



# UNIVERSITY OF ILLINOIS EXTENSION

College of Agricultural, Consumer, and Environmental Sciences

## *Illinois Fruit and Vegetable News*

Vol. 16, No. 20, March 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](mailto: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.

This is the final issue of the 2010 subscription cycle for this newsletter. Spring marks the start of a new subscription cycle. If you receive the newsletter in printed form via US Mail, a new subscription form is included with this issue. Those who receive direct email notifications when each issue is posted will continue to receive those emails unless you ask that your address be removed from my list ... email me at [weinzierl@illinois.edu](mailto:weinzierl@illinois.edu) if you wish to have your address removed from my email list.

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### *Upcoming Programs*

- **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.
- **Good Agricultural Practices (GAP) Workshop, March 23, 2011.** Countryside Extension Center. Phone: 708-352-0109. Register online at: <http://web.extension.illinois.edu/countrysidecenter/>.
- **Cover Crop Field Day, March 30, 2011.** Miller Farms, 918 Calvery Cemetery Road, Campbell Hill, IL. The program begins at 10:00 a.m. and lunch is provided. An RSVP is requested, and for additional information, contact John Miller at 618-426-1094.
- **Good Agricultural Practices (GAP) Workshop, April 7, 2011.** Kankakee County Extension Office. Phone: 815-933-8337. Register online at: <https://webs.extension.uiuc.edu/registration/?RegistrationID=5408>.
- **SW Illinois Orchard Twilight Meeting, April 14, 2011.** Backwoods Berry Farm (Dale & Becky Conrady), 27244 Hettick Scottville Road, Hettick, IL. Program begins at 6:00 p.m. and will include discussions led by UI Extension on early season insect and disease management in fruit crops. From Carlinville, take IL-108 west to IL-111. Turn right onto IL-111 and follow for 4.3 miles. Turn left onto CR-9. Take the first left to stay

on CR-9 and go another 4.5 miles to 27244 Hettick Scottville Road. For additional details or questions, contact Elizabeth Wahle at [wahle@illinois.edu](mailto:wahle@illinois.edu) or 618-692-9434, ext. 21.

- **Grape Growers Workshop, May 14, 2011.** Lazy L Grape Ranch, near Mechanicsburg, IL. Brad Taylor, SIU, and Elizabeth Wahle, UI Extension, will demonstrate and discuss major practices, including shoot thinning and positioning and cluster thinning and leaf removal, vineyard floor management, and petiole sampling. Program begins at 10:00 a.m., with registration at 9:30 a.m. On I-72 east of Springfield, take Exit 114 into Mechanicsburg. Turn left (east) onto W. Main Street, then right onto S. Church Street, which turns into Roby Road. Continue south past Darnell Road and turn left (east) onto Moomey Road. The vineyard is on the right (south) and visible from the road. Registration is \$20.00 for individual IGGVA members or \$30.00 per vineyard or non-IGGVA member. Registration is at the door and includes lunch. For further details, contact Elizabeth Wahle at [wahle@illinois.edu](mailto:wahle@illinois.edu) or 618-692-9434, ext. 21.
- **SW Illinois Orchard Twilight Meeting, May 19, 2011.** Broom Orchard, located 2.3 miles south of Carlinville/IL-108 on the Alton Road/Shipman Road. Program begins at 6:00 p.m. For more information contact Elizabeth Wahle at 618-692-9434, ext. 21 or [wahle@uiuc.edu](mailto:wahle@uiuc.edu).

### ***Illinois Driftwatch Website Now Available***

The Illinois Department of Agriculture has introduced a web-based tool that aims to protect pesticide-sensitive crops by improving communications between specialty crops growers and commercial pesticide applicators. Driftwatch is an online program that allows organic and specialty crop growers to enter the locations of their fields on a map that pesticide applicators can consult to avoid drift onto sensitive crops. Every time a new field is added, the program sends an email alert to applicators who have registered to use the site. Driftwatch is free to growers and applicators. This program was developed by Purdue University in Indiana and has been adapted for use in Illinois, Michigan, Wisconsin, and Minnesota. For more information, consult the Illinois Department of Agriculture site at [www.agr.state.il.us](http://www.agr.state.il.us) and click on the Driftwatch link.

### ***Regional Updates***

**In southern and southwestern Illinois**, signs of spring include wheat fields greening, catkins on filberts, northern spring peepers singing, daffodils pushing up, and the henbit actively growing. The entire area is soggy from recent heavy rainfall which may slow the first planting of sweet corn which traditionally would start in the next week to 10 days. The rains have certainly has delayed horseradish digging. With any amount of warmth, the landscape is ready to make the transition into spring.

Growers in the region are reminded to take advantage of upcoming programs ... the St. Louis retail and food service buyers meeting on March 11 in Sparta, the cover crop field day near Campbell Hill on March 31, the orchard twilight meeting near Hettick on April 14, a workshop for grape growers near Mechanicsburg on May 14, and a second twilight meeting on May 19 just south of Carlinville. Details on all of these programs are provided under the *Upcoming Programs* heading at the beginning of this issue.

*Elizabeth Wahle (618-692-9434; [wahle@illinois.edu](mailto:wahle@illinois.edu))*

### ***Notes from Chris Doll***

The 28 days of February seemed like a long month to many growers, but at least it did not warm up enough to make early March growth too worrisome. An inspection of plants in the Back-40 on the March 4 revealed that flower buds on apricot and some Asian plums had pushed enough to be easily visible, and I could identify some swelling on a few peach varieties. The good news here is that very little bud kill happened to peaches. Brambles are ready to show growth when the next warm-up happens. The earliest pink on peach at this location was on March 12, 2007, which most folks remember because of the subsequent freeze in early April.

An easy way to record the floral development of tree fruit crops is to make notations of the dates on page 63 of the 2011 Midwest Tree Fruit Spray Guide. And then hope that you don't have to worry about the killing temperatures included on that page this year.

The rains on March 4 and 5 exceeded 2 inches here, and soils are very wet. It looks like early tree planting this year will not happen unless we experience a rapid drying out. Studies show that the benefits of early planting are increased root growth in cooler soils, but the effects of planting in soils that are too wet to be friable are worse than waiting a little bit. In my work travels, I saw apple trees being planted with a planter in very wet soils where the packing wheels would not close the seam, and some blueberries being planted in an augured hole 24 hours after a five-inch rain. The recovering soil was 1-2 inch mud balls. Neither planting was successful.

As pruning season winds down, there is still time of use some pruning concepts for improving fruit quality. Thinning and reducing top growth reduces the shade that prevents good light penetration. The same can be true for the lower part of the tree, and the benefits include better spray penetration and most likely better disease control. Renewal of shoots and fruiting spurs is also a good reason to prune, as is maintaining tree size for equipment movement during the growing season and harvest season.

Growers at last week's Illinois Small Fruit and Strawberry Schools were privileged to hear Dr. Paul Domoto from Iowa State University tell about studies on high tunnels and the strawberry industry in Iowa. The interest in high tunnels is quite high and seems to offer good potential for some small fruits and maybe tree fruits like sweet cherries and peaches. In his strawberry talk, he mentioned the acreage and number of growers in his state. So I went on line to learn what was reported for Illinois in 2007 and 2002. Illinois has only a few more acres and growers than Iowa. In 2007, Illinois reported 277 harvested acres for 201 farms in contrast to 262 acres for 154 farms in 2002.

In my last report, I cited the number of Illinois fruit growers that were members if the Illinois State Horticulture Society in recent years. Census reports show that these numbers could be higher, as the 2007 report listed 367 farms (growers?) for 1979 harvested acres of apples. These numbers were down 10 percent for the number of farms and 40 percent for the acres from 2002. For peaches, the data was 220 farms (growers?) and 1603 harvested acres in 2007, with very little change from 2002. About one-third of the farms with apples and one-half with peaches were in the 0.1-0.9 acre category of the census. A small industry compared with many states. I feel like a minority, but the great growers make it worthwhile.

In 2010, quite a number of peach trees died in Illinois from asphyxiation due to wet soils, as did some apple trees in other states from herbicide damage. Tree losses have been common to the industry through history. While cleaning files, I found a copy of "Why Fruit Trees Die" by Meador, Ries and Randell of the University of Illinois. The first listing was wet soils, followed by cold injury, mice, borers, soil-borne diseases, fireblight, bot rot, black knot, cankers, and drought. I could add herbicides and mechanical injury to that list. Maybe that is good for our friends in the nursery business.


Some good reading in the *2011 Michigan Fruit Management Guide*, Extension Bulletin E-154, includes pages 250-251 on the results of research on rainfastness of pesticides, a question that has been heard for many years. Data are included on page 243 of the 2010 issue of the same publication, as well as the effect of water pH on the stability of pesticides on page 244-245.

*Chris Doll*

## ***Specialty Crops and Local Foods Issues***

### ***Why and How to Register Your Business in MarketMaker***

MarketMaker connects willing markets and quality sources of food from farm to fork. It's a great way to let potential customers know exactly what your business has to offer. Enter your information in detail; give specific product forms, product attributes, and methods of sale, along with business details such as hours of operation. You can even add photos, Facebook, and Twitter!

The greatest benefit of registration is that your business will be among the first that a viewer will see. Registered businesses are always listed first and are identified by this icon: 

Create a user account on Illinois MarketMaker at <http://www.marketmaker.uiuc.edu/>. Click on “Register Your Business”. Follow the on-screen instructions to input your business information. Also complete the “Business Profile” (be sure to select the correct product type tabs for your particular business) and submit.

Once you submit your information, you will automatically receive an email from MarketMaker that will include your username and temporary password. This access will allow you to make changes in your profile and keep your information up-to-date. Your information will appear on the website within one or two business days.

It’s that easy. There’s no cost for registering, and it’s a great way to get your business name out for all to see. For more information, email [marketmaker@extension.uiuc.edu](mailto:marketmaker@extension.uiuc.edu) or call 309-792-2577.

Lori Dalfonso (309-792-2577; [dalfonso@illinois.edu](mailto:dalfonso@illinois.edu))

## ***Fruit Production and Pest Management***

### ***2011 Spray Guide Does Not List Rates per 100 Gallons***

You may have noticed the “Rate/100 Gallons” column from previous editions is not included in the 2011 [Midwest Tree Fruit Spray Guide](#). Here’s why. Rates for older products (such as Guthion) were based on an assumed 400gal/acre application rate and were originally tested on large trees. With smaller trees you could divide by 4 and get the rate/100 gals for these older products and still have an effective dose. The label also stated both the rate/acre and the rate/100 gals. New products (such as Assail ... and many others) were not tested on large trees, so the effective dose stated as a rate/acre on the label is the amount you put in the tank no matter how much carrier you use per acre. If you divide the rate of a new product by 4, you will be well below an effective dose. If the label does not give a rate/100 gal, **DO NOT** reduce the rate/acre. The “Rate/100 Gallons” column was removed to avoid this type of confusion. Always refer to the label for any guidance on rate/100 gals.

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### ***Pheromone Traps for Fruit Insects***

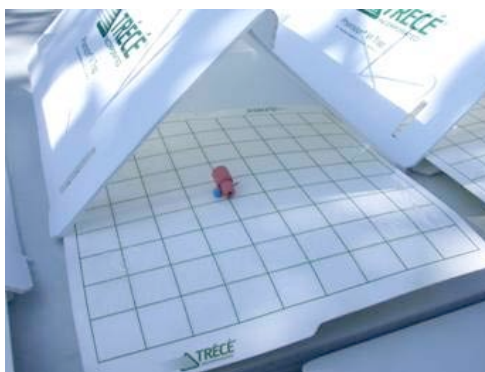
My usual spring column about using traps to monitor key insect pests in fruits, with a few updates ...

(Our next issue will deal with calculating and interpreting degree days so that you can make best use of the insect counts you get from these traps.)

For apple, peach, and grape growers who may not have heeded recommendations on insect monitoring offered during our winter programs, NOW is the time to order pheromone traps for key insects if you've not already done so. 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 and peachtree borer in peaches. 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 2 to 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.

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 the suppliers and make plans to order supplies 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 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***

| <b>Crop and pest</b>  | <b>When should you use traps?</b>   | <b>Where do you hang the traps?</b>   |
|---|-------------------------------------|---|
| Apples -- all of Illinois<br>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<br>Tufted apple bud moth  | April 15 through harvest            | Same as above for codling moth.   |
| Apples -- north of Springfield<br>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 --<br>Lesser peachtree borer  | Bloom or petal fall through harvest | Similar to codling moth, but trap height should not exceed 5 to 6 feet.   |
| Peaches --<br>Oriental fruit moth<br><b>(In southern IL, trapping for Oriental fruit moth in apples is also recommended.)</b> | Green tip to pink through harvest   | Similar to codling moth, but trap height need not exceed 6-8 feet.  |
| Grapes --<br>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<br>Vestaburg, MI 48891-9746<br>email: <a href="mailto:glipm@greatlakesipm.com">glipm@greatlakesipm.com</a><br>On the web at: <a href="http://www.greatlakesipm.com">http://www.greatlakesipm.com</a> | 989-268-5693<br>989-268-5911<br>800-235-0285<br>FAX: 989-268-5311 |
| Gempler's       | P.O. Box 44993<br>Madison, WI 53744-4993<br>On the web at: <a href="http://www.gemplers.com/pheromone-lures">http://www.gemplers.com/pheromone-lures</a>   | 1-800-382-8473 (U.S.A.)<br>FAX 1-800-551-1128                     |

Rick Weinzierl (217-333-6651; [weinzier@uiuc.edu](mailto:weinzier@uiuc.edu))

## **Vegetable Production and Pest Management**

### **Corn Earworm Monitoring**

With a purpose similar to that of the notes above on fruit insect trapping, here's my usual spring rant about earworm biology and the use of pheromone traps to monitor flights and plan control programs ...

Corn earworms are often the most damaging insect in Illinois sweet corn. They overwinter in the pupal stage in the soil, but their survival rate is very low in most of the state. It manages to be a severe pest every year anyway it migrates in from southern states on weather fronts every summer. Moths are almost always active in the Collinsville area (where overwintering success is greater) by late May and early June, but in much of the state the period of first activity (and the first need to control them) can vary from June through August. Although control may be necessary in one portion of the state at a particular time, it may be unnecessary in many other locations. Consequently, it really is essential to establish a monitoring program to determine spray needs. Unfortunately, scouting for foliar damage or larvae on the surface of plants is not an option. Corn earworm moths lay their eggs singly on silks, and larvae move down the silk channel immediately after they hatch from the eggs (and hatching can occur in as little as 2 ½ days during hot weather). On corn, larvae do not feed on any exposed parts of the plant (leaves, husks, etc.), so the only practical way to kill them (short of having planted BT sweet corn, which does not provide 100 percent control) is with a contact insecticide applied to the silks. Larvae crawl across the residues on the silks, and the insecticide is taken up through the cuticle.

Effective monitoring programs depend on the use of pheromone-baited traps that catch male corn earworm moths and are used as indicators that adults of both genders are present and eggs are being laid. Previously we have recommended using either a wire Hartstack trap (pictured below) or a nylon version of the same general design marketed by Scentry and several regional distributors. We've long known that paper sticky traps are ineffective at monitoring corn earworm moths, and in recent years evidence indicates that the Scentry nylon cone traps may not work well enough. Several years ago the Scentry traps were shown to catch fewer moths than the Hartstack traps in trials completed in the northeastern U.S., and results from monitoring work done in 2006 show that the nylon traps also may fail to detect light but still significant flights when the wire Hartstack traps do catch moths. Consequently, I now recommend that all sweet corn and seed corn producers use the wire Hartstack trap. (Data to support this recommendation came from a regional monitoring effort coordinated by Bill Hutchison of the University of Minnesota and conducted by several entomologists and horticulturists who participate in the Great Lakes Vegetable Workers Group.) Traps should be baited with Hercon "zealures," and the lures need to be replaced every 2 weeks. Earworm control is necessary when moth flight is ongoing and fresh silks are present. If traps are catching more than a few moths (3 to 5 per trap per night) when silking begins, sprays should be applied within 2 days after first silk -- insecticide residues must be on the silks to kill larvae immediately after they hatch from eggs and before they enter the silk channel.



Left: Corn earworm larva. Right: Hartstack trap.



Corn earworm moth (Kansas Department of Agriculture).

A Midwest supplier of the Hartstack trap for earworms is Bob Poppe, Route 1, Box 33, Lexington, IL, 61753 (309-723-3201). Lures are available from Great Lakes IPM (10220 Church Road NE, Vestaburg, MI 48891; 989-268-5693; 989-268-5911; 800-235-0285; FAX: 989-268-5311) and Gemplers (1-800-382-8473). As I have pointed out in previous seasons, the wire Hartstack trap is not cheap ... think in the \$250 range plus shipping, and think higher numbers if the traps must be shipped a long way. But before you let the price tag make you balk, consider ...

- These traps will last for many years (I have a couple that are 25 years old) ... as long as you don't run over them with tractors or other vehicles.
- Along with a few dollars for lures every year and daily monitoring of moth counts, they provide you with guidance that can keep you from spending thousands of dollars unnecessarily or losing thousands of dollars worth of sweet corn sales. If you spray 10 acres of sweet corn even twice a week for 3 weeks before earworms are actually present and require control, that's 6 applications at (conservatively) \$12.00 per acre for each application ... multiplied by 10 acres, that's \$720 (plus the loss of time not spent doing something more necessary). Multiply that by a 20-year life span for the trap, and the total exceeds \$14,000. I think that pays for the trap and the lures. Viewed in a different way, if high trap counts lead you to spray more often in order to get the control you really need, you market more corn. For a fresh-market producer who sells sweet corn at \$4.00 per dozen, a yield of 1,500 dozen per acre is worth \$6,000. Preventing a 5 percent loss by spraying extra when needed saves \$300 per acre in sales. Multiply that by 10 acres and 20 years, and the total reaches \$60,000 ... that, plus keeping your customers from complaining about wormy corn, certainly pays for the cost of a trap and a package of lures every year.

### **Insecticide choices for corn earworm for 2011**

In preparation for controlling corn earworm when traps indicate the need to do so, growers need to be aware that pyrethroid resistance varies among populations of corn earworms. Sometimes the populations we receive as a result of migrations are susceptible to pyrethroids such as Warrior, Brigade, and Mustang Max. Other populations may be



highly resistant, and these insecticides fail to provide control even at high rates and frequent applications. Alternatives that are effective against pyrethroid-resistant corn earworms include Coragen, Belt, and Radiant; for organic growers Entrust is fair to good. I'll cover spray rates, timing, and intervals in detail as the season develops, but growers should plan ahead to have alternatives to pyrethroids available in 2011.

(Rick Weinzierl; 217-244-2126; [weinzier@uiuc.edu](mailto:weinzier@uiuc.edu))

### ***High Tunnel Production Systems***

One of the most common complaints of growers using high tunnels is excessive moisture inside the tunnel, especially during the early part of the growing season. When there is high moisture inside the high tunnel, there are commonly increased disease problems. The lack of supplemental heat makes this problem much more difficult to handle in high tunnels than in their heated greenhouse counterparts. Here are some of the strategies that may be used in a grower's effort to minimize excessive moisture in the high tunnel during the early growing season.



1. Obviously proper site selection is most important – set on the high tunnel on a ridge crest where possible, and definitely avoid sites that are lower than the surrounding terrain.
2. The impermeable cover of the high tunnel inherently results in a high volume of water shed which falls along the sides of the high tunnel. The design of the structures makes guttering impractical in most cases. Therefore, it is critical that earth be sloped away from the baseboards. This will be part of the directives for those using the NRCS program. Additionally, when two houses are sited near each other, there must be extra effort to address drainage issues between the two tunnels. Some growers use French drains to address drainage requirements while others use drainage tile. Care must be taken to avoid creating erosion problems in efforts to afford drainage.
3. Keep water from running in from outside the tunnels. This may require the development of diversion ditches or channels and may involve additional needs for drain tile. Keeping water from running into the high tunnel is absolutely necessary to keep them from being too wet.
4. High tunnels must have adequate ventilation. This can be managed to help reduce humidity levels (moisture) within the house. By using several cycles of opening and closing, moisture levels can be reduced. This is similar to the technique used in greenhouses. In the greenhouse, growers reduce humidity levels by drawing in cold air (typically in the evening). As the air is heated by the furnace in the greenhouse it becomes lower in humidity. This allows the air to now pick up additional water from the plants, media, and other water holding materials of the greenhouse. After the now heated air becomes higher in humidity, it is in turn exhausted from the greenhouse and new cold air is drawn in and in turn heated and the cycle is repeated. A few cycles per night over a couple of nights nearly always dries down even the wettest greenhouses. Since there is no supplemental heat source in a high tunnel, we modify this technique by venting the house as soon as it gets warm in the morning which results in cooler air being drawn in. The tunnel is then reclosed and allowed to reheat. This can be done two or three times each morning and will help dry down the house. It is time-consuming but will help manage moisture.
5. Employ the use of circulation fans. The use of fans (typically 4 or 6 for a 96' structure) can help in keeping the plants drier and also helps make the air throughout the house more uniform. This helps the methods described in number 4 above be much more effective.
6. If a grower is having problems with water dripping down onto the crop from the polyethylene covering, there are wetting agents which can be purchased and sprayed onto the covering. These will result in the water running down the covering and being shed to the hip board rather than dripping down onto the crop.

Hopefully these methods will help you control moisture in your high tunnels. Best wishes for the upcoming growing season. It is almost upon us!!!

Jeff Kindhart (618-695-2770); [jkindhar@illinois.edu](mailto:jkindhar@illinois.edu))

***Less seriously ...***

WISDOM FROM TRAINING MANUALS

- 'If the enemy is in range, so are you.'* Infantry Journal
- 'It is generally inadvisable to eject directly over the area you just bombed.'* U.S. Air Force Manual
- 'Five second fuses last about three seconds.'* Infantry Journal
- 'Any ship can be a minesweeper. Once.'* Naval Ops Manual
- 'Never tell the Platoon Sergeant you have nothing to do.'* Unknown Infantry Recruit

***University of Illinois Extension Specialists in Fruit Production and Pest Management***

| <b>Extension Educators in Food Crop Horticulture</b> |                                     |  |
|--|-------------------------------------|--|
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