



UNIVERSITY OF ILLINOIS EXTENSION

College of Agricultural, Consumer, and Environmental Sciences

Illinois Fruit and Vegetable News

Vol. 17, No. 18, February 9, 2012

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/ifvn/>. To receive email notification of new postings of this newsletter, call or write Rick Weinzierl at the number or email address above.

For those who receive this newsletter by US Mail, your 2011 subscription will expire soon. A new subscription form is attached. Those who receive email notification of new issues do not need to re-subscribe; you will continue to receive notifications. If you would like to receive a subscription form for US Mail delivery, please contact Rick Weinzierl at the email address or phone number above.

In this issue ...

Upcoming Programs

Staffing Changes (new – or sort of new – staff include Andrew Holsinger, Sonja Lallemand, Chris Konieczka, Laurie George, and Julia Govis; Maurice Ogutu leaves for US AID)

Notes from Chris Doll (weather and fruit bud development; notes from this winter's meetings)

Local Foods Issues (new Illinois SARE web site and calendar)

Fruit Insect Production and Pest Management (caring for new trees before planting; reminders on pheromone traps for fruit insects)

Vegetable Production and Pest Management (results of high tunnel tomato trials at DSAC; understanding the mode of action of carbamate and organophosphate insecticides; survey on cover crops in organic vegetable production)

University of Illinois Extension educators and specialists in fruit and vegetable production and pest management

Upcoming Programs

For commercial fruit and vegetable growers ... lots of upcoming events; be sure to see the notes on the Southern Illinois Vegetable Growers School, February 16, in Mt. Vernon, the Illinois-Wisconsin Fruit and Vegetable Conference in Rockford on February 20, and the statewide Illinois Small Fruit and Strawberry Schools, March 6-7 in Mt. Vernon.

- **Small Farms Local Foods Webinars, January 24 – March 29** ... a series of webinars on a variety of topics that relate to small farms and local foods will be held at University of Illinois Extension offices throughout the state. For a schedule [click here](#) or contact Steve Cravens at scravens@illinois.edu or 309-342-5108, ext. 131
- **Kankakee Area Vegetable School, February 15, 2012**, at the Kankakee County University of Illinois Extension Office, Kankakee, IL. For more information, contact James Theuri, jtheu50@illinois.edu, 815-993-8337.
- **9th Annual Composting Symposium: Composting for a Sustainable Community: From Backyards to Farms, February 15, 2012**, at the Trutter Center, [Lincoln Land Community College](http://www.lilcc.edu/greencenter) in Springfield, IL. To register visit www.lilcc.edu/greencenter or call 217-786-2434.
- **Southern Illinois Commercial Vegetable School, February 16, 2012**, at the Mt. Vernon Holiday Inn, Mt. Vernon, IL. For more information, contact Elizabeth Wahle, wahle@iilinois.edu, 618-650-7050.
- **Extending the Season Using High Tunnels, February 18, 2012** at the U of I Extension Office in Onarga, IL. For more information and to register [click here](#) or contact Steve Ayers at srayers@illinois.edu or 217-333-7672.
- **Yielding Success in Social Media, February 18** at the U of I Extension office, Bloomington, IL. For more information [click here](#) or to register contact, Micah Bornstein, Farmer Programs Coordinator, The Land Connection at micah@thelandconnection.org.

- **Illinois-Wisconsin Fruit and Vegetable Growers Conference, February 20, 2012**, at Midway Village Museum, 6799 Guilford Road, Rockford Illinois, 8:30 a.m. – 4:00 p.m. To register in advance online, use <http://web.www.extension.illinois.edu/jsv>; for more information contact Maurice Ogutu at Ogutu@illinois.edu, 815-235-4125.
- **Putting Small Acres to Work, February 18, 2012**, at [John Wood Community College](#) in Quincy, 8:30am - 1:00 pm. This program is designed for those who have a few acres and would like to find an enterprise to supply some income or provide for family enjoyment. Register on line at <http://web.extension.illinois.edu/abhps/> or contact Mike Roegge at roeggem@illinois.edu or 217-223-8380.
- **Tomato Grafting Workshop, February 21, 2012**, at the U of I Extension office, Macomb, IL. For more information and to register [click here](#) or contact Kyle Cecil at cecil@illinois.edu or 309-342-5108.
- **MOSES Organic Farming Conference, February 23- 25, 2012**, in La Crosse, WI. For more information and to register, see <http://www.mosesorganic.org/conference.html>.
- **Illinois Small Fruit and Strawberry Schools, March 6-7, 2012**, at the Mt. Vernon Holiday Inn, Mt. Vernon, IL. March 6th will feature presentations on brambles and blueberries and include information on fertility management for small fruit growers. March 7th will focus on strawberries including information on both matted row and plasticulture production. For more information please contact Jeff Kindhart at 618-695-2770 or jkindhar@illinois.edu.

Staffing Changes

As the 2012 season begins to take shape, this newsletter will include profiles of Extension Educators on the University of Illinois Local Food Systems and Small Farms team and those in horticulture and other programs that serve commercial fruit and vegetable producers. At the end of each issue we include a list our campus-based staff and our field staff. Some recent changes in this group include:

- Andrew Holsinger is a new Horticulture Educator in the Christian, Jersey, Macoupin, & Montgomery Unit.
- Sonja Lallemand is still relatively new in her role as Horticulture Educator in the Franklin, Jackson, Perry, Randolph, & Williamson Unit.
- Laurie George is a new Local Food Systems and Small Farms Educator in the Bond, Clinton, Jefferson, Marion, & Washington Unit.
- Christopher Konieczka is still relatively new in his role as a Local Food Systems and Small Farms Educator in the Livingston, McLean, & Woodford Unit.
- Julia Govis is in a new state-wide position as U of I Extension's Farm-to-School Program Coordinator.

Contact information for these and all our educators who devote program time to commercial fruit and vegetable production is listed at the end of this newsletter.

Maurice Ogutu, a Local Food Systems and Small Farms Educator in northern Illinois will be leaving University of Illinois Extension in a few days to take a position with US AID where he will be involved in a variety of agricultural projects around the world.

Notes from Chris Doll

As per usual, everyone is talking about the winter weather of 2011-12. What has seemed like a warm season turned out to be only the eighth warmest January in St. Louis. For this winter, my lowest temperature was 13 degrees F. No apparent injury has been seen. Luckily there have been only two record-setting warm days, with 72 degrees being the highest. The numerous above-normal minimum temps have allowed dormancy to be broken, and signs of growth can be seen on many plants. Japanese plums and some apricots are pushing bud development into Stage 2, and apples, pears and peaches are pushing toward Stage 1. It is fairly easy to determine the survival of peach buds, which is now about 99 percent.

The chart inside the back cover of the Midwest Tree Fruit Spray Guide shows the development stages and also the predicted flower bud kill for given temperatures. By recording the dates for your tree fruit crops on this chart, one can keep a running record for reference.

There have been numerous rain showers and only a couple of light snowfalls since December 1, but ground conditions have been favorable for most activities in sodded plantings and pruning is moving along nicely. Once the prunings are

cleaned up, both dormant sprays and herbicide spraying can be done. The same is true for applying fertilizers. Applied now, nitrogen will have some time to be washed into the root zone for early uptake, but due care should be made to prevent it from washing away on bare hillside soils. As per usual, the suggestion for fertilizing peach trees is to apply about half now and the other half about bloom time if the crop potential looks good.

Early planting of new trees can be done whenever the soil moisture levels make it feasible. Last year was a good example for gambling on early planting because of all the rains in April and May. Growers making high-density plantings that include either posts or trellis wires for support should also consider the soil condition because all the foot and machine traffic for the process.

December and January fruit meetings were a time for renewing friendships, continuing learning about fruit production, and helping out the financial well-being of a couple of growers and ex-growers with my poker losses. At Michigan, John Stanley, an Australian marketer, talked about "communications" necessary for success in marketing. Included in this, he said that 85 percent of customers go web sites, and that the technology involved in Facebooking, Tweeting, UTube, etc. has changed lots of marketing concepts, so use the social media, signage, good sales people, and good merchandise for success. Dr. Steve McCartney from North Carolina State talked about apple thinning and how "stress" causes thinning to happen, whether from natural causes of temperatures, shading, and pollination conditions or chemical effects. At our Illinois meeting, he said that biennial bearing of apples is common in varieties like Golden Delicious, Fuji, and Winesap, in contrast to Jonathans, Gala, etc. He listed Cameo, Fuji, and Honeycrisp as hard to thin. And when chemical thinning fails to thin adequately, the use of 5 ppm of NAA in cover sprays beginning eight weeks post bloom or Ethrel up to 96 ounces per acre at 6 weeks post bloom on Fuji should help break the biennial habit.

Some grower quotes at the Illinois meeting:

- "Start small; if you get ahead of the game, Nature will come along and knock you down."
- "Eighteen inches of rain during 10 days of the early spraying season is a challenge! But then every year is."
- "14 days of temperatures over 100 degrees causes problems with Honeycrisp."

Chris Doll

Local Foods Issues

The Illinois SARE Web Site and Calendar

Our new Illinois SARE (Sustainable Agriculture Research and Education) website <http://illinoissare.org/> is designed to help growers and educators. The front page has information not only about what SARE does but also about grants available for farmers, ranchers, and educators.

The calendar page at <http://illinoissare.org/calendar.php> lists a wide variety of agriculture- and food-related events and webinars in the Midwest. There are tabs along the top of the calendar to change the view to either "week," "month," or "agenda," and you can also use the arrow keys along the top to advance a day at a time. (*The Google search function does not yet work on the calendar.*)

The links along the left-hand banner will take you to pages with more detailed information about SARE grants and the work being done in Illinois with SARE funds. We are currently building a "Resources" page; it is still a "*work in progress.*"

We need your help to make this site as useful as possible ... if you know of an event that should on the calendar, a resource that should be included, or would like to make a suggestion for other content, please send an email to mhosier@illinois.edu with your comments.

Mary Hosier, IL SARE Project Manager (217-333-7512; mhosier@illinois.edu)

Fruit Production and Pest Management

Caring for New Fruit Trees Before Planting

Are you ready for your order of new trees? Most nurseries will be filling orders for new trees in the next few weeks. Here are a few points that should help you care for these trees until they are ready for planting.

First and foremost, find out from the nursery the exact date the trees will be shipped, the shipping company, and a tracking number if available. Call the shipping company to find out the exact date of delivery and give them your cell phone number, in case you are out when the truck arrives at your farm. Quickly inspect the trees or at least the box for signs of damage as soon as it arrives and before you sign the shipping slip. Call the nursery to reject the shipment if the saw dust or wood chips that are used to keep the tree roots moist is bone dry or if some or all the buds are open. Also check the trees to make sure that the variety, rootstock, and caliper are correct. Each tree should have a label for the rootstock and each variety should be labeled as well. Trees of the same variety maybe bundled together, but there should be at least one label listing the variety name. Also check to see if the graft union is at least two inch above the root system (apples). If you notice that the trees have arrived dry, if the buds have started to grow, or if the trees are not labeled correctly, call the nursery immediately and explain the problem and ask for replacement or refund. If the trees look healthy, but they are shipped bare-roots, then cover the roots with moist sawdust or wet rags. Don't cover the entire tree with sawdust. The sawdust should feel moist but not soggy. Reseal the plastic liner and place the box in a cold room. Fruit trees are very sensitive to low oxygen, so don't put the roots directly in water for more than a few minutes. Do not trim any broken branches or roots on these trees before planting. Any damage to the trees will enhance bud break, so wait until the time of planting to make any cuts.

Trees should be stored in a cold environment to prevent the buds from breaking. The cooler should be set to 40 to 45F. A cold room is preferred, but a cellar or any non-heated room will do fine for a short storage time. If you plan to store the trees in a fruit storage room, make sure it has been emptied of fruit and properly aerated to get rid of any residual ethylene. Ethylene is a hormone produced by most fruits like apples, pears, peaches, tomatoes, and bananas. It stimulates bud break at very low concentrations. Ethylene has no smell, and it mixes very easily with air so the room should be aerated for at least a week before you store any trees in it. To speed up the process of aeration, you can use an exhaust fan to remove any residual ethylene. Make sure you bring in fresh air free from ethylene. Ethylene is autocatalytically produced in the plant (meaning a little bit makes a lot), so a few fruits or any small amount left in the room can cause buds to start opening. Smoking, propane powered forklifts, car exhaust, and some types of rubber will generate ethylene. Do not cover the tree tops with plastic bags, especially if you are going to store them in a cellar or non-refrigerated room. High humidity and some ethylene will be generated by the trees stored in plastic bags, especially in late winter or early spring. Therefore, only the roots should be covered in plastic bags.

Humidity is another important factor that can affect stored trees. Make sure to place a humidifier or at least an open pan of water in the room to increase humidity. Lay the trees flat on the ground or raise the bottom of the tree a little higher than the top so their buds will not germinate quickly.

If you plan to store trees that you dug out of your own nursery, it is best to store them in pots of soil or peat moss. Water will evaporate from the pots and some of it will be taken up by the trees, so make sure to add water to the pots even in cold storage. Check your cooler temperature frequently and make sure the temperature in the room is set correctly. A thermometer is the only way to determine the exact temperature in the room. Also check the trees once and a while to make sure that they are still alive and sawdust is still moist.

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

Traps for Monitoring Fruit Insects

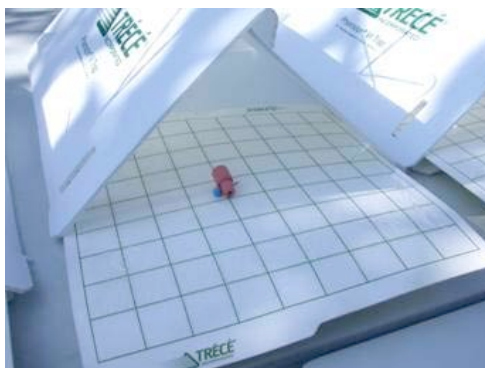
Yes, this is a repeat and update of my usual spring rant about using traps to monitor key insect pests in fruits ...

For apple, peach, and grape growers who have not already done so, NOW is the time to order pheromone traps for key insects. Traps are available and useful for monitoring many insects of fruit crops, and the ones listed in the table that follows are probably the most important for most Illinois fruit growers. Other pests that may be worth monitoring with traps include dogwood borer, spotted tentiform leafminer, redbanded leafroller, and obliquebanded leafroller in apples.

Contact me if you want more information on these insects.

What kind of traps work best?

A few companies manufacture traps, and all have a similar range of designs. Trecé is still the best known, but Scentry, Suterra, and others are also reliable providers. Over the last few years, the trap design that has become most widely used for fruit insects in general is the large plastic delta trap; Trecé sells it as the Pherocon VI trap, and Suterra and Scentry simply call it a large plastic delta trap (LPD). This trap is quick to set up and easy to maintain, because unlike earlier “wing traps,” the sticky trapping surface is provided by an exchangeable card that slides in and out quickly and easily. It is MUCH faster to change sticky liners on this trap than it is to change the bottoms of the wing traps we used several years ago. If you bring the trap “shell” indoors at the end of the season, you can expect to get 2 to 3 years use from each trap (while replacing lures and liners as needed).



A Pherocon VI trap (an example of a large plastic delta trap), with the sticky liner partially removed, showing a pheromone lure.

How do traps work?

Most of the insects listed in the table below are moths in their adult stage. For all the moths typically monitored using sticky pheromone traps, the trap must be baited with a pheromone lure – usually a small piece of rubber or plastic containing a synthetic blend of chemicals that is very similar to compounds used by female moths to attract males. When traps capture male moths, that serves as an indication that females are also present, and mating and egg-laying are occurring. When you order pheromone traps, you also must order lures for the specific insect(s) you wish to monitor. (Sometimes you may order “kits” that come with a combination of traps and enough extra sticky liners and lures to last the season.) Remember that although you may use the same type of trap to monitor different pests, you must use only a single lure per trap ... it does not work to put lures for codling moth and tufted apple bud moth in the same trap. Depending on the pest species, lures usually last 2 to 8 weeks (suppliers can tell you the effective life of the lures they sell), so you have to order enough lures to last through the whole season.

For apple growers in the northern half of Illinois, monitoring the flight of apple maggot flies also is necessary. Traps for apple maggot flies rely on appearance (especially the color and shape of a bright red apple) and the use of a food odor (“apple volatiles”) instead of a pheromone, and they are designed to capture female apple maggot flies ready to lay eggs on fruit. All the major suppliers of insect traps carry these kinds of traps. Growers should order the red spheres, tubes or tubs of stick-um or tanglefoot, and the food lures recommended by the supplier. Apple maggot traps may be used without any food lures; counts are interpreted accordingly.



An apple maggot trap.

How many traps are needed for each pest species?

There are no precise answers, but in general, for the moths that are pests in Midwest fruit crops, I consider it adequate to use 3 pheromone traps per pest species per each individual block of trees or vineyard up to 10 acres in size. Guidelines often recommend at least 3 traps per pest species for any orchard up to 10 acres in size and 1 more trap for every 3 to 5 acres above 10. To monitor 50 acres of trees in 3 or 4 separate blocks, use at least 3 traps per block and at least 9-12 traps total ... for each pest species. Always use at least 3 apple maggot traps (red spheres) per block of trees. See the table below regarding placement of traps. Remember that you should check these traps and record counts in each at least twice per week.

If you have only one relatively small block of trees, you may want to order 3-trap "kits" that suppliers package for each of the major pests. Kits with "standard" lures will include 3 lures per trap, but because the lures for most will have to be replaced every 4 weeks, most Illinois growers will need yet another 2 extra lures per pest species per trap to get through the entire season. Suppliers also sell these extra lures and extra "liners" (the sticky trapping surface) for traps. If you operate an orchard larger than 10 to 15 acres, you'll need more traps, so don't "mess with" 3-trap kits; contact a supplier and make plans to order in bulk. "Long-life" lures are available for the codling moth and the Oriental fruit moth (and some other species) ... these lures last 8 weeks between changes and are the best choice for almost all Illinois growers.

For apple growers in southern Illinois, it has been a few years since we saw some problems with tufted apple bud moth in orchards that were treated pretty much exclusively with organophosphates. With greater reliance on alternative chemistries in recent years, this pest has not reached economic levels in many Illinois orchards in the last 5 to 7 years (to my knowledge), but I'm including it in the following table because it still warrants attention in some orchards.

Pheromone trapping guidelines for major fruit insects

Crop and pest	When should you use traps?	Where do you hang the traps?
Apples -- all of Illinois Codling moth	Early bloom through harvest	At eye level or higher (<u>upper third of canopy is best</u>), spaced throughout the block, including one somewhere near the upwind edge and one near the downwind edge.
Apples -- south of I-70 Tufted apple bud moth	April 15 through harvest	Same as above for codling moth.
Apples -- north of Springfield Apple maggot	June 15 through harvest	In the outer portion of the canopy of trees on the edge of the block ... VERY visible to adults flying into the block (remove foliage around the sticky red spheres). Hang in border rows or end trees nearest any woods or brush outside the block
Peaches -- Lesser peachtree borer	Bloom or petal fall through harvest	Similar to codling moth, but trap height should not exceed 5 to 6 feet.

Peaches – “greater” peachtree borer	May 15 through harvest	Similar to codling moth, but trap height should be 3-4 feet above the ground.
Peaches -- Oriental fruit moth (In southern IL, trapping for Oriental fruit moth in apples is also recommended.)	Green tip to pink through harvest	Similar to codling moth, but trap height need not exceed 6-8 feet.
Grapes -- Grape berry moth	Bloom through harvest	Hang traps on the top trellis wire. Place traps in the outside rows and near ends of rows; concentrate traps on edges near wooded areas. (Note that where GBM populations carry over in wild grapes in woods near vineyards, mating may occur there, mated females may lay eggs in the vineyard, and traps may not capture many (or any) males in the vineyard itself.)

Midwestern suppliers of pheromone traps include:

Supplier	Address	Phone & Fax
Great Lakes IPM	10220 Church Road Vestaburg, MI 48891-9746 email: glipm@greatlakesipm.com On the web at: http://www.greatlakesipm.com	989-268-5693 989-268-5911 800-235-0285 FAX: 989-268-5311
Gempler's	P.O. Box 44993 Madison, WI 53744-4993 On the web at: http://www.gemplers.com/pheromone-lures	1-800-382-8473 (U.S.A.) FAX 1-800-551-1128

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

Vegetable Production and Pest Management

Tomato Variety Evaluations from the Dixon springs High Tunnels

In 2011, twenty-one tomato cultivars were evaluated for yield performance at the University of Illinois Dixon Springs Agricultural Center (DSAC). The tomatoes were grown from seed which was started on February 24 and were potted into 4 inch peat pots filled with Pro Mix on March 4. The transplants were planted in the high tunnel on April 11 and set at spacings of 12 inches for indeterminate cultivars and 18 inches for determinate cultivars.

Determinate cultivars were grown using a trellis weave system and pruned up to but not including the first sucker below the first cluster. No additional thinning or pruning was done on the determinate cultivars. Indeterminate cultivars were pruned to a single leader and affixed to a single polyethylene twine suspended from a permanent overhead trellis made from treated lumber and high tensile fence wire.

The planting was monitored for pest problems and treated as required. Pests that represented significant problems included tomato fruitworm, aphids, and both two spotted spider mite and broad mite.

Yield data are given in Tables 1 – 4. The data represent the mean of three replicated plots, each with eight plants. Results are given per row foot so that the difference in plant spacing is nullified.

Table 1. Top 5 early season (6/15 – 7/6) harvest results from DSAC high tunnel tomato cultivar evaluation. (Yield per foot of row)

	U.S. No. 1		U.S. No. 2		Total Marketable		U.S. No. 1	
Cultivar	Number	Pounds	Number	Pounds	Number	Pounds	%	Size (oz.)
CAIMAN	4.5	2.9	3.8	1.4	8.3	4.3	67.9	10.3
GERONIMO	4.4	2.5	3.5	1.3	7.9	3.9	65.6	9.2
BIG BEEF	4.1	2.8	2.7	1.0	6.9	3.8	73.2	10.7
CABERNET	3.2	2.1	2.6	1.0	5.9	3.1	66.8	10.2
ARBASON	3.6	1.9	3.3	1.0	6.9	2.9	64.9	8.4

Table 2. Top 5 mid season (7/8 – 7/29) harvest results from DSAC high tunnel tomato cultivar evaluation. (Yield per foot of row)

	U.S. No. 1		U.S. No. 2		Total Marketable		U.S. No. 1	
Cultivar	Number	Pounds	Number	Pounds	Number	Pounds	%	Size (oz.)
BHN 961	5.9	5.4	5.1	1.9	11.0	7.3	74.0	14.6
CHARGER	4.8	4.1	8.8	3.1	13.5	7.2	56.9	13.7
GERONIMO	6.2	3.8	8.4	2.6	14.6	6.4	59.6	9.9
TRIBECA	4.7	3.5	9.3	2.7	14.0	6.2	56.0	12.0
PHOENIX	4.1	3.3	8.5	2.8	12.6	6.1	53.7	13.0

Table 3. Top 5 late season (8/1 – 8/29) harvest results from DSAC high tunnel tomato cultivar evaluation. (Yield per foot of row)

	U.S. No. 1		U.S. No. 2		Total Marketable		U.S. No. 1	
Cultivar	Number	Pounds	Number	Pounds	Number	Pounds	%	Size (oz.)
PHOENIX	4.6	2.7	8.5	2.8	13.1	5.5	48.4	9.3
CHARGER	3.0	2.3	8.8	3.1	11.7	5.4	42.7	12.4
ROCKY TOP	4.8	3.0	6.1	2.1	10.9	5.1	58.2	9.9
TRIBECA	3.6	2.1	9.3	2.7	12.9	4.8	43.2	9.4
BHN 961	4.2	2.5	5.1	1.9	9.3	4.4	56.7	9.4

Table 4. Total season (6/15 – 8/29) harvest results from DSAC high tunnel tomato cultivar evaluation. (Yield per foot of row)

Cultivar	U.S. No. 1		U.S. No. 2		Total Marketable		Culls
	Number	Pounds	Number	Pounds	Number	Pounds	Number
BHN 961	28.5	8.6	7.7	2.9	36.2	11.5	6.1
ROCKY TOP	12.2	8.3	9.6	3.6	21.8	11.9	3.2
CHARGER	9.1	7.3	12.4	4.6	21.5	11.9	6.4
TRIBECA	10.4	7.0	14.7	4.7	25.1	11.7	5.7
GERONIMO	11.7	6.9	18.6	6.5	30.3	13.4	7.5
PHOENIX	10.0	6.8	11.3	4.0	21.4	10.8	2.5
BHN 589	9.8	6.7	11.2	4.1	21.0	10.8	5.6
BIG BEEF	9.4	6.3	11.6	4.1	21.0	10.4	11.6
CAIMAN	9.4	5.8	14.5	5.0	23.9	10.9	7.5
IMPERIAL	8.2	4.9	16.2	5.9	24.4	10.8	7.3
SCARLET RED	5.6	4.5	1.6	0.7	7.1	5.2	3.3
TRUST	6.8	4.1	17.6	5.9	24.4	10.0	12.0
RED DEUCE	5.4	4.0	1.4	6.0	6.9	10.0	1.7
CABERNET	5.8	3.6	10.2	3.7	16.0	7.3	14.1
EMPIRE	5.1	3.3	11.4	4.7	16.5	8.0	11.1
YELLOW PEAR	63.4	3.2	0.0	0.0	63.4	3.2	29.1
ARBASON	5.6	2.9	20.6	6.9	26.2	9.9	12.2
COBRA	4.6	2.9	12.4	4.2	17.0	7.1	9.5
GIANT TREE	3.3	2.8	1.6	0.7	4.9	3.4	3.6
BLACK SEAMAN	2.1	1.5	2.3	1.1	4.4	2.6	6.7
NYAGOUS	0.6	0.3	14.1	3.2	14.7	3.5	8.0

For more information on these results, contact Jeff Kindhart at 618-695-2770 or jkindhar@illinois.edu.

Insecticide Modes of Action

This is the first of a few notes we'll include in this newsletter on modes of action of insecticides. Understanding how they work is an important step in choosing the right products and using them effectively.

Acetylcholinesterase Inhibitors

It's not too hard to imagine a circumstance in which Sevin, Diazinon, or Malathion might be used in the coming growing season. Most readers can imagine a situation in which beetles might need to be managed using Sevin, somebody will undoubtedly use Diazinon in a seed or soil treatment, and Malathion may be used against aphids in some crops. These insecticides, along with other organophosphates and carbamates such as Lorsban, Imidan, Orthene, and Lannate, all have similar modes of action. That is, they poison insects and other animals in a similar fashion. How do they work? And why is it important to know how they work?

Products such as Sevin, Diazinon, and Malathion belong to groups of chemicals described as “acetylcholinesterase inhibitors.” Stated briefly, interfere with nerve impulse generation between cells at gaps called synapses and cause those nerve cells to fire unceasingly. Important information needed to keep the organism alive cannot be effectively transmitted through the poisoned nervous system. This eventually results in death, and one can usually see the agitated nervous system at work as the targeted organism “twitches.” Understanding how this feat is accomplished requires a little information about how a nerve cell works.

A nerve cell at least vaguely resembles a tree, and the nervous system basically looks like a series of small trees almost (but not quite) connected from top to bottom. In other words, the “branches of the tree below” almost touch the “roots of the tree above.” The nervous system is typically described as being electrical in nature, but it is actually electrochemical in nature. An electrical signal (a signal to breath, move, etc.) is sent through nerves. At the end of a nerve the electrical signal is transformed into a chemical signal. This happens when the electrical signal “tells” the nerve cell to release a chemical which then travels across the gap from one nerve to another or from a nerve to a muscle. That chemical is called a neurotransmitter, and once the neurotransmitter reaches the next nerve cell or a muscle it acts much like a key. The neurotransmitter attaches to gates in the receiving nerve or muscle and signals those gates to open. Opening the gates in the receiving nerve or muscle cell allows charged particles to rush inside. This causes the net electrical charge of the receiving cell to change and it “fires” – it sends an electrical signal down the length of the tree-like nerve cell or to the mechanism that causes muscle contraction. The nerve signal has now been transmitted from one cell to the next.

After the nerve impulse has been transmitted from one cell to another, the neurotransmitter (the key) must be removed or the gates to the receiving cell remain open and the system continues to “fire.” The nervous system solves this problem by releasing an enzyme which chemically breaks down the neurotransmitter. Once the neurotransmitter key is broken down, the gates on the receiving cell close, the charge of the cell reverts to normal, and the system stops firing. The chemical signal or key – the neurotransmitter – of interest in this discussion is “acetylcholine,” and the enzyme responsible for breaking it down is “acetylcholinesterase” (sometimes simply called cholinesterase).

Carbamates (such as Sevin and Lannate) and organophosphates (such as Diazinon, Lorsban, and Malathion) bind to and therefore inhibit the action of cholinesterase. In other words, these products occupy the attention of this enzyme and prevent it from breaking down the chemical key – the neurotransmitter acetylcholine. Because the neurotransmitter is not broken down the nerve cell continues to fire, disrupting key activities (movement, for example) and exhausting muscle systems. Acetylcholinesterase inhibitors keep gates open in impulse-receiving nerve and muscle cells and don’t let the nerve cell shut down – the result is death.

So what? Why do we care how these products work? Understanding mode of action (how products kill) is important because it allows us to note relationships between products. The pest management world is littered with evidence of resistance development – evidence of pests that now withstand the application of once effective products. Understanding mode of action allows the applicator to note those products that are related to one another so that they might use different modes of action on a targeted pest. Rotating modes of action decreases the type of long-term exposure typically needed for a pest to develop resistance. Products such as Sevin, Lannate, Diazinon, and Malathion (and other carbamates and organophosphates) are all related from a mode of action standpoint, but applicators often may not realize that they are. So ... rotating among modes of action – not just product names or even classes of insecticides – is a key step in resistance management.

For an illustration of how acetylcholinesterase inhibitors work, see the following link to Introduction to Applied entomology course at the University of Illinois: <http://cpsc270.cropsci.illinois.edu/syllabus/organophosphate.ppt>.

Matt Montgomery (309-547-3711; mpmontgo@illinois.edu) and Rick Weinzierl (217-244-2126; weinzierl@illinois.edu)

Organic Cover Crops Research Project

A research project entitled *Summer Cover Crops for Weed Suppression and Soil Quality in Organic Vegetable Production in the Great Lakes Region* needs organic vegetable farm managers’ help. The project is being conducted by a team from Purdue University, Cornell University, University of Illinois, and Michigan State University. The objective of the study is to better understand the economic impact of the use of summer cover crops in organic vegetable production systems and to explore the factors that influence the adoption of summer cover cropping practices

by managers of successful organic vegetable farms. As part of the project, researchers are conducting a survey of organic vegetable farmers. Participation is completely voluntary and all surveys will be treated confidentially by Purdue University. To participate, see https://purdue.qualtrics.com/SE/?SID=SV_1FjKZ5ZkUGw3We0. If you have questions or comments about this study, you can reach Shasha Li by phone at 765-413-5112 or by email at li264@purdue.edu or Brent Gloy at 765-494-0468 or bgloy@purdue.edu.

Less seriously ...

TOP 10 SIGNS YOUR FAMILY IS STRESSED...

10. Conversations often begin with, "Put the gun down, and then we can talk."
9. The school principal has your number on speed-dial.
8. The cat is on Valium.
7. People have trouble understanding your kids, because they learned to speak through clenched teeth.
6. You are trying to get your four-year-old to switch to decaffeinated.
5. The number of jobs held down by family members exceeds the number of people in the family.
4. No one has time to wait for microwave TV dinners.
3. "Family meetings" are often mediated by law enforcement officials.
2. You have to check your kid's day-timer to see if he can take out the trash.
1. Maxwell House gives you industrial rates.

University of Illinois Extension Educators and Specialists in Fruit and Vegetable Production and Pest Management

Extension Educators – Local Food Systems and Small Farms		
STEPHEN AYERS , Champaign, Ford, Iroquois, & Vermilion counties	217-333-7672	srayers@illinois.edu
DEBORAH CAVANAUGH-GRANT , Logan, Menard & Sangamon counties	217-782-4617	cvnghgrn@illinois.edu
KYLE CECIL , Henderson, Knox, McDonough, & Warren counties	309-342-5108	cecil@illinois.edu
LAURIE GEORGE , Bond, Clinton, Jefferson, Marion, & Washington counties	618-548-1446	ljgeorge@illinois.edu
CHRISTOPHER KONIECZKA , Livingston, McLean, & Woodford counties	815-842-1776	cmkonie@illinois.edu
PAUL MARIMAN , DeWitt, Macon, & Piatt counties	217-877-6042	pmariman@illinois.edu
MATT MONTGOMERY , Fulton, Mason, Peoria, & Tazewell counties	309-547-3711	mpmontgo@illinois.edu
ELLEN PHILLIPS , Boone, DeKalb, & Ogle counties	815-732-2191	ephillps@illinois.edu
JOHN PIKE , Franklin, Jackson, Perry, Randolph, & Williamson counties	618-993-3304	jpik@illinois.edu
MIKE ROEGGE , Adams, Brown, Hancock, Pike & Schuyler counties	217-223-8380	roeggem@illinois.edu
DAVID SHILEY , Coles, Cumberland, Douglas, Moultrie & Shelby counties	217-543-3755	dshiley@illinois.edu
JAMES THEURI , Grundy, Kankakee, & Will counties	815-933-8337	jtheu50@illinois.edu
Extension Educators – Horticulture		
RICHARD HENTSCHEL , DuPage, Kane, & Kendall counties	630-584-6166	hentschel@illinois.edu
ANDREW HOLSINGER , Christian, Jersey, Macoupin, & Montgomery counties	217-532-3941	aholsing@illinois.edu
SONJA LALLEMAND , Franklin, Jackson, Perry, Randolph, & Williamson counties	618-687-1727	lalleman@illinois.edu
ELIZABETH WAHLE , Bond, Clinton, Jefferson, Marion, Madison, Monroe, St Clair, & Washington counties	618-650-7050	wahle@illinois.edu
Extension Programs for Farm to School		
JULIA GOVIS , Statewide Extension Program Coordinator, Farm to School	630-955-1150	jgovis@illinois.edu
Horticulture Research-Extension Specialists at our Research Stations		
JEFF KINDHART , Dixon Springs Agricultural Center	618-695-2770 618-638-7799 (cell)	jkindhar@illinois.edu
BILL SHOEMAKER , St. Charles Research Center	630-584-7254	wshoemak@illinois.edu
Campus-based Extension Specialists		
MOHAMMAD BABADOOST , Plant Pathology	217-333-1523	babadoos@illinois.edu
MOSBAH KUSHAD , Fruit & Vegetable Production	217-244-5691	kushad@illinois.edu
JOHN MASIUNAS , Weed Science	217-244-4469	masiunas@illinois.edu
CHUCK VOIGT , Vegetable Production (& herbs)	217-333-1969	cevoigt@illinois.edu
RICK WEINZIERL , Entomology	217-244-2126	weinzierl@illinois.edu

Return Address:

Rick Weinzierl
Department of Crop Sciences
University of Illinois
1102 South Goodwin Ave.
Urbana, IL 61801

