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College of Agricultural, Consumer, and Environmental Sciences

Illinois Fruit and Vegetable News

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a newsletter for commercial growers of fruit and vegetable crops

"We are what we repeatedly do. Excellence, then, is not an act, but a habit." Aristotle

Address any questions or comments regarding this newsletter to the individual authors listed after each article or to its editor, Rick Weinzierl, 217-244-2126, weinzierl@uiuc.edu. The *Illinois Fruit and Vegetable News* is available on the web at: <http://www.ipm.uiuc.edu/ifvn/index.html>. To receive email notification of new postings of this newsletter, call or write Rick Weinzierl at the number or email address above.

This is the final issue of the 2007 prescription year. For readers who receive this newsletter by US Mail, a subscription form for 2008 is attached. For those who view this newsletter on the web and would like to subscribe and receive printed copies by US Mail, please contact Rick Weinzierl at weinzierl@uiuc.edu.

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University of Illinois Extension Specialists in Fruit & Vegetable Production & Pest Management

Upcoming Programs

- **March 4-5, Small Fruit and Strawberry Schools, Holiday Inn, Mt. Vernon, IL.** The program is available online at http://web.extension.uiuc.edu/regions/hort/PDF/FruitStrawberrySchool_Program2008.pdf. For more information, contact Jeff Kindhart (618-695-2444, jkindhar@uiuc.edu) or Bronwyn Aly (618-695-2444, baly@uiuc.edu).
- **2008 Sustainable Agriculture Tours Scheduled.** For the sixth consecutive year, University of Illinois Extension is offering tours that highlight sustainable agriculture operations around the state of Illinois. Not all of these tours involve fruit or vegetable production, but the overall schedule for the 2008 sustainable agriculture tours is:
 - May 13, Eagle Dancer Ridge Llamas, Inc. in East Peoria (www.edrlamas.com/).
 - June 20, Learn Great Foods in Mount Carroll (www.learngreatfoods.com/).
 - July 11, Lyons Fisheries in Sandoval.
 - July 22, Cedar Valley Sustainable Farm Community Supported Agriculture (www.localharvest.org/farms/M5067)
 - August 8, University of Illinois Dixon Springs Agricultural Center, Dixon Springs (www.cropsci.uiuc.edu/research/rdc/dixonsprings) This tour is being co-sponsored by the Upper Midwest Organic Tree Fruit Growers Network (www.mosesorganic.org/treefruit/).
 - September 8, Iyabo Farms in Hopkins (www.sustainusa.org/familyfarmed/profile_iyabo.html).
 - October 3, Mill Creek Farm in Quincy (www.millcreekfarmquincy.com/).

A fee of \$20 per person will be charged for each tour, which includes lunch. Registration at least one week in advance is required. Visit www.extension.uiuc.edu/smallfarm/ to register and for more details about each of the tours, including a map and agenda. To register by phone, contact Donna Cray at 217-241-4644. For more information, contact Deborah Cavanaugh-Grant (217-968-5512; cvnghgrm@uiuc.edu).

Regional Updates

At the Dixon Springs Ag Center, after the recent ice storm brought us a hiatus from electricity, we are quite convinced that electricity is one of those technologies that really make life better. The area children, including mine, would like to have been excited

to be off from school, but somehow it was less fun to stay home with no computers, heat, or lights. Tomato seedlings we had started for use as high tunnel transplants, became part of the family and spent evenings with us huddled around the fireplace. There was a second ice storm last week, but it was much weaker and nearly everyone remained with power. We continue to seed and pot transplants for this season's research projects and hope to finish pruning apples and blueberries over the next few days.

Remember: The Illinois Small Fruit and Strawberry Schools will be March 4 and 5 in Mt Vernon. For more information and a copy of the program click [here](#) or call Jeff or Bronwyn at 618/695-2444.

Notes from Chris Doll

February 2008 has been an OK month for some of us. For the growers in the southern part of the state that had the heavy ice storm coupled with loss of power, it has been a memorable month. As with the local ice storm 13 months ago, the damage to fruit trees was reported to be minor because they have been pruned to support loads of fruit. Inspection of peach flower buds reveals low percentages of kill. And in spite of the dry summer without a fruit crop, there are plenty of buds for a crop. Temperatures this month have been about average, in contrast to the 5th coldest February in 2007. Only one 70-degree day has been recorded, and the past week has been cold. The winter minimum has been 2.3 degrees so far. Precipitation amounts have been variable for the area, enough to make the surface moist, but not enough locally to re-charge the subsoil.

Pruning has been ongoing on good weather days. The calendar says that most crops can be pruned at this season, but the cautions about pruning young trees, especially peaches, at the end of winter remains in effect. Brambles can be pruned, and those that do lots of tip rooting like black raspberries and thornless blackberries can have the rooted tips pulled from wet soil during the process.

The chances of a late winter/spring freeze diminish with the passing of each day. Tree fruit growers can keep a wary eye out for the Alberta Clippers that might come down and then hope and pray that all is well. The Floral Development and Critical Temperature Charts for Flower Bud Kill are again published on pages 54 and 55 of the [2008 Midwest Tree Fruit Guide](#). These charts are also an easy site to record the dates of phenological development of tree crops and can be used for annual comparisons if maintained in the files.

Time spent comparing the 2008 Spray Guide with the 2007 edition may be needed to stay abreast of the introduction of new pesticides and the many trade names available. In the 2008 edition, ADAMENT and Gem are new fungicides, and Beleaf, Decis, Delegate, Mustang Max and Renounce are new insecticides that I found. The table of Generic Insecticides on pages 39-40 increased in number of brand names to 52 in 2008 from 30 in the 2007 book. New products and chemistry keep coming, hopefully for the better.

The Illinois Small Fruit and Strawberry Schools are scheduled at the Mt. Vernon Holiday Inn on March 4 and 5. Some outstanding speakers are on this year's program. Details and programs can be obtained by contacting Jeff Kindhart or Bronwyn Aly, listed in the directory at the end of this issue. I summarized the history of the Strawberry School in the Proceedings four years ago. While going through the records for 1968 (40 years ago), the post-meeting headline read "Panel discusses Migrant Labor," with a comment about a "sometimes heated discussion". Sometimes the wheel makes another revolution.

Peach growers might be alerted to watch for an increase in "twinning" this spring. The last year that it was a significant problem was in 2000, which followed a hot summer of 1999. I visited with Dr. Desmond Layne about this in Springfield last month, and he indicated that high temperatures and drought stress can cause some physiological problems with floral development. If you want to read more about this, it was reported by L. D. Tucker in the 1936 Proc. Amer. Soc. Hort. Sci. 33: 237-239 and for a similar situation in sweet cherries in the February 15, 2008 issue of the Good Fruit Grower, pages 24-26.

Chris Doll

Fruit Production and Pest Management

Notes on Small Fruit Insects, Insecticides, and Reference Materials

As the Illinois Small Fruit and Strawberry School approaches (March 4-5, check the *Upcoming Programs* list above), it may be a good time to provide some updates on a few key insects, new (and old) insecticides, and valuable references.

- Western flower thrips have been a problem for Midwest strawberry producers for several years, and growers should be prepared to control them as needed in strawberries in 2008. Winged adults of this insect migrate into the region each season on spring and summer weather fronts, and the timing and magnitude of that migration differs from year to year and from

location to location. Thrips feeding on strawberries from bloom through early stages of berry formation result in small, seedy berries that fail to ripen normally. Berries usually are normally shaped however, unlike berries damaged by lygus bugs, where feeding injury usually results in distorted growth. Sample for western flower thrips in strawberries by tapping blossom clusters into a small white pan or dish and looking for the tiny yellowish-brown thrips crawling about on the white background. The threshold for control is a little vague – 2 to 10 thrips per blossom – but that’s as specific as research data allow. Control thrips from blossom bud stage until all berries that will be harvested have reached a dime-sized diameter. Lorsban may be used very early in the control period (if needed); its Preharvest interval (PHI) is 21 days, however, so application must precede the time that most blossoms have opened. Several other insecticides labeled for use on strawberries will provide some thrips control; products that have short PHIs and have been observed to be effective include Brigade (0-day PHI), Danitol (2-day PHI), and Endosulfan (4-day PHI). Brigade and Danitol are Restricted-Use pesticides; users must have a pesticide applicator’s license. For organic growers, Entrust or neem-based products give some control.



Left and center: western flower thrips (Texas A & M and Oregon State Univ., respectively); right: berry injury (Virginia Tech.).

- Separate phases of grape phylloxera cause leaf galls and root galls. For winter hardiness and resistance to the root phase of grape phylloxera, using North American-French hybrids and /or rootstocks derived from North American grapes has long been recommended for successful grape production. Insecticides can be used to kill the leaf phase of grape phylloxera, but timing and insecticide choice are both important for success. Until a few years ago, the active ingredient endosulfan (as Endosulfan 50WP or Thiodan 50WP) was the most effective product available, but it also causes plant injury in several varieties. Danitol and Assail now are labeled against foliar phylloxera, and no plant injury problems have been associated with the use of these insecticides. Admire-Pro also is labeled for soil application and systemic uptake into leaves for phylloxera control. The general recommendation for timing has always been one application at bloom and a second 10-14 days later, with the idea that this corresponds to the time that most phylloxera nymphs are moving from bark to leaves and initiating galls, so they are exposed to spray residues and subject to control. Donn Johnson of the University of Arkansas spoke at the Illinois Specialty Crops and Agritourism Conference in January and suggested that timing might be refined a bit by wrapping black electrical tape sticky-side-out around upper canes just before bloom and looking for the tiny yellow crawlers on the tape twice weekly to identify the right time for sprays. He also noted that the period of movement of nymphs from bark to new leaves begins 400 to 800 degree-days base 50F after March 1. Where Admire-Pro is used as a soil application, reason says that a few days are required for uptake and movement to leaves.



Left: leaf galls caused by grape phylloxera (Univ. of Illinois). Right: Grape phylloxera on a root (Ohio State Univ.).

- Raspberry crown borer is a clearwing moth, the larval stages of which tunnel in and destroy roots and crowns of raspberries and blackberries. Completion of its life cycle in Illinois requires 2 years, and adult moths fly and lay eggs in August and September. Eggs are deposited on foliage, and first-stage larvae crawl down the canes to the base of the plant in the fall of the year. They tunnel into the cane just below the soil surface to form a blister-like cell in which they overwinter. They remain vulnerable to an insecticidal drench at this stage (until they tunnel deeper into root and crown tissue). The insecticides we used to recommend to control raspberry crown borer – Guthion and diazinon – are no longer registered. Donn Johnson of the University of Arkansas has found that bifenthrin (Capture or Brigade) is effective when applied to the lower canes as a drench in the fall or spring (6.6 fl oz of the 2EC formulations in 50 gal of water per acre); timing in Illinois should range from September through early November or from April through early May.



Raspberry crown borer adult (left) (New York Ag. Exper. Station); and larvae (right) (Univ. of Idaho)

- The [2008 Midwest Commercial Small Fruit and Grape Spray Guide](#) contains several new insecticide listings, including:
 - Renounce 20WP, a new formulation of cyfluthrin (same ingredient as in Baythroid), is labeled against flea beetles, climbing cutworms, grape berry moth, and leafhoppers in grapes. It is also effective against other beetles, including multicolored Asian lady beetle as a pest at harvest time, and its PHI in grapes is 3 days.
 - Venom 70SG (dinotefuran) is labeled for use on grapes against leafhoppers and against multicolored Asian lady beetle at harvest; the PHI is 1 day for this formulation, applied as instructed on the label.
 - Capture and Brigade (2EC formulations of bifenthrin) are labeled against raspberry crown borer in brambles. See the note above about timing and application methods.
 - Several miticides are labeled for use strawberries against twospotted spider mite; they include Agri-Mek, Savey, Acramite, Zeal, Kelthane, Kanemite, and Oberon. Danitol also gives some mite control in strawberries.
 - The active ingredient spinetoram is labeled for use on grapes, brambles, and blueberries under the trade name Delegate and for use on strawberries under the trade name Radiant. This ingredient is a synthetic mimic of the spinosyns and is related to SpinTor and Entrust. Target pests are primarily Lepidopteran larvae such as leafrollers and grape berry moth, and it MAY be effective against thrips. Entomologists in the lower Midwest have no regional data on spinetoram, so these products are listed in the table of registered insecticides in the Spray Guide (page 46) but not in the tables of recommended products for each crop.
 - Page 48 of the Spray Guide lists generic products that contain the same active ingredients as several common “original” products.
- Publications that contain valuable information on pest management for small fruit growers include:
 - [2008 Midwest Commercial Small Fruit and Grape Spray Guide](#), available in print for \$9.00; contact Elizabeth Wahle at wahle@uiuc.edu or 618-692-9434 or University of Illinois ITCS at 1-800-345-6087 or 1-217-333-2007; mail Pubs Plus, University of Illinois, 1917 South Wright Street, Champaign, IL 61820.
 - [Midwest Small Fruit Pest Management Handbook](#), available in print from University of Illinois ITCS for \$13.00; call 1-800-345-6087 or 1-217-333-2007; mail Pubs Plus, University of Illinois, 1917 South Wright Street, Champaign, IL 61820.
 - [Midwest Strawberry Production Guide](#), available in print from University of Illinois ITCS for \$12.00; call 1-800-345-6087 or 1-217-333-2007; mail Pubs Plus, University of Illinois, 1917 South Wright Street, Champaign, IL 61820.
 - [Midwest Grape Production Guide](#), available in print as Bulletin 919 from Ohio State University Extension, Media Distribution, 385 Kottman Hall, 2021 Coffey Road, Columbus, OH 43210-1044. Phone: 614-292-1607. Fax: 614-292-1248. E-mail: pubs@ag.osu.edu. (\$10.50 w/ shipping).
 - [A Pocket Guide for Grape IPM Scouting in the North Central and Eastern United States](#). Order for \$14.00 from MSU Bulletin Office, 117 Central Services, Michigan State University, East Lansing, MI 48824-1001; phone: 517-353-6740.

- o **A Pocket Guide for IPM Scouting in Highbush Blueberries.** Order for \$14.00 from MSU Bulletin Office, 117 Central Services, Michigan State University, East Lansing, MI 48824-1001; phone: 517-353-6740.

Rick Weinzierl (217-244-2126; weinzier@uiuc.edu)

Vegetable Production and Pest Management

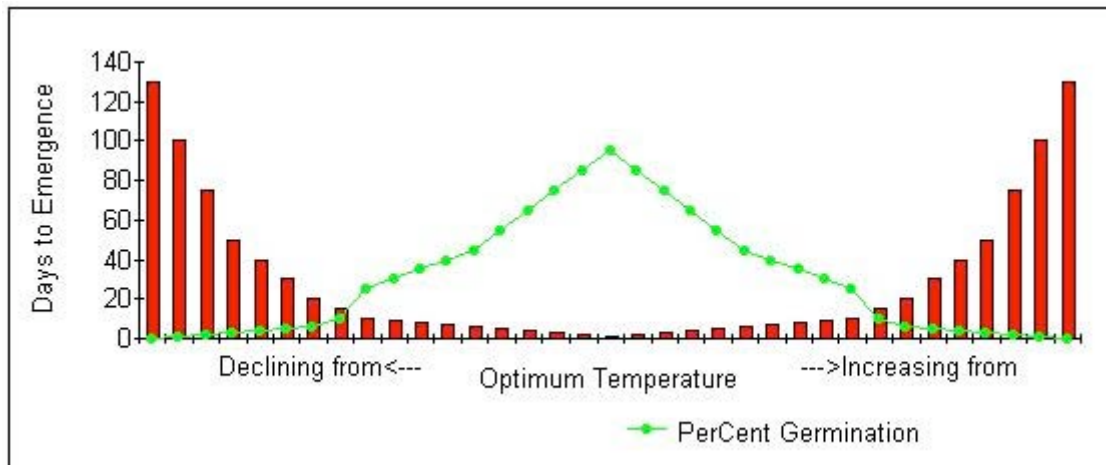
Transplant Production Tips – Part I

It is time to start thinking about transplant production for vegetable growers. Here are some things growers should keep in mind for better results.

Clean up the greenhouse – pots, flats, tools, potting area, and germination chamber. Before we get started, we need to take time to clean up. Pots, trays, benches and the greenhouse should be washed with a disinfecting agent such as Green Shield or a bleach solution. This step lacks virtually any element of fun (unless you bleach your co-workers clothes or hair in the process), but is a very important starting point for a successful season. It is critical that any winter annuals that may be growing inside are removed as well as all dead, left-over plant material from last year. Sanitation 101 is important for greenhouse success.

Check seed that will be used from previous years. Although most of the seed a grower will use will probably be fresh seed ordered this year, it is fairly common to also use some seed left over from previous years. Longevity of the viability of seeds varies with species and storage conditions. For example, lettuce seed is normally only viable for one year, while tomatoes can be viable for four years. If you have a substantial quantity of old seed you will be using, it might be a good time to pull a sample and perform a germination test to make sure the seed is still viable. Tables with extensive lists of species and expected seed life can be found numerous places including *Knott's Vegetable Handbook* or at web sites such as Colorado State University's [Storing Vegetable and Flower Seeds](#).

The germination room or chamber is a very common component of larger greenhouse operations. Smaller growers should also consider developing an area that will afford the needs of germinating seed. These are principally heat and humidity for most vegetable crops. Light may also be a component for some seeds. Smaller growers might make modifications to an old refrigerator to convert it into a germinator. We need thermostatically controlled heat (can be from heat mats or lights etc.) and a method to keep the air moist such as a common table top humidifier. Many growers fail to achieve rapid uniform germination. This can be a very big problem for a lot of reasons, ranging from failing to get value from high priced seeds to leaving plants in the tray too long so that many of the seedlings are leggy even before they are potted. Vegetable production, not unlike computer programs, suffers from garbage in = garbage out. The impact of temperature on seeds germination is well documented. Providing optimal temperature for the species will decrease the time required for germination and increase the percent of normal seedlings produced.



Many of the common vegetable crop transplants that are raised in Illinois require much higher temperatures for seed germination than we will achieve by merely seeding flats and placing them in a greenhouse or on the top of our refrigerator in the kitchen (your spouse will like this, much like when you clean fish in the kitchen sink). You can find the optimum temperature for the seed you are trying to germinate in numerous locations including web sites such as the [germination table](#) presented by Tom Clothier.

These are some of the things you should be thinking about as the time to start your seeds approaches. Growers cannot afford to do a poor job producing transplants. It is difficult or impossible to overcome poor transplants, regardless of how great all of your other cultural practices may be, so let's vow to do a good job in raising our plants. More information on transplant production will be included in the next issue.

Jeff Kindhart (618-695-2444; jkindhar@uiuc.edu)

More on Planning Ahead ... Temperature Management for Postharvest Handling

Fruits and vegetables are alive at harvest and are still living as they pass through the marketing channels. Because they are alive, they respire. Respiration is a natural process that can result in the deterioration of quality in produce. As the produce respire, it uses water and sugar, which is not replaced. Maintaining sugar and water levels is critical to quality in harvested produce. So for the grower who wants to deliver a quality product, it is critical to manage respiration in produce after harvest.

Respiration cannot be eliminated, it can only be managed. The single greatest influence on respiration rates is temperature. At high temperatures, respiration in produce proceeds rapidly. At lower temperatures respiration slows down. At very low temperatures it can be reduced to a very slow rate, resulting in very little deterioration of the produce. As a result, techniques which cool produce are critical for managing post-harvest quality in fruits and vegetables.

The problem for growers is that cooling temperatures can result in physical or qualitative damage to produce. Any time the cooling process results in localized freezing, damage will occur to any fresh produce. However, there are many fruits and vegetables that can be cooled safely to temperatures just above freezing. If successfully stabilized at 32+°F, many produce items can have greatly increased shelf life and quality will diminish very slowly. Some of these items include such vegetables as broccoli, sweet corn and carrots. In fact, a popular post-harvest technique for these crops is to use slush-ice to cool and stabilize the temperature, and respiration, of produce in waxed-box containers.

Other produce items may be susceptible to chilling injury at such low temperatures. These items may need to be stabilized at higher temperatures. While this means they maintain a higher rate of respiration, it also means they will not suffer loss of quality due to chilling injury. Tomatoes may suffer loss of flavor if chilled below 50°F. Muskmelons need to be stabilized at similar temperatures, depending on their state of maturity. Several references noted in the previous article on post-harvest handling of produce (and listed again at the bottom of this article) provide detailed tables of data describing optimum cooling temperature ranges for produce.

Cooling produce after harvest is often referred to as “removing field heat.” This is acknowledging the fact that the mass of the product is warmer than it should be and a certain amount of energy will be required to remove that heat from the product. This is a basic principle of post-harvest handling of produce and has clear economic implications. Removing field heat can be expensive. Not removing field heat can be even more expensive, particularly as the distance between the field and the consumer's table grows. Preserving quality in produce is a race against time. Cooling lengthens that time and makes the race a little more comfortable to run, slowing the pace.

A number of techniques can be used to cool produce after harvest, but there may be ways for growers to limit the cooling “liability” after harvest. Field heat develops during the day, when sunshine drives warming of the environment, including the crop. After the sun goes down, the environment cools down, and so does the crop. So the crop goes through a daily cycle of warming and cooling. Harvesting in the late afternoon or evening can result in very high levels of field heat in the harvested product. Harvesting at daybreak, or just prior to daybreak, can result in the produce being at the low end of the cooling cycle so that growers will not need to provide as much energy to cool down the harvested product. The expense involved in cooling the harvested product will be minimized. In some cases, it may be eliminated, especially if the post-harvest handling period is short.

Another consideration for retail growers, especially those selling at farmer's markets, is that the source of the heat is sunlight. Exposure to sunlight is a critical factor in driving up the heat and respiration rate of produce. Direct exposure means that sunlight hitting the produce will be converted to heat, directly driving up the temperature of the produce. Making things worse, the respiration process releases heat within the produce, compounding the rise in temperature of the product. If the produce is in a container, the heat builds up in the container as well, resulting in a perfect storm of produce deterioration. The simple act of protecting produce from exposure to the sun can be critical to preserving the quality in the market.

Another technique that can help in the market is misting the produce. Most consumers recognize this as an accepted practice in produce markets but may not know why it is done. While it increases relative humidity and decreases transpiration of the produce, which is a good thing, it also leads to evaporative cooling. When the water released by the mister evaporates, it consumes energy from the atmosphere. The evaporative process results in cooler air around the produce, minimizing a rise in respiration rates and preserving produce quality.

More discussion of post-harvest handling of produce will come in following issues. Repeating the list from the previous issue of this newsletter, here are several good references on postharvest handling:

BOOKS

- Knott's Handbook for Vegetable Growers, Maynard and Hochmuth, Wiley Publishing
- Postharvest Technology of Horticultural Crops, AA Kader, UC-Davis Spec Pub #3311
- Small-Scale Postharvest Practices: A Manual for Horticultural Crops, UC-Davis Postharvest Technology Program Publication # 8E

WEBSITES

<http://attra.ncat.org/attra-pub/postharvest.html>

<http://postharvest.ucdavis.edu>

http://www.postharvest.com.au/Produce_Information.htm

<http://vric.ucdavis.edu/selectnewtopic.fruitveg.htm>

<http://pubs.caes.uga.edu/caespubs/pubcd/FS-100.htm>

<http://postharvest.ifas.ufl.edu/Postharvest%20Resources/Government%20Sites.htm>

Bill Shoemaker (630/584-7254; wshoemak@inil.com)

Less seriously ... A picture's worth a thousand words ... I'll leave the other 998 unwritten, but the caption speaks the first two ...



Redneck grill.

(from a message forwarded by Chris Doll)

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