VEGETABLE CROPS HOTLINE

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

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In This Issue

Cantaloupe and Watermelon Transplant Diseases

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

Many cantaloupe and watermelon growers are either growing transplants in a greenhouse or are expecting delivery of transplants in the next few weeks. Either way, growers should inspect transplants for disease before planting in the field. Below I will describe several common transplant diseases of cantaloupe and watermelon as well as management options.

Figure 1: A common symptoms of gummy stem blight of watermelon is a watersoaked area where the seed leaves attach to the stem.

Gummy stem blight on transplant seedlings may be recognized by the water soaked area of the stem near the seed leaves (Figure 1). (A water soaked area near the soil line is more likely to be damping-off.) The water soaked area may eventually turn brown and woody. A closer look at the woody area may reveal the small, dark fungal structures of the gummy stem blight fungus. Medium brown, irregular lesions may also be observed on true leaves.

The fungus that causes gummy stem blight (*Didymella bryoniae*) may survive in crop debris, thus overwintering in the field from year to year. This fungus may also be introduced through seed or transplants. It is also possible for the fungus to survive in greenhouse production facilities.

Anthracnose of watermelon is another disease that may be observed on transplants. The lesions caused by anthracnose (*Colletotrichum orbiculare*) are often jagged or sharp in appearance (Figure 2). Stem lesions are less common, but if they occur they may appear watersoaked, light brown and pitted. Such stem lesions will not necessarily appear at the seed leaves. Anthracnose on cantaloupe transplants is less common.

Figure 2. Anthracnose lesions on watermelon often appear jagged.

As described above for gummy stem blight, the fungus that causes anthracnose may survive in crop debris such as in transplant production facilities. This fungus may also be introduced through seed or transplants.

Watermelon transplants with Fusarium wilt often appear wilted or the plant tops may have died back (Figure 3). Symptoms that appear under humid greenhouse conditions may be accompanied by white mycelial growth of the causal fungus, *Fusarium oxysporum* f.sp. *niveum*. Seedlings with Fusarium wilt symptoms may be clustered in transplant trays.

Figure 3. Fusarium wilt on a watermelon transplant with die-back symptoms.

Fusarium wilt may be introduced through seed or transplants. Unfortunately, the fungus that causes Fusarium wilt has long lived spores that may survive for years in soil, equipment or transplant trays.

The symptoms of bacterial fruit blotch (BFB) can be difficult to recognize on foliage. Leaf lesions may have a dark necrosis with water soaked margins (Figure 4). Leaf symptoms of BFB are easily confused with angular leaf spot, a disease that is not often economically important. A laboratory analysis may be required to distinguish these two diseases.

The bacteria that cause BFB do not often survive in crop debris; the disease is more often transmitted through seed. Although symptoms are more often observed on watermelon, cantaloupe transplants may also be affected.

Figure 4. Lesion of bacterial fruit blotch on a watermelon transplant may appear watersoaked.

To guard against these diseases in your field, carefully inspect transplants regularly during production or upon delivery. If unsure about symptoms, send them in to the Plant Pest and Diagnostic Laboratory or a similar laboratory for an official diagnosis.

Clean and sanitize transplant production facilities and equipment in-between generations. Purchase transplant trays for each generation of transplants or clean and sanitize trays well. Do not use soilless greenhouse mix that has been opened or come into contact with the ground or unclean equipment.

Purchase vegetable seed that has been tested for the diseases described above. Ask your seed company representative if you are uncertain about what tests have been conducted.

Finally, avoid planting transplants grown from seed lots or greenhouses where any of these diseases has been confirmed. Seedlings that appear healthy may in fact have a disease that has spread from a nearby seedling.

In most years, it will be impossible to avoid at least some of the diseases described above. But, as much as possible, do not plant these diseases with your transplants. In particular, avoid using transplants with Fusarium wilt. Since the Fusarium wilt fungus survives many years in the absence of a host, an introduced fungus may last indefinitely. Plus, watermelon transplants with Fusarium wilt may add a new race or strain of the fungus to your field.

Managing these diseases in the field is a different discussion and will be addressed in many articles throughout the year.

Flea Beetles

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

Many of our vegetable crops are attacked by one or more species of flea beetles (Figure 1). All species do similar types of damage, chewing small holes in the leaves. Damage is most important on young plants or transplants, so growers should watch young plants carefully. Fortunately, flea beetles are easy to control. Sevin®, the pyrethroids, and many other products will provide excellent control.

Figure 1. Flea beetles on a brassica plant (Photo by John Obermeyer)

Cabbage Caterpillars

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

Crucifers such as cabbage, cauliflower, and broccoli are frequently attacked by a variety of caterpillars, with the most important being the imported cabbageworm, diamondback moth, and cabbage looper.

The first caterpillar pest to attack crucifers is the imported cabbageworm. The adult stage is the common white butterfly that you will see flying around your field (Figure 1.). They lay eggs singly on the leaves. The larvae are velvety green and move very slowly (Figure 2.). They will consume large amounts of plant tissue and will also contaminate the heads with their feces. Your first indication of activity is when you see the daytime flying butterflies in your field. Once the butterflies are observed, you should begin watching your plants for signs of damage. Plants can tolerate a considerable amount of feeding damage on the leaves before heads begin to form. See the table on page 101 of the Midwest Vegetable Production Guide for details about thresholds. These insects are easy to control, as evidenced by the number of products recommended. It should be noted that some of the Bt products, will control this pest as well as many of the more conventional products.

Figure 1. Cabbageworm lay eggs on a crucifer plant (Photo by John Obermeyer)

Figure 2. Cabbageworm larva (Photo by John Obermeyer)

The diamondback moth is the next caterpillar to arrive (Figure 3). The adults are small moths with a diamond shape on their backs. The larvae are much smaller than the other two species and do less damage per caterpillar, but can occur in much higher numbers. When disturbed, the larvae may drop to the ground on a silken thread, or wiggle like a fish out of water. Diamondback moths are one of the species with a great ability to develop resistance to pesticides. As a result, you may need to experiment a little to see which products work. The pyrethroids are cheap and effective if resistance is not an issue, so those products should be tried first. If they are not effective, again there is a wide variety of options available, as listed in the Midwest Vegetable Production Guide.

Figure 3. Diamondback moth on a cabbage leaf (Photo by John Obermeyer)

Cabbage loopers are usually the last pest to arrive because they do not overwinter in Indiana and must fly in from southern locations. The adults are kind of nondescript moths that lay eggs at night. The larvae are easy to identify because of the looping motion they make when crawling (Figure 4). These larvae, like imported cabbageworms, can do a large amount of damage per caterpillar. Cabbage loopers are often the hardest of the three species to control. The Bt insecticides tend to be less effective on loopers. Resistance is not an issue so the pyrethroid insecticides, along with a host of others, will provide good control.

Figure 4. Cabbage looper (Photo by John Obermeyer)

Black Cutworm

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

We have had substantial black cutworm moth (Figure 1.) catches in our pheromone traps. Black cutworm moths typically lay their eggs on winter annual weeds growing in un-tilled fields. When the eggs hatch, the larvae will begin feeding on the weeds. Then, when you kill the weeds with either tillage or a burndown herbicide, the larvae are left there with nothing to eat. If you wait a couple of weeks to plant, they will probably starve to death. If you plant sooner than that, they will just be really hungry and will readily attack a variety of crops. The pyrethroid insecticides provide good, economical control.

Figure 1. Black cutworm larva (Photo by John Obermeyer)

Armyworms

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

We have had major flights of armyworm moths (Figure 1.), as evidenced by pheromone trap catches. Catches have been highest in the northeastern portion of the state. Armyworms prefer grasses but will feed on other crops if necessary. During outbreak years, the infestation usually will start in pastures or other grassy areas. Once the armyworms have consumed most of the available leaf tissue, the larvae will march as a group (hence the name) looking for something else to eat. The next crop consumed may be wheat or early corn. When populations are heavy, the damage can be devastating.

Fortunately, these kinds of outbreaks occur quite rarely. The last major outbreak we experienced was in 2001. If you have early-planted sweet corn, it would be wise to watch grassy areas for armyworm damage. If you see evidence of a problem there, watch your sweet corn for any signs of activity. The pyrethroid insecticides provide effective, inexpensive control of armyworm.

Figure 1. Armyworm damage on corn leaves (Photo by John Obermeyer)

Seedless Fruit Production

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

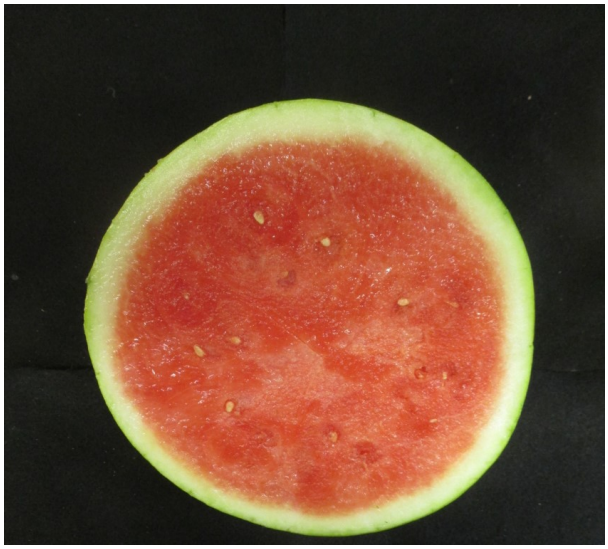

Figure 1. A seedless watermelon

A plant is considered to be seedless if it is able to produce a fruit without or contain a much-reduced number of seeds, or in some cases, only present traces of aborted seeds. Seedlessness is a desirable fruit character because seeds are often hard, have a bad taste and produce hormones that lead to fruit deterioration. As a result, seedless fruit often has better quality and longer shelf lives.

Seedless watermelons that were introduced in the 1990s have become the main type of watermelons grown in the U.S. Besides seedless watermelons, breeders have developed seedless varieties for other fruiting vegetables. This article briefly introduces the different types of seedless fruit and discusses potential opportunities for growing theses varieties.

Seedlessness exists in two forms. In the case of seedless watermelons, the fruit contains partially formed seeds that are aborted after fertilization (Figure 1.). Seedless watermelon plants are self-infertile. They must be pollinated by a seeded watermelon plant (diploid) in order to produce a seedless fruit. Another form of seedlessness is called parthenocarpy, for which fruit are seedless because the ovary is able to develop without fertilization, therefore they do not need pollination. The parthenocarpic character can be found in most of the common cucumber types (Figure 2), i.e. picking, slicer, long and mini cucumbers. It also exists in summer squashes. Green zucchinis are more likely to carry the parthenocarpic character, varieties include Partenon, Dunja etc. A yellow summer squash Golden Glory has also been found to set fruit without pollination.

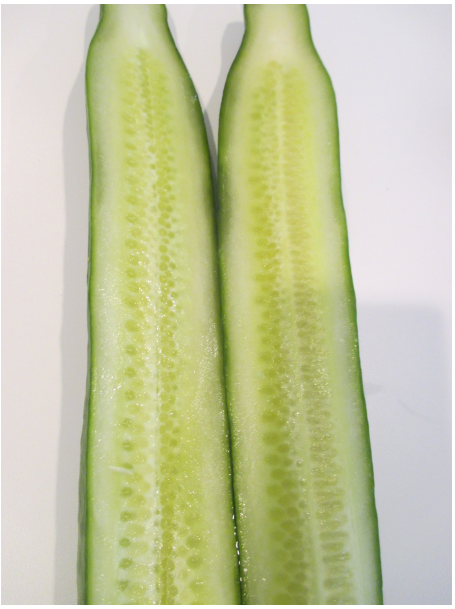

Figure 2. A seedless cucumber

Without the need for pollination, parthenocarpic cucumbers and summer squashes are ideal to be grown in high tunnels and greenhouses. In addition, these varieties work well with insects netting, as the nettings do not need to be removed at flower stage as required by varieties that need pollination.

Parthenocarpic tomato and eggplant varieties are also available. Examples include tomato Legend and Oregon Spring. Tomato pollen maturation and fertilization are sensitive to several environmental factors including light, temperature and relative humidity. One of the advantages of growing parthenocarpic tomatoes is that they can set fruit when environmental conditions are undesirable, for example, in the early season when low temperature prevent fertilization.

April MW Vegetable Guide Update

(Dan Egel, egel@purdue.edu, (812) 886-0198) & (Rick Foster, fosterre@purdue.edu, (765) 494-9572)

Another update has been added for the *Midwest Vegetable Production Guide for Commercial Growers* 2017. Under Root maggot controls for rutabagas, please substitute the information below for the existing information on page 211.

Lorsban 15G at 3.3 fl. oz per 1000 linear ft. of row at planting or Lorsban 4E/Advanced at 1 fl. oz/1000 linear ft. of row at planting.

Belay Label Change

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

Growers that purchase the insecticide Belay® should read the label carefully. The new label will contain several significant changes. Please see this announcement recently released by Valent.

"Valent is voluntarily removing or limiting certain crop uses on the Belay® label going forward due to on-going regulatory challenges with these uses. Specifically, all Fruiting Vegetable uses have been removed and uses for Cucurbits, and Potato have been modified. These changes have been made to both the Federal and State labels. Valent is currently out of any old Belay® labeled product and will not be producing any additional material with that label. We are currently in production of *Belay®* with the new label and it should be available by mid-April.

Customer owned inventory with the old Belay® label can be sold to growers and used by them going forward (no expiration period has been imposed)."

2017 North Central SARE Grant Awardees Announced

(Wenjing Guan, guan40@purdue.edu, (812) 886-0198) & (Roy W Ballard, rballard@purdue.edu, (317) 462-1113)

Farmer Rancher Grant Program of NCR-SARE is for farmers and ranchers who want to explore sustainable solutions to problems through on-farm research, demonstration, and education projects. The Farmer Rancher Grant offers grants of up to $7,500 for an individual applicant, $15,000 for 2 applicant farmers cooperating, and $22,500 for three or more farmers cooperating. More information about the grant is available at http://www.northcentralsare.org/Grants/Our-Grant-Programs/Farmer-Rancher-Grant-Program

In Indiana, we had five farmer-initiated projects selected to receive funding in 2017. They were:

- James Catron of Hallelujah Acres Farm in Lebanon, IN was awarded $7,500 for the project, "Measure the Effectiveness of Interseeded Cover Crops for Proactive Weed Prevention in a Chemical-free, Low-till Vegetable Market Garden Operation."
- Jane Loomis of Old Loon Farm in Columbia City, IN was awarded $22,477 for the project, "Investigating the Possibilities of Cooperative Sorghum Syrup Production and Marketing for Strengthening Small Farm Sustainability in Northern Indiana."
- Thomas McEvilly of McEvilly Gardens LLC in Bloomington, IN was awarded $7,458 for the project, "Differential Impacts of Growing Medium on Micro Greens Productivity."
- Genesis McKiernan-Allen of Full Hand Farm in Noblesville, IN was awarded $6,244 for the project, "Hoosier Young Farmer Coalition."
- Denice Rackley of Clearfield Stockdogs and Lamb in Bennington, IN was awarded $21,714 for the project, "Success with Stockdogs: Herding Workshops and Continuing Skills Development for Livestock Producers."

Congratulations !!!

Partnership Grant Program of NCR-SARE is intended to foster cooperation between agriculture professionals and small groups of farmers and ranchers to catalyze on-farm research, demonstration, and education activities related to sustainable agriculture. An Agricultural Professional is the grant applicant and

the principal investigator. Three or more farmers or ranchers are substantially involved in the project. More information about the program is available at http://www.northcentralsare.org/Grants/Our-Grant-Programs/Partnership-Grant-Program

In 2017, Wenjing Guan with Purdue University was awarded $29,791 from the grant for the project "Using Grafting Technology to Enhance Greenhouse Cucumber Production in High Tunnels". Grafting has the potential to extend harvest season and increase the yield of cucumbers. This project introduced cucumber grafting technology to vegetable farmers, with the goal of enhancing early season cucumber production.

Updates about the project will be published in the *Vegetable Crops Hotline*. If you are interested in participating in this project, please contact Wenjing Guan at guan40@purdue.edu.

The Call for Proposals for the 2018 NCR-SARE Grant Programs will be announced in Fall. Please watch for the announcements if you are interested in applying for the grants.

Upcoming Events

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

Southwest Purdue Ag Center Field Day

Save the date June 29 for Southwest Purdue Ag Center Field Day

Beginning Farmer Tours and Workshops

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

June 15. Clay Bottom Farm near Goshen, IN uses intensive growing methods to support a CSA program on less than an acre of land. Learn about their 'lean farm" approach to support a CSA, supply restaurants, and sell at farmers' markets.

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

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