



UNIVERSITY OF ILLINOIS EXTENSION

College of Agricultural, Consumer, and Environmental Sciences

Illinois Fruit and Vegetable News

Vol. 16, No. 18, February 7, 2011

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@illinois.edu. The *Illinois Fruit and Vegetable News* is available on the web at: <http://www.ipm.illinois.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.

In this issue ... note the revised dates for tree fruit programs in southern and southwestern Illinois. Kudos to Elizabeth Wahle and the local Extension staff members who managed to reschedule these after last week's storm

Upcoming Programs

2011 Illinois Specialty Crops, Agritourism, and Organic Conference presentations available online

Regional Updates (from Maurice Ogutu)

Specialty Crops and Local Foods Issues (Whole Foods seeking growers / suppliers; GAP and food safety notes from ISCAOC in January; AGR-LITE insurance)

Fruit Production Pest Management (Cold hardiness and winter stress, woolly apple aphid management)

High Tunnel Production Systems (Questions and answers and data from the DSAC from 2010)

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

Upcoming Programs

- **Southern Illinois Commercial Vegetable School, February 9, 2011.** Mt Vernon Holiday Inn, Mt. Vernon, IL. For more information, contact Elizabeth Wahle, 618-692-9434; wahle@illinois.edu.
- **Southern Illinois Commercial Tree Fruit School, rescheduled for February 10, 2011.** Franklin County Extension Office, 1212 Rt. 14 W., Benton, IL. Registration begins at 9:30 a.m. For more information, contact Elizabeth Wahle, 618-692-9434; wahle@illinois.edu.
- **Southwestern Illinois Commercial Tree Fruit School, rescheduled for February 16, 2011.** First Presbyterian Church, Hardin, IL. Registration begins at 8:00 a.m. For more information, contact Elizabeth Wahle, 618-692-9434; wahle@illinois.edu.
- **Western Illinois Fruit and Vegetable School, February 17, 2011.** Adams County Extension Office, 330 S. 36th, Quincy, IL Contact Mike Roegge at roeggem@illinois.edu or the Adams/Brown Extension Unit at 217-223-8380.
- **IL-WI Stateline Fruit and Vegetable Conference, February 21, 2011.** Union, IL, contact Maurice Ogutu at ogutu@illinois.edu.
- **Sales and Aggregation Meeting, Whole Foods and FamilyFarmed.Org, February 21, 2011.** 2:00-5:00 p.m., Best Western Ashland House, 201 E. Ashland Street, Morton, IL. For reservations, call 708-763-9920 or email info@FamilyFarmed.org. See note below under *Specialty Crops and Local Foods Issues*.
- **Sales and Aggregation Meeting, Whole Foods and FamilyFarmed.Org, March 1, 2011.** 2:00-5:00 p.m., Prairie Crossing Farm Bus. Development Center, 32400 N. Harris Road, Grayslake, IL. For reservations, call 708-763-9920 or email info@FamilyFarmed.org. See note under *Specialty Crops and Local Foods Issues*.
- **2011 MOSES Organic Farming Conference, February 24-26, 2011.** LaCrosse, WI, see <http://www.mosesorganic.org/conference.html>
- **Illinois Small Fruit and Strawberry Schools, March 1-2, 2011.** Mt. Vernon, IL. For more information, contact Elizabeth Wahle at 618-692-9434 or wahle@illinois.edu or Jeff Kindhart at 618-695-2770 or jkindhar@illinois.edu.

- **Greenhouse Tomato Short Course, March 8-9, 2011.** Eagle Ridge Conference Center, Raymond, Mississippi (close to Jackson and Jackson-Evers International Airport, Code: JAN). For more information, see <http://greenhousetomatosc.com>. Conference registration fee is \$125.
- **Meet St. Louis Retail and Foodservice Buyers, March 11, 2011.** Randolph County Farm Bureau, 1403 Hillcrest Drive, Sparta, Illinois, 8:30 a.m. to 5:00 p.m., for Illinois fruit and vegetable growers. For reservations, contact the Randolph County Farm Bureau at 618-443-4511 by March 7, 2011. Free, lunch provided.

2011 IL Specialty Crops, Agritourism, and Organic Conference presentations available online

Many of the speakers from the 2011 Illinois Specialty Crops, Agritourism, and Organics Conference have made their presentations from this year's conference available to us to post online. Most are in the form of PowerPoint presentations converted to pdf format. Keep in mind that these presentations do not contain audio or extra notes, but in many cases the slides contain adequate text and tables to convey key points. And, as the adage goes, "a picture is worth 1,000 words."

Here are the presentations that are available. A link to the presentations also is provided at the top of the home page for the *Illinois Fruit and Vegetable News* at: <http://ipm.illinois.edu/ifvn/>.

Pumpkin Workshop

Dennis Norton, [Pumpkin Production at Royal Oak Farm Orchard](#)
 Rick Foster, [Insect Management in Pumpkins and Other Vine Crops](#)
 Liz Maynard, [Performance of Pumpkin Varieties in Northern Indiana](#)
 Mohammad Babadoost, [Pumpkin Diseases: Observations from 2010 and Recommendations for 2011](#)
 Elizabeth Wahle, [Weed Control in Illinois Pumpkins](#)
 Alan Walters, [Performance of Pumpkin Varieties in Southern Illinois](#)
 John Pike, [Production and Marketing Strategies that Match Consumer Demand](#)

High Tunnel Workshop

Jeff Kindhart, [High Tunnels at the Dixon Springs Agricultural Center: Insights and Results](#)
 Zachary Grant, [Producing Salad Greens for Dining Services at the University of Illinois Student Sustainable Farm](#)
 Aaron Trover, [Experiences with Conventional, Hydroponic, and Organic Production of Tomatoes in High Tunnels](#)
 Rick Foster, [Insect Management in Purdue University's High Tunnel Systems](#)
 Ivan Dozier, [USDA NRCS Seasonal High Tunnel Projects](#)
 Rick Weinzierl, [Survey of High-Tunnel Production and Pest Management Practices](#)
 Jeff Kindhart, [Irrigation Pointers for Raised Beds in High Tunnels](#)

Farmers Market Workshop

Stacy Miller, [Expanding Farmers Market Opportunities](#)
 Pat Stieren, [Developing a Local Food System in the Springfield Area](#)

GAP Workshop

John Pike, [Preparing for GAP Audits and Certification](#)
 John Atsaves, [How to Write a Farm Safety Plan](#)
 John Atsaves, [What Happens in an Audit](#)

Conference Opening Session

Julie Fox, [Are You MarketReady?](#)

Fruit Program

Mike Parker, [Apple Production in North Carolina and the Use of SmartFresh on Apples for Retail Operations](#)
Mike Parker, [Peach Production in North Carolina: Striving for Profitability](#)
Rick Weinzierl, [New Issues in Insect Management in Apples and Peaches](#)
Mohammad Babadoost, [Managing Apple & Peach Diseases, with Notes on the Strengths and Weaknesses of Sulfur](#)
Elizabeth Wahle, [Basics of Fertility Management for Apples and Peaches](#)
Jeff Kindhart, [Opportunities and Resources for Small Fruit and Strawberry Production](#)

Vegetable Program

Rick Weinzierl, [Understanding Insecticides and Selecting the Best Options](#)
Jason Williamson, [Sweet Corn Varieties from Siegers Seed Company](#)
Tim Coolong, [Transplanting Sweet Corn on Plastic](#)
Rick Foster, [Corn Earworm Management in Sweet Corn](#)
Bill Shoemaker, [Fundamentals of Pepper Production](#)
Jason Williamson, [Tomato and Pepper Varieties from Siegers Seed Company](#)
Jeff Kindhart, [Observations on Tomato and Pepper Variety Performance](#)
Mohammad Babadoost, [Disease Management in Tomatoes and Peppers](#)
Bill Shoemaker, [Basics of Cole Crop Stand Establishment](#)
Mohammad Babadoost, [Disease Management in Cole Crops and Crucifer Greens](#)
Rick Weinzierl, [Insect Management in Cole Crops and Crucifer Greens](#)

Herbs Program

Mohammad Babadoost, [Effective Treatments for Basil Downy Mildew](#)

Agritourism/Marketing Program

Julie Fox, [Social Media Marketing](#)
Stephanie Rhodes, [Fit More P's in Your Pod: Working with Partners for Effective Promotion](#)
Cindi Fleischli, [Illinois Office of Tourism Programs & Signage Information](#)
Stephanie Rhodes, [The Dazzle is in the Details: Getting the Most out of Merchandising and Sales Promotions](#)
John Pike, [Agritourism Safety and Liability Considerations](#)

Organics

Lisa Kivirist, [Cultivating Diversity: A Recipe for Organic Opportunity \(slides\)](#)
Lisa Kivirist, [Cultivating Diversity: A Recipe for Organic Opportunity \(handout\)](#)
Mohammad Babadoost, [Phytophthora in Peppers and Cucurbits](#)
John Hendrickson, [Creating a Livelihood on a Fresh-Market Vegetable Farm](#)
Adam Davis, [Strategies for Managing the Weed Seedbank and Encouraging Weed Seed Predation](#)
Eric Gallandt, [Cultivation and Seedbank Management for Improved Weed Control](#)
Rick Weinzierl, [Organic Approaches to Insect Pest Management in Fruit Crops](#)
Deidre Birmingham, [Key Considerations in Planning and Managing an Apple Orchard Organically](#)
Wes Jarrell, [How to Use Your Weather-kissed and Pest-kissed Fruit](#)

Enterprise Management and Marketing

Jeff Kindhart, [Post-Harvest Handling & Transportation to Allow Small-Scale Growers to Deliver Top-Quality Produce](#)
Jim Slama, [Wholesale Success](#)

Irrigation

Tim Coolong, [Drip Irrigation Management for Vegetables: Tomatoes and Peppers](#)

Regional Updates

In northern Illinois, winter weather still is making news. The area recorded 18-22 inches of snow on February 2 to 3, and lots of snow was already on the ground in many parts of the region. Recent high temperatures have been in the teens and low 20s, and overnight lows have ranged from the single digits to as cold as -19 F. Another reminder on upcoming programs ... The *Stateline Fruit and Vegetable Conference* is set for Monday, February 21, 2011, at Donley's Village Banquets, 8512 S. Union Road Union, IL. For more information, see <https://webs.extension.uiuc.edu/registration/?RegistrationID=5306> or contact the McHenry County Extension Office at 815-338-3737 or Maurice Ogutu at 708-352-0109 (ogutu@illinois.edu). Later the same week the *Kankakee County Vegetable Growers School* is set for Friday, February 25, 2011, at the University of Illinois Kankakee County Extension Office, 1650 Commerce Drive Bourbonnais, IL. For more information, contact James Theuri at 815-933-8337 (jtheu50@illinois.edu) or see <http://web.extension.illinois.edu/kankakee/news/news19758.html>.

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Specialty Crops and Local Foods Issues

Whole Foods Seeking Illinois Growers

Whole Foods Market is seeking to increase its selection of conventional and organic produce from farmers in Illinois and other nearby states. To do so, the company is deepening its local procurement partnership with FamilyFarmed.org, a Chicago-based nonprofit organization. Over the next month, the two organizations will meet with regional growers in the Peoria area and Lake County to discuss new sales opportunities and the need for distribution infrastructure. At these meetings, FamilyFarmed.org will also discuss opportunities to create regional packing houses in Illinois to aggregate produce. The dates for these meetings are February 21, 2011, at Morton, IL, and March 1, 2011, at Grays Lake. Contact information for reservations and questions is listed in the *Upcoming Meetings* section at the beginning of this issue. Whole Foods also has an application form for those who want to sell to them. For a copy, contact Jim Pirovano at 630-306-1361 or jpirovano@familyfarmed.org. Deadlines for applications is March 1, 2011.

GAP and Food Safety

A preconference workshop prior to the Illinois Specialty Crop, Agritourism and Organic Conference covering information related to the new Food Safety Modernization Act and Good Agricultural Practices (GAPs) was well attended and received positive feedback from participants. Requirements of commercial buyers to provide traceability and documentation of food safety protocol throughout the supply chain prompted the scheduling of the program.

The signing of the FDA Food Safety Modernization Act provided timely food safety information to the program. While many details are yet to be defined, growers and processors now have a general idea of where the industry is heading where food safety is concerned. The legislation has empowered FDA to order recalls where they could only negotiate with businesses for voluntary recalls in the past. FDA is also charged with developing safety regulations for "high risk" foods and increased inspections of domestic and foreign food facilities. A threat of burdensome and costly food safety requirements for small specialty crop operations was a point of contention during the debate over this bill, resulting in the addition of the Tester Amendment which provided exemptions for "small" growers and processors. Farm exemptions are offered to operations with annual sales less than \$500,000 who market directly to consumers, grocery stores and restaurants within 275 miles or in-state. **Sales to third party brokers are not exempt regardless of farm size**, and there is a possibility that local grocery stores or restaurants could adopt individual delivery standards as part of their risk management strategy. Regardless of exemption status and because food safety risks are not correlated with farm size, it is important that all producers become familiar with GAPs and risk assessment as they strive to deliver the safest and highest quality produce possible.

To inform growers about GAPs and risk assessment, John Atsaves, USDA inspector, provided information on developing a Food Safety Plan, which is the first step to prepare for a third party farm audit. The goal of this plan is to minimize the risk of food borne pathogens in farm produce, and the food safety plan is a written guide outlining the

practices that will be followed to minimize that risk. These plans include policies (what you do), procedures (how you do it), records (who did what when), maps (where it is) and flowcharts (how it works) specific to the farm. Due to differences in production practices, crops grown, equipment, and other variations from one farm to another, food safety plans will be unique to the operation, as will farm audits. Since the food safety plan is used by third party inspectors as a guide to the farm audits they conduct, producers should be thorough in plan development but ensure that only issues specific to their own operation are included. Some resources available to aid in developing the food safety plan may include issues that are not applicable to some operations or may not address very unique aspects of other operations. Atsaves also offered information about different types of on farm audits, as well as USDA audit procedures. A producer panel provided growers' perspectives about food safety plans and audits which led to good discussions that clarified the process further.

PowerPoint files from the GAP workshop are available online and include ...

John Pike, [Preparing for GAP Audits and Certification](#)

John Atsaves, [How to Write a Farm Safety Plan](#)

John Atsaves, [What Happens in an Audit](#)

Additional resources concerning food safety and GAPs can be accessed on the following websites:

www.ams.usda.gov

www.fda.gov

www.gaps.cornell.edu

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Insuring Diversified and Specialty Farms: Is USDA's AGR-LITE Insurance Program Right for You?

On January 20, Jeff Schahczenski, Agricultural Economist and Conservation Specialist at the National Center for Appropriate Technology (NCAT)/ ATTRA presented a webinar to demonstrate a tool for assessing AGR-Lite Insurance options. The webinar discussed the benefits of the AGR-Lite insurance program and demonstrated a new free online assessment tool that can help farmers determine if AGR-Lite crop insurance is right for them.

AGR-Lite is a whole farm revenue product that insures a percentage of a farm's historical adjusted gross revenue based on tax records rather than historical crop yield information. Since specialty crop farm revenue may be based on organic or other price premiums, their revenue might be higher than conventional operations of similar size. AGR-Lite is also one of the few federally subsidized insurance products that also insure revenue from livestock.

Farmers with diverse crop and livestock operations or organic or specialty crops face special hurdles in today's crop insurance market. These farmers may raise crops or livestock that are little understood by mainstream crop insurance brokers. Highly diverse, organic and specialty crop operations are often unable to reduce their risk by carrying traditional crop insurance. Fortunately there's a new computer-based decision tool that helps diversified farmers assess AGR-Lite.

You can view the webinar at <http://attra.ncat.org/video/index.php#agr-lite> or get slides in a pdf format at http://attra.ncat.org/video/pdf/AGR-LITE_webinar_01.18.11.pdf. Free copies of the AGR-Lite assessment tool are also available at [NCAT's ATTRA National Sustainable Agriculture Information Service website](#) or by calling 1-800-346-9140.

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Fruit Production and Pest Management

Woolly Apple Aphid Management

Woolly apple aphid (WAA) infestations have become increasingly common and severe in Illinois and nearby states in recent years. I've done only limited work on this insect and have little data from Illinois, but I surveyed other fruit entomologists in the eastern part of the United States and received some valuable updates from David Biddinger of Penn State University and from Art Agnello of Cornell University at Geneva, New York. Some general background information and some specific recommendations for managing this insect in 2011 (including findings from Biddinger and Agnello) are:

Hosts and life cycle: Colonies of WAA appear on shoots of American elm, apple, hawthorn, and mountain ash. All WAAs on apples are female; when mature they give birth to live young without mating (parthenogenic reproduction). Nymphs overwinter below ground on roots; movement to and from shoots occurs throughout the growing season. Production of males, mating, and egg-laying occurs only on American elm. Parthenogenic reproduction on apples sustains populations. Nymphs tend to settle at the bases of root suckers and around pruning wounds and cankers on limbs and trunks; colonies are visible first at these sites. Colonies may begin to build as early as petal fall (though often slightly later).



Woolly apple aphid colony on shoot (R. Bessin, Univ. of Kentucky)

Damage: Above-ground colonies feeding on shoots cause galls, bark splitting, and “blind wood” (portions of twigs with no foliage). Aphids also enter the calyx end of fruits, and contamination, honeydew, and sooty mold result from these infestations. WAA can transmit perennial apple canker. Feeding on roots causes root galls and proliferation of fibrous roots. Where normal root growth is inhibited, trees may be more easily uprooted during storms. Heavy infestations on roots can kill small trees.

Why have infestations increased in recent years? The two recurrent themes in answers to this question are: (1) key insecticides that previously killed this insect are no longer labeled for use after bloom; (2) insecticides used to kill codling moth also kill the natural enemies of WAA (a predaceous fly and a parasitic wasp) but not the pest itself, allowing it to increase in the absence of natural controls. Lorsban and Penncap M are two the products that used to give some postbloom control of WAA but are no longer labeled for such use. On the natural enemy side of the story, David Biddinger of Penn State University has linked repeated applications of Delegate or Rimon to increases in WAA infestations, and preliminary evidence indicates that Delegate kills the parasitic wasp and possibly the syrphid flies that are important natural enemies of WAA. He notes that Delegate sprays are not always causing WAA flare-ups, but they increase the probability of flare-ups. (By the way, it appears that the parasitic wasp that is important in WAA control was resistant to Guthion and Imidan in at least some areas, so although these compounds did not control WAA, they also did not disrupt its natural control.)



Woolly apple aphid: Bark splitting caused by WAA (upper left); stem galls (upper right); colony on roots (lower left); galling of roots (lower right). Photos by E. Beers, Washington State University.)

What can be done to manage WAA? I don't think anyone is yet confident in recommending a "best" sequence of reduced risk insecticides to avoid killing the natural enemies of WAA (although Dr. Biddinger's data shows Altacor to be less detrimental than Delegate to the parasitic wasp that attacks WAA). For now, being aware of rootstock and varietal differences in susceptibility to WAA, following a few cultural control guidelines, and timing applications of effective insecticides to control it are clearly important.

Host plant resistance: David Biddinger has summarized WAA resistance ratings for rootstocks as follows:

- Very susceptible = M.9, M.26, Ottawa 3
- Susceptible = M.7, M.27, MARK, G.16, G.30, P-Series, Bud-Series
- Moderately susceptible = G.11, G.65
- Resistant = MM.106, MM.111, MM.104, CG.210, CG.179, Bemali, G.202

He also notes that the following varieties are most susceptible to above-ground colonization by WAA: Fuji, Rome, Greening, York, and Ginger Gold.

Cultural controls: Art Agnello offered these recommendations on cultural practices that discourage WAA. (1) Remove root suckers to eliminate an early colonization site. (2) Remove water sprouts on major scaffold limbs early in the season (June). (3) Paint large pruning cuts to discourage aphid colonies. (4) Summer pruning in August can remove larger colonies.

Insecticides: For insecticidal control of WAA, based on the combined summaries of David Biddinger, Art Agnello, and others (they get the credit ... I get the blame for any misinterpretations), effective approaches appear to be:

- In blocks with recent histories of problems, apply Lorsban prebloom (see the [2011 Midwest Tree Fruit Spray Guide](#) for products and rates). Where the predaceous mite *Typhlodromus pyri* is a key natural control for European red mite, making this application before half-inch green avoids disrupting natural control. Lorsban is long-lasting on bark (several weeks), and thorough coverage is possible at this time.
- Begin scouting between petal fall and first cover and continue weekly. Examine four pruning scars on each of 5 scaffold limbs per tree. Record the presence or absence of WAA colonies and determine if live aphids are

present in the cottony masses you find ... natural enemies may have killed all the aphids, but the waxy residue will remain. Apply an insecticide if 10% of the pruning scars or shoots are infested. (Also examine any root suckers to detect WAA presence; this may precede the development of infestations on pruning scars and shoots on scaffold branches.)

- When colonies first exceed thresholds, apply an insecticide. All of the products that control WAA work best if applied as soon as necessary and in high volumes of water. Products that have been most effective in experimental trials and orchard uses include Diazinon, Endosulfan, and Movento. Diazinon is relatively inexpensive; the problem in some areas is availability. If you have had problems with WAA in the past, identify a source for Diazinon 50WP or Diazinon AG600. David Biddinger reports that Movento has given mixed results when applied to large trees and notes that use of a penetrant (such as IL 700) is essential. Although Endosulfan (also sold as Thionex) is also rated as good to excellent against WAA, its use on apples is to be phased out (prohibited) as of July 31, 2015. (Don't lay in a lifetime supply ... this is the FINAL USE date, and use of existing supplies on apples will NOT be legal after this date.) Provado has not been effective against WAA. Assail is rated fair to "suppressive."

See <http://www.nysipm.cornell.edu/factsheets/treefruit/pests/waa/waa.pdf> for Cornell University's fact sheet on woolly apple aphid.

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Cold Hardiness and Winter Stress

With recent temperatures in central and northern Illinois falling below zero on a few occasions, it may be timely to expand on an earlier discussion of this topic. How quickly temperatures drop and the cold-hardiness of various species determines the impacts of cold temperatures.

When the weather cools slowly, free water within cold-hardy plants such as apples and pears moves out of the cells into the open spaces between the cells (intercellular space) where most of it is lost to transpiration. However, if the temperature drops rapidly to below freezing, while the plants are still active, the water within the cells freezes causing ice crystals to form. The ice crystals puncture the cell membranes, causing leakage and disorganization of the cells' components, which can be lethal. A slow drop in temperature also causes hardy plants to tie-up water to other molecules inside their cell so it does not freeze. Slow movement or tie-up of water inside the cells causes other physiological and biochemical changes inside the cells, such as thickening of the cell membrane, conversion of sugars to starch, build-up of growth-inhibiting hormones such as abscisic acid, and loss of growth stimulating hormones such as gibberellins and cytokinins. Very hardy plants also produce a polymer material that acts like anti freeze to inhibit water from freezing inside their cells. Contrast this to annual or perennial "cold-tender" plants that form seeds and then die or the top of the plants die but the underground organs do not.

Resistance to cold stress is a complex process, but simply put, most experts agree that the reason for cold stress is not low temperature, per se, but the formation of ice crystals inside cells. For this reason, knowing how cold-hardy plants escape injury is important in identifying cultural practices that help the trees survive freezing. Cold-hardy plants avoid winter stress by going through a developmental phase called dormancy. Dormancy implies inactivity, however most physiological processes for the tree survival continue during this stage, but at a reduced rate (most important of which is respiration). Dormancy can be divided into two phases, quiescence and rest. Quiescence is the failure of the plants to grow because of cold weather. It is a reversible phase. In other words, if the weather warms up, trees in the quiescent stage will start to grow. Also, at this stage trees will break buds when they are injured by pruning or fertilized with nitrogen, especially if the weather warms up for a few days. Trees are in a quiescent state in early fall or late winter. The second phase is rest. Rest is not reversible by warming up of the weather until the trees have accumulated a sufficient amount of chilling hours. In late fall and early winter, depending on cultivar and temperature, trees transition from the quiescent phase into the rest phase after 30 to 40 days of temperature below or slightly above freezing. The same happens in late winter and early spring; trees transition from rest into quiescence after 20 to 40 days of temperature above freezing (see model below).

Dormancy Model: Quiescence (fall and winter) → Rest → (late winter to early spring) Quiescence

For these reasons, trees exposed to a few days of warm temperature during early fall and late winter may break bud, while trees exposed to the same temperature in midwinter will not. Trees exposed to warm temperature followed by very cold temperature during quiescence are more likely to be injured severely than trees exposed to the same regime in the rest phase during the middle of winter. Again, the reasons are many and are driven by water movement, hormonal and solute build up, and morphological changes at the cellular level. Growers who are interested in pruning in the early fall or late winter must know about these processes. Know that trees are likely to be injured if they are pruned during the quiescence stage but not at the rest stage.

During winter, temperate fruit trees such as apples, pears, cherries, and peaches, have to accumulate a certain number of hours of temperature between 32 and 45 F as shown below. These hours are needed before the buds can break dormancy. Some trees need less than others, and those are the ones that are likely to be injured by severe winter weather or when the weather warms up then freezes in winter or early spring.

Chilling hours required to break rest.

Fruit	Chilling required (hours between 32 F and 45 F)
Apples	200-2,000
Pears	600-1,500
Sweet cherries	500-1,300
Peaches	200-1,100
European plums	700-1,700
Asian Plums	500-1,500
Apricots	250- 900

(From Chandler, 1937. Subtract hours above 60 F between December and March.)

A few tips on how to reduce injury to fruit trees. For peaches and apricots, delay pruning until spring in order to reduce the potential for winter injury. Avoid pruning young trees less than 10 years old and trees on sub dwarfing rootstocks (M.27 EMLA, P.22) during the quiescent phases. Also, avoid pruning trees in quiescence if they were pruned heavily the year before or if you applied a heavy nitrogen dose in the summer. Avoid pruning trees that lost major scaffolds to wind or other mechanical damage during quiescence. Avoid pruning tender fruits at quiescence; these include apricots, plums, Asian pears, and some peach varieties. Peaches should be pruned in early spring after bloom or the last frost.

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High Tunnel Production Systems

This is the first installment of a new section to the Illinois Fruit and Vegetable Growers News aimed at providing information for specialty crop growers that are considering or already using high tunnels on their farms. We will strive to provide timely information as well as post questions we receive and their subsequent answers. The results from the 2010 tomato trial conducted in a high tunnel at DSAC are listed in the table below. Growers planning on producing tomatoes this spring in high tunnels should be ordering seed or already have completed this task. Growers planning on providing supplemental heat and planting in early March (this is no longer technically a high tunnel at the point when supplemental heat is provided but none the less we see growers doing this) have already started their transplants. Growers shooting for end of March plantings should soon be sowing seeds for their tomato transplants. The shorter days and typical cooler temperatures in the greenhouse often result in taking 6 weeks for transplant production compared to the typical 4 weeks that would be common when producing the transplants in April for field production.

Yield results from the 2010 DSAC high tunnel tomato trial. Data are given for 5 plant plots.

Cultivar	Type	Early Number 1		Total Number 1		Total Number 2.		Culls
		No.	Wt (lbs)	No.	Wt. (lbs)	No	Wt. (lbs)	No.
Orange Strawberry	I	34	34.3	78	76.9	34	14	9
Scarlet Red	D	28	15.8	102	65.5	52	22.4	9
O1522942	D	37	25.1	95	64.1	38	15.6	6
Jazzy Avg	I			2058.5	63.75			
LD O978	D	24	12.8	100	58.7	129	47.9	12
Mt. Spring	D	25	14.6	90	53.4	86	31.7	13
Mt. Fresh	D	27	16.2	86	50.8	79	28.7	2
BHN 871	D	16	8.7	82	49.6	79	27.9	15
O1721400	D	15	8.3	71	49.4	41	22.6	28
Palenque (plum)	I	70	20.5	197	49.1			173
Finishline Avg	D	17.33333	9.333333	68.66667	47.76667	43.66667	18.6	6.666667
BHN 964	D	23	12.4	76	47.4	75	29.2	3
BHN 965	D	26	13.3	82	47.4	95	34.3	6
Geronimo Avg	I	19	9.933333	81.33333	46.66667	120.3333	43.86667	3.666667
BHN 961 Avg	D	56	31.8	71	45.43333	79.66667	30.33333	53
Phoenix Avg	D	20	10.46667	71.33333	44.7	59.33333	23.76667	8.666667
Chocolate Cherry	I			1163	44.5			17
Red Defender Avg	D	17	9.166667	68.33333	44.2	64.33333	24.53333	11.33333
Rocky Top Avg	D	18.66667	9.966667	67.66667	43.13333	58.66667	21.36667	9
BHN 963	D	9	4.8	68	42.5	85	28.5	10
Big Beef Avg	I	30.2	16	74.8	42.2	91.4	34.84	19.6
Jaune Flammee	I			281	42.1			5
Sunbrite	D	29	19.1	58	41.2	44	21.8	17
BHN 962	D	30	17.2	68	40.8	69	25.7	9
Redline Avg	D	14.66667	8	63	40.8	43.66667	16.36667	9.333333
Nico Avg	D	15	7.633333	67.66667	40.26667	86.33333	32.76667	15.66667
Akers West VA	I	8	5	47	40.1	47	21.8	35
Sunsation	D	15	7.8	61	34.4	119	48	47
Sunbeam Avg	D	24	13.55	57	34.25	76	30.45	17.5
BHN 589 Avg	D	16.66667	8.633333	56.66667	31.9	111	40.03333	16.33333
Empire Avg	D	19.33333	10.4	47.33333	30.26667	106.6667	39.86667	40.66667
White Queen	I	14	8.9	43	27.2	94	30.7	38
Ludmillas Red Plu	I	20	11.7	50	24.2	49	20.6	33
Arbason Avg	I	19.66667	9.3	50.33333	22.63333	170.6667	57.96667	14.66667
Cobra Avg	I	11.66667	6.133333	38.33333	20.7	170.3333	58.76667	16.33333
Torbay	D	6	2.6	37	20.1	240	65.1	25
Polbig	D	9	4.6	35	19.9	88	31.2	9
Buffalo Avg	I	58	11.36667	34	19.63333	128.3333	40.4	92
Trust Avg	I	8.666667	4.366667	26	13.8	114.6667	39.86667	39
Cherokee Purple AI		5.75	3.45	8	5.525	78.25	32.225	51.75

Question and Answers

What crops are best suited for high tunnel production?

Although many different crops respond positively to the protected culture afforded by a high tunnel, growers typically have a few criteria, examples listed below, for selecting what they raise in their high tunnels.

1. Crop should be of high value particularly when marketed 4 weeks ahead of what is possible in outdoor production. Tomatoes serve as a classic example of this.

2. Crop should produce yields that exceed what could be obtained in outdoor production. Raspberries serve as a classic example.
3. Ideally crop should not be able to be benefited by some other cheaper form of technology. For example, asparagus would produce high yields earlier in the high tunnel but they could also likely receive almost all the same benefit for much less input by utilizing a low tunnel to achieve earlier yields.



Less seriously ... haunting questions

- Why do toasters always have a setting that burns the toast to a horrible crisp, which no decent human being would eat?
- If the professor on Gilligan's Island can make a radio out of a coconut, why can't he fix a hole in a boat?
- If Wile E. Coyote had enough money to buy all that ACME crap, why didn't he just buy dinner?
- Did you ever notice that when you blow in a dog's face, he gets mad at you, but when you take him for a car ride, he sticks his head out the window?
- Why does someone believe you when you say there are four billion stars, but check when you say the paint is wet?
- Why doesn't Tarzan have a beard?
- Why does Superman stop bullets with his chest, but ducks when you throw a revolver at him?
- Is there ever a day that mattresses are not on sale?
- Why do people constantly return to the refrigerator with hopes that something new to eat will have materialized?
- Why do people keep running over a string a dozen times with their vacuum cleaner, then reach down, pick it up, examine it, then put it down to give the vacuum one more chance?

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