The Vegetable and Small Fruit Gazette

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Horticulture Department
The Pennsylvania State University

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Tip for the Month-- "The greatest discovery of my generation is that man can alter his life simply by altering his attitude of mind"-- William James

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Comments from the Editor

Bill Lamont, Department of Horticulture

This is my favorite time of the year! Hunting seasons begin and the growing season is winding down except in the high tunnels, as the temperatures begin to make their gradual decline. The mornings are chilly and frost is on the pumpkins. This is the season of beautiful fall foliage and the peak of "Entertainment Horticulture" with the corn maize's and the host of school children scouring the renewal pumpkin patch for the perfect pumpkin to take home. I look forward to receiving John Esslinger's article for the November issue. I want to thank colleagues from other departments who contributed articles to this issue and I want to encourage others to join us in upcoming issues. If you have an event that you would like to advertise, please send it to me. As always, the Vegetable and Small Fruit Gazette Team encourages your feedback so that we can better serve your needs and address your concerns.

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Schedule for Agent Articles

Bill Lamont, Department of Horticulture

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Choosing and Establishing the 'Right' Cover Crop

Tom Becker, Former Extension Agent/Horticulture, York County

"Cover crops are major ingredients in many biologically integrated farming systems. They're often the first biological technique farmers use, and once they see their benefit, other related practices make more sense to adopt."-Robert Bugg, SAREP UC Davis-based UC Sustainable Agriculture Research and Education Program's analyst

Most organic and conventional PA vegetables growers can agree on one thing:

A cover crop should follow most vegetable crops to add organic matter to the soil.

Those growers not using cover crops are often adding organic matter in other ways including the use of green manure crops, crop residue, animal manures, mulches and compost.

Vegetable growers in York County establish cover crops: (1) as a full-season, rotational crop in vegetable production, (2) as a living or no-till planting mulch layer, (3) as a 'catch' crop for nutrient recycling especially nitrogen or (4) as a seasonal winter crop grown for soil protection.

Land availability and the cost to establish and incorporate cover crops limit many of our grower's uses of the technique. On many small farms, cover crops are sown following grain or vegetable harvest in the Summer or Fall.
The most common and reliable species, winter rye, provides a very dense grass mat all winter. Rye continues to grow if temperatures stay above 38 F. Winter rye is plowed under before it is 18" high followed by a late-planted spring vegetable crop.

In Vernon Grubinger's new book, Sustainable Vegetable Production From Start-Up to Market, Vernon provides one of the 'best' reasons to use winter rye, oats or other small grains as a winter cover. He calls it 'mopping up available nitrogen'. As a result, nitrogen becomes available to a vegetable crop later in the Spring in the upper 4 to 6 inches of soil. Additional nitrogen results from fertilization, manure applications or the mineralization of soil organic matter.

Unfortunately, after late-harvest (Fall) vegetables, cover crops are sometimes not practical. To avoid going a season without any cover crop, some growers plan their cover crops as part of a sequenced crop rotation. For example, a 3 year rotation of vegetable (potato, etc.)/wheat/clover and grass allows the cover crop to be inter-seeded with the winter wheat.

Often, the use of a winter cover crop is unplanned. Winter cover crops may follow a crisis event like a major disease or insect infestation, hailstorm, early Fall freeze or other catastrophic events. For more information on the selection and establishment of a cover crop, contact your cooperative Extension office.

Here's a list of selection and establishment tips for August.

1. What cover crop species works ‘best’ overall on your farm and in your crop rotation? To answer this question, establish two or more test strips (10 X 50 feet) long or longer with different types of cover crop species or mixtures for one season. Note the cover crops emergence and establishment capabilities. Seed company suppliers often supply a grower with a 1 to 5lb trial bag of seed. For example, for a single test plot, sow winter rye in early September at a rate of about three quarters of a quart of seed per each 1000 square feet of area.

2. Think ‘spatial niches’. In vegetable plantings, strip-cropping provides a simple method for rotating a cover crop with a vegetable planting. Field strips or beds of a Fall or Spring planted cover crop are alternated with strips of early-planted vegetables like potato, onion, cabbage, lettuce or peas. Adjust the width of your fields to accommodate easier cover crop seeding using your seeding equipment as a standard. Strip cropping is a low cost, low input way of getting the benefits of a cover crop

3. Even in plastic mulch systems, one method being evaluated is seeding a cover crop in the Spring between raised beds and/or plastic mulch rows for crops like tomato, pepper and eggplant. Planting or mulch layer strips that are 5 feet wide are worked several weeks later for the cash crop.

4. Less common is interplanting or interseeding a cover crop as a companion crop between the rows of tomato or cole crops. Careful sequencing and an irrigation source ensures the growth of both are not hindered. For interseeding to work, sow the cover crop with only vigorous vegetable crops (sweet corn, cabbage, winter squash, not onions or carrots) and only after that crop is well established, around the time a cultivator could get in for the last time.

5. Winter annuals cover crops like rye and wheat work best with warm-season crops like peppers, tomatoes, sweet corn, melons, squash, pumpkins and sweet potato. A wet Spring often limits incorporating the cover crop for early crops like kale potato, lettuce, onion, cabbage, broccoli, radish, beets and carrots.

6. A full-season cover crop can add significant fertilizer and organic matter to the soil. Plan for it annually in your crop rotation plans for each field.

7. Try a new cover crop species like hairy vetch alone or in combination with rye or oats. One application is increasingly popular on raised beds. Prior to planting a cover crop in early September, plow, disc and establish permanent (2 to 3 year), 4-8” high raised beds. Plant 25 to 40 pound per acre of a legume like hairy vetch. Allow 60 days before a hard winter freeze to get the legume established. In late Spring, the cover crop is killed by mowing or a herbicide application and becomes a mulch layer for no-till seeding or transplanting of tomatoes, melons, peppers and pumpkins. Seed a new cover crop on the existing beds after your vegetable harvest. Hairy vetch can contribute up to 100 lbs or more of available nitrogen per acre to a vegetable crop the following Spring.

8. The cover crops of ‘choice’ for quick establishment in the Fall for soil erosion control include winter rye, forage-type ryegrass or crimson and sweet clover.

9. Deal in reality. Cover crop systems do require time, money and management. If not properly managed, cover crops can actually interfere with the vegetable crop. Find the least expensive cover that meets your goals. Low cost cover crops like rye range from $21 per acre up to high cost covers using vetch at $60. To save time and money, use minimal soil preparation prior to seeding. Conventional seedbeds that are plowed, disked and harrowed require time and labor. Keep lots of residue on the surface.

10. Know the optimal seeding time and rate for each cover crop. Desirable seeding dates include Sept. 1 to Nov. 10 for rye, Sept. 1-Oct. 1 for a rye/vetch mixture and July 15-Aug. 20 for ryegrass/sweet clover mixture. For late cover crop plantings (Oct/Nov), look at the 7 day or longer weather forecasts for your area. Does the seed have enough time to germinate and establish itself before Winter. If they are predicting rain, plant prior to it.

11. Know the characteristics and organic matter content of your soil type. On some soil types, cover crops

allow earlier field entry and planting in the Spring. Cover crops like alfalfa, barley or white clover require good soil drainage or high nitrogen. For wet sites, use alsikes clover or winter rye. For low fertility sites with low pH, use pearl millet, barley, alsikes clover or birdsfoot trefoil.

12. How will you get your cover crop established? Think 'big' picture. Small-scale farm equipment, drills and precision seeders for small areas are hard to find. Lawn equipment rentals often offer useful equipment (if its working properly) for small farms.

13. Get recommendations from your Cooperative Extension office on seeding rates and its need for incorporating residues. For cover crops established for grain production or for use as a forage crop, use higher seeding rates.

14. Before choosing a seeder, consider the cost to operate. Growers may find an old 'barrow' seeder useful for small areas while electric hand-held or tractor mounted spinner- seeders in larger areas.

15. Many cover crop species are small-seeded. As a result, shallow incorporation is required. Smaller cover crop seed (legumes, ryegrass, etc.) tends to adapt best using broadcast application equipment rather then a grain drill. Whenever broadcasting seed rather then using a drill, increase the recommended seeding rate slightly. Grain drills tend to establish a better stand and use 20 to 50 percent less seed then a stand established using broadcasting equipment. Grain drills and push-seeders lack what custom-seeders have, a cultipacker to firm the soil. An ideal seed placement recommendation for winter annual grains is 1 1/2 inches deep.

16. Is your main goal Spring and Summer weed control? Fall planted cover crops compete with weeds better in the Spring then a Spring-planted cover crop. Consider using a summer and winter cover crop to transition from a fallow or uncultivated areas of pasture to cropland intended for vegetables.

17. Take a soil test before planting. Cover crops require adequate soil pH and fertility. If needed, incorporate the recommended fertilizer or lime prior to planting using a disk.

18. Brassicas like rape, kale, turnip and radish establish quickly in cool weather. Any crop with a taproot like alfalfa or clover work well to break up compacted or hardpan soils.

19. Spring oats seeded alone or with vetch in late Summer or Fall provide an adequate protective winter cover. Oats winter-kill and do not regrow in the Spring. As a result, incorporating the cover crop is easier then other cereal grains.

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Bug vs. Bug

Cathy Thomas, Integrated Pest Management Program
PA Department of Agriculture

Before implementing a pest control program using natural enemies (biocontrols), give these issues some thought and careful planning.

The first issue to consider before starting a pest control program using natural enemies (biocontrol) is to know what pesticides have been used on the crop itself and in the greenhouse where you will be using biocontrols. Conventional classes of insecticides such as carbamates, chlorinated hydrocarbons, organophosphates, and synthetic pyrethroids can persist for many months on plants and on the greenhouse structure itself. Insecticides from these classes usually have a negative impact on natural enemies and on the bumble bees used for pollination. If you plan to use biocontrols, transplants should

not be treated with long residue pesticides. Check with the plant propagator if you do not start your own transplants.

The second issue is to determine what pesticides you can use along with the introduction of natural enemies. If a pest outbreak requires a spray treatment, use selective pesticides and spot spray when possible. A selective pesticide has these qualities:

• Non-toxic or slightly toxic to natural enemies (soft chemistry)
• Short persistence
• Does not inhibit development or reproduction of the natural enemies

Some compounds may be harmful to biocontrols at the moment they are applied, but may have a short persistence (i.e., natural pyrethrins). After the recommended time period has elapsed, beneficial insects can be introduced again.

Always consult your biocontrol supplier before applying any pesticide. Even though a particular pesticide label may state that the compound is safe to use in an IPM program, it may not be safe to use with natural enemies. On line information on the side effects of pesticides on beneficial insects can be obtained through this web site:
http://www.koppert.nl/e0110.shtml
A list of materials for approved for organic production can be found at this web site:
Organic Materials Review Institute
http://www.omri.org

Here are a few additional points to consider when using pesticides with natural enemies.

• Designate a sprayer for soft pesticides and use only in biocontrol houses

• Pesticide vapors from a non-biocontrol area may have a negative impact in other areas where biocontrols are being used.

• Keep accurate records of pesticides and biocontrols that are used and note the effectiveness of those treatments
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Pesticide Use Compatibility with Biological Controls (Prepared by Cliff Sadof, Purdue University and Michael Raupp, University of Maryland)

Botanicals
Pyrethrins – somewhat compatible, short residue but very broad spectrum. Can be used to cleanup a pest population, one to two weeks (check with biocontrol supplier) before biocontrols are introduced.

Azadirachtin – compatible, insect growth regulator derived from seeds of the neem tree, controls larval stages of insect pests.

Microbial insecticides (pathogen biological control agents)

Bacillus thuringiensis var. *kurstaki* – highly compatible, targets caterpillars. Larval stages must feed on plants parts containing the bacteria.

Bacillus thuringiensis var. *israelensis* – highly compatible, targets fungus gnat larvae.

Beauvaria bassiana (fungus) – compatible, kills some soft bodied predators, short residue, broad spectrum.

Steinernema feltiae (Nematode) – compatible, targets fungus gnat larvae, low toxicity to humans.

Others

Horticultural Oil – compatible, active when wet, kills soft-bodied insects; pupal stage parasitoids not killed.

Insecticidal Soap – compatible, active when wet, kills soft- bodied insects, pupal stage parasitoids not killed

Please phone or email me if there are specific issues you would like me address in this column.
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The Organic Way- Use of Compost and Manure in Small Fruit Production

Elsa Sanchez, Assistant Professor of Horticultural Systems Management and
Kathy Demchak, Senior Extension Associate, Small Fruits

Compost

Compost can be an important part of small fruit nutrient management. In addition to adding nutrients to the soil, compost can improve long-term soil health. Composts are best when used in combination with other nutrient management strategies including raw manures, green manures, fertilizers and crop rotations. According to the National Organic Standard, compost can applied as necessary provided the compost meets carbon to nitrogen (C:N) and temperature requirements and has not been treated with prohibited substances. When using compost it must have a C:N ratio between 25:1 and 40:1. In addition, when using an in-vessel or static aerated pile system for composting the pile must reach a temperature between 131ºF and 170ºF for a minimum of three days. If using a windrow system for composting, the pile temperature must be maintained between 131°F and 170°F for a minimum of 15 days and turned a minimum of five times during that time. A compost log should be used to document that the composting procedure meets protocol. If the compost used is purchased, it must also have been produced in adherence with these requirements.

The nutrient content in compost varies depending on source materials and composting protocols used; therefore, it is recommended that compost be tested to determine the amount of nutrients it contains (kits are available through local county Extension offices). Finished compost typically has 0.5 to 2.5 percent 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. This percentage is referred to as the availability coefficient. Phosphorus in composts, like nitrogen, is in an organic form that is not immediately available for plant use. As phosphorus is changed to a form useable by plants, some of it binds to soil particles and is again unavailable for plant use. Because of this, compost generally contains very little phosphorus for plant use and phosphorus from alternate sources is typically needed to meet plant requirements. Potassium in composts is in a form that is readily available for plant use, but it is also water-soluble and therefore can leach out of compost piles. Placing a cover over a compost pile can help reduce the amount on potassium lost to leaching. In addition to determining the nutrient content of

compost, it can be useful to determine the pH because it can be unsuitably high for small fruit production, particularly for blueberries, which grow optimally in low pH soils.

When using composts, it is best to apply it based on crop needs rather than on a depth basis for long-term soil health. Studies have shown that this is especially the case when growing in high tunnels. The environment within high tunnels excludes factors that assist in the breakdown of compost (for example, rain). Applying compost on a depth basis in high tunnels can increase soil nutrient and soluble salts to well above optimum levels and compromise yields. Compost can be applied based on the amount of nitrogen, phosphorus or potassium the crop needs. Most commonly compost is applied based on the nitrogen requirements of the crop because nitrogen most often is limiting for plant growth.

To calculate how much compost to apply based on the nitrogen needs of a crop, first determine the total amount of nitrogen contained in the compost. Generally this is given in units of pounds per ton or as a percent. If total nitrogen is given as a percent, multiply this number by 20 (2000 lb/ton X 0.01 to change the number from a percent to a proportion) to determine the pounds of nitrogen per ton of compost. Next, determine the availability of the nitrogen in the compost. A general rule is 10% of the organic nitrogen will be made available to the plants in the first year. Finally, determine the amount of nitrogen needed by the crop. Remember to subtract nitrogen added from other sources (e.g., green manures or fertilizers) from the amount of nitrogen needed by the crop. To calculate the application rate of the compost, multiply the total amount of nitrogen in the compost by the availability coefficient of the nitrogen. Then divide that number by the amount of nitrogen needed by the crop.
For example, a compost has 1.1% total nitrogen on a wet weight basis and analysis has indicated that a June-bearing strawberry planting needs 30 pounds of nitrogen per acre.

Step 1: Convert the 1.1% total nitrogen to units of pounds per ton by multiplying 1.1% by 20. The result is 22 pounds of nitrogen are contained per ton of compost.

Step 2: Determine how much nitrogen will be made available to the plant and multiply it by the amount of total nitrogen in the compost. The result is 2.2 pounds of nitrogen per ton (22 pounds per ton X 10%).

Step 3: Determine how much nitrogen needs to be applied to meet the needs of the crop and divide it by the amount of nitrogen available from the compost. The result is 13.66 tons per acre (30 pounds of nitrogen needed per acre ÷ 2.2 pounds of nitrogen per ton) of compost needs to be applied to supply the plants with 30 pounds of nitrogen per acre.

Timing the application of compost is different than for adding chemical fertilizers because nutrients are generally slowly made available to plants. When applying compost, timing must be adjusted to account for decomposition and the subsequent release of nutrients. For example, June-bearing strawberries have a high nutrient demand in the fall as they produce flower buds for the crop the following season. Compost may need to be applied in the summer so it will have sufficient time to decompose and release nutrients in time to meet plant needs in the fall. Applying compost at improper times can result in vigorous plant growth late in the season. This delays hardening off of the plants and can lead to winter injury. Additionally, when compost is applied to raspberry plantings, use a fine compost because primocanes have difficulty emerging through large clumps.

Raw Manures
As with composts, raw manures can be used as a part of a nutrient management system. They also are best when used in combination with other nutrient management strategies. However, for reasons outlined below, manures are better suited for use during soil preparation prior to planting small fruit crops rather than after the crop has been planted. Composted manures are a better option for application after the small fruit crop has been planted.

According to the National Organic Standard, raw animal manures can be used anytime when needed on fields planted with crops not intended for human consumption, such as on green manures or cover crops. When raw manures are used on fields that are planted in crops for human consumption with the edible

part of the crop not in contact with the soil (e.g., trellised brambles, highbush blueberries, gooseberries, currants), the manure must be soil incorporated a minimum of 90 days before harvest. When raw manures are used on fields that are planted in a crop for human consumption with the edible part of the crop in contact with the soil (e.g., strawberries), the manure must be soil incorporated a minimum of 120 days before harvest. The use of sewage sludge is prohibited in certified organic production. Even non-organic growers should be aware that there are site- and crop-specific restrictions that limit sewage sludge application to cropland, as outlined in state (and possibly local) regulations.

Tables listing the nutrient contents of different manures are available, however nutrient content varies depending on several factors including the feed the source animal was provided, presence of bedding in the manure and manure handling. Also, nutrient availability decreases as the manure ages. Therefore, as with composts, it is recommended that manures be tested for their nutrient content. Manure is typically applied based on the nitrogen needs of the crop. Fact sheets are available through cooperative Extension with detailed calculations for determining application rates for manures (for example, Estimating Manure Application Rates, Penn State Publication CAT UC151).

Nitrogen contained in manures is in the form of ammonia or ammonium, which can be quickly lost, through volatilization, to the atmosphere. To avoid this nitrogen loss, raw manures are soil incorporated. Soil incorporating manures can be a challenge for small fruit crops because the plants are perennial and have shallow root systems that can be damaged during incorporation. Applying manures to the small fruit crop can also damage the plants because of potentially high nitrogen and salt levels in manure. Additionally, manures can be contaminated with human disease causing organisms, which can be transferred to fruit. Manures can also have high weed seed levels, which can complicate production. It has been documented on vegetable crops that as manures decompose they can release compounds which when taken up by plants can lead to vegetables with off-flavors and odors. This may or may not be the case for small fruit crops. However, for these reasons, manures are recommended for use during soil preparation prior to planting small fruit crops rather than after the crop has been planted.

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That's a Berry Good Question!!!

Kathy Demchak, Small Fruits Specialist, Department of Horticulture

Q. Many strawberry growers are dealing with fields full of thistle and broadleaves and don't want to go into the winter with fields looking like this. Now what can they do?? (Steve Bogash, PSU Coop. Extension)

A. Unfortunately, there are few options for perennial weed control on strawberries. When people have problems with thistle, the current material that helps the most is Stinger™; however, you'll notice the timing for postharvest use on the Stinger™ label is "from after harvest to early fall". This is because a few years ago, there had been some phytotoxicity issues with Stinger™ when it was used later in the fall. Consequently, an option for thistles now (besides hand-pulling) is to burn the tops off with Gramoxone. This is only for weeds between the rows, since you don't want to burn the tops off of your strawberries. The thistles will come back, but then can be treated next spring with Stinger™, if applied at least 30 days before harvest. Other broadleaves for which Stinger™ is useful include clovers, curly dock, dandelion, groundsel, ragweed, red sorrel, and vetch. Another spring herbicide option is 2,4-D. It doesn't work quite as well on the thistles as Stinger™, but is especially useful for dandelions that often poke through the straw on matted-row plantings before the strawberries do. Some growers apply the 2,4-D right overtop the straw in the spring, applying it to the emerging dandelions while the strawberry plants are still protected by the straw. Other options for established perennial broadleaved weeds are few, though Sinbar® should be applied late this fall before straw mulch application or early next spring after straw mulch is pulled back in matted rows to keep them (and annual broadleaves) from multiplying further via

seed. The days-to-harvest limitation on Sinbar is 70 days, so if applied in the spring, care needs to be taken with timing on early cultivars. If this is a plasticulture planting, keep in mind that no herbicides should ever be sprayed overtop the plastic, as the herbicide is "concentrated" into the planting holes and damage to the plants is likely.

Got a question? Chances are that someone else has the same question, but isn't asking! Send your question to Kathy Demchak, at 102 Tyson Bldg., University Park, PA 16802, or via email to kdemchak@psu.edu. You will be credited with the question, or can remain anonymous, as you wish.

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Potato Musings

Bill Lamont, Department of Horticulture

Potato Storage Managment

Bill Lamont, Department of Horticulture

(The article was taken from Bill Bohl, Extension Educator's newsletter, the Spudvine, and was written by Nora Olsen and Gale Kleinkopf from the University of Idaho).

Placing problem potatoes into storage can't make them better, but properly managed storages can help maintain quality and minimize deterioration of good quality potatoes. Managing storages includes making sure your storage has proper ventilation and temperatures and no condensation problems. Other concerns are sprouting, pressure bruise potential, sugar development, and disease problems.

Unless there is a need to dry out wet or rotting potatoes, always humidify ventilating air. To help avoid condensation, make sure the ventilating air is slightly cooler than tubers at the bottom of the pile. Free water on potatoes will initiate or accelerate and water rot problems in tubers.

Since uniform air distribution with the storage is needed for maintaining tuber quality, eliminate as much dirt and debris as possible as the potatoes are being placed in storage. Remember, however, that excess ventilating air can lead to tuber dehydration and increased shrinkage. This can result in lost tonnage and decreased tuber quality. To minimize tuber weight loss and reduce the chances of having pressure bruise in your potatoes, maintenance of proper ventilation, temperature and humidity are important. Humidity levels should be above 90 percent and preferably at 95 percent or more.

To determine if your storage will properly keep potatoes, check out this brief list of overall basics of storage management.

Facility Preparation

Repair all insulation materials to minimize the potential for condensation.
Clean plenum and duct ports thoroughly.
Replace worn humidity equipment and high-pressure nozzles.
Check for corrosion on all surfaces that may limit the life of the storage facility.
Service the air system and check all fans for proper balance.
Check the air delivery system by adjusting all ports or ducts for optimum and consistent airflow.
Repair or replace worn components on air louvers, both fresh air and exhaust.
Calibrate all computerized sensors that are used for control functions.
Service the relative humidity supply systems-check for mineral deposits and eliminate clogged flow paths.
Operate your storage for conditioning before the potato crop is delivered.

Know the quality of the incoming potatoes and the potential problems that might arise in storage. Protecting the quality of the stored tubers is the goal of all storage management.

During Potato Delivery

Tape all duck seams to improved system performance-open seams will reduce air delivery consistency.
Harvesting and handling operations should deliver a minimum of 75 percent bruise-free potatoes for both short and long term storage.
Check pulp temperatures of potatoes going into storage-ideal temperature range is a minimum of 48oF to a maximum of 60o F. Suspend harvest operations, whenever possible, until pulp temperatures in the field are in this temperature range.
Limit potato pile height to 16 to 18 feet to minimize pressure bruise. Remember that pressure bruise can be variety dependent.
Operate fan and humidity systems as soon as the first ducts are covered. This early operation helps to remove pulp temperature differences between fields, truckloads and time of day.
Clod and debris removal from the incoming loads is important to achieve optimum air circulation performance in the pile from the ventilation system.
Fill each storage facility with potatoes destined for similar end uses.
Close storages as soon as filled to rapidly achieve temperature equilibration of the pile.
Maintain pulp temperatures at 50 to 55o F for 2 to 3 weeks for proper would healing. Relative humidity of 95% is always recommended for wound-healing period and for continued short or long term storage.
Reduce pile temperatures slowly, approximately 2 to 3o F per week, to a holding temperature of 45 to 48oF for processing, 42 to 45oF for fresh pack, 50 to 52oF for chipping stock.
Continue to monitor the storage daily for operational continuity and for any potato problem that might occur. Air circulation times should be set to maintain the pile temperature less than 2oF difference from bottom to top. Continuous fan operation at reduced airflow or speed is capable of maintaining the desired temperature control of the pile while reducing energy costs of fan operation.
Sprout control should be done by certified applicators. The type of inhibitor or time of application may vary with different varieties.

During Unloading

Maintain storage air supply during storage unloading to minimize quality losses. Remember that good storage management during the unloading operation includes adjustment of duct airflow to maintain consistent supply to all parts of the remaining pile.

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Upcoming Meetings

Bill Lamont, Department of Horticulture

Local

Nov 3 and 4, 2004. 2004 Mid-Atlantic Vegetable Workers, Howard Johnson's in Newark, DE. Contact Joanne Whalen at jwhalen@UDel.Edu.

November 16, 2004. 2004 Western Pennsylvania Vegetable and Berry Growers Seminar, Days Inn, Butler, Pa. Contact: Eric Oesterling, (724)-837-1402.

Regional

January 19-21, 2005. Ohio Fruit and Vegetable Growers Congress , Toledo SeaGate Convention Centre and Radisson Hotel, Toledo, OH. Contact: www.ohiovegetables.org

February 1-3, 2005. Mid-Atlantic Fruit and Vegetable Conference, Hershey, PA. Contact: Bill Troxell (717)-694-3596 or e-mail: wt.pvga@tricountyi.net

February 14-17, 2005. Empire State Fruit and Vegetable Expo, Omni Center, Syracuse, N.Y.

National

December 7-9, 2004. Great Lakes Fruit, Vegetable and Farm Market Expo, DeVos Place,, Grand Rapids, MI. Contact: www.glexpo.com.

January 9-10, 2005. Wisconsin Fresh Fruit and Vegetable Conference. Holiday Inn Conference Center, Stevens Point, Wis. Contact: (920) 478-3852.

International

August 28-31, 2004. 17th International Lettuce and Lettuce and Leafy Vegetable Conference, Quebec, Canada. Contact: Dr. Sylvie Jenni (450)-346-4494 ext. 213 or jennis@agr.gc.c