VEGETABLE CROPS HOTLINE

A newsletter for commercial vegetable growers prepared by the Purdue University Cooperative Extension Service

Issue: 630
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In This Issue

Spider Mites

(Rick Foster, fosterre@purdue.edu, (765) 494-9572)

We have received a number of reports of spider mite problems lately. Some of them have been on crops grown in high tunnels, particularly tomatoes and cucumbers.

Figure 1. Spider Mites damage on cucumbers in a high tunnel (photo by Wenjing Guan)

High tunnels are the perfect environment for mites because it is hot, which means they reproduce faster, and the mites are protected from rainfall, which is a major mortality factor for them. So far, our efforts to develop biological control strategies for mites in high tunnels have been unsuccessful. Therefore, chemical control is often required. One important point is that you should start the management process early, before the mites get out of hand. Don't wait until you have a disaster before you take action. Check the *Midwest Vegetable Production Guide* for the miticides labeled for use on your crop, and then check the table on page 45 to see if it can be used in greenhouses or high tunnels.

Most of the reports of mite problems outdoors have been on melons. Mites on muskmelons are not as worrisome as on watermelons because they will not affect the texture of the fruit. However, they can also affect the growth and yield of both muskmelons and watermelons. If you detect an early infestation of mites, mark the location and come back in a few days and see if it is increasing. If it is, you should take action. If not, continue to monitor the situation every few days. If you find a serious infestation, check the weather forecast before spraying. If heavy rains are predicted, you may get some control by the rain washing the mites off the plants. If possible wait until after the rain to spray (after the field dries). If no rain is in the forecast, you should treat as soon as possible. When populations are heavy, it often takes more than one application to achieve control. Wait at least a week, or whatever the label says, before making a second application. If the control with the first spray is totally unacceptable, change to a different product with a different mode of action.

Corn Earworm

(Rick Foster, fosterre@purdue.edu, (765) 494-9572)

Corn earworms are flying. I had 10 in my pheromone trap this morning (June 20). With the surrounding dent corn in most areas far from producing silks, the threshold for spraying silking sweet corn is 1 moth per night, well below what we are catching. So growers who have sweet corn with fresh silks are in danger of suffering serious losses if they don't control the earworms. Because of problems with resistance to the pyrethroid insecticides, the best products available are Coragen® and Radiant®. Note the limitations on the number of applications or amount of product allowed. You may need both products to complete management on a particular planting. Begin spraying when 30-50% of the plants in your field are silking. Continue to spray every 3-5 days until the silks turn brown.

To see corn earworm trap catches around the state, go to https://extension.entm.purdue.edu/cornearworm/index_doc.html.

Striped Cucumber Beetles

(Rick Foster, fosterre@purdue.edu, (765) 494-9572)

Populations of the overwintering generation of striped cucumber

beetles are just about at their peak levels right now (Figure 1.). For muskmelons and cucumbers, this generation is the one that we worry the most about in terms of transmitting the pathogen that causes bacterial wilt. As a result, our spray threshold is relatively low, 1 beetle per plant. Watermelons and most squashes and pumpkins are not susceptible to bacterial wilt so we use a higher threshold, 5 beetles per plant. The pyrethroid insecticides provide excellent control. Because these insecticides are harmful to pollinators, growers should wait until late afternoon or evening when the flowers have closed and the pollinators have left the field before spraying.

Figure 1. Striped cucumber beetle (Photo by Wenjing Guan)

Colorado Potato Beetles

(Rick Foster, fosterre@purdue.edu, (765) 494-9572)

I have received some reports of Colorado potato beetles damaging both potatoes and tomatoes, including tomatoes in high tunnels. Both the adults and larvae are voracious feeders. As with most pests, it is best to get potato beetles under control before the populations get too high. Also, killing small larvae is easier than killing large ones, so spraying earlier will provide better control. We have had numerous reports of resistance to the pyrethroids in Indiana, so I generally don't recommend those products. If you try one and it works, then you probably don't have a resistant population at this point. For most of the state, I recommend one of the following products, Admire Pro®, Agri-Mek®, Assail, Coragen®, Exirel®, Radiant®, and Rimon®. Note that Coragen® and Radiant® cannot be used in high tunnels.

10 Useful Rules for Fungicide Application

(Dan Egel, egel@purdue.edu, (812) 886-0198)

Since we are well into fungicide application time, below I have listed 10 rules that will help vegetable growers apply fungicides effectively and safely.

1. Apply fungicides prior to the development of disease. Although many fungicides have systemic ("kick back") action they will not completely eradicate diseases after they have started. And by the time a single disease lesion is observed in the field, many more lesions too small to observe are already working at your crop. Most systemic fungicides move less than an inch toward the tip of the plant or may just move from the upper to the lower side of the leaf.
2. Use shorter spray intervals during weather conducive to plant disease. Each plant disease has its own "personality" and thus prefers different weather. However, most plant diseases require leaf wetness. Therefore, during periods of rain and heavy dews, more frequent fungicide applications are a good idea. The normal range of spray applications is every 7 to 14 days. Cantaloupe and watermelon growers have the guesswork taken out of this process with a Purdue University program known as **MELCAST**. Ask the author for more details by calling (812) 886-0198 or go to melcast.info.
3. Apply fungicides before a rain if possible. Water is necessary for most fungal spores to infect foliage and for the splash dispersal of spores. Therefore apply fungicides before a rain if it appears that the fungicide will have a chance to dry before the rain. Some fungicides list the rain fastness period on the label. It is not necessary to apply fungicides again after every rain. Most fungicides have a good sticker and will persist through rains pretty well. The **MELCAST** program takes into account the affect weather has on fungicides.
4. Know when to alternate fungicides. Systemic fungicides, those with a single mode of action, if applied again and again in sequence, may cause the disease fungi to mutate into a form resistant to the fungicide. Always alternate fungicide applications from one FRAC code (MOA code) number to another. Contact fungicides with a FRAC code of M like chlorothalonil and mancozeb are very unlikely to cause such mutations and therefore may be applied without alternation. Table 29 (page 76) in the Midwest Vegetable Production Guide **http://mwveguide.org/** will help growers alternate fungicides.
5. Timing of fungicide applications is more important than nozzle type and spray pressure. Studies here in southern Indiana as well as by researchers in other areas of the country have found that nozzle type and spray pressure doesn't make as much difference as we once thought. See the article *Spray Pressure and Nozzle Types* in issue 596 of the *Hotline*. In general, the more water one uses per acre, up to about 50 gallons, results in better coverage.
6. Some diseases cannot be managed by foliar sprays. Problems caused by soil borne fungi or nematodes cannot be controlled with foliar fungicides. Examples of these types of problems would be Fusarium wilt of watermelon or root-knot nematodes of tomatoes. Also, be certain that the problem you observe is really a disease. No amount of fungicide will improve a problem caused by soil fertility. Send a sample to the Purdue Plant and Pest Diagnostic Laboratory to determine the official diagnosis **http://www.ppdl.purdue.edu/ppdl/index.html.**
7. Use copper products for bacterial diseases. For the most

part, copper products are more effective against bacterial diseases than they are against fungal diseases.

8. Some diseases require specialized fungicides. Diseases, such as downy mildew and Phytophthora blight may require specialized fungicides. It may be wasteful to apply specialized fungicides all season long for diseases that are not a threat. For example, downy mildew of cucurbits usually does not arrive in Indiana until late in the season.
9. Double-check the label for details. Rates may vary widely based on label changes and different formulations. While you are checking the rate, also make sure that the crop and disease are on the label. Can this fungicide be applied in the greenhouse? Did you get the rate from the *Midwest Vegetable Production Guide for Commercial Growers*? Check the label anyway.
10. Play it safe. Always adhere to the Post-Harvest Intervals, Re-Entry Intervals and Worker Protection Standards listed in the label. No one wants an accident or lawsuit. Besides, the label is the law.

Effectiveness of Preemergent Herbicides

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

Recent dry weather raises concern about effectiveness of preemergent herbicides. Preemergent herbicides applied on the soil surface need to be moved into the soil where the target weed seeds are germinating (normally 1-2 inches deep) in order to be effective. The process normally requires 0.5 to 0.75 inch of water within a few days of herbicide application. For example, product labels state that Curbit 3EC® needs 0.5 inch of water within 5 days of application, and Dual Magnum® needs at least 0.5 inch water within 10 days of application. In nonirrigated areas where rain is not anticipated, a shallow cultivation is needed to move the herbicide into the zone of weed seed germination.

Most areas of Indiana were dry the last week of May and first week of June. If preemergent herbicides were not incorporated in a timely manner by water or machine, unsatisfactory weed control might be observed. In that case, cultivation and/or a postemergence herbicide application is needed to control emerged weeds. It is important to keep in mind that the weeds need to be controlled before they cause yield loss, depending on crop and weed density this may be 3 or 4 weeks after planting.

Taking Care of Plant Nutrition in Your High Tunnel – Fertilizer and Nutrient Solution Mixing Tips

(Petrus Langenhoven, plangenh@purdue.edu, (765) 496-7955)

Developing and mixing your nutrient solution is one of several very important steps in the production process. Mistakes are easily made when fertilizers are mixed. Not only does this have a cost implication, but also it can have severe consequences on production and therefore revenue. In the previous article *Taking Care of Plant Nutrition in Your High Tunnel-Water Soluble Fertilizer Calculations*, we have looked at basic calculations that is important when interpreting the fertilizer formulation in the bag and how to use that information to apply specific concentrations of mineral nutrients. In this issue, we will discuss what you need to consider when developing a nutrient program, and focus on key fertilizer characteristics and nutrient solution mixing tips.

Developing a nutrient program

A nutrient solution is just as good as the quality of the ingredients and the time spend on formulation, calculation and mixing. Fertilizer should be of a high quality and purchased from a reputable source. Make sure that you meet the specific nutrient needs of your crop. Most small greenhouse operations use 25 to 50 gallon stock tanks. Replenishment of these tanks will depend on the time of the year, the crop and the substrate used. In Nutrient Film Technique systems replacement is more regular since routine flushing of the sump tank is needed. Most production systems use two stock tanks. The reason being, certain fertilizer sources when mixed in concentrated form will form insoluble precipitates (refer to nutrient solution mixing tips).

Most N, P and K compound fertilizers are mixed in proportions that will meet the specific plant demand, and are developed for use with calcium-rich water sources. These blends may also contain other minerals and include micronutrients. Therefore, according to crop needs you might be required to add more calcium (in the form of calcium nitrate) or magnesium (in the form of magnesium sulfate or magnesium nitrate) to the nutrient solution.

Accurate calculations of the amounts of fertilizer to be added to reach the desired concentrations of individual nutrients are essential to get the most out of your fertilizer program. Premixed fertilizer might be perfect for beginner growers, but experienced growers will find that they can be more efficient and knowledgeable if they calculate their own formulations (similar to calculations we did in the previous article). To improve nutrient management, it is very helpful to know what minerals are in your start water, mixed nutrient solution, and substrate. By monitoring pH and EC, you can assure that nutrients are available in ample amounts. EC measurements are only helpful in checking total salt concentration. Make use of an analytical laboratory if you are interested to measure and know the concentration of individual elements. Remember to calibrate your meters regularly. Bad information leads to bad decisions.

Key Fertilizer Characteristics and Nutrient Solution Mixing Tips

- Use high-quality ingredients from a reputable source for your nutrient solution.
- Use a fertilizer specifically developed for fertigation.
- Check maximum solubility.
- If using a compound fertilizer, make sure the blend has a tag that shows the analysis of the fertilizer, the sources used and company’s name.
- Do accurate calculations and use accurate scales to weigh

each material.

- The pH of the stock solutions need to be lower than 5 to make sure all the fertilizers would be completely dissolved.
- Chelates are sensitive to low pH levels in the tanks. At a pH of 3.5 or lower, the chelate structure will break down (especially true for EDDHA and HBED chelates). EDTA, DTPA and HEDTA chelates are stable at pH 1.5-6.0, 1.5-7.0, and 2.5-7.0, respectively. EDDHA and HBED chelates are stable at pH 3.5-9.0 and 3.5-12.0, respectively.
- Protect chelates from exposure to daylight. Chelates are sensitive to light, hydrogen peroxide, UV and ozone. UV and ozone will break down the chelate structures to some extent, and therefore replacing chelates after disinfection is recommended.
- Make sure compatible fertilizer are mixed in the same tank. Insoluble precipitates will form when mixed in concentrated form. Fertilizer sources containing calcium, phosphorus and sulfate should not be mixed together. Insoluble precipitate formation of calcium phosphate (mixing calcium nitrate and phosphorus containing materials) and calcium sulfate (mixing calcium nitrate and magnesium sulfate or potassium sulfate) will occur.
- Two-tank system: mix calcium, iron and half of the total potassium nitrate in one tank and the rest of the macro- and micronutrients in the other tank.
- Lukewarm to hot water will speed up the time for dissolution of the fertilizer.
- While small batches of fertilizer is added to the stock, the total stock tanks is brought to the desired level and stirred.
- Stir while mixing the fertilizer, manually or electrical. Manual stirring is satisfactory for smaller batches, but large batches will require an electrical agitator.
- It will take a few hours for the solution to become clear, but a sludge will often form in the bottom of the tank. This sludge is from certain additives in some fertilizers that are added to prevent caking and dust. Since these materials are not soluble, they will settle in the bottom of the tank and will need to be rinsed out periodically.
- Keep solution in a dark environment.

This is the fourth article in a 7 part series that look at high tunnel nutrient management. In the next issue, we will concentrate on 'Fertilizer Injection'.

Is My Farm Profitable? The Drivers of Farm Profitability

(Allan Pinto, pinto7@purdue.edu) & *(Ariana Torres, torres2@purdue.edu)*

The latest Census of Agriculture reported that 244,974 U.S. farmers utilized more than 14 million acres to grow specialty crops in 2012. In Indiana 2,935 farmers grew specialty crops on 63,252 acres. Indiana's specialty crop industry includes operations that grow fruit and vegetable, tree nut, dried fruit, horticulture, floriculture, and nursery crops. Specialty crops include a long list of agricultural products that are sold through a wide variety of market channels.

A pair of Purdue Extension publications show the results of a survey of Indiana specialty crops farmers. The survey found that most specialty crops farmers sell their fruit and vegetables through farmers markets or other local outlets, tend to be smaller, and grow 20 crops on average. Details are available in *Fruit and Vegetable Farmer Surveys: Characteristics of Indiana Vegetable Farming Operations* (Purdue Extension publication HO-270-W) and *Fruit and Vegetable Farmer Surveys: Characteristics of Indiana Vegetable Farmers* (HO-271-W). Both are available from the Education Store, edustore.purdue.edu.

This article looks at the main factors driving the profitability of specialty crop farms and provides a useful tool to assist farmers' decision-making.

Farm Profitability

Ensuring farm profitability is probably one of the most important tasks of every farm owner. Being profitable means that the farm is generating enough money to pay employees and bills, repay loans, and provide the farmer with enough earnings to make a living.

In a 2012 survey of fruit and vegetable farmers, Torres and Marshall (2016) found that 86 percent of interviewed farmers in Indiana reported annual revenues less than $250,000. Of them, almost a third made less than $10,000 annually. Their survey also found that about a third of the farmers reported additional off-farm sources of income while still spending an average of 46 hours per week on farm activities.

Most of the specialty crop farmers are satisfied with their farming systems, but they tend to indicate that they are concerned about the financial health and sustainability of their farm businesses. Using decision-making tools can help farmers evaluate how efficient their farm resources are being used and how financially healthy their businesses are. In other words, to improve profit, it must first be measured.

Calculating farm profitability is a decision-making tool that helps farmers assure financial sustainability. Farmers may use this information to create financial statements and measure their financial positions. Farm profitability provides farmers with a "moving picture" of the farm's gain over time. Farmers can compare their performance to similar successful farms or relate current year's performance to prior years.

For example, farmers can evaluate if their net profits are increasing or decreasing over time. Farmers can also compare the net profits of field-grown tomatoes to those from hydroponic tomatoes.

There are a few ways to calculate profits, but one of the easiest and most common is presented in Equation 1. The net profits or financial gain is the result of the total money earned (revenues) minus the total money spent on production, harvesting, and selling activities throughout the growing season (costs).

Equation 1

Net Profits = Revenue – Costs

Revenue = price × quantity

Costs = variable costs + fixed costs

Costs can be further categorized as variable and fixed costs. **Variable costs** (or operating costs) are those that vary with the level of production; farmers do not incur variable costs if production stops. Examples of variable costs for a tomato farm are the payments for labor, seeds, fertilizers, mulch, cages, irrigation, fuel, and other inputs. Labor costs tend to be the highest input category of costs for specialty crops operations. According to the United States Department of Agriculture (USDA), "wages, salaries, and contract labor expenses represent roughly 17 percent of total variable farm costs and as much as 40 percent of costs in labor-intensive crops such as fruit, vegetables, and nursery products".

Fixed costs are those that farmers have to incur whether they are producing or not. Fixed costs are usually payments made to capital assets such as equipment, land, buildings, and machinery. For example, if a farmer buys a tractor, she will have to make her payments whether she harvested the tomatoes or not. Other examples of fixed costs are depreciation, insurance, taxes on property, and repairs and maintenance.

Machinery depreciation is calculated as the price paid for the machinery minus the salvage value (the estimated resale value of an asset at the end of its useful life), divided by the years of useful life (see Equation 2). For example, a tractor that costs $50,000 with a salvage value of $10,000 at the end of 10 years will have an annual depreciation value of $4,000 [annual tractor depreciation = ($50,000 – $10,000)/10 years].

Equation 2

Annual machinery depreciation = (price of machinery – salvage value) / years of useful life

Farm revenue is the quantity of produce sold multiplied by the prices received. Farmers should keep track of their produce yields throughout the season to accurately quantify farm revenue. The revenue of a farm selling 400 pounds of heirloom tomatoes from May through October at a price of $2.50 per pound will be $1,000.

Net profits are equal to the total revenues received throughout the growing season minus variable and fixed costs incurred over the same period. In addition, farmers can calculate their **gross profit** by the variable costs from the total revenues (see Equation 3). Gross profit is useful for measuring the efficiency to cover all the costs related to production. Gross profits does not equal farm net profits as they do not include fixed or asset costs, but they provide valuable information on the efficiency of a specific crop or enterprise. Gross and net profits are useful indicators of farm financial health and its ability to generate enough cash to meet obligations.

Equation 3

Gross Profit = Revenue – Variable Costs

While farmers are more likely to have control over production yield and variable and fixed costs (internal factors), market prices (external factor) may be one of the least controlled variables in Equation 1. Prices depend on the market characteristics, market demand, competition, consumer perceptions, and produce characteristics.

For example, prices are influenced by the type of market channel (direct sales or retailer markets), the number of customers demanding a product, the number of competitors offering the same produce, the value customers place on the produce, and the quality of the produce offered. For more information on how production costs and customer value affect prices, see *The Top 5 Things to Consider before Pricing Your Products*.

Asking customers is a great way to understand their perceptions and the value they place on the produce. Farmers may ask customers at the farmers market stand, at the time of delivery, or by developing surveys on their Facebook business pages. Ideally, farmers will know their production costs before pricing their products.

Farmers should also observe what other farmers and competitors are charging for similar produce. Price points from other vendors and other markets can help farmers benchmark their pricing strategy and evaluate how much money other markets are charging customers. While supermarket prices tend to offer cheaper produce because of their supply chain efficiency, their prices can provide a baseline for minimum prices. Observing produce price at direct markets (e.g., farmers markets) is a great way to compare how prices, and potential profitability, may affect farmers success.

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Upcoming Events

Indiana Fruit & Vegetable Field Tour

The tour will be held at Tuttle Orchards, 5717 North 300 West Greenfield IN 46140, June 28, 9:00 am -4:00 pm. On-site registration 9 am at Tuttle Orchard. Registration fee is $5 per person. For further questions contact Lori Jolly-Brown

at ljollybr@purdue.edu or (765) 494-1296.

Southwest Purdue Ag Center Field Day

Southwest Purdue Ag Center Field Day will be held on June 29, 2017 at Southwest Purdue Agricultural Center, Vincennes, IN.

The field day provides two choices of tours: Horticultural Crop Production and Agronomic Crop Production. The Horticultural Crop Production tour will feature Organic Tomato Production, High Tunnel Vegetable Production, Grape Research, Protecting Pollinators while Managing Insect Pests in Watermelon Production, and Produce Food Safety. A meal will accompany the tour with PARP classes available after lunch. Please contact Barb Joyner (joynerb@purdue.edu, (812) 886-0198) for registration, or register online at https://purdue.qualtrics.com/jfe/form/SV_0rICQrMVJmiMnqZ.

Organic Vegetable Seed Production & Varietal Selection Workshop

The workshop will be conducted on August 22, 2017, 9:00 am – 3:00 pm. Daniel Turf Center, 1340 Cherry Ln, West Lafayette, IN, 47907. Topics include Seed biology fundamentals; Harvesting, processing, and storing seed; Population size and isolation requirements; Managing pathogens during seed production and after harvest; On-farm variety trialing and participatory breeding techniques. Registration fee is $15 including workshop and lunch. Register at http://tinyurl.com/y7da7dsh

Beginning Farmer Tours and Workshops

Join Purdue's beginning farmer team for farm tours in 2017.

June 24. Silverthorn Farm near Rossville, IN uses organic practices to produce a wide variety of fruits and vegetables. The tour will include a session on working with restaurants.

September 11. Two tours for the price of one! Tour Little Prairie Farms, a small acreage vegetable farm near Brookston, IN, and the Purdue Student Farm near West Lafayette to learn about farming practices and tools for small acreage farms.

September 27. Full Hand Farm is a diverse vegetable farm located near Noblesville, IN. The tour will include information on the use of high tunnels in vegetable production.

October 2. Aficionado Farms produces organically grown produce, herbs, and flowers near Elberfeld, IN. Learn about their farm and Farm to School programs.

More information about these tours are available at http://www.cvent.com/events/beginning-farmer-tours-and-workshops/event-summary-0f7526f0380a432788708b2f2edcf1e7.aspx

Vegetable Crops Hotline © Purdue University - vegcropshotline.org
Editor: Wenjing Guan | Department of Horticulture and Landscape Architecture, 625 Agriculture Mall Dr., West Lafayette, IN 47907 | (812) 886-0198

Registration

Registration Required!

Deadline - Monday, June 19, 2017.

Name_____

Organization_____

Address_____

_____

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Phone_____

Email_____

Please list the names of those attending.

_____

_____

Please mark the tour of your choice.

_____**Horticultural Crop Production**

_____**Agronomic Crop Production**

_____

Please check box if you require a vegetarian meal

☐ I require a vegetarian meal.

For those participating in this program for PARP credit, you will need to bring your ID card and $10.00

Please mail registration to Barb Joyner at the address below, e-mail to joynerb@purdue.edu, call 812-886-0198 or register online at

https://purdue.qualtrics.com/jfe/form/SV_0rICQrMVJmiMnqZ

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If you need a reasonable accommodation to participate in this program, prior to the meeting, contact Barb Joyner at 812-886-0198

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Southwest Purdue Agricultural Center

Vincennes, IN

Field Day

June 29, 2017

8:30 a.m. Registration

Featured Speaker - Lt. Governor Suzanne Crouch

Noon - Health Fair

An educational morning packed full of valuable information while observing the research production techniques being conducted at the agriculture center by Purdue Specialists and educators.

A meal will accompany the tour with PARP classes available after lunch.

Health Fair provided by Good Samaritan Hospital.

PARP credit will be available

PURDUE UNIVERSITY

Presentation Topics

Horticultural Crop Tour

Organic Tomato Production - Lori Hoagland & Dan Egel

The Tomato Organic Management and Improvement project including foliar disease management of tomatoes will be discussed.

High Tunnel Vegetable Production - Wenjing Guan & Petrus Langenhoven

This presentation will discuss tomato, cucumber and melon production in high tunnels. You will learn about vegetable grafting techniques used on tomatoes and cucumbers and melon varieties adapted to high tunnel production.

Grape Research - Bruce Bordelon

The Purdue Wine Grape Team conducts research on wine and table grapes to support the rapidly growing wine industry of the state. Plots at SWPAC contain a number of new cultivars and advanced breeding lines to test their adaptation to Indiana's climate.

Protecting Pollinators while Managing Insect Pests in Watermelon Production - Rick Foster

Join us to learn what you can do to effectively manage insect pests while preserving pollinators in watermelon field production.

Produce Food Safety - Scott Monroe

This presentation will include an update on produce food safety research at SWPAC, as well as other research and extension activities.

Agronomic Crop Tour

The Potential of Hybrid Cottonwood as a Bioenergy Crop - Rick Meilan

A discussion of our poplar species suitability and yield trial, including: 1) how it was established, 2) how the growth data is being used to develop a model for predicting biomass yield, and 3) how poplar wood can be used to produce a biofuel.

Managing Nutrients for Sandy Soils of SW Indiana - Jim Camberato

Proper fertility is critical when raising crops. Application rates and timing of N, S, Mg, Zn, and B will be discussed at this stop.

Don't Forget Economics when Choosing Seeding Rates for Corn - Bob Nielsen

The cost of corn seed is one of the largest variable input costs for Indiana corn growers. This stop will discuss results from research trials that have been ongoing since 2008 evaluating optimum seeding rates. They will likely be lower than what you expect.

Winter Canola Production - Chuck Mansfield

Winter canola is a high oil, cool season crop that fits well in cropping systems of the lower Midwest. At SWPAC, we conduct winter canola variety testing and applied research to fine-tune production practices for our region.

Soybean Production - Shaun Casteel

In Indiana, Knox County ranks in the top ten counties for soybean production. Discussion will be focused around Purdue research results that will address hot topics in 2017 soybean production.