Vegetable Crops Hotline

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

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In This Issue

Susceptibility of Melon Varieties to Bacterial Wilt

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Bacterial wilt is a serious pest of cucumbers and melons. This disease is caused by the bacterium, *Erwinia tracheiphila*. However, it is spread by the striped or spotted cucumber beetle. Most management schemes have concentrated on controlling the cucumber beetle in order to lessen the severity of bacterial wilt. Currently, management of bacterial wilt often takes the form of a soil applied systemic insecticide such as Admire Pro® at transplanting and follow up pyrethroid products applied foliarly about 3 weeks post transplanting. The pyrethroid applications are made when the 1 beetle per plant threshold is met.

Every year, there is a melon variety trial at the Southwest Purdue Agriculture Center in Vincennes, IN. In 2018, the trial included several specialty melon varieties. We noticed more bacterial wilt than usual (Figure 1). Therefore, we decided to rate the varieties to see if there were any differences in susceptibility.

Figure 1. A melon cultivar that was severely affected by bacterial wilt.

Figure 2 shows the result of the bacterial wilt evaluation of melon varieties in the 2018 season. Among the most susceptible cultivars, Honeydew 252, and HD150 are honeydew melons; Da Vinci is a Tuscan type melon; Miracle is a netted yellow-green fresh melon; and Sheba is a netted green fresh melon. Among the most tolerant cultivars, F39 is a western shipper cantaloupe; USAM 14836 is a Harper melon; Aphrodite, Athena, Astound and Accolade are eastern cantaloupes. It appears that the management method that we used for the cucumber beetle and bacterial wilt was satisfactory for standard cantaloupe varieties. However, the methods we used were not adequate for some of the specialty melons. Let’s look at our management methods in detail.

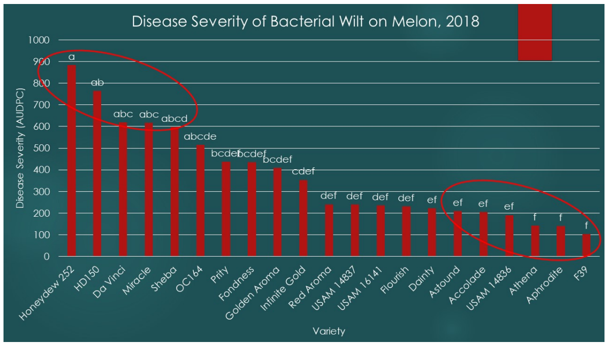

Figure 2. Disease severity of bacterial wilt on melon cultivars.

We used Admire Pro® at 4.3 fl. oz per acre as a transplant drench. More about that rate later. A flush of striped cucumber beetles was observed at the end of May. In response, we applied Permethrin® at 8 fl. oz. per acre and Warrior® at 1.25 fl. oz. per acre on 1 June and 14 June, respectively. Recall that while Admire Pro® will help to manage cucumber beetles initially, if cucumber beetles are present in sufficient numbers (the threshold for cucumber beetles on cantaloupe is 1 beetle per plant) 2 to 3 weeks after application of Admire Pro®, foliar applications of insecticides to manage cucumber beetles may be required. Bacterial wilt was observed in mid-June.

Admire Pro® is labeled as a soil drench for striped cucumber beetles at 7 to 10 fl. oz. per acre. Note that we accidentally applied the wrong rate of Admire Pro®. Nevertheless, this low rate, in combination with the foliar applications of insecticides was sufficient to control bacterial wilt on standard cantaloupe varieties.

Two take-home messages from this research are:

- Purdue entomology recommends the low rate, 7 fl. oz per acre, for control of cucumber beetles and bacterial wilt on cantaloupe. We are not recommending the 4.3 fl. oz rate. However, these results confirm research by Purdue entomology that it is not necessary to apply the high rate of Admire Pro® to control these pests. In fact, the high rate is more likely to result in bee death.
- The specialty melon varieties grown in our trial appear to be more susceptible than standard western shipper or eastern cantaloupe varieties. Therefore, management of bacterial wilt of specialty melons may take more care.

Tomato Spotted Wilt Virus

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This disease was recently observed in a tomato greenhouse. This article will review tomato spotted wilt virus symptoms, biology and management.

Tomato spotted wilt virus (TSWV) and the closely related Impatiens necrotic spot virus (INSV) are usually observed in greenhouse or high tunnel situations. Both TSWV and INSV affect many hosts, including vegetables and flowering ornamentals. Symptoms vary according to host, stage of plant affected and environmental conditions. Both diseases can cause stunting, yellowing, necrotic rings, leaf mottle and more. Figure 1 shows a tomato leaf with a necrotic mottle caused by TSWV. Figure 2 shows tomato plants stunted as a result of infection by TSWV. Additional symptoms may be viewed **here** . Since the symptoms of these two viruses vary, plants with suspicious symptoms should be submitted to the Purdue Plant and Pest Diagnostic Laboratory for confirmation of virus symptoms.

TSWV and INSV cannot spread without thrips. Thrips are small insects less than 1/20th of an inch long (Figure 3). To detect thrips, tap a flower over a white sheet of paper. Look for the small insects to move quickly around the sheet of paper. Alternatively, shake flowers vigorously over a glass of water. The insects will fall into the water 10X hand lens may help to detect thrips. Yellow sticky cards placed at crop height will help to detect these small insects. Thrips feed by scraping the leaf or flower petal surfaces with their mouthparts. Thrips may acquire and transmit either of these viruses by feeding. Thrips feeding damage often results in a light brown or gray necrotic area. The necrotic area may be dotted with very small dark spots which is frass of the insect (Figure 3).

Figure 1: The necrotic mottling on this tomato leaf is caused by tomato spotted wilt virus.

Figure 2: Some of the tomato plants in this photo have been stunted as a result of infection by tomato spotted wilt virus.

Figure 3: Thrips feeding damage and dark spots due to frass can be observed on this tomato leaf. An adult thrips can be observed to the right of the feeding damage.

Preventing TSWV is easier than halting the spread of this important disease. Avoid growing vegetables and ornamentals in the same greenhouse. Even vegetable transplants and ornamentals grown together may risk the occurrence of these virus diseases. TSWV may be introduced on ornamentals that are propagated by cuttings or plugs. The disease can then spread to vegetables. Although thrips do not usually overwinter in the Midwest, in a covered greenhouse structure, thrips may survive, especially if there is plant residue. They can overwinter as adults on plant residues and potentially as immature stages in the soil.

The following steps may be used to help reduce the severity of TSWV or INSV.

- Use transplants known to be free of both INSV, TSWV and thrips.
- Plant resistant varieties if possible. For example, there are a few tomato cultivars with resistance to these virus diseases.
- Use yellow or blue sticky traps to monitor thrips populations or by direct observations of the flowers.
- Thrips should be managed with insecticides when populations reach an average of 5 thrips per flower. However, if plants show symptoms of INSV or TSWV and thrips are present, control measures should be implemented regardless of number of thrips per flower. Effective insecticides that can be used in the greenhouse include Entrust®. When using insecticides to control thrips, coverage is critical. Thrips are very small and often hide in seams and crevices, so make sure you have sufficient water and pressure to get the insecticide where it is needed. If INSV or TSWV symptoms are suspected, send samples to the Purdue University Plant Pest and Diagnostic Laboratory. See below for information about biological controls for thrips.
- Remove symptomatic plants from a greenhouse with INSV or TSWV. Do not compost such plants; instead destroy them. Avoid crop debris in the greenhouse such as older leaves that have fallen or pruned leaves.
- Keep the area clear of weeds that may serve as hosts for INSV or TSWV

There are a variety of natural enemies that can be used to control thrips, as an alternative to pesticides. It is important to remember that a portion of the thrips lifecycle occurs in the soil. Control methods should target both the leaf-feeding stage and the soil pupation stage of this pest for full control. Above ground, *Orius insidosus* and the predatory mites *Neoseiulus cucumeris* and *Amblyseius swirskii* are commercially available. If your plants are irrigated using misters or overhead sprinklers, do not use predatory mites because they will be washed off. For control of the pre-pupal and pupal stages which occur in the soil the predatory rove beetle *Dalotia coriaria* and the predatory nematode *Steinernema feltiae* offer good control. All of these agents are available from a variety of commercial suppliers. If there is a high risk of virus incidence, biological control agents may not be compatible because of increased movement to avoid predation, which has been shown in other systems.

Both INSV and TSWV can be difficult to manage once established in a greenhouse or high tunnel. Pay close attention to the prevention measures discussed above.

Protect Early Planted Warm-Season Vegetables from Low Temperatures

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

Two types of injury on young warm-season vegetable plants are caused by low temperatures: frost/freezing injury and chilling injury.

Frost/freezing injury occurs when temperatures drop below

32°F. Ice formation in plant tissues cut cell membranes. When the tissue thaws, the damage results in fluids leaking from the cell, causing water soaked damage. Frost/freezing injury is detrimental to warm-season vegetables, such as melons, cucumbers, tomatoes, peppers, beans. To avoid damage, the best way is to plant warm-season vegetables later in the spring, after the last frost has passed. However, weather is difficult to predict, and there is a growing trend of planting early to achieve early harvests. For the early planted warm-season vegetables, here are a few suggestions that may protect plants from low temperature damages.

Covering. The idea of covering the seedlings is to create a microclimate around plants. Because the heat accumulated in soil irradiate back at night, covering maintains heat around plants, and creates a few degrees higher temperatures around young seedlings. Prevent covering materials from directly contacting plants. Using wire hoops create low tunnels and cover with thick fabric row cover for effective frost protection. If it is in the open-field, it is important to seal the edges of the cover to avoid wind blow. In large-scale production, low tunnels that are covered with clear plastic are used for early planted cucurbit plants in southern Indiana (Figure 1). On smaller scales, farmers may cover individual plants with styrofoam cups or plastic nursery pots. Styrofoam cups can be secured in position in the hole in plastic mulch. I also saw a field with young tomato plants covered with 1 gallon nursery pots and secured with a stone on top.

Windbreaks. Windbreak play an important role in modifying microclimate. Daytime and nighttime temperatures downwind and near the ground, up to three feet high, tend to be several degrees warmer than unsheltered areas. Soil temperatures also tend to be several degrees warmer in sheltered area as humidity levels in sheltered areas increase that contribute to conservation of soil moisture and attract more heat. Windbreak is used on many vegetable production systems, and it is essential in watermelon production in southern Indiana. Winter rye cover crop or other small grain are used as the windbreaks. The winter rye may be sown in broadcast in the fall as a cover crop. Then tilled in spring for the watermelon crop, and strips of rye covers are left as windbreaks. Alternatively, strips of rye were planted in fall. The general idea is to space windbreak 12 ft apart for every foot in height of the windbreak. If the rye is 4 ft tall, rye strips are typically spaced around 50 ft apart. For early planted field, windbreaks are spaced closer, success was achieved by using rye strips between every bed of watermelons.

Figure 1. Early planted watermelons covered with low tunnels. Note the rye strips were planted between every bed of watermelons.

Hardening. Hardening is the process of exposing transplants growing in greenhouse environment to outdoor conditions. The process induces plants to accumulate carbohydrates, thicken cell walls, trigger root development. It helps plant withstand low temperatures, have less damage under chilling condition. Hardening typically start 1-2 weeks before transplanting. Move plants outdoors when temperatures are at least 45-50°F, and gradually increase the amount of time plants are exposed to outdoor conditions.

Deep planting. The benefit of planting seedlings deeper in the hole is to prevent plants from having wind damage. This strategy can also help with preventing plants from low temperature damages. We saw this effect on cucurbit plants. Plants have a higher chance to survive when hypocotyls are buried in the soil, leaving leaves and growing points exposed above the soil. In this case, even leaves are damaged by the cold air, as long as growing point survives, plants may still recover. While if hypocotyls are above soil line, plants have little chance to survive if freezing damage occurred on the stems.

Figure 2. The hypocotyl of a cucumber plant was damaged by low temperatures.

Other considerations. For the earliest planted field, chose the field with the lightest soil as they warm up quickly. Avoid areas with frost pockets and shade. Lay beds and black plastic mulch as early as possible. The plastic should have excellent contact with the soil to help warm up soil. Firm beds and tight plastic help.

Chilling Injury on Young Warm-season Vegetable Plants

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Chilling injury occurs when temperatures are above 32°F and below 55°F. The plant tissue becomes weakened that leads to cellular dysfunction. The most noticeable visual symptom of chilling injury is leaf and hypocotyl wilt (Figure 1). This is caused by the rapid decline in the ability of roots to absorb and transport water. It also caused by the plant's reduced ability to close stomata. If temperatures do not improve, plants may be killed. Low temperatures also have an effect on mineral nutrient uptake of the plants. Absorption of ions by roots is difficult, as well as their movement in the above-ground parts of the plants. As a result, chilling injured plants often show symptoms similar to nutritional deficiency.

Figure 1. A cucumber plant wilt after transplanting.

Although warm-season vegetables are all susceptible to frost/freezing damage, their susceptibility to chilling injury varies among plant species. Pepper plants seem to have greater difficulty recovering after chilling injury compared to tomato plants. Cucumber plants are more susceptible than watermelon plants, and both cucurbit plants are more susceptible than tomatoes. Within the same plant species, different cultivars, plant growth stages, and the environment that transplants were grown in prior to exposing to cold affect cold tolerance.

The approaches discussed in the previous article for helping plants from low-temperature damage is applicable here. In addition, this article will discuss a few more ideas.

Cultivar selection.

Although tolerance to low temperatures may not be the most important criteria in cultivar selection, cold tolerance should be considered, especially for early planted fields. Recently, we evaluated cold tolerance of 19 commercial cucumber cultivars (including field grown slicer, pickle and greenhouse and high tunnel grown cultivars) and found great differences in cold tolerance among them. These cucumber seedlings were placed outside of the greenhouse for a night when temperature gradually dropped from 60°F to 30°F. They were brought back to greenhouse the next morning. We then compared leaf areas of the cucumbers. Most cultivars, except a field grown pickle, had a leaf area smaller than the day before, indicating those plants were more or less wilted after the chilling stress. After the plants were placed in the greenhouse for 24 hours, about 1/3 of cultivars recovered and started to grow. Interestingly, we found that English cucumbers that are bred for greenhouse production tend to be more susceptible to chilling injury than some of the field grown cucumber cultivars.

It was documented that varietal difference existed in chilling-susceptible vegetables, such as cucumber and watermelon. Unfortunately, this information is not readily available for farmers from seed companies. Farmers have to depend on their experience in selecting cold tolerant cultivars. Research in this area is surely needed.

Chemical treatment.

Studies have been conducted in using trace elements, synthetic growth regulators, and antioxidants to increase cold tolerance of chilling-sensitive plants. Their mechanisms might be to increase fluidity of members; alter activity of membrane enzymes; and influence hormone synthesis. Availalbe products that can be used on vegetable seedlings such as Soil Triggrr® (active ingredient: cytokinin), LandSpringTM WP® (active ingredient: 1-Methylcyclopropene). LandSpringTM WP® was registered to spray on transplants a few days before transplanting, and Soil Triggrr® can be applied at transplant, preplant and early plant growth stages. Their labels can be found at https://assets.greenbook.net/L107175.pdf and https://agrofresh.octochemstore.com/wp-content/uploads/2017/04/LandSpring-_epa-approved-seedling-label.pdf. Results of the effects of using these products are often inconsistent, primarily because their effects are greatly influenced by environmental factors and plant species. We have tested LandSpringTM WP® on processing tomato two years ago at the Southwest Purdue Agricultural Center, and observed a positive effect of using this product to improve early plant growth. However, no significant difference between the treated plants and controls were observed on watermelons and peppers in the one-year's study.

Basic Aspects of High Tunnel Soil Fertility Management

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

Basic Aspects of High Tunnel Soil Fertility Management – *(Petrus Langenhoven, plangenh@purdue.edu, 765-496-7955)* – Spring has arrived! Every high tunnel grower is now thinking of planting summer vegetable crops in high tunnels or has already planted. Whichever scenario applies to you, I hope that you have submitted soil samples or are in the process of submitting samples to your closest laboratory. Have you analyzed your irrigation water? It will be a good idea to send a water sample along too. There is a lot of important information locked up in your water and soil test results. The results will help you to plan and manage your high tunnel fertility program. Remember, growing in a high tunnel is like growing crops in an irrigated desert. Natural rainfall is unavailable inside your high tunnel and therefore all your plants water needs are satisfied through an irrigation system. Fertilizer needs could be addressed by adding water-soluble fertilizer to irrigation water (fertigating at times throughout the growing season), or by adding compost and other soil amendments prior to planting and during the growing season. High tunnels have some unique problems, which include temperature extremes, possible nutrient deficiencies due to faster crop growth under warmer conditions, salt accumulation in the soil, and faster release of nutrients from organic materials. In anticipation of these issues, growers can plan to manage soil fertility and moisture issues timely. In this article we will be focusing on water quality and the interpretation of your soil test report.

Importance of Water Quality Testing – The effect of using of high alkalinity irrigation water in greenhouse bench crop production is well known. Over time, the water can cause a rise in soil or media pH, resulting in deficiencies of zinc, manganese and iron in specific crops. High tunnel growers experience this problem too. Total alkalinity and pH of your irrigation water should be in the range of 0 to 100 ppm $CaCO_3$ and 5.5 to 6.5, respectively. Ideally, it should be about 80 ppm $CaCO_3$ with a pH of 5.8. An additional negative effect of alkalinity levels higher than 150 ppm $CaCO_3$ is an increase in the incidence of clogged drippers. Remember, water pH and alkalinity are not strictly related. Therefore, it is important to test for both. There are two options to deal with high alkalinity and pH. Acidification and a reduction in alkalinity of the irrigation water could be achieved with the addition of an acid (i.e. citric, sulfuric, phosphoric or nitric). Rates could be calculated with this very handy **ALKCALC** resource. Amending your water alkalinity and pH while you irrigate is perhaps the fastest and most cost-effective method to manage soil pH. If you are interested to acidify your soil slowly with an organic amendment, apply elemental sulfur at 15 lb/1000 sq. ft. of bed area for each 0.5 pH unit drop needed (Sideman, 2018). Also make sure that iron, manganese and sulfate is within acceptable ranges. Iron levels higher than 5 ppm could be toxic to the plant and could result in iron precipitates forming at the emitter, plugging your irrigation system. Similarly, manganese levels higher than 1.5 ppm and sulfate levels higher than 240 ppm could cause emitter blockage. It is also important to keep track of the sodium and chloride levels in the water. High levels (>50 ppm Na and >70 ppm Cl) can lead to an increase in soil salinity, especially in the top 2-4 inches, and therefore has to be managed carefully. Particularly in view of the fact that the high tunnel cover prevents natural rainfall from washing or leaching excess soluble salts from the soil and that the elevated soil temperatures inside the tunnel increases soil microorganism activity, releasing nutrients from organic materials such as manures and composts faster into the root zone.

Understanding your Soil Test Report – The optimum **pH** varies by crop but it is generally accepted that the ideal pH range for organic and mineral soils are 5.3 to 5.8 and 6.0 to 7.0, respectively. In mineral soils nitrogen, phosphorus, potassium, calcium, magnesium, boron and molybdenum are most available when the pH is between 6.0 and 7.0. With a soil pH below 6.5, zinc, manganese, iron and copper tend to be most available. It is therefore desirable to maintain mineral soil pH between 6.0 and 6.5. The available aluminum increases as the mineral soil pH decrease, especially below 5.5. The increasing aluminum concentration can further contribute to soil acidification and aluminum toxicity, which inhibits root growth. The target pH range for organic soils are between 5.3 to 5.8. The lower pH range is acceptable because aluminum levels are very low in organic soils (Warncke et al., 2004). The capacity of a soil to hold exchangeable cations is measured and reported as the **cation exchange capacity** (CEC) of the soil. This value is a good indicator of soil fertility. A good soil has a CEC between 5 and 35 meq/100g soil. Generally sandy soils have a low CEC and soils with a high CEC is more likely to have a high clay or organic matter content. Two tests are performed to determine the **phosphorus** levels, P1 (weak Bray) and P2 (strong Bray). The P1 test is an indication of the phosphorus that is readily available to plants (20 to 50 ppm is adequate) and the P2 test confirms the level of phosphorus that is available and part of the active reserve in the soil (40 to 60 ppm is a desirable level). **Potassium** should be in the range of 150 to 300 ppm, **calcium** 1000 to 2500 ppm, and **magnesium** >50 ppm. **Soluble salts** results are presented as the electrical conductivity (EC) of the soil and is measured in mmhos/cm. An EC <1.0 (<640 ppm salt) is considered good and and EC >2.5 (>1600 ppm salt) is unsuitable for crops. **Percent base (cation) saturation** gives you an indication of what proportion of the CEC is occupied by cations such as Ca^{2+}, Mg^{2+} and K^{+}. Optimum ranges for Ca^{2+}, Mg^{2+} and K^{+} are 40-80%, 10-40%, and 1-5%, respectively. **Micronutrient** ranges for vegetable crops are between 1 to 3 ppm Zn, 1 to 5 ppm Mn, 11 to 16 ppm Fe, 0.5 to 1.5 ppm Cu, 0.7 to 1.0 ppm B, and 0.11 to 0.20 ppm Mo.

Considerations for the Plan – Now you are able to initiate the development of a soil fertility management strategy. **Nitrogen** is an important element to promote vegetative growth. Under warm and high light intensity conditions, over fertilization of nitrogen can lead to excessive growth and deficiencies, especially in fruiting vegetable crops. The nitrogen form applied is also an important consideration. Applying most nitrogen as ammoniacal or urea will result in a soil pH decrease in the root zone. The conversion of these nitrogen forms to nitrate nitrogen is temperature dependent, converting at a faster rate when the soil temperatures are higher. Excess ammonium nitrogen can lead to deficiencies, especially calcium, magnesium and potassium. It is a smaller molecule and are therefore more readily taken up by plants. On the other hand, the uptake of nitrate nitrogen can lead to a slight increase in pH in the root zone. **Phosphorus** is most available to plants at a pH between 6.2 and 7.2. It is therefore important to keep the soil pH in check for maximum availability of phosphorous. Apart from soil amendments, you can adjust your irrigation water pH and nitrogen form to help manage soil pH in the root zone. **Potassium** is an essential element for plant growth and the production of a high quality crop. Higher soil moisture conditions means that more potassium is available in the soil solution and therefore enhances the availability for uptake by plant roots. However, be careful. Excessive soil moisture reduce root respiration, limits root activity and therefore decrease the uptake of potassium. The uptake of both potassium and phosphorus increase with an increase in soil temperature. The optimum soil temperature for uptake is 60 to 80°F.

Remember that recommendations are usually given as pounds per acre of P_2O_5 and K_2O, because fertilizer grades are expressed as percent N-P_2O_5-K_2O. To convert from P to P_2O_5 multiply the P value by a factor of 2.3. To convert from P_2O_5 to P multiply by a factor of 0.43478. Similarly, to convert from K to K_2O multiply the K value by a factor of 1.2. To convert from K_2O to K multiply by a factor of 0.83333. If you would like to know how much of P or K is available in one acre one foot deep, multiply the ppm value in the soil test report by a factor of 3.6.

Use guides such as the *Midwest Vegetable Production Guide for Commercial Growers*, the *Indiana High Tunnel Handbook*, the *Nutrient recommendation for Vegetable Crops in Michigan*, and the *Nutrient Management for Commercial Fruit & Vegetable Crops in Minnesota* to help you plan and manage your fertility program.

Resources:

Sideman, B. 2018. High Tunnel Soil Management Update. UMass Extension. Vegetable Notes, Vol. 30 No. 2. https://ag.umass.edu/sites/ag.umass.edu/files/newsletters/february_15_2018_vegetable_notes.pdf

Warncke, D., J. Dahl and B. Zandstra. 2004. Nutrient recommendation for Vegetable Crops in Michigan. Michigan State University, Extension Bulletin E2934. http://msue.anr.msu.edu/resources/nutrient_recommendations_for_vegetable_crops_in_michigan_e2934

Brassica Pest Collaborative

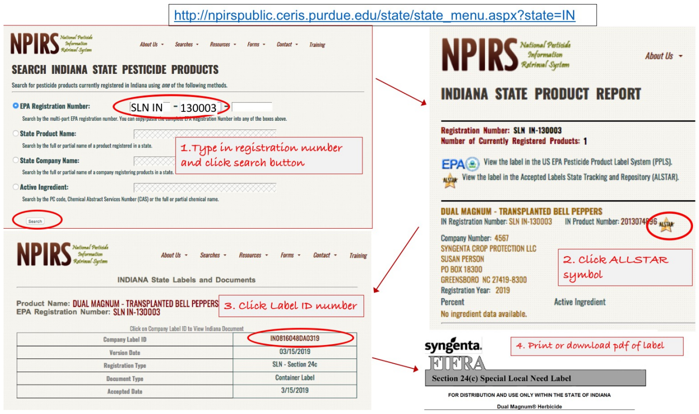
(Wenjing Guan, guan40@purdue.edu, (812) 886-0198)

Great information on pest management of brassica crops can be found at the Brassica Pest Collaborative website (https://ag.umass.edu/vegetable/resources/brassica-pest-collaborative). This project recently conducted several online workshops on managing insect pests of brassicas, including imported cabbageworm, cross-striped cabbageworm, cabbage maggot, flee beetle. All the webinars should be posted on the above website after April 12.

Dual Magnum Indiana 24C Label Amended to Include More Crops

(Liz Maynard, emaynard@purdue.edu, (219) 548-3674)

Dual Magnum® has had a special local needs (24C) label in Indiana for use on transplanted bell peppers and other vegetables for a number of years. Last week the label was amended to include additional small fruit and vegetable crops, including asparagus. The new 24C label is available on the National Pesticide Information Retrieval System web site: http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=IN. To find it, type “SLN IN” and “130003” in the first two boxes for “EPA Registration Number” and click the search button. The product report will show “DUAL MAGNUM – TRANSPLANTED BELL PEPPERS.” Click on the ALLSTAR symbol. On the page that opens, click on the Company Label ID number "IN0816048DA0319." This will open a pdf of the label. If you decide to use the product, carefully read and follow the label instructions.



To find the Dual Magnum Indiana 24C label online, visit http://npirspublic.ceris.purdue.edu/state/state_menu.aspx?state=IN and follow instructions in the figure.

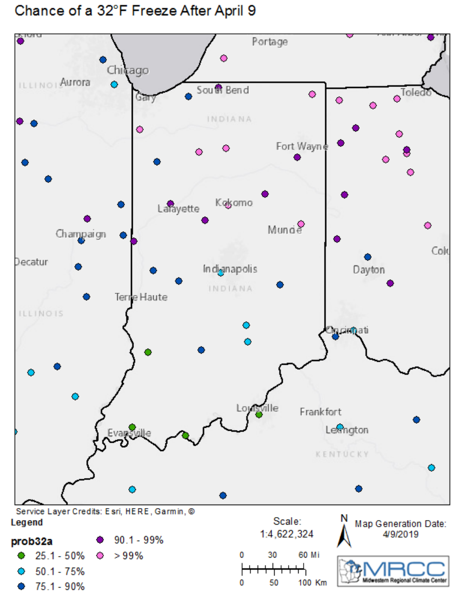


Figure 1. Probability of a 32°F freeze still occurring after April 9th.

Indiana Climate and Weather Report

(Beth Hall, hall556@purdue.edu)

The rain seems to keep falling, barely providing time for things to dry out and start planting! The last few weeks has experienced up to 2" above normal precipitation – particularly for west-central and southern Indiana, which is near the 125th-125th percentile. Warm days seem to be relatively few and far between, causing a slow start to growing degree-day (GDD) accumulations. While it is still early in the season, Indiana has only accumulated about 30-60 GDD units, with the few amounts to the north. Hard freezes (<= 28°F are still in recent memory, with the most recent hard freeze occurring just last week (April 1-3). For April 8-16, precipitation forecasts are predicting 1.5"-2.5" of rain, with the higher amounts expected in the southern half of the state. There is still a 25-50% chance of a 32°F freeze occurring in southern counties and over a 90% chance of a freeze occurring in the northern half of the state (see Figure).

Dr. Beth Hall is the new Indiana State Climatologist. She can be reached at bethhall@purdue.edu or (765) 494-8060.

New Leadership Appointed for the Indiana Horticulture Congress

On April 1, 2019, Dr. Hazel Wetzstein, Head of the Department of Horticulture and Landscape Architecture, announced a change in leadership for the Indiana Horticulture Congress. "I am pleased to announce that Petrus Langenhoven and Kyle Daniel have agreed to serve as Co-Chairs for the Indiana Horticulture Congress, effective immediately. They bring a wealth of information and experience and I am looking forward to the leadership they will bring to IHC".

Peter Hirst, will be stepping down as chair. He is going to maintain a program in Pomology in the HLA Department and will assume an active international role as Assistant Director in International Programs in Agriculture (IPIA). "We all wish to thank Peter for his dedication and many years of service as IHC Chair. It is important to note that the past successes of Hort Congress would not have been possible without the dedicated efforts of Lori Jolly-Brown and Tristand Tucker, which are much appreciated. Lori will continue in her excellent role as the primary staff organizer and liaison".

Petrus and Kyle are looking forward to serving the specialty crop growers of Indiana. You can reach them at plangenh@purdue.edu or (765) 496-7955, and daniel38@purdue.edu or (765) 494-7621. Please contact us if you have any suggestions on how we could expand and improve your Indiana Hort Congress experience.

Survey to Your Production and Marketing challenges

A research team at Purdue University invites you to participate in a survey of specialty crops growers to better understand your production and marketing challenges. **This survey will help us identify future production and marketing research to help support growers like you**. The survey takes approx. 10-15 minutes.

Take the survey: **http://bit.ly/purduesurvey**

Your responses are important because you will be representing your neighbors as well as yourself. **Information from this study can help inform policymakers, state legislators, and industry stakeholders.**

If you have questions or concerns, please contact me to: Dr. Ariana Torres; Assistant Professor and Marketing Specialist; telephone: (765) 494-8781; email: torres2@purdue.edu.

Thank you very much for considering this invitation! Your help is greatly appreciated.

Upcoming Events

Southwest Purdue Agricultural Center Field Day

Date: June 27, 2019

Location: Southwest Purdue Agricultural Center, Vincennes, IN 47591

Tentative schedule of this event will include: Removing invasives and cultivating natives; Growing hemp in Indiana; Bee health; Organic tomato production; Drones to help scout for crop problems; High tunnel cucumber and specialty melon production; Low tunnels in strawberry production; How termites can benefit and control of invasive plants. The event is free. Registration details will be announced soon.

Small Farm Education Field Day at Purdue Student Farm

Date: August 1, 2019

Location: Purdue Student Farm, West Lafayette, IN 47907

The Purdue Student Farm is proud to announce its second annual Small Farm Education Field Day. The event is packed with educational sessions during the morning, followed by a tour and hands-on experiences on the farm. Topics of discussion throughout the day include Cover Crop Choices, Scheduling of Crops in High Tunnels, High Tunnel Pepper vs. Tomato Production, Soil Restoration, Dynamic Enterprise Budgets, Food Safety Certification, Rototiller vs. Power Harrow Demonstration, and Postharvest Processing of Fruits and Vegetables with Solar Driers, among other. Stay tuned. There might be more topics added to this very exciting program. Registration details will be announced soon. Please contact Petrus Langenhoven (plangenh@purdue.edu, (765) 496-7955) or Lori Jolly-Brown (ljollybr@purdue.edu, (765) 494-1296) if you have any questions or suggestions. Further details will be published as soon as the program has been finalized. Registration will open in May 2019.

Advanced Soil Health Systems- Specialty Crops

Date: May 71, 2019

Location: Bartholomew County Area (final location TBD)

This training will focus on no-till pumpkin production with cover crops. It is designed for those who work one-on-one with specialty crop producers. Attendees should have a foundational knowledge of soil health cropping systems and cover crops. For more information or questions, contact Jessica Hoehn at jessica.hoehn@in.nacdnet.net (812) 972-8194

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