West Virginia University
EXTENSION SERVICE

Volume 9 • Issue 2
Spring 2021

IPM Chronicle

extension.wvu.edu

In This Issue:

Pest problems in West Virginia speciality crops

In order to prioritize extension programs based on the needs of producers, the WVU Integrated Pest Management Team conducted a survey in the winter of 2021 to obtain feedback from specialty crop growers (with the exception of commercial orchards) related to pest problems faced in various production systems. Both controlled-environment (high tunnels and greenhouses) and field-grown crop growers were included in the survey.

The survey gathered information related to crops raised, major pests encountered (insects, plant diseases, weeds, vertebrate pests), pest management practices used and service-based resources that would be beneficial. The following results summarize findings based on data collected from 44 respondents.

Survey findings

Half the respondents raised field-grown crops, 39% grew crops in high tunnels and 11% produced crops in greenhouses. Tomatoes, sweet peppers *(Capsicum spp.)*, onions, salad greens and cucurbits emerged as the top five specialty crops raised on West Virginia small farms (Table 1, page 2).

The most common pest problem in controlled environments was insect pests, followed by plant diseases. All four types of pests were more or less uniformly distributed (23% to 26%) in field-grown crops. However, stark contrasts were evident between controlled-environment and field-grown crops based on the ranking of pest types. Insects, plant diseases or weeds, and vertebrate pests were ranked 1 through 4 respectively in controlled environments, whereas the opposite ranking order was revealed in field-grown specialty crops, where vertebrate pests (such as deer, rodents and birds) were ranked as the worst pest problem by the respondents (Tables 2 and 3, page 2).

The pest management practices engaged varied based on the production system. IPM practices were mostly implemented in greenhouse systems, followed by field-grown crops. More than two-thirds of the growers across all production systems indicated that they used either IPM or IPM-influenced organic practices to manage pests in their operations. None of the respondents were certified organic, although 15% and 20% of the respondents in field-grown crops and high tunnels, respectively, did not use any pesticides (Table 4, page 2).

Conclusions

Based on the results of the survey, it was evident that programming efforts need to be directed more toward management of vertebrate pests and weeds in field-grown specialty crops, and toward the management of insect pests and plant diseases under controlled environments. The respondents indicated that lack of materials or good source of materials (29.4%), lack of information to make management decisions (26.5%) and pest identification (20.6%) were the top three concerns related to pest management in their production systems.

– continued on page 2 –

Pest problems in West Virginia speciality crops *(continued)*

Table 1. Top 12 specialty crops raised on West Virginia small farms (excluding commercial orchards).

Rank	Crop	Farms (%)	Rank	Crop	Farms (%)
1	Tomatoes	22 (8.0)	8	Tubers (carrot, beet, turnip)	15 (5.4)
2	Peppers (*Capsicum* spp.)	20 (7.3)	8	Potatoes	15 (5.4)
3	Onions (green or bulb)	18 (6.5)	10	Herbs (basil, celery, fennel, leeks, etc.)	14 (5.1)
3	Salad greens (lettuce, kohlrabi, etc.)	18 (6.5)	10	Pumpkins	14 (5.1)
5	Cucurbits	17 (6.1)	12	Small fruits (raspberries, blueberries, etc.)	13 (4.7)
5	Beans	17 (6.1)	12	Sweet corn	13 (4.7)
7	Brassicas (cabbage, cauliflower, broccoli, etc.)	16 (5.8)			

Table 2. Pest types encountered in field-grown and controlled-environment specialty crops production systems in West Virginia.

Type of Pest	Type of Production System		
		Controlled-environment	
	Field-grown	*High tunnel*	*Greenhouse*
	%		
Insects	24.6	31.9	50
Plant diseases	26.1	27.7	37.5
Weeds	26.1	25.5	0
Vertebrate pests (deer, rodents, birds, etc.)	23.2	14.9	12.5

Table 3. Ranking of pest types encountered in field-grown and controlled-environment specialty crops production systems in West Virginia.

Type of Pest	Type of Production System		
		Controlled-environment	
	Field-grown	*High tunnel*	*Greenhouse*
	Rank		
Insects	3	1	1
Plant diseases	4	2	2
Weeds	2	4	2
Vertebrate pests (deer, rodents, birds, etc.)	1	3	4

Table 4. Pest management practices in field-grown and controlled-environment specialty crops production systems in West Virginia.

Type of Pest Management	Type of Production System		
		Controlled-environment	
	Field-grown	*High tunnel*	*Greenhouse*
	%		
No pesticides at all	15	20	0
IPM influenced by organic practices (non-certified organic growers)	40	47.6	25
Certified organic	0	0	0
Conventional IPM (used pesticides based on monitoring, threshold levels or record-keeping)	40	20	50
Conventional (pesticides applied without monitoring, threshold levels or record-keeping)	5	13.3	25

Cercospora leaf spot of Swiss chard, sugar beet and spinach

Production of leafy greens, including Swiss chard, sugar beet and spinach, are gaining popularity due to changes in consumers' food preferences. As a result, production has been steadily increasing; however, disease, such as Cercospora leaf spot caused by fungal pathogen *Cercospora beticola*, has become a limiting factor. The disease can render Swiss chard and spinach leaves unmarketable and seriously affect sugar beet root development by compromising the photosynthetic areas on the leaves. Out of these three hosts, the disease causes the most damage on Swiss chard in West Virginia. While these are the primary hosts of Cercospora leaf spot, other plants under the family Chenopodiaceae also can get the disease.

Figure 1. Cercospora leaf spot shown on sugar beet with brown to off-white centers surrounded by red margins. (Photo credit: MM Rahman)

Identification and life cycle

Small, brown to reddish spots appear on the upper surface of the leaf. Spots quickly enlarge with the centers turning brown to off-white surrounded by red margins (Figure 1). Enlarged lesions merge together to kill part of or the whole leaf. Tissues at the lesion's center may fall off giving leaves a shot-hole appearance. Older leaves near the soil line are affected first while younger leaves at the center of a plant may remain healthy. Fungal growth on older lesions may form hard, compact masses of hyphae with a darkened rind (sclerotia) that are visible with a hand lens.

Initial infection can start from infected debris from the previous year, germinating sclerotia or from seedlings that grew from infected seeds. As infected leaves dry up and detach, *C. beticola* can survive on infected plant debris from one season to another. In addition, sclerotia are considered long-term survival structures of this pathogen once mixed in the soil. Weed hosts belonging to Chenopodiaceae can be infected with *C. beticola* and spread the inoculum. This fungal pathogen also is known to be seed borne.

Under favorable environmental conditions (high humidity and temperature between 75 to 85 F), several cycles of infection and inoculum (fungal conidia) multiplication can take place. Conidia can spread by air or rain splash from diseased to healthy leaves to initiate new infections.

Management

The suggestions below can be used to help minimize or eliminate the presence of Cercospora leaf spot.

- Because the inoculum can survive on plant debris from season to season, it is best to rotate crops outside of the Chenopodiaceae family or remove plant debris at the end of the season before sclerotia get incorporated into the soil. In the case where removal of plant debris is not possible, bury infected crop residues by deep plowing and destroying volunteer plants and weed hosts.
- Only buy seeds from reputable companies that sell certified or disease-free seeds. Seeds also can be treated with hot water or bleach to make them pathogen free.
- Under optimum temperature, leaf wetness is the determining factor for new infections. Minimize the duration of leaf wetness by avoiding overhead irrigation or only irrigating during the first half of the day to allow foliage to dry before sunset. Drip irrigation also can minimize leaf wetness. Optimum plant spacing can improve air movement and sunlight penetration to expedite drying.
- In a hot and humid environment, protectant biocontrol agents or fungicides from DMI and QoI groups are needed to keep the disease severity low. However, *C. beticola* can develop resistance against both DMI and QoI fungicides, so any product from these groups should not be used more than twice in a row before rotating.

Spotted lanternfly update

Spotted lanternfly is an invasive insect from Asia that can be found in Berkeley and Mineral counties in West Virginia. It also is established in several counties in Pennsylvania, Virginia, Ohio, Connecticut, New Jersey, New York, Delaware and Maryland. Because it can feed on more than 70 different plant species, spotted lanternfly is a serious economic threat to multiple industries, including viticulture, fruit trees, ornamentals and timber. The insects do not bite, sting or transmit disease to humans or pets.

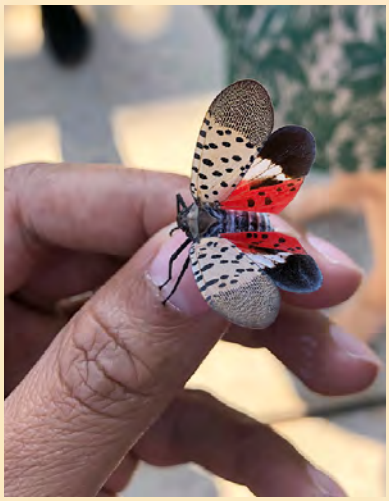

Figure 2. Adult spotted lanternfly have black bodies, four wings and are about 1 inch long. (Photo credit: C. Quesada)

Life cycle

The spotted lanternfly is a sucking insect of the order hemipteran and undergoes an incomplete metamorphosis (egg, nymph and adult stage). The insects overwinter as eggs, with females laying eggs from September to December (or the first frost of the year). Once eggs are laid, females cover them in a white putty-like substance that ages over time to look like cracked mud. Egg masses are laid on hard surfaces, including trees, stones, patio furniture, plant containers, vehicles, etc.

Nymphs hatch from eggs during May and June. The first, second and third nymph instars have black legs and bodies. Their bodies are covered in bright white spots. In contrast, the fourth nymph instar has a black and red body. They are about ½ inch long and can be present from July to September. All nymph instars are strong jumpers, especially when poked or frightened.

Adult spotted lanternfly have black bodies, four wings and are about 1 inch long (Figure 2). Their forewings are gray with black spots at the base and black with gray veins at the tips. The hindwings are red with a black spot near the base, have a white band in the middle and black tips. Wings remain closed while they are feeding and walking.

Plant damage

Both adults and nymphs of spotted lanternfly feed by sucking sap from trees through a sharp, needle-like beak, which is characteristic of all hemipterans (true bugs). This can result in leaf curl, wilt, tree dieback and death of the tree. Tree dieback caused by a high infestation of spotted lanternfly has been observed on black walnut, willow, staghorn sumac and maple trees.

In addition, grapevines, tree of heaven and tree saplings have been killed by the insect. Spotted lanternfly also excretes honeydew (a sugary substance), which produces sooty mold fungus. Sooty mold doesn't directly affect plants but can reduce photosynthesis.

Management

Egg masses of spotted lanternfly can be found in firewood, recreational items, building materials and outdoor household items. Before you travel or move material within or out of the places where spotted lanternfly are present, check for and remove all stages of the insect. Eggs should be smashed or scraped downward using a plastic card, putty knife or stick into a bottle or bag filled with rubbing alcohol.

Trapping can be effective during nymphal stage. Spotted lanternfly nymphs move up and down on the trunk of trees, making them easy to capture by wrapping the tree trunks with specialized bands that have an adhesive outer layer.

These bands or a funnel-style trap can be purchased online or from your local garden center. While some bands may catch adults, banding trees is most effective for nymphs. Be advised that it has been reported that birds and small mammals have gotten stuck to the bands.

Lastly, because tree of heaven is the preferred host, if there is one nearby consider removing it to decrease the spotted lanternfly population. Please report any stage of spotted lanternfly to *bugbusters@wvda.us* or call 681-313-9140.

Eastern cottontail rabbits

Eastern cottontail rabbits (*Sylvilagus floridana*) are a common small game species found throughout West Virginia. Their fur is brown or grayish brown with white bellies. They also have a rusty patch on the nape of their neck. They get their name from their short, fluffy tail that is brown above and cottony white below.

Feeding habits

Eastern cottontails can be active any hour of the day with crepuscular (dawn and dusk) peaks in feeding activity. They are active year-round and feed on a variety of vegetation including grasses, crops, seeds, twigs, fruits and buds. They prefer to eat plants that are in the growing stage and still green, but they will eat dormant, dried vegetation if green vegetation is not available. During warm months, cottontails eat a variety of plant items including grasses, legumes, forbs and soft mast (fruit) including your garden and landscape plants. During the winter months, rabbits browse on buds, twigs and bark of trees and shrubs. Rabbits also eat cultivated crops including grains, soybeans, corn and garden crops.

Nests

Beginning in the spring and continuing through summer, be on the look out for rabbit nests, especially when mowing your yard, working in your garden or landscaping. Rabbits dig or scrape out a small shallow depression in the ground and line it with dead grass, leaves and fur from their bellies and chests (Figure 3). Rabbit nests are generally well hidden in plain sight. They may appear as a small patch of dead grass in your lawn, garden or pasture.

The mother rabbit will feed or rest nearby but will typically only return to the nest to feed her young twice a day, at dawn and dusk. If you do not see an adult rabbit nearby, do not assume that the nest is abandoned. When she returns, she will uncover the top of the nest and lie over it to allow the young to nurse. Young rabbits will stay in the nest for about 16 days. If you find a nest, simply leave it alone, or if you uncover a nest, just replace the material. Rabbits usually will not reject a nest due to human scent or disturbance.

Population decline

Rabbits have mortality rates that can be as high as 80% during any given year thanks to weather, depredation and disease. To overcome this high death rate, rabbits have a high reproductive rate, giving birth to three to six litters per year with an average of four to six young per litter.

Figure 3. Rabbits dig or scrape out a small shallow depression in the ground and line it with dead grass, leaves and fur from their bellies and chests. (Photo credit: S. Owen)

Over the past 30 years, rabbit populations have declined due largely to loss of habitat. West Virginia is about 79% forested, and those forests are getting older with closed canopies that reduce the amount of herbaceous vegetation growing at ground level. Because rabbits require herbaceous foraging areas and brushy cover, the loss of this habitat has caused their populations to decline.

Although cottontails are still relatively common across the state, landowners can implement wildlife management practices that will improve rabbit habitats and increase the populations.

Rabbit control

Rabbits can cause significant damage to gardens. Consider using woven wire, poultry wire or hardware cloth with a mesh opening no larger than 1 inch for rabbits. The fence should extend at least 2 feet above ground. If you add the single-wire electric fence (with peanut butter or repellent) above the lower mesh fence, you will effectively exclude both deer and rabbits. There also are many chemical repellents available for rabbits, but the results of their effectiveness have been mixed.

Wilted, drying leaves do not always indicate a need for more water

When the leaves of a plant or tree begin to wilt and dry out, it is often assumed it is because of underwatering. But, what should you do when adding more water makes the plant or tree worse instead of better? Remember, drooping leaves do not necessarily mean that your plant or tree needs water.

The symptoms for insufficient watering and excessive watering are the same. If a regularly watered tree is displaying wilted leaves, the probable cause is overwatering, which is causing the roots to suffocate and rot (Figure 4). To correct the issue, it is suggested to get some cactus mix growth medium and repot the tree – preferably, using a new pot.

Figure 4. Symptoms of water distress in an olive tree. (Photo credit: Tina Hanigan, Extension Master Gardener Trainee, Jefferson County)

If the same pot is used, it should be thoroughly washed with soapy water and disinfected with bleach (10% solution). Add about 2 inches of gravel at the bottom of the pot for improved drainage, then backfill with the cactus potting mix.

Repotting the tree will give you an opportunity to check the root system. Healthy roots are light-colored, and the dark brown (almost black) roots should be cut out.

After planting the tree, add a 3% solution (one part peroxide to three parts water) of household hydrogen peroxide to the soil to kill pathogens and diseases, like *Phytophthora*. Allow the mixture to penetrate the soil before regular watering resumes. Do not overwater. Before watering, put your finger down into the pot and check to see if the soil is damp. If it is, wait several days to check again and if it appears to be dry at that time, water it thoroughly.

Olive trees are native to the Mediterranean region and are accustomed to dry and rather warm weather, which makes them well-suited for indoor conditions of most houses where it is generally dry. Olive trees can tolerate drought much better than they can handle excessive water.

While olive trees can stay indoors year-round, they do appreciate being outside during the summer months. Remember, the tree would need to go through acclimatization before staying outdoors.

Start by taking it outside for a couple hours a day for a couple of days, then increase it to three or four hours for another two to three days. After a week of acclimatization, the tree will be ready to stay outdoors. Of course, in the fall before bringing the tree back indoors, the same acclimatization process needs to be followed.

About IPM Chronicle

Rakesh S. Chandran,
IPM Chronicle Manager
304-293-2603

WVU Extension Service Contributing Authors:

Rakesh S. Chandran,
Weed Scientist and
IPM Program Coordinator

Mira Danilovich,
Consumer Horticulturist

Sheldon Owen,
Wildlife Specialist

Carlos Quesada,
Entomologist

MM (Mahfuz) Rahman,
Plant Pathologist

WVU-ES Creative Team:

Greg Jacobs, *Graphic Designer*
Lindsay Wiles, *Editor*

This work is supported by the Crop Protection and Pest Management Program [grant no. 2017-70006-27157/project accession no. 1014109] from the USDA National Institute of Food and Agriculture (NIFA).

 ANR21-31