



# UNIVERSITY OF ILLINOIS EXTENSION

College of Agricultural, Consumer, and Environmental Sciences

## *Illinois Fruit and Vegetable News*

Vol. 12, Nos. 18-19, January 23, 2007

*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, 217-333-6651, [weinzier@uiuc.edu](mailto:weinzier@uiuc.edu). The *Illinois Fruit and Vegetable News* is available on the web at: <http://www.ipm.uiuc.edu/ifvn/index.html>. To receive email notification of new postings of this newsletter, call or write Rick Weinzierl at the number or email address above.

### *Final issues of the 2006 newsletter year ...*

Often in the publication of the *Illinois Fruit and Vegetable News*, the final issues of a given year are actually published in January and February of the next year ... and this winter is no exception. This double issue – Issues 18 and 19 of the 2006 subscription year – will be followed in 2 to 3 weeks by Issue 20. Issue 20 will include a subscription form for 2007.

### *In this issue ...*

#### **Upcoming Programs**

##### **Regional Updates** (from Maurice Ogutu)

**Notes from Chris Doll** (winter observations; notes on apple and peach presentations at the 2007 Illinois Specialty Crops Conference; kudos to Gerald McArtor and family (Jonamac Orchards) and to Jerry Mills; dwarfing rootstocks for peaches)

**Fruit Production and Pest Management** (cider contest winners at the Illinois Specialty Crops and Agritourism Conference; updates on Guthion and Imidan regulatory actions; 2006 Illinois apple insecticide trial summary)

**Vegetable Production and Pest Management** (corn earworm, soybean aphid, and western bean cutworm updates will be included in Issue 20) )

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

*Upcoming Programs ...* please note the expanded discussions of certain programs following the bulleted listing below.

- **Kankakee County Vegetable Growers School**, January 30, 2007, at the Kankakee County Extension Office in Bourbonnais, IL. Contact Maurice Ogutu ([ogutu@uiuc.edu](mailto:ogutu@uiuc.edu)) or James Theuri ([jtheuri50@uiuc.edu](mailto:jtheuri50@uiuc.edu)). (See Maurice Ogutu's comments in the Regional Updates below.)
- **Southern Illinois Tree Fruit School**, February 6, 2007, at the Holiday Inn, Mt. Vernon, IL. Contact Elizabeth Wahle, University of Illinois Extension, 618-288-4584 or [wahle@uiuc.edu](mailto:wahle@uiuc.edu). For program details, see <http://web.extension.uiuc.edu/regions/hort/>.
- **Southwestern Illinois Tree Fruit School**, February 7, 2007, at the First Presbyterian Church, Hardin, IL. Contact Elizabeth Wahle, University of Illinois Extension, 618-288-4584 or [wahle@uiuc.edu](mailto:wahle@uiuc.edu). For program details, see <http://web.extension.uiuc.edu/regions/hort/>.
- **Putting Small Acreage to Work**, February 7, 2007, 6:00 to 9:00 p.m., at the Adams County Extension Office, Quincy, IL. For details, call 217-223-8380 or check the web site at: <http://www.extension.uiuc.edu/adams>.
- **Tri-State Organic IP Video Series**, February 13, 2007, 5:00 – 7:30 p.m.; this is the first of five sessions to be held from February through November). Contact Deborah Cavanaugh-Grant at 217-968-5512 or [cvnghgrn@uiuc.edu](mailto:cvnghgrn@uiuc.edu), or check the web site at <https://webs.extension.uiuc.edu/registration/default.cfm?RegistrationID=510>
- **Western Illinois Fruit and Vegetable School**, revised date: February 13, 2007, Quincy, IL. Contact Mike Roegge, University of Illinois Extension, 217-223-8380 or [roeggem@uiuc.edu](mailto:roeggem@uiuc.edu).

- **Southern Illinois Vegetable Growers School**, February 15, 2007, at the Holiday Inn, Mt. Vernon, IL. Contact Elizabeth Wahle, University of Illinois Extension, 618-288-4584 or [wahle@uiuc.edu](mailto:wahle@uiuc.edu). Program details are available at <http://web.extension.uiuc.edu/regions/hort/>.
- **Illinois/Wisconsin (Stateline) Fruit and Vegetable Conference**, February 15, 2007, at FitzWoody's Lakeshore Grill, Twin Lakes, Wisconsin. For details, contact Don Schellhaass at 815-338-3737 or by e-mail: [schellha@uiuc.edu](mailto:schellha@uiuc.edu) or Maurice Ogutu at [ogutu@uiuc.edu](mailto:ogutu@uiuc.edu). (See Maurice Ogutu's comments in the Regional Updates below.)
- **Illinois Grape Growers and Vintners Association Annual Meeting**, February 22-25, Hilton Hotel, downtown Springfield. Each day will focus on a particular aspect of the grape and wine industry: Thursday will be marketing; Friday, enology; Saturday, viticulture; and Sunday will be reserved for the IGGVA business meeting. Check the program at [http://www.illinoiswine.com/pdf\\_forms/2007reg-agenda.pdf](http://www.illinoiswine.com/pdf_forms/2007reg-agenda.pdf).
- **Illinois Small Fruit & Strawberry Schools**, February 27-28, 2007, at the Holiday Inn, Mt. Vernon, IL. Contact Jeff Kindhart ([jkindhar@uiuc.edu](mailto:jkindhar@uiuc.edu)) or Bronwyn Aly ([baly@uiuc.edu](mailto:baly@uiuc.edu)), 618-695-2444.
- **Commercial General Standards Pesticide Training in English and Spanish**, March 22-23, 2007, St. Claire County Extension Office. For details, contact the St. Claire UI Extension Office at 618-236-4172 or by email at [stclair\\_co@extension.uiuc.edu](mailto:stclair_co@extension.uiuc.edu).

### Putting Small Acreage to Work

A workshop entitled "Putting Small Acreage to Work" is scheduled for February 7, 2007, and will be held at the U of I Adams County Extension office 6:00 to 9:00 p.m. More and more people are investigating options on the use of small acreages for income-generating activities. Whether they are large producers looking for options on a small, hard-to-farm field, or new landowners who purchased 10 acres and don't want to mow it all summer, all seem to have interest in using those acres to the fullest degree possible. With that in mind, we've designed a program to help provide some options on those acres. The program will open and close with general sessions: Evaluating the Alternatives, Enterprise Analysis, and Marketing Tools. In between you'll have breakout sessions on the following topics: goats/sheep; culinary herbs; growing and developing for a farmers market; composting; agritourism; and livestock production on pasture. You'll have an opportunity to choose two of these topics. Presenters are local producers or extension educators. The cost of the program is \$30 per person, which will provide you with a proceedings and snacks at the break. Registration must be received by Feb. 2; contact the Adams County office at 217-223-8380 (please let us know which of the breakout sessions you'd like to attend), or register on line at [www.extension.uiuc.edu/adams](http://www.extension.uiuc.edu/adams). The program is sponsored by U of MO Extension, WISAS, and U of I Extension.

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### Tri-State Organic IP Video Series

In order to provide regional- and national-caliber speakers on topics relating to organic farming, the University of Illinois Extension will host a series of video presentations at offices throughout Illinois. The series will begin on Tuesday, February 13, from 5:00 to 7:30 p.m., with a presentation on cover crops and fertility management. The video will be transmitted to selected U of I Extension offices so more people can take advantage of this educational opportunity without having to travel far.

Future dates and topics are as follows:

March 15 -- Organic Weed Control

April 19 -- Insect and Disease Control in Organic Vegetables

September 20 -- Organic Poultry Production

November 15 -- Beginning Organic Farming/Certification and Marketing

All presentations will begin at 5:00 p.m. and end at 7:30 p.m. Pre-registration is required three days before each workshop, along with a fee of \$10. To register, visit <https://webs.extension.uiuc.edu/registration/default.cfm?RegistrationID=510> or contact Donna Cray (217-241-4644; [dcray@uiuc.edu](mailto:dcray@uiuc.edu)). For additional information, contact Deborah Cavanaugh-Grant (217-968-5512; [cvnghgrn@uiuc.edu](mailto:cvnghgrn@uiuc.edu)). The Tri-State Organic Video Series is sponsored by University of Illinois Extension, the North Central Region Sustainable Agriculture Research and Education (NCR-SARE), The Ohio State University Extension, and Purdue University Extension.

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## Illinois Small Fruit and Strawberry Schools

The 2007 Illinois Small Fruit and Strawberry Schools will be held February 27 and 28 at the Holiday Inn in Mt. Vernon. The schools are designed to provide information to those interested in growing and marketing small fruit crops in the Midwest. Presentations will be provided by university specialists, industry professionals and growers.

The Illinois Small Fruit School will be on February 27, and the first educational session will begin at 9:30 a.m. and include presentations on the possibilities of elderberry production in the Midwest, table grape production for direct marketing, weed control and the role of micronutrients in small fruits, blueberry diseases, insect pests at harvest, marketing tips for small fruit, and growing blueberries in the Missouri area. Featured speakers throughout the day include Patrick Byers, fruit grower advisor of Missouri State University, plant pathology professor Mark Gleason of Iowa State University, agricultural economist Tim Woods of the University of Kentucky, and various members of the University of Illinois research and extension staff. The educational sessions will end at 5:00 p.m.

The Illinois Strawberry School will be held February 28 with the first session kicking off at 8:30 a.m. Presentations will include information on insect and disease management and weed control. A number of strawberry marketing strategies will be addressed, and Lakeview Farms owner Carl Lask will present a session on utilizing the technological wonders of the internet and e-newsletters to communicate with berry customers. Leslie Cooperband will inform growers about using organic nitrogen sources during production, while Mosbah Kushad will discuss the post-harvest handling of strawberries. Missouri State University's research professor of fruit Martin Kaps will present variety trial information and University of Kentucky fruit and vegetable specialist Joe Masabni will evaluate herbicides in strawberry plasticulture production. Educational sessions will end at 3:30 p.m. In addition to the educational sessions, there will be a trade show both days featuring vendors offering products, supplies and services to small fruit and strawberry growers.

The registration fee is \$30 per farm family and includes admission to the educational sessions and trade show along with one copy of the *2007 Proceedings* (available on CD-ROM or printed version) and the *2007 Midwest Commercial Small Fruit and Grape Spray Guide*. For more information contact Jeff Kindhart ([jkindhar@uiuc.edu](mailto:jkindhar@uiuc.edu)) or Bronwyn Aly ([baly@uiuc.edu](mailto:baly@uiuc.edu)) (618-695-2444).

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## Commercial General Standards Pesticide Training in English and Spanish

On March 22 and 23, University of Illinois Extension staff will be teaching the Commercial General Standards subject matter in English with immediate translation to Spanish by bilingual staff members. This unique class can benefit your staff in two ways. First, for those employees that have a good command of English but can't quite pass the test for licensing, this class may provide the thorough understanding of the subjects that is necessary. Secondly, for those employees that are weaker in English, the class offers an outstanding opportunity to gain an understanding of the safety issues surrounding pesticides and their application. Either way, your employees win when they are better informed and protected. If you have additional questions, please don't hesitate to call the St. Claire UI Extension Office at 618-236-4172 or by e-mail at [stclair\\_co@extension.uiuc.edu](mailto:stclair_co@extension.uiuc.edu).

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## Regional Updates

**In northern Illinois ...** as in the rest of the state, it was much warmer than normal during the last two weeks of December 2006, with day temperatures in the upper 30s to 50s and night temperatures in the upper teens to 40s. The trend has changed a little bit in January, with day temperatures in the upper teens to low 50s and night temperatures from -2 to the upper 30s. The coldest temperatures of zero and below were recorded in the northwestern counties on January 17. The region received 2 to 5 inches of rainfall during the period between December 16 and January 21..

Growers in northern Illinois are reminded of two upcoming programs...

The **Kankakee Vegetable Growers School** will be held on Tuesday January 30, 2007 at the Kankakee County Extension office Bourbonnais. Topics to be covered are: Management of phytophthora in vegetables and updates on new fungicides; post-harvest handling of sweet corn and other vegetables; effects of colored plastic mulches on bell pepper yield; updates on hi-tunnel vegetable production; scouting for insect pests and updates on new insecticides;

and updates on use of rye cover crops in pumpkin production. For more information, contact James Theuri, Kankakee County Extension Office at 815-933-8337, or Maurice Ogutu at [ogutu@uiuc.edu](mailto:ogutu@uiuc.edu).

The **Illinois/Wisconsin (Stateline) Fruit and Vegetable Conference** will be held on Thursday February 15, 2007 at FitzWoody's Lakeshore Grill, Twin Lakes, Wisconsin. Topics to be covered during the conference include: The future of fresh market fruit and vegetable production; alternative fruits; IPM for apples; tomato disease management, and more. For more information, contact Don Schellhaass at 815-338-3737 or by e-mail: [schellha@uiuc.edu](mailto:schellha@uiuc.edu) or Maurice Ogutu at [ogutu@uiuc.edu](mailto:ogutu@uiuc.edu).

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

So far, so good for the winter of 2006-07. What began as a warm winter, with lots of ice, has settled into one without many problems for fruit growers. Fruit trees survived ice of 3/4 inch without damage, although the ice spread limbs down closer to the ground than any crop of fruit ever did. At Edwardsville, the winter low was 9 degrees on December 8, and we missed a bullet last week with a low of only 19. Some writers say that global warming is here, and that the hardiness zones have moved north. Some evidence of this phenomenon may have been indicated at the Illinois State Horticulture Society meeting in Springfield last week as part of the Illinois Specialty Crops and Agritourism Conference. Two growers from northern Illinois near Joliet and Harvard joined in the peach discussion about their peach crops the last three years. And yet, a check of record high temperatures for St. Louis shows that many record highs were set in the 1890's. But according to US Today, we did set a record high average temperature for the nation, but only the 7th highest for St. Louis.

Locally, we ended 2006 with rainfall 8 inches below normal, but some recharge occurred with 3 three inches earlier this month. Until that time, field conditions for both orchardists and horseradish growers (for digging) was pretty good. Lots of pruning has been done, and once again, apple orchards that were treated with Apogee required less pruning time.

The Illinois State Horticulture Society winter meeting was well attended, and the audience was privileged to hear many excellent presentations. Notes from Dr. David Rosenberger's (NY) talks on peach diseases included such statements as "sanitation and prevention are primary steps for control" and "peach growers need to use SI and strobilurin products judiciously to prevent resistance." On bacterial spot control, he indicated more problems tend to develop on susceptible varieties and following mild winters with high levels of inoculum present. Control measures included a copper spray at leaf drop and late dormant, followed by a couple of antibiotic sprays around shuck split, maybe alternated with the low rate of fixed copper.

Dr. Rosenberger also outlined programs for control of apple scab and fire blight. For apple blocks with a fair amount of carry-over inoculum, leaf shredding might help reduce the amount. After that, it is primarily prevention, beginning with coverage at green tip. Then, the use of full rates of chemical, shortened spray intervals, and managed use of several fungicides to prevent resistance was the primary message. For control or reducing fire blight infections, he indicated that pruning out old cankers is recommended, but that maybe only 15 percent have bacteria. Tools do not require disinfection treatment during the dormant period. Sprays of fixed coppers at green tip might help with control, and that bloom sprays of antibiotics are the most critical part of control. After that, only pruning out of new infections will do any good, and then only while the procedure is feasible labor-wise. If the weather is warm and dry, the cut shoots can be left in the row middles. Apogee does not control fire blight, it only reduces the infection potential of shoots.

Jerry Frecon, peach Extension specialist and variety guru from Rutgers University, indicated that production in New Jersey is somewhat similar to that in Illinois in training systems and harvest dates, and he discussed problems with more intensive growing systems. New Jersey peach growers would like to emulate the apple growers with the high density systems, but unfortunately, rootstocks for size control are not yet adapted. So, lots of labor is required for pruning and training the high density systems, with the timing being during the summer months of growing and harvesting of both peaches and other crops. The perpendicular V system involves letting the trees grow to 10-14 feet to optimize the benefits of the system, and that compounds the harvest labor with required ladders. Growers using the system are using power platforms that aid workers both with pruning and harvesting. Open center trees topped out at 8-9 feet are the most prevalent. Jerry showed slides of many of the peach and nectarine varieties that he has listed in both the New Jersey and Penn State Tree Fruit Production Guides. Many of the choices are limited by the susceptibility to bacterial sport, but there are also many new varieties in the low to sub-acid category, both yellow and white, and with high red skin color that attracts customers to the queen of fruits.

Kudos to Gerald McArtor and family of the Jonamac Orchards at Malta for making the cover of this month's Fruit News, and to Jerry Mills of the Mills Apple Farm at Marine for being inducted into the Illinois State Horticulture Society Hall of Fame.

An addendum to Jerry Frecon's report on peach rootstocks: An article in the January 15, 2007 issue of the Goodfruit Grower has an article about the California rootstocks Controller 5 and Controller 9. The report is fairly positive about their dwarfing ability of 10 to 50 percent. This would permit closer spacing, more trees per acre and less ladder work. However, warnings are given about heavier fruit set that requires earlier and heavier thinning, maybe some fruit size problems, and maybe less resistance to nematodes.

*Chris Doll*

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

### **Edwards' Orchard West Wins the Illinois Cider Contest**

The Illinois State Horticulture Society sponsored its 18th Annual Illinois Cider Contest, held in conjunction with the Illinois Specialty Crop and Agritourism Conference on January 12th in Springfield, Illinois. Edwards' Orchard West, located at Winnebago, IL, produced the No.1 overall rated cider at this year's contest, thus winning First Place National and Illinois Cider. Mike Edwards and his son Brian pressed their winning cider in a rack and cloth on October 11th, using a blend of Golden Delicious, Jonagold, Red Delicious, and Honeycrisp. Second Place National Cider and Illinois Cider were awarded to Honey-Hill Orchards, located at Waterman, IL. Hills Bros. Orchards of Grand Rapids, MI and Joe Ringhausen Orchards of Fieldon, IL tied for Third Place National. Joe Ringhausen Orchards also was awarded Third Place Illinois Cider. Midwest Cider of Merit 1st Runner-up resulted in a tie as well and was awarded to Tanners Orchard in Speer, IL and Engelsma Apple Barn in Grand Rapids, MI. The 2nd Runner-up went to Edwards Apple Orchard, located at Poplar Grove, IL, and the 3rd Runner-up was awarded to Fly Creek Cider Mill & Orchards, Inc., located in Fly Creek, NY. ISHS also sponsored the Fifth Annual Hard Cider Contest, where contestants vied for the top honor. Tracy Grissom, of Lost Creek Orchard, located at Greenup, IL, was awarded the Champion Hard Cider Award, using a blend of King David, Gold Rush, Golden Delicious, Fuji, and Jonathan. The ISHS gratefully acknowledges the dedication and hard work of our judging team. Thank you! Most importantly, thanks are extended to all who entered the contest this year. Start planning now for the next contest in 2008.

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### **Regulatory Notes on Guthion and Imidan**

A reminder and an update ...

Guthion's use on peaches is no longer allowed. The phase-out period for this use ended with the 2006 season. It remains registered for use on apples, though the US EPA has announced plans to end all Guthion uses by 2012. Appeals to this decision remain in progress.

On January 18, 2007, the US EPA issued reregistration decisions on the "time-limited" uses of phosmet (Imidan) on the following nine crops: high bush blueberries, peaches, nectarines, apples (including crabapples), pears, plums, prunes, grapes, and apricots. The EPA determined that the time-limited uses of phosmet should be retained with extended restricted entry intervals (REIs) and additional risk mitigation, with changes to be included on product labels sold or distributed by the registrant after June, 2008. The key changes in REIs, taken from the EPA's 42-page statement, are:

- Apples (east of the Rockies): Changes the REI from 3 days to 4 days and reduces the maximum allowable amount applied per season from 21 lbs. a.i. per acre to 15.5 lbs. No change in the PHI for grower / employee harvesting (7 days) or pick-your-own (14 days).
- Peaches (east of the Rockies): Changes the REI from 3 days to 4 days. No change in PHI for grower / employee harvesting or pick-your-own (14 days) or maximum allowable amount applied per season (11.9 lbs. a.i. per acre for peaches and 9.1 lbs. a.i. per acre for nectarines).
- Grapes (east of the Rockies): No changes except that pick-your-own is prohibited if phosmet has been applied. (REI and PHI for grower / employee harvesting remain at 14 days; maximum allowable amount applied per season remains at 4.55 lbs. a.i. per acre).
- High-bush blueberries: No changes. REI remains at 24 hours; PHI remains at 3 days (including for pick-your-own), and maximum allowable applications remain at 5 per season with a maximum amount of 1 lb. a.i. per acre.

## Results of 2006 Illinois Apple Insecticide Trials

In 2006 we evaluated certain registered and experimental insecticides in apples at the University of Illinois Pomology Farm near Urbana and at the Dixon Springs Agricultural Center near Simpson in far southern Illinois. Here's a slightly abbreviated report of the results.

### Urbana, Illinois

The effectiveness of selected insecticides was evaluated in a small plot trial in 2006 at the University of Illinois Pomology Farm near Urbana, Illinois. Five insecticide regimes (Table 1) were evaluated in comparison with an untreated check for controlling fruit injury by codling moth. Observations of injury by and/or infestations of potato leafhopper, San Jose scale, European red mite, and woolly apple aphid, also were recorded.

**METHODS:** Six treatments in 4 single-tree replications per treatment were assigned to 24 trees in a randomized complete block design. Trees in blocks 1 – 3 were 'Red Delicious,' and trees in block 4 were a mixture of cultivars. Sprays were applied in 0.6 gallon of water per tree from a CO<sub>2</sub>-powered backpack sprayer operating at 40 psi (or a Solo® hand-pump backpack sprayer operating at similar pressure), with insecticide concentrations based on the calculation that a single tree at this site represented 0.005 acre. This spray volume was the equivalent to 120 gal/acre. Applications began on 16 May, 2006, approximately 115 degree days (base 50 F) after biofix on 01 May. Subsequent sprays were applied according to the schedule summarized in Table 1, with treatment 2 usually applied on 1-week intervals and other treatments applied on roughly 2-week intervals.

TABLE 1. INSECTICIDES, RATES, AND APPLICATION DATES FOR APPLES, UNIVERSITY OF ILLINOIS POMOLOGY FARM, URBANA, 2006.

<b>Tmt</b>	<b>First Generation Codling Moth Treatments: Product &amp; Rate</b>	<b>Application Dates</b>	<b>Second Generation Codling Moth Treatments: Product &amp; Rate</b>	<b>Application Dates</b>
<b>1</b>	Check		Check	
<b>2</b>	Entrust 80W, 3 oz/A + Pyganic 1.4EC, 16 fl oz/A (8 applications)	16, 23, 31 May; 6, 12, 19, 23 June; 3 Jul	Entrust 80W, 3 oz/A + Pyganic 1.4EC, 16 fl oz/A (6 applications)	7, 21, 26 Jul 5, 16, 23 Aug
<b>3</b>	Assail 30 WG, 7 oz./A (4 applications)	16, 31 May 12, 23 June	Rimon 0.83EC, 30 fl oz/A (4 applications)	13, 26 Jul 5, 16 Aug
<b>4</b>	DPX E2Y45, 0.077 lb a.i./A (4 applications)	16, 31 May 12, 23 June	Assail 30 WG, 7 oz./A (4 applications)	13, 26 Jul 5, 16 Aug
<b>5</b>	Rimon 0.83EC, 20 fl oz/A (4 applications)	16, 31 May 12, 23 June	DPX E2Y45, 0.066 lb a.i./A (4 applications)	13, 26 Jul 5, 16 Aug
<b>6</b>	Assail 30WG, 7 oz/A (2 applications); then Rimon 0.083EC, 30 fl oz/A (2 applications)	16, 31 May  12, 23 June	Assail 30WG, 7 oz/A (2 applications); then Danitol 2.4EC, 21.3 fl oz/A (2 applications)	13, 26 Jul  5, 16 Aug

The number of applications of Entrust exceeded US EPA label-specified limits, but this treatment regime was intended to determine whether or not this combination of OMRI-listed insecticides could control codling moth if applied frequently; further trials will be needed to identify the level of control possible with a reduced number of applications. DPX E2Y45 (rynaxypyr, Altacor® by DuPont) is not yet labeled for use on apples; other treatment regimes fell within seasonal label limits for the insecticides applied. No phytotoxicity was observed.

Fruit injury apparently caused by codling moth was assessed by nondestructive observation of 100 fruits per tree (replication) on 10 July, following completion of development of the first generation of this insect. Characteristic frass at the openings of tunnels was considered evidence of codling moth entry. To determine the significance of differences in means of codling moth injury among treatments, a 2-way ANOVA (block and treatment) was used, with  $P = 0.05$  (Microsoft Excel). In addition, trees were rated for potato leafhopper injury on the same date, with injury categorized as none (0), light (1), moderate (2), or heavy (3).

Fruit injury was assessed again in harvest samples of up to 100 apples per tree taken on 02 September after the

completion of second-generation codling moth development. This sampling date preceded full maturity of 'Red Delicious' apples, but to assess second-generation injury before infested fruit began to drop from trees, an early harvest was necessary. Fruits were examined individually for codling moth tunnels and larvae and for presence of San Jose scale. Infestations of woolly apple aphid were rated for each tree (same categories as for potato leafhopper, above). All larvae found in fruit were examined to confirm that they were codling moth, not oriental fruit moth or other species. To determine the significance of differences in means of codling moth injury and numbers of larvae among treatments, a 2-way ANOVA (block and treatment) was used, with  $P = 0.05$  (Microsoft Excel). Infestations of apple maggot, and Japanese beetle, were too low at this site in 2006 to allow assessment of their control.

RESULTS AND DISCUSSION: Percentages of fruit apparently damaged by first-generation codling moth and ratings of potato leafhopper and Japanese beetle injury are summarized by insecticide treatment in Table 2. All of the insecticide regimes effectively reduced apparent codling moth injury in comparison with the untreated check ( $P < 0.05$ ), and there were no significant differences in the percentage of injured fruit among the five treatment plans. Treatment regimes that included Assail or Entrust + Pyganic adequately prevented injury by potato leafhopper. Potato leafhopper injury was rated moderate to heavy in the untreated check and in the Rimon and DPX E2Y45 treatments.

TABLE 2. INJURY BY CODLING MOTH AND POTATO LEAFHOPPER IN APPLES UNDER SELECTED INSECTICIDE REGIMES, 10 JULY, 2006, URBANA, ILLINOIS.

Treatment <sup>1</sup>	Percentage of fruits with apparent codling moth tunnels; mean of 4 reps <sup>2</sup>	Potato leafhopper injury, average rating
1. Untreated	20.0 A	Mod – Heavy (2.5)
2. Pyganic + Entrust, weekly	0.5 B	Very Light (0.75)
3. Assail, 4 applications	0.25 B	None (0)
4. DPX E2Y45, 4 applications	0.0 B	Mod – Heavy (2.6)
5. Rimon, 4 applications	0.5 B	Mod – Heavy (2.6)
6. Assail, 2 applications, then Rimon, 2 applications	0.0 B	Very Light (0.6)

<sup>1</sup> See table 1 for complete details on application dates and rates.

<sup>2</sup> Means in the same column followed by the same letter are not significantly different at  $P = 0.05$ .

Percentages of fruit damaged by codling moth larvae, the number of larvae in fruit, and the number of fruits damaged by San Jose scale in harvest samples collected on 02 September are summarized by treatment in Table 3. Similar to first-generation codling moth control, all of the insecticide regimes effectively reduced codling moth infestations in comparison with the untreated check ( $P < 0.05$ ), and there were no significant differences in the percentage of codling moth-injured fruit or the number of codling moth larvae among the five treatment plans. The different rates of Rimon and DPX E2Y45 applied in treatments 5 versus 3 and 4 versus 5, respectively, did not result in significant differences in codling moth injury.

All of the lepidopteran larvae recovered from within fruit at this site were codling moth, not oriental fruit moth, even though pheromone traps at this location captured oriental fruit moth males throughout the season. Differences among treatments in San Jose scale infestations of fruits were not significant.

Bronzing caused by European red mite was more prevalent in treatment 6 than in other treatments; trees in this treatment received 2 applications of Assail and 2 applications of Rimon for first-generation codling moth control, then 2 applications of Assail and 2 applications of Danitol for second-generation codling moth control. Bronzing had already occurred before the first Danitol application on 5 August. Woolly apple aphid was more prevalent in treatment 5 than in other treatments; this treatment received 4 applications of Rimon for first-generation codling moth control and 4 applications of DPX E2Y45 for second-generation codling moth control. Neither Rimon nor DPX E2Y45 was expected to control woolly apple aphid.

TABLE 3. MEANS OF CODLING MOTH INJURY AND CODLING MOTH AND SAN JOSE SCALE INFESTATIONS IN APPLES UNDER SELECTED INSECTICIDE REGIMES, 02 SEPTEMBER, 2006, URBANA, ILLINOIS.

Treatment <sup>1</sup>	Percentage of fruits with codling moth tunnels; mean of 4 reps <sup>2</sup>	Codling moth larvae per 100 fruit; mean of 4 reps <sup>2</sup>	Percentage of fruits infested by San Jose scale; mean of 4 reps <sup>2</sup>
1. Untreated	46.8 A	7.5 A	16.3 A
2. Pyganic + Entrust, weekly	2.0 B	0.3 B	10.5 A
3. Rimon, 4 applications	1.8 B	0.0 B	12.8 A
4. Assail, 4 applications	0.0 B	0.0 B	2.5 A
5. DPX E2Y45, 4 applications	0.0 B	0.0 B	6.0 A
6. Assail, 2 applications, then Danitol, 2 applications	0.0 B	0.0 B	4.8 A

<sup>1</sup> See table 1 for complete details on application dates and rates.

<sup>2</sup> Means in the same column followed by the same letter are not significantly different at  $P = 0.05$ . Because the range of percentages of codling moth-injured fruit exceeded 40%, percentages were arcsine-transformed before analysis. Counts of codling moth larvae per 100 fruits were transformed [square root of  $(x + 1)$ ] before analysis.

#### Dixon Springs Agricultural Center, Simpson, Illinois

Two demonstration plantings containing disease-resistant apple cultivars, each approximately 1 acre in size, are established at the Dixon Springs Agricultural Center near Simpson in far southern Illinois. To observe and record the effectiveness of different management plans, one of these plantings is managed in compliance with organic certification standards (with application for organic certification planned for 2007), and the other is designated as an “integrated pest management (IPM)” planting, with pesticides applied according to results of insect and weather monitoring data. In each planting, there are 3 adjacent rows (19 trees per row) of each of the scab-resistant cultivars ‘Enterprise,’ ‘Goldrush,’ and ‘Liberty.’ Two border rows of the disease-susceptible cultivar ‘Golden Delicious’ are planted on each edge of each planting. In the organic block, rows run north-south; in the IPM block, rows run east-west.

METHODS: In 2006, half of each of these cultivars (the north or south half of all 3 rows in the organic planting or the east or west half of all three rows in the IPM planting) was treated according to the schedule in Table 4; the other half of each 3-row block was left untreated with any insecticides after bloom. Application dates, products, and rates for insecticides applied in the organic and IPM blocks are listed in Table 4.

TABLE 4. INSECTICIDE APPLICATION DATES, PRODUCTS, AND RATES FOR ORGANIC AND IPM PLANTINGS, DIXON SPRINGS AGRICULTURAL CENTER, 2006. (ALL SPRAYS APPLIED IN 100 GALLONS OF WATER PER ACRE USING A JACTO AIR BUS 400 (MODEL # MAOC 2200) AIR BLAST SPRAYER.)

Treatments	Insecticide application dates, products, and rates
<b>Organic block Treated</b>	28 April: Surround @ 25 lb/A 12 May: Surround @ 25 lb/A + Pyganic 5.0EC @ 12 fl oz/A 22 May; 6, 13, 21, and 29 June; 7, 17, and 25 July; and 7 August: Entrust 80W @ 3 oz/A + Pyganic 5.0EC @ 12 fl oz/A (or equivalent active ingredient in the form of Pyganic 1.4EC)
<b>Organic block Untreated</b>	No insecticides applied after bloom
<b>IPM block Treated</b>	28 April: Avaunt 30WG @ 6 oz/A 12 May and 02 June: Assail 70WP @ 2.3 oz/A 21 and 30 June; and 7 July: Imidan 70WP @ 3.0 lb/A 17 July: Danitol 2.4EC @ 21.3 oz/A 25 July and 7 August: Imidan 70WP @ 3.0 lb/A
<b>IPM block Untreated</b>	No insecticides applied after bloom.

On 21 June, 100 fruits per block (20 per tree from 5 trees) were examined in a nondestructive manner, and the number of fruits with apparent tunneling by lepidopteran larvae was recorded. Characteristic frass at the openings of tunnels was considered evidence of lepidopteran entry. Additionally, the number of fruits exhibiting plum curculio oviposition scars was recorded. To determine the significance of differences in means of incidence of lepidopteran injury and plum curculio oviposition scars in treated versus untreated portions of each planting, paired  $t$ -tests were used ( $P = 0.05$ ; Microsoft Excel), with pairings based on variety. Trees also were rated for potato leafhopper injury and Japanese beetle injury on 21 June, with injury categorized as none (0), light (1), moderate (2), or heavy (3).



Fruit injury was assessed again in harvest samples of up to 100 apples per tree taken on 01 September. Fruits were examined individually for tunnels, live larvae, surface-feeding scars characteristic of plum curculio adults or leafrollers, and infestations of San Jose scale. Analyses of differences in these measures from treated versus untreated portions of each planting again used paired *t*-tests ( $P = 0.05$ ; Microsoft Excel). A portion of the larvae found in fruit were examined to determine their identity.

## Results

Incidence of early-season fruit-tunneling and plum curculio oviposition scars, along with ratings of Japanese beetle injury and potato leafhopper injury, is summarized by insecticide treatment in Table 5. Incidence of lepidopteran tunnels in treated portions of the organic planting and the IPM planting were significantly lower than in untreated portions of either planting. Incidence of plum curculio oviposition scars was relatively low overall (in comparison with observations in previous years), and no significant differences were observed among treatments. Ratings of Japanese beetle injury were reduced by insecticide applications in the IPM planting but not by insecticide application in the organic planting. Movement of adult Japanese beetles from the untreated half of each block in the organic planting, coupled with the shorter residual activity of the organic insecticides used in this planting, likely accounted for these observations. Potato leafhopper injury in the treated portions of the IPM planting and the organic planting was less severe than in the untreated portions of either planting. ‘Goldrush’ suffered significantly less injury from Japanese beetles and potato leafhoppers than the other cultivars at this site.

TABLE 5. INCIDENCE OF LEPIDOPTERAN TUNNELING AND PLUM CURCULIO OVIPOSITION SCARS AND AVERAGE RATINGS OF JAPANESE BEETLE AND POTATO LEAFHOPPER INJURY IN APPLES UNDER SELECTED INSECTICIDE REGIMES, 21 JUNE, 2006, DIXON SPRINGS AGRICULTURAL CENTER, SIMPSON, ILLINOIS.

Treatment <sup>1</sup>	Percentage of fruits with lepidopteran tunnels; mean of 4 varieties <sup>2</sup>	Percentage of fruits with plum curculio oviposition scars; mean of 4 varieties <sup>2</sup>	Average Japanese beetle injury rating; mean of 4 varieties	Average potato leafhopper injury rating; mean of 4 varieties
1. Organic block, treated	0.0 A	12.5 A	Light – Moderate (1.3)	Very Light (0.3)
2. Organic block, untreated	3.0 B	16.8 A	Light – Moderate (1.5)	Light – Moderate (1.1)
3. IPM block, treated	0.0 A	9.3 A	Very Light (0.5)	None (0.0)
4. IPM block, untreated	2.3 B	7.5 A	Light – Moderate (1.5)	Light – Moderate (1.3)

<sup>1</sup> See table 4 for complete details on application dates and rates.

<sup>2</sup> Means from each block in the same column followed by the same letter are not significantly different at  $P = 0.05$ .

Incidence of fruit tunneling, numbers of larvae recovered from within fruit, and incidence of surface scars characteristic of late-season plum curculio adult or leafroller larval feeding at harvest are summarized by treatment in Table 6.

TABLE 6. LEPIDOPTERAN TUNNELING, LARVAL INFESTATIONS, AND SURFACE FEEDING INJURY IN APPLES UNDER SELECTED INSECTICIDE REGIMES, 01 SEPTEMBER, 2006, DIXON SPRINGS AGRICULTURAL CENTER, SIMPSON, ILLINOIS.

Treatment <sup>1</sup>	Percentage of fruits with lepidopteran tunnels; mean of 4 varieties <sup>2</sup>	Number of internal larvae per fruit; mean of 4 varieties <sup>2</sup>	Percentage of fruits with surface scars characteristic of late plum curculio or leafroller feeding; mean of 4 varieties <sup>2</sup>
1. Organic block, treated	33.0 A	6.3 A	2.0 A
2. Organic block, untreated	72.0 B	21.0 B	31.0 B
3. IPM block, treated	0.3 A	0.3 A	0.0 A
4. IPM block, untreated	18.5 B	18.5 B	14.0 B

<sup>1</sup> See table 4 for complete details on application dates and rates.

<sup>2</sup> Means from each block in the same column followed by the same letter are not significantly different at  $P = 0.05$ .

Regular applications of Entrust plus Pyganic in the organic planting and the regime of insecticides used in the IPM planting significantly reduced incidence of tunneling and numbers of larvae within fruits in comparison with the untreated portions of these plantings. All of the lepidopteran larvae recovered from within fruits at this site were oriental fruit moth, NOT codling

moth. Nearly all of the larvae recovered from the treated portions of the organic block were plum curculio. These observations suggest that regular applications of Entrust plus Pyganic adequately controlled oriental fruit moth, but not late-season plum curculio. Although Surround® (kaolin clay) has been shown to reduce oviposition injury by plum curculio during the 2 to 3 weeks after bloom, we did not use it in late season because residues from sprays applied at this time are difficult to remove from fruit.

## Conclusions

Based on the observations from trials completed at Urbana and Dixon Springs, we offer the following conclusions:

- Assail, Danitol, Rimon, and DPX E2Y45 are effective alternatives to organophosphate (O-P) insecticides for control of codling moth, at least where O-P resistance has not presented problems.
- Previous work at sites with O-P resistant populations of codling moth has shown Danitol and other pyrethroids not to be highly effective, so the availability of the different modes of action of Assail (and other neonicotinoids), Rimon, and DPX E2Y45 is significant.
- Rimon and DPX E2Y45 are not highly effective against non-lepidopteran pests; patterns of use in commercial orchards will need to take this into account.
- Regular applications of Entrust + Pyganic can effectively control codling moth and oriental fruit moth (and some other insects). Consequently, these OMRI-listed insecticides may be effective for small-scale growers whose orchards are not large enough for effective use of mating disruption against these key pests. Restrictions on the number of applications of Entrust allowed by the label mean that organic growers may need additional insecticides to obtain adequate control over the course of a season. Applications of Entrust + Pyganic did not adequately prevent late-season entries into fruit by plum curculio larvae in southern Illinois.
- Oriental fruit moth was prevalent in apples in Illinois for the first time in research and commercial orchards in 2006 (Dixon Springs and in commercial apple orchards in Calhoun County in southwestern Illinois).
- Although not detailed in the results presented above, injury by potato leafhopper and Japanese beetle was near zero in the cultivar ‘Goldrush’ in comparison with other cultivars. ‘Goldrush’ appears to be resistant to these insects.

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## Vegetable Production and Pest Management

Issue 20, scheduled for publication in early February, will include a summary of 2006 findings on corn earworm resistance to pyrethroids, trap counts from various locations, and results of small-plot insecticide trials aimed to control this insect, as well as updates on soybean aphid and western bean cutworm.

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## Words of Wisdom ... yet a few more bumper stickers ...

- 4 out of 3 people have trouble with fractions.
- It's not whether you win or lose that counts ... it's whether I win or lose.
- I respect your opinion ... I just don't want to hear it.
- On the road to riches, I'm stuck in a traffic jam.
- Are you drunk or just on your cell phone?
- I really had a handle on life ... but it broke.
- Don't honk ... driver trying to sleep.
- Don't worry about what people think ... they don't do it very often.
- If money is the root of all evil, why do churches beg for it?
- Men ... can't live without em... can't shoot em.

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