



UNIVERSITY OF ILLINOIS EXTENSION

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@illinois.edu. The *Illinois Fruit and Vegetable News* is available on the web at: <http://ipm.illinois.edu/ivfn/>. To receive email notification of new postings of this newsletter, call or write Rick Weinzierl at the number or email address above.

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Upcoming Programs

- **Creating an Attractive and Efficient Farmer's Market Stand, April 30, 2012.** University of Illinois Extension, Livingston County Extension Office, 1412 S. Locust St., Pontiac. Register at <http://web.extension.illinois.edu/units/event.cfm?UnitID=477&EventID=57400> or contact Christopher Konieczka at cmknie@illinois.edu or call 815-842-1776.
- **Food Safety: From Garden Gates to Dinner Plates, May 2, 2012.** University of Illinois Extension, McLean County Extension Office, 402 North Hershey Road, Bloomington. Register at <http://web.extension.illinois.edu/units/event.cfm?UnitID=477&EventID=57736> or contact Christopher Konieczka at cmknie@illinois.edu or call 309-663-8306.
- **Sustainable Beekeeping Practices and Backyard Queen Rearing, May 5, 2012.** University of Illinois Extension, Sangamon County Extension Office, 700 S. Airport Drive, Springfield. Register at <https://webs.extension.uiuc.edu/registration/?RegistrationID=6605> or contact Deborah Cavanaugh-Grant at cvnghgrn@illinois.edu or call 217-782-4617.
- **High Tunnels and Agritourism Tour, Vermilion County, May 5, 2012.** 9:00 a.m. – 3:30 p.m., sites include Strawberry Acres, Danville, IL, Lingley Brothers Produce, Rossville, IL, Ludwig Farmstead Creamery, Fithian, IL, and Sleepy Creek Vineyards, Fairmount, IL. Register in advance by contacting Steve Ayers at 217-333-7672 or 217.442-8615 or srayers@illinois.edu.
- **High Tunnel Workshop, May 12, 2012.** Workforce Careers Center, Lincoln Land Community College, 9:00 a.m. to 4:30 p.m. Mike Bollinger will cover siting considerations, pre-planning, and construction of a high tunnel. Participants will assist in constructing a 22'x48' high tunnel during the workshop. Registration is \$30. (A discounted rate of \$50 will be charged to participants who sign up for this and the June 11 workshop listed below.) Registration includes a box lunch and copies of two books, *The Polytunnel Handbook* and *The Winter Harvest Handbook*. For more information and to register, see www.llcc.edu/greencenter or contact Julie Bates at julie.bates@llcc.edu or 217.786.2434. Hosted in conjunction with University of Illinois Extension and funded with the assistance of the Illinois Community College Board and the Illinois Department of Commerce and Economic Opportunity.

- **Equipment for Small Farmers, Soil Fertility and More (Central Illinois Sustainable Farming Network Workshop), May 12, 2012.** Spence Farm, Fairbury, IL, 10:00 am to 3:00 pm. Register at <https://webs.extension.uiuc.edu/registration/?RegistrationID=6646> or contact Deborah Cavanaugh-Grant at cvnghgrn@illinois.edu or call 217-782-4617.
- **SW Illinois Orchard Twilight Meeting, May 24, 2012.** Eckert's Grafton Farm, 20995 Eckert Orchard Lane, Grafton, IL. Program begins at 6:00 p.m. For more information contact Andrew Holsinger at 217-532-3941 or aholsing@illinois.edu.
- **High Tunnel Workshop, June 11, 2012.** Workforce Careers Center, Lincoln Land Community College, 9:00 a.m. to 4:30 p.m. Mike Bollinger and local growers will cover developing a planting plan, planting, and management topics including insect and weed control and winter growing. Registration is \$30. (A discounted rate of \$50 will be charged to participants who sign up for this and the May 12 workshop listed above.) Registration includes a box lunch and copies of two books, *The Polytunnel Handbook* and *The Winter Harvest Handbook*. For more information and to register, see www.ilcc.edu/greencenter or contact Julie Bates at julie.bates@ilcc.edu or 217.786.2434. Hosted in conjunction with University of Illinois Extension and funded with the assistance of the Illinois Community College Board and the Illinois Department of Commerce and Economic Opportunity.
- **Illinois Summer Horticulture Day, June 14, 2012,** at Kuipers Family Farm near Maple Park, Illinois. More details in upcoming issues of this newsletter.

Regional Updates

In the Quincy area ... Frost events the past two weeks have had varying levels of influence upon growers across the region. Some were adversely affected, others not so. Much depended upon location, topography and crop. April 10-12 frost events affected strawberry blossoms and fruit, but not apples, peaches, blueberries or grapes. Tomatoes planted outside were definitely affected, as were potatoes. Cool season crops, such as cole crops, onions, etc. are fine.

High-tunnel strawberries have been harvested for the past 7-10 days. A few plasticulture strawberries have been harvested, but the main season is still a week or more away. Matted-row strawberries are still in early bloom. Early season high-tunnel tomatoes are beginning to bloom, so suckering and staking are in order. Harvest of spring greens has been ongoing.

Successive plantings of sweet corn are being made with no problem of wet soils. We've been very dry, but cold. Sweet corn planted in mid-March had a few frost issues, but late March and early April sweet corn were not affected. Stands and emergence have been excellent. Growers who have warm season transplants (cucumbers, melons, tomatoes, etc.) waiting for the weather to improve before setting them out are expressing frustration with the cold weather.

Mike Roegge (217-223-8380; roeggem@illinois.edu)

Notes from Chris Doll

As we were observing the first blackberry (thorny) bloom of the year on the 4th of April, a grower commented upon the incoming colder weather and wondered it was the "blackberry winter?" (Blackberry winter is the usual cold front that comes down during blackberry bloom.) That was followed by temperatures in the 30s several times in the next three weeks, with the minimums for each period being on April 7, 12, and 22. Luckily, the lowest temperature for the month in the Back-40 was 33 degrees, and the only damage to the fruit crops was the frost that froze the grapes. The same blackberry planting was still blooming when I saw it 4 days ago, and my thornless plants are just beginning to bloom. So, it's a difficult call to tell which date was blackberry winter.

There are many other things to be said for 2012 weather, and for many, the worst were the cold temperatures that caused crop loss in many areas and situations. The word is that tree fruits in SW Illinois fared fairly well, with grapes and unprotected strawberry plantings not so well. The year with the 4-week early phenology calendar suddenly tried to slow down, which has resulted in difficulties in making chemical thinning applications to apples for satisfactory results. Even spraying during 80 degree temperatures does not appear to be too successful because of much cooler temperatures the next day and thereafter. For this area, the time for chemically stopping the apple growth is past, but

growers to the north of here still have a chance ... if thinning is still necessary. For this area too, keep in mind that including low rates of NAA in several cover sprays OR a couple of well-timed ethephon cover sprays can improve flower bud initiation on trees that are not totally over-cropped.

For peach growers, the latest issue of the Penn State Fruit Times included a discussion on peach size, date of harvest, and the weather. Cool temperatures following bloom tend to extend the interval from bloom till harvest, which allows more time for cell division and growth for increase in size. The outlook remains for an earlier harvest, but there will not be a 4-week advancement of the harvest season. With that said, Tom Schwartz (Centralia, IL.) was reported to have picked the first Earliglo strawberry on April 21, whereas the previous early picking for Tom and his father was May 9.

My Missouri reporter said that his codling moth traps filled on the 80 degree night early in the month, but he has had very few catches recently. In Southern Illinois, Ren Sirles reported probably enough catch early to set the biofix, followed by the slow-down, and with a little increase this week. Then Dr. Art Agnello, in New York's Scaffolds wrote during Monday's snowstorm that he thinks the insects are confused too. So maybe one of these weeks there will be something to write about (or we'll have to switch to politics?).

Chris Doll

For Fruit and Vegetable Growers

More on Neonicotinoids and Honey Bees

The news release below went out last week from Mike Gray, Professor and Extension Specialist in Entomology at the University of Illinois. It provides a link to a webinar by Greg Hunt and Christian Krupke at Purdue on their work with neonicotinoid insecticides and honey bees. I encourage fruit and vegetable growers to watch / listen to the webinar and look over the two articles that Mike cited in this news release. I suspect that we'll see some regulatory action on at least some uses of some neonicotinoid insecticides in the future ... the results from the Purdue work are very compelling in indicating that these insecticides are contributing significantly to honey bee deaths.

Neonicotinoid insecticides are used for insect management in fruits and vegetables, but pest management in our industry would not be totally disrupted by the loss of the most hazardous uses of neonicotinoids. Urban use of soil applications of neonicotinoids for insect control in trunks and on the foliage of woody ornamentals is also likely to be a focus of regulatory concern, so this issue spans more than commercial agriculture. This is an important topic for your attention over the next several months.

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

Here's the content of the news release ...

[New webinar on honey bees and neonicotinoids](#)

URBANA – Insecticides known as neonicotinoids are used extensively across the Corn Belt according to University of Illinois Professor of Entomology and Crop Sciences Extension Coordinator Mike Gray.

“This class of insecticide, which includes clothianidin and thiamethoxam, is widely used in the form of insecticidal seed treatments,” he said. “Imidacloprid, another neonicotinoid insecticide, is used widely in urban and suburban landscapes to protect ornamentals from insect injury.” Overall, these products are used extensively in both urban and rural settings and are a source of concern.

Recently, Purdue University Associate Professor of Entomology Christian Krupke offered a webinar that provided information on this important topic, which is available at <https://gomeet.itap.purdue.edu/p32228058/>. In addition, he collaborated on a paper titled *Multiple Routes of Pesticide Exposure for Honey Bees Living near Agricultural Fields*. The paper was published in the journal *PLoS ONE* (Volume 7, Issue 1) in January 2012. Last month, two other papers were published on this topic in *Science Express*. Researchers from the U.K. published *Neonicotinoid Pesticide Reduces Bumble Bee Colony Growth and Queen Production*, which can be found at <http://www.sciencemag.org/content/early/2012/03/28/science.1215025.full>, and a group of French scientists published *A Common Pesticide Decreases Foraging Success and Survival in Honey Bees*, available at <http://www.sciencemag.org/content/early/2012/03/28/science.1215039.full>.

Fruit Production and Pest Management

Freezing temperatures about 2 weeks ago caused substantial damage in fruit crops, including apples, pears, apricots, peaches, cherries, plums, and grapes in central Illinois. The photos below illustrate the damage that has occurred.

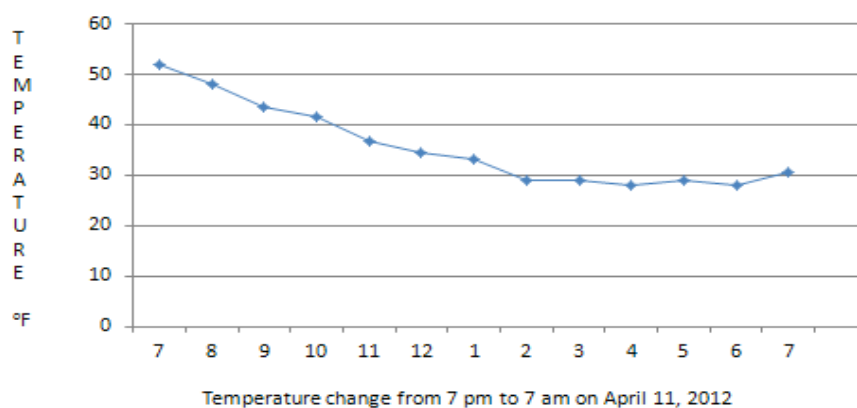
Mohammad Babadoost (217-333-1523; babadoos@illinois.edu)



Freezing Damage to Fruit Trees and Vines in Central Illinois

The freezing temperatures that we had on April 11 and 12 in central, western, and northern Illinois counties (and indeed, even in the far south) caused extensive damage to many fruit crops, with varying degrees of injury. Most peach varieties in central Illinois have been hit hard, especially in low areas, with some damage reported as far west as Jerseyville and Hardin. Damage to peaches in the far south is sporadic, but more than 50 percent of the fruit at the Dixon Springs Ag Center was lost. Some apples, like Jonathan and Empire have also hit hard, with some orchards reporting 30% to 60% loss. Golden Delicious did slightly better than Red Delicious. Interestingly, I have a young block of Honeycrisp with nearly 60% of the fruitlets dead. My inclination was that Honeycrisp is hardier than many others, but it does not seem to be different. The only variety that I have seen with practically no damage to the fruitlets is Juliet from the PRI breeding program. I have seen a few blossoms starting to appear on some trees, but time will tell if honeybees will pollinate blossoms without petals. Some varieties of grapes were also hit hard, while others were unharmed. There is some foliage damage to raspberries, but no damage to blueberries and blackberries.

Most – but by no means all – of the severe damage occurred north of I-70. The following graph shows the temperature fluctuation from 7:00 pm on April 10 to 7:00 am on April 11 in central Illinois. During a span of seven hours, the temperature dropped about 25 degrees. As we all know, this spring has been one of the warmest on record, with the daytime temperature in central Illinois in March averaging more than 60°F and reaching as high as 75°F on March 28th. Early April was also very warm, with the daytime temperature between April 1 and 4 averaging more than 83°F. Similar temperatures were observed throughout the Midwest. In most areas of the Midwest, growers reported bud development being a month ahead of schedule. Extensive damage to stone fruits has also been observed in New York.



In “normal” years cool weather in March and April keeps the buds dormant. However, the unseasonably warm weather this year pushed the buds develop much earlier, and in addition, the warm weather before the 27° F freeze hit on April 11th added more the severity of the damage. Had the weather cooled gradually, the damage would not have been as extensive. The reasons are explained in the following paragraphs.

Understanding how freezing kills buds is not easy. It is complicated by the fact that different varieties harden at different rates. Hardening is a process that a plant goes through to prepare itself for temperature changes.

Cold hardiness or cold acclimation is a physiological change in the plant that allows it to tolerate an otherwise injurious temperature. Cold hardiness is believed to be genetically controlled, especially in acclimated plants. Hardiness occurs when a plant is acclimated by being exposed, for a few days, to temperatures slightly above those that normally cause injury. The cue for acclimation and eventual hardiness is cool temperature and day length. Plants start to acclimate when the days get shorter and cooler in the fall. Insect models offer the best example of cold hardiness and acclimation. Survival of the adults of an insect called the pharate (*Sarcophaga crassipalpis*) increased to 91% when they were placed at 0°C for only 2 hours and then transferred to -10°C. Acclimation can also be seen in tender plants like tomato or pepper when the temperature drops gradually versus rapidly. When the temperature drops gradually these plants can survive a few degrees lower than when there is a sudden drop in temperature.

Several mechanisms have been proposed for plants that tolerate freezing. Some plants tolerate freezing by expelling water outside the cell into the extracellular spaces, others undergo a process known as supercooling, and yet others

lower their freezing point by accumulating a type of antifreezes in the form of proteins, other cryoprotectants, or by dehydration of the cells. However, most physiologists agree that the crucial factor in winter injury is not low temperature, per se, but ice crystals that form inside the cells causing their rupture. For any living organism to survive winter damage it has to prevent ice crystals from forming inside the cells. However, water freezing in the spaces between the cells (outside the cells) does not kill plants unless it is combined with ice forming inside the cells. Ice is formed around nucleating agents, which are very tiny particles inside the tissue. It is the same principle for rain formation and cloud seeding. Rain droplets form around microscopic particles – dust, smoke, salt crystals, soil, and other materials that are present in the atmosphere – to form rain. Inside living cells, water also condenses around microscopic particles to form ice crystals. Fortunately, there aren't many floating microscopic particles in living organisms, but unfortunately it takes only a few ice crystals to form for the plant to freeze.

Interestingly, studies have shown that Antarctic micro-arthropods, only a few millimeters long, are the largest terrestrial animals that live year round on the Antarctic Continent. They survive low temperatures by a process known as supercooling, which involves reducing their freezing point to as low as -30°C in the winter by emptying their gut of food. However in the summer, when they start feeding, these insects were found to freeze at about -6°C , because of ice nucleating agents found on the particles of food in their gut. More recent studies have also shown that in some organisms digestive enzymes destroy ice nucleating sites on the surface of food particles inside the gut and that allows them to survive lower temperatures. The process of supercooling can occur in plants as well, especially in plants that have small cells, limited intercellular spaces, and low free water content. Remember the few orange trees in Central Florida that survived the freeze even though every tree around them had died. These trees survived because they were able to supercool. There is nothing magical about those trees, except that they were able to supercool at that time. Supercooling is when the free water in the cell does not freeze at subfreezing temperatures. Most likely, these trees will die if they are exposed to the same temperature, unless they are able to supercool again. The reason those trees were able to survive may have been due to very limited free water in their cells at that time. Unfortunately, supercooling can only proceed to a certain steady-state level, which varies seasonally, depending on the condition of the plant, but after which freezing and death will occur.

In the spring, water starts to move into the tissue causing them to become more susceptible to freezing injury. Young tissue, including leaves and flowers, tends to have much more free water (90 to 95% free water) than older tissue. The more free water in the tissue, the more likely the tissue will freeze at close to 32 F. Water movement into the tissue is much faster on warm days than on cold days. For this reason plants, even hardy fruits such as apples are more likely to be damaged by spring frost. There is nothing you can do to have the plants go back to their state before the warm spell. The only thing you can do is to warm up the air to above freezing by heating or to protect the plants by spraying water. As water freezes it releases heat called heat of fusion. The released heat keeps the tissue from freezing and the ice serves as a blanket to protect the plants from lower temperature.

Mosbah Kushad; 217-244-5691; kushad@illinois.edu

Peach and Apple Insects

Early Stink Bug and Plum Curculio Damage in Peaches

In the few weeks after petal fall and shuck split in peaches, stink bugs feed on small fruitlets by inserting their beaklike feeding stylets through the skin to suck juices from the fruit and developing seed. Cells around the feeding puncture die, and gum exudes from the wound. As the fruit continues to grow, the portion around the wound does not grow normally, and the resulting distortion is often called “catfacing.” During the same time period, adult plum curculios chew small slits in the surface of the fruit, then lay an egg into each opening. Larvae that hatch from these eggs tunnel into the fruit and feed extensively around the seed. These insects damage fruit before second-generation oriental fruit moth larvae become the next major pest to manage. Pyrethroid insecticides (Asana, Baythroid, Pounce, Mustang Max, Warrior, and other products with the same active ingredients) are most effective against stink bugs. These insecticides and Assail and Avaunt are effective against plum curculio. After curculio larvae hatch and enter fruit, nothing can be done to prevent their survival and development within the fruit.



Stink bug injury to small peach fruitlets (left) and a plum curculio larva feeding internally (right).

Degree-day Updates for Oriental Fruit Moth

Biofix for oriental fruit moth at Urbana was March 24; for at least some orchards in southern to southwestern IL, the biofix date (beginning of consistent flight) was March 18. Based on a 45-degree F developmental threshold, degree-day accumulations through April 25 were approximately:

Location	Biofix Date	Degree-days (base 45F) from biofix through April 10
Carbondale	March 18	665
Belleville	March 18	723
Urbana	March 24	394

First generation egg hatch ends (or declines to very low levels) by about 650 degree-days after biofix, and second-generation flight begins about 950 degree-days after first generation biofix. For growers who are using mating disruption for oriental fruit moth control, it is essential that dispensers be in place before second generation flight begins at around 950 degree-days ... second-generation larvae infest fruits of peaches and other stone fruits. For additional background information on oriental fruit moth, see <http://agsci.psu.edu/tfpg/part2/insects-mites-web/oriental-fruit-moth>.

Codling Moth

The earliest biofix for codling moth in far southern Illinois appears to be March 30. Traps in the U of I orchard picked up moths the last two nights, so we may set a biofix here at April 25, but cool weather forecast again for the next few days may limit further flight. See the previous issue of this newsletter for comments on degree-days and the timing of application of insecticides for codling moth control.

The Illinois Degree-Day Calculator site is not available this spring pending updates to revise it. If you are trapping for codling moth and oriental fruit moth, please email me or call me with reports of biofix dates (first sustained captures of moths in traps) for your location ... I'll use your information and the Midwestern Climate Center database to provide updates on degree-day accumulations for these insects throughout the state in upcoming issues of this newsletter.

Degree-day "look-up tables": For growers who are using traps for oriental fruit moth and codling moth but do not have weather-monitoring stations with programs that calculate degree-days, using local weather stations' minimum and maximum daily temperatures is an option for approximating degree-day accumulations. Tables that allow you to look up degree-days for these insects based on min-max temps are available at <http://jenny.tfrec.wsu.edu/opm/displaySpecies.php?pn=-55>. Add each day's degree-day accumulation since biofix to keep track of totals.

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

Spring Developments in Grapes in the North

The spring of 2012 continues to be unusual for grape producers in northern Illinois. Warm conditions in March led to early emergence of shoots from dormancy. Then April came along and cooler temperatures have prevailed. Weather services are reporting that it is likely April will be a cooler month than March in northern Illinois this year, so vines which broke bud and began growth early are now making slow progress, or have been hurt by repeated flirtation with freezing temperatures.

Variation in temperatures has led to a consistent cycle of warm-ups followed by a cold wave with lows in the low 30s. Site selection for grape production has never been more important. I've heard from a number of growers about the impacts of these cold waves. The most consistent factor that separates damaged vineyards from those which suffered little or no damage has been elevation. One grower related a freeze incident that nipped his Foch vines at 860' elevation, resulting in negligible damage to the vineyard overall. His neighbor in a nearby low area with other fruit crops recorded a low of 19°F, resulting in severe damage to his strawberries. Stratification of cold and warm air led to a strong gradient of temperatures, warm at higher elevations and very cold down low. Anyone interested in finding a site for growing grapes or other fruit, take heed!

By this time in northern Illinois almost all varieties of grapes are fully engaged in the new season's growth. But we are not beyond risk of another freeze event. Keep frost protection strategies in place. In reviewing images of past freeze events, I found a picture of frost damage in our vineyard at St Charles on May 23rd. Let's hope that never repeats, but don't bet on it.

One question that has emerged has been whether the vineyard needs as much management if it has suffered freeze damage. Yes, it does. See the previous issue of this newsletter for more information. Right now, the new growth is exposed to more than just risk of freezing temperatures. The vines can be at risk from diseases and insects too, so keep monitoring for signs of pest pressure. If you have susceptible varieties, preventive fungicide sprays may be necessary, especially if we have periods of wet weather. Because of the warm weather in March, weeds began growth early too. Weeds can compete with vines for resources and diminish growth and productivity. Young vines are especially at risk from this pressure. There are a number of alternatives for managing weeds, but not managing them is not a good one.

While it's a little early to employ canopy management techniques, we're not far away from shoot thinning time. Once shoots get to 12-16" it is time to choose which ones will be this year's productive shoots. The challenge to making good choices is greater this year due to the freeze. Growers who lost many primary shoots in their grapes may have to focus on secondaries. These may break bud at different times, resulting in more variation in phenological development of the clusters. It'll be critical to make good choices to maintain crop uniformity and have shoots growing in good positions for production next season. It might be good to make solid observations early and often while you are in the vineyard before you have to make those choices.

Growers with young vines may be discouraged by the damage suffered on small young plants, but grapes are resilient, so expect the plants to quickly push new buds and growth. The challenge will be to direct the plants' energies into the appropriate growth. Where trunks are needed, pick the two strongest shoots to train into trunks. They may not be the ones at the top of last year's growth. If a shoot further down shows much stronger growth, choose that one ... it is growing stronger because it is better connected to the plant's internal resources.

Bill Shoemaker (630-584-7254; wshoemak@illinois.edu)

Vegetable Production and Pest Management

Nicki Gilbert is a PhD student at the University of Illinois, Champaign-Urbana, pursuing research on vegetable production, soil management and nitrous oxide emissions. She is looking for vegetable farmers to participate in her research. This would involve a 20-minute conversation about vegetable production practices and permission to take soil samples from vegetable fields. Soil samples will be processed for general fertility (including pH and percentages of macro and micro nutrients), total nitrogen, and carbon. Results will be available to participating farmers. If you are interested in participating, please call 217-244-9430 or email gilber27@illinois.edu.

Cutworms and Armyworms

Where early plantings of sweet corn (especially) and other vegetable crops are emerging, growers should scout for damage by cutworms and armyworms. Black cutworm moths have been captured in pheromone traps in several areas at densities that may result in damaging populations of larvae over the next few weeks. Similarly, true armyworm moths have been numerous in pheromone traps as well. These insects commonly infest and damage sweet corn (corn in general), and cutworms of various species may cut seedlings or transplants of numerous vegetable crops. Scout for these insects by looking for defoliation (areas of leaves eaten by larvae) and plants that have been cut off at the base. See the 2012 Midwest Vegetable Production Guide for listings of registered insecticides that can be used on specific crops.



Top: Black cutworm moth (Univ. of Wisconsin) and larva (Univ. of Illinois). Bottom: Armyworm moth (Univ. of Illinois) and larva (Univ. of Nebraska).

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

Less seriously ...

If you can start the day without caffeine; if you can always be cheerful, ignoring your aches and pains; if you can resist complaining and boring people with your problems; if you can eat the same food every day and be grateful for it; if you can understand when your loved ones are too busy to give you any time; if you can take criticism and blame without resentment; if you can conquer tension without medical help; if you can relax without alcohol; AND if you can sleep without the aid of drugs ... you are probably the family dog.

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