylvania

Michael D. Orzolek, Department of Horticulture, Pennsylvania State University

The method of nitrogen application can include broadcasting, banding, sidedressing, fertigation and foliar fertilization. Common or standard sources of nitrogen for vegetable crop production includes: Ammonium nitrate (33% N), calcium nitrate (20-22% N and 21% Ca), potassium nitrate (13% N and 44-46 K₂O), ammonium sulfate (21% N and 24% S), urea (45-46% N), monammonium phosphate – MAP (11% N and 48% P₂O₅), and Diammonium phosphate – DAP (16-18% N and 46-48% P₂O₅). Excess nitrogen in plants can result in luxurious vegetative growth and reduced reproductive growth or yield. In addition, excess nitrogen can delay crop maturity and quality of the harvested crop.

Total recommended nitrogen requirement for vegetable crops = Total recommended rate – residual N – cover crop N – manure N – equals lbs/A Nitrogen required or **surplus N**. If in doubt regarding nitrogen level in plant tissue, we suggest tissue analysis within 2 to 3 weeks after establishing the crop

Crop	Total N ₂ Requirement/ (lbs/A)	Crop	Total N ₂ Requirement (lbs/A)
Asparagus		Okra	80-100
Crowns	40		
Cutting beds	40-60	Onions	60-80
Beans:		Parsley	100-125
Lima	45-70		
		Parsnips	40-60
Beets	60-80	Peas	30-45
Broccoli	80-120	Peppers	100-120
Brussel Sprouts		Potatoes	
Cabbage		Sweet	40-60
Cauliflower	100-120	White	120-140
Carrots	60-80	Pumpkins and Winter Squash	40-60
Celery	100-120		

		Radishes	40
Cucumbers	80-100		
Eggplants	100-120	Rutabaga and Turnips	40-60
		Spinach	80-100
Endive, Escarole Leaf Lettuce	60-80	Summer Squash	60-80
Horseradish	120-140		
Iceberg Lettuce	45-65	Sweet Corn	
		Fresh Market	100-120
		Processing	90
Leafy Greens:	40-60	Tomato	
Collards, Kale, Mustard and Turnip Greens		Fresh Market	100-120
		Processing	90
Leeks	80-100	Watermelon	
Muskmelons	60-80	Non-irrigated	60-80
		Irrigated	90-120

[Back to top](#)

The Organic Way- Organic Methods for Blueberry Nutrition

Elsa Sánchez, Department of Horticulture

This article examines organic options for blueberry nutrition. Because soil pH and nutrient availability are closely linked, methods for adjusting soil pH are also included.

Before Planting

Blueberries grow optimally in soils with a pH between 4.5 and 5.0. Generally the soil pH will need to be lowered prior to planting to meet this requirement. Some materials for lowering soil pH include sulfur, peat moss and organic cottonseed meal. Options for sulfur include elemental sulfur and iron sulfate. Both of these products are labeled as 'restricted' according to the Organic Materials Review Institute (OMRI)

which means that they are allowed in organic production but are subject to restrictions. Peat moss, which has a pH between 3.0 and 5.0, can also be used to lower the pH of the soil. It is allowable in organic crop production; however, the type used cannot contain a synthetic wetting agent. Organic cottonseed meal is a fertilizer (see table below) that also has a low pH and can be used to decrease the soil pH. It is approved for organic production as long as it is not from GMO cotton and is free from prohibited substances. Peat moss and cottonseed meal can be expensive. With all of these materials, it is best to work closely with your certifying agency before applying them to ensure organic certification is not compromised by their use.

Berry crops grow best in soils with organic matter contents between 2% and 5%. Organic matter acts as a slow release nutrient source. Methods to increase the soil organic matter content include the use of green manures, composts and raw manures. Green manures are crops that are turned into the soil while they are young and succulent, rather than harvested, to improve the organic matter content. When planting a green manure crop before blueberries, select one that will grow well in soils with a low pH, compatible with blueberry plant requirements. Some options include: crimson clover, buckwheat, cereal rye and spring oats. All of these will grow in soils with a pH of 5.0. Finished compost typically contains 0.5 to 2.5% total nitrogen. Most of the nitrogen is in an organic or slow release form. As a general rule, about 10% of the organic nitrogen in the compost will be available to the plant per year. When using composts, it is best to apply it based on crop needs rather than on a volumetric basis for long-term soil health. When raw manures are used for blueberry production, they must be soil incorporated a minimum of 90 days before harvest. The Fact Sheet, Estimating Manure Application Rates, Penn State Publication CAT UC151, is available through cooperative Extension with detailed calculations for determining application rates for manures.

After Planting

If soil pH needs to be adjusted after planting, sulfur products used prior to planting can be used. Blueberries generally have a relatively high nitrogen requirement followed by potassium. Phosphorus is needed in lesser amounts. Compost and many 'meals' can be used to meet the nutrient requirements of blueberries. The table below contains the percent nitrogen, phosphate and potash as well as relative availability of nutrients in some of these products. Many blended fertilizers and liquid fish products are also available and allowed for organic production. Many of these products can be costly. Also, as with materials applied prior to planting, verify that the formulations you plan on using are allowable with your certifying agency to avoid compromising your organic certification.

Fertilizer Source	% Nitrogen	% Phosphate	% Potash	Relative Availability of Nutrients
Alfalfa Meal	3.0	1.0	2.0	Medium-Slow
Blood Meal	10.0-14.0	1.0-1.5	0.6-0.8	Medium-Fast
Cottonseed Meal	7.0	2.5	1.5	Slow-Medium
Feather Meal	11.0-15.0	0	0	Slow
Fish Meal	10.0	4.0	0	Slow
Soybean Meal	7.0	1.6	2.3	Slow
Compost	Variable*	Variable	Variable	About 10% of nitrogen per year.

* Nutrient levels in compost varies depending on source materials and composting protocols used; therefore, it is recommended that compost is tested to determine the amount of nutrients it contains (kits are available through local county Extension offices).

Table adapted from *Blueberries: Organic Production* (G.L. Kuepper, S. Diver, K. Adam, M. Guerena and P. Sullivan, ATTRA, www.attra.ncat.org), *How to Convert an Inorganic Fertilizer Recommendation to an Organic One* (W. McLaurin and W. Reeves, University of Georgia Cooperative extension, <http://pubs.caes.uga.edu/caespubs/pubcd/C853.htm>) and *Organic Soil Amendments and Fertilizers* (D.E. Chaney, L.E Drinkwater and G.S. Pettygrove, UC Sustainable Agriculture Research and Education Program, University of California, Division of Agriculture and Natural Resources, Publication 21505).

[Back to top](#)

2004-2005 Honey Bee Colony Winter Losses High

Maryann Frazier, Department of Entomology

Beekeepers in the Northeast and Mid-Atlantic regions are beginning to assess the winter survival of their honey bee colonies. Reports of losses in these areas so far are unusually high. High losses have also been reported by beekeepers nation-wide. So far it is uncertain what is causing these abnormally high losses but parasitic mites and their associated diseases are strongly suspected as playing a key role. Estimates of losses among commercial beekeepers, many of whom over-winter their colonies in the south to make a winter honey crop and escape the stresses of over-wintering in the North, are as high as 50-60% in some operations. These migratory beekeepers provide the majority of honey bee colonies for spring pollination of apples and other tree fruits in the Northeast and Mid-Atlantic regions. In addition, many large commercial beekeepers are being lured to CA for almond pollination by the high prices being paid for colony rentals. Almond growers paid beekeepers up to \$150 to rent a single colony. A percentage of eastern colonies that were sent west for almond pollination are not expected to return.

These factors are expected to result in a shortage of high-quality pollination units for fruit growers in our region. If you are a grower depending on rented honey bee colonies for spring pollination and have not contacted the beekeeper you are depending on to supply your colonies, you should do so immediately. If you are located in the Mid-Atlantic region and are trying to find a source of local bees as pollination rentals, you can visit the MAAREC web site at this URL: <http://maarec.cas.psu.edu/participants.htm> for an up-to-date list of local beekeeping organizations in each state. Contact information for state beekeeping extension specialists, who might be able to assist growers in locating honey bee colonies to rent, are also located at this URL. In addition, growers should expect to pay more for rented honey bee colonies in 2005.

[Back to top](#)

Maintaining Drip Irrigation Systems

Bill Lamont, Department of Horticulture

Drip irrigation systems are becoming more widely used for horticultural crop production, especially vegetable crops. The system must function efficiently during the entire growing season. Failure at a critical point in the crop production cycle can cause loss of the entire crop. System failures are often due to inadequate maintenance of the system especially if fertigation is being utilized to supply nutrients to the plant's root zone. Maintenance of the drip irrigation system does take time and understanding; however,

maintenance is critical for successful use of drip irrigation systems. This guide should help one understand how to maintain drip irrigation systems.

Water Quality

Water for drip irrigation can come from wells, ponds, rivers, lakes, municipal water systems, or plastic-lined pits. Water from these various sources will have large differences in quality. Well water and municipal water is generally clean and may require only a screen or disc filter to remove particles. However, no matter how clean the water looks, a water analysis/quality test prior to considering installation of a drip irrigation system should be completed to determine if precipitates or other contaminants are in the water. This water quality analysis should identify inorganic solids such as sand and silt; organic solids such as algae, bacteria, and slime; dissolved solids such as iron, sulfur and calcium; and pH of the water. Water testing can be done by a number of laboratories in the state. Your local Cooperative Extension Service (CES) County Extension Educator can supply a list of laboratories or suggest a local lab that can do water quality analysis. Check with the lab first to obtain a sample kit containing a sampling bottle that is clean and uncontaminated.

Table 1: Criteria for Plugging Potential of Drip Irrigation System Water Sources

		Plugging Hazard	
Factor	Slight	Moderate	Severe
		[in parts per million (ppm)* except pH]	
Physical			
Suspended Soils (filterable)	<50	50-100	>100
Chemical			
PH	<7.0	7.0-7.5	>7.5
Manganese	<0.1	0.1-1.5	>1.5
Iron	<0.1	0.1-1.5	>1.5
Hardness	<150	150-300	>300
Hydrogen sulfide	<0.5	0.5-2.0	>2.0

In addition to these factors, it is desirable to ask for any additional tests that might be necessary. If the water is also to be used as a household supply or might be used as a drinking water source, the analysis should also include the basic drinking water analysis which includes bacterial counts, nitrates, or other suggested tests. Also salts, Chlorides, Sodium, Calcium (for general irrigated water quality) should be analyzed.

Hydrogen sulfide can often be detected by a bad “rotten egg” smell. If a review of your water test indicates factors that may cause potential plugging (Table 1), then special care in drip system maintenance needs to be practiced. High levels of a factor might not render a well unsuitable for drip irrigation but will make appropriate water treatment a requirement before successful use in a drip irrigation system.

Any surface water such as streams, ponds, lakes, rivers, or pits will contain bacteria, algae or other aquatic life. Sand media filters are absolute necessities. **Even though sand media filters will be more expensive than screen or grooved-disk filters, they are highly recommended for water sources that have high levels of suspended organic and inorganic materials.**

Maintenance of the System

Filters

Both screen and sand media filters in a drip irrigation system should be checked during or after each operating period and cleaned if necessary. A clogged screen or grooved-disk filter can be cleaned with a stiff bristle brush or by soaking in water. A sand media filter should be backflushed when pressure gauges located at the inlet and outlet sides indicate a five psi difference. Check drip irrigation lines for excessive leaking, and look for large wet areas in the planting area indicating a leaking tube or defective emitter. It is also a good practice to flush submains and laterals periodically to remove sediments that could clog emitters. Systems can be designed with automatic backflushing devices and automatic end line flushing devices, but still require manual checks.

Chemical Control Measures

Unfortunately, filtration alone is not always adequate to solve all water quality problems. Chemicals are necessary to control algae, iron and sulfur bacteria, and disease organisms. Chemicals can cause some materials to settle out or precipitate out of the water while causing other materials to maintain solubility or stay dissolved in the water. Chlorine is a primary chemical used to kill microbial activity, to decompose organic materials and to oxidize soluble minerals which causes them to precipitate out of solution. Acid treatments are used to lower the water pH to either maintain solubility or to dissolve manganese, iron and calcium precipitates that clog emitters or orifices. Potassium permanganate also is used to oxidize iron under some conditions. It is recommended to place the filtration system after the chemical treatment to remove any particles formed. Chemigation protection and injection equipment requirements vary with toxicity class of the injected chemicals.

Chlorination

The common practice of chlorination is the addition of chlorine to purify drinking water supplies. Chlorine acts as a powerful oxidizing agent in water and vigorously attacks organic materials. Free available chlorine also reacts strongly with readily oxidizable substances such as iron, manganese and hydrogen sulfide.

To be effective, a residual of active chlorine in parts per million of available chlorine should be measurable near the end of the lateral lines of the irrigation system. The amount of chlorine added to the system will be the residual desired plus the amount needed by the water to oxidize the materials present. This amount can vary considerably over a season. Contact time between chlorine and the water should be maximized to get the most benefit.

Table 2: Common chlorine compounds used in microirrigation

Compound	Form	Percent Available
calcium hypochlorite	dry	65-70
sodium hypochlorite	liquid	5.26-15
chlorine gas	gas	100

The gas and liquid forms of chlorine are more commonly used (Table 2). Common household bleach, 5.25% sodium hypochlorite, is used in many small operations. Chlorine gas is more dangerous (very poisonous and very corrosive). A commercial dealer should install the gas metering device called a chlorinator and train the operators. Chlorine gas is heavier than air, so adequate ventilation is recommended.

The pH of the water greatly affects the effectiveness of chlorination. Acidic water causes greater availability of hypochlorous acid (HOCl), which has an efficiency for killing microorganisms that is 40 to 80 times greater than that of hypochlorite (OCl⁻). When chlorine is dissolved in water, HOCl and OCl⁻, which together are referred to as "free available chlorine", co-exist in an equilibrium relationship influenced by temperature and pH.

A general formula for calculating the amount of chlorine to inject in liquid form (sodium hypochlorite, NaOCl) is:

$$IR = Q \times C \times 0.006/S$$

where: IR = Chlorine injection rate (gal/hour)

Q = Irrigation system flow rate (gal/min)

C = Desired chlorine concentration (ppm)

S = Strength of NaOCl solution used (percent)

Example: A grower wishes to use household bleach (NaOCl at 5.25% active chlorine) to achieve a 3 ppm chlorine level at the injection point. The flow rate of his irrigation system is 90 gpm. At what rate should he inject the NaOCl?

$$IR = 90 \text{ gpm} \times 3 \text{ ppm} \times 0.006/5.25$$

$$= 0.31 \text{ gallon per hour}$$

At an irrigation flow rate of 90 gpm, the grower is pumping (90 x 60) 5400 gph. The goal is to inject 0.31 gallon of bleach into 5400 gallons of water each hour that injection occurs.

If the injector is set for a 300:1 ratio, it will inject 5400/300 or 18 gallons per hour. Then, 0.31 gallon of bleach should be to 18 gallons of water in the stock solution.

Note: be careful to use the same time units (hours) when calculating the injection rate.

Commercial Drip Maintenance Treatment Solutions

Several commercial solutions are available which contain a mixture of ingredients to deal with pH, iron and hardness water problems. These commercial products come with instructions on dilution concentrations for daily maintenance or "shock" treatment to unclog plugged lines. For small producers getting started with drip irrigation, these commercial products should be considered as a water treatment.

[Back to top](#)

An Opportunity for Value-Added Grants for Growers

Mike Orzolek, Department of Horticulture

The USDA – Rural Business-Cooperative Service is accepting proposals for Value-Added Grants. The deadline for submitting a proposal is May 6, 2005. Independent agricultural producers are eligible for funding under this program. The primary objective of this grant program is to help eligible independent producers of agricultural commodities, agricultural producer groups, farmer and rancher cooperatives, and majority-controlled producer-based business ventures develop strategies to create marketing opportunities and to help develop business plans for viable marketing opportunities. Further information can be found at

<http://a257.g.akamaitech.net/7/257/2422/01jan20051800/edocket.access.gpo.gov/2005/05-4310.htm>

[Back to top](#)

Soil Test Summaries for Potatoes in Pennsylvania

Bill Lamont, Department of Horticulture

I thought it would be interesting to look at the soil test summaries for potato soil samples submitted to the Agricultural Analytical Services Laboratory here at Penn State. We had a total of 304 soil samples submitted in the categories: Potatoes-Unspecified Use, Home Potato Patch, Unstored Chip Potatoes, Stored Chip Potatoes, Early Tablestock Potatoes, Stored Tablestock Potatoes, and Experimental (500 CWT/A) potatoes.

The following counties had soil test submissions in the double digits: Centre (a lot of research plots), Erie, Northampton and Schuylkill.

The average pH was 6.3, acidity (meq/100g) 2.2, P (ppm) 161, K (ppm) 218, Mg (ppm) 154, Ca (ppm) 1,805, CEC 11.1, K (% Sat) 4.8, Mg (% Sat) 11.5 Ca (% Sat) 61.4.

It is important to take a soil test to determine what is in your soil bank so you do not add excessive amounts of nutrients or lime to the soil or come up short during the growing season which costs money and cuts into your bottom line.

[Back to top](#)

Indar for Mummy Berry in PA for 2005

Kathy Demchak, Department of Horticulture

The U.S. EPA granted an emergency exemption for the use of Indar 75WSP (fenbuconazole) to control mummy berry disease in blueberries in Pennsylvania for 2005.

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 the flowers have been pollinated no further infection can take place. Indar 75WSP may be applied by ground at a maximum rate of 2 ounces of product per acre per application, with a maximum of 5 application 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 75WSP 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, 2005.

Labels and copies of the letter granting this exemption were distributed to county offices, and should be obtained before an application is made. This Section 18 label is expected to be available on the Dow AgroSciences Web site shortly.

[Back to top](#)

Attention Raspberry Growers!

Elsa Sánchez & Kathy Kelley, Department of Horticulture

We need your input! We received funding from the Northeast Sustainable Agriculture Research and Education program for a project on raspberries. We will be evaluating different trellis systems and organic/biorational products for gray mold management. We are looking for six raspberry growers to help direct the project by serving on an advisory board. The only qualifications needed are that you grow raspberries and are willing to share your ideas with us. We are interested in your ideas for what products to test and also on what your preferred methods are for holding field days. We are also interested in your experiences with the cultivars 'Nova' and 'Prelude'. The advisory board will meet in State College, PA in late April or early May, 2005 and we'll reimburse you for your travel expenses. If you are interested in being an advisory board member for this project please contact:

Elsa Sánchez by phone (814)-863-2433 or by email at ess11+raspberry@psu.edu or

Kathy Demchak by phone at (814) 863-2303 or by email at kdemchak@psu.edu by April 11, 2005

[Back to top](#)

Job Announcements

Pennsylvania Certified Organic Job Announcement for Organic Transition Specialist

The Organic Transition Specialist will coordinate PCO's new-applicant program and "Focus on Organic Dairy" project.

Qualifications

- Agricultural experience, preferably in dairy, (organic preferred, but not required);
- Bachelor's degree or equivalent;
- Knowledge of organic standards;
- Strong communication skills, both written and oral;
- Computer expertise: word processing, Power Point; spreadsheets, internet research, databases.

Position is full-time with benefits. The specialist will work at our Centre Hall, PA, office. Some travel required.

For complete job description or to apply for the position, contact:

Penny Sandoval
PCO Administrative Director
406. S. Pennsylvania Ave.
Centre Hall, PA 16828
penny@paorganic.org
penny@paorganic.org

[Back to top](#)

Upcoming Meetings

Elsa Sánchez, Department of Horticulture

Local

April 5, 2005; 10 am to 3 pm. Pennsylvania Certified Organic (PCO) Certification Workshop, Midway Mennonite Center, Lititz, PA. Register by April 1, 2005 by contacting PCO at 406 S. Pennsylvania Ave., Centre Hall, PA 16826; phone: (814) 364-1344; e-mail: pco@paorganic.org

October 14-15, 2005. Passive Solar Greenhouse Workshop, 1522 Lefever Lane, Spring Grove, PA 17362. Contact: Steve and Carol Moore (717) 225-2489 or sandcmoore@juno.com.

Regional

January 31 – February 2, 2006. Mid-Atlantic Fruit and Vegetable Convention. For more information contact the Pennsylvania Vegetable Growers Association at pvga@pvga.org or visit <http://www.pvga.org/.yracuse>, N.Y.

National

International

September 5-9, 2005. Potato 2005. Emmeloord, the Netherlands. Contact: www.potato2005.com.