WV EXTENSION

Volume 10 • Issue 1
Winter 2022

IPM Chronicle

extension.wvu.edu

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Asian giant hornets, European hornets and cicada killers

Asian giant hornet *(Vespa mandarinia)* was detected for the first time in Washington state and British Columbia, Canada, in 2019. Native to Asia, this wasp belongs to the order Hymenoptera, but media has inaccurately named it the "murder hornet."

Even though Asian giant hornets are not yet present in West Virginia, WVU Extension county offices have received several calls and emails from West Virginia citizens reporting it. European hornets *(Vespa crabro)* and cicada killers *(Sphecius speciosus)*, on the other hand, are both found in West Virginia and are often confused with Asian giant hornets because of their similar size and color (Figure 1). To facilitate the identification of these wasps, this article describes their patterns on their abdomens. However, there are several other tools and clues used for the identification of the wasps.

Asian giant hornet

The Asian giant hornet is the world's largest hornet. The insects live in colonies that are built yearly in abandoned underground borrows, in dead hollow tree trunks or within the roots of trees. Because of their social behavior, they will only attack humans to defend themselves, their nest or their food source. They are predators of large caterpillars, beetles and spiders; however, they may attack honeybee hives later in the season when the hornet nest is large and reproductive. The Asian giant hornet can be identified by alternating straight dark and light bands on its abdomen.

European hornet

European hornet also is an invasive species first reported in New York in 1840. Similar to Asian giant hornets,

Figure 1. The three giant hornets can be distinguished by the patterns on their abdomens. From left to right are the Asian giant hornet, the European hornet and the cicada killer. (Photo credit: Carlos Quesada)

European hornets live in colonies and will attack humans to defends their nests. The European hornet diet mainly consists of large insects such grasshoppers, flies, bees and yellow jackets. They also can be considered problematic insects when they feed on fruits like apples. The European hornet is similar in color to the Asian giant hornet, however, they have dark triangular shapes on the abdomen segments closest to the thorax, followed by rows of dark teardrop shapes near the end.

Cicada killers

Eastern cicada killers are solitary wasps (live individually) native to the United States, and they build their nests in the ground. While their size can be alarming, they are not aggressive and do not engage in nest-guarding. They are beneficial wasps that help reduce cicada populations. They will only sting to defend themselves. Unlike the other two insects, the yellow color on the cicada killer's abdomen does not connect to form clear yellow bands across the back.

Phytophthora root and crown rot management

Phytophthora spp., also known as water mold, causes root and crown rot on numerous trees and shrubs. This pathogen can survive in the soil for a long time and thrives in saturated or high moisture soil. Movement of infective propagules takes place with splashing rain, irrigation water and runoff water from an infected plant to a healthy plant, which causes new infections. Many perennial trees and ornamental shrubs are susceptible to the disease, especially when the soil around the plant's root system remains too wet for too long due to heavy soil or lack of proper drainage.

Root infection and symptoms

Initial infection takes place on the root surface and can kill many of the feeder roots. These roots may turn brown to black and decay due to other microorganisms feeding on the roots after being killed by Phytophthora. Fungal growth may move upward to the crown area, destroying the cambium layer of the plant. Because feeder roots are not able to uptake water from the soil, the leaves will appear drought-stressed even in the presence of plenty of soil moisture. Leaves may turn dull green, yellow or in some cases red or purple.

Symptoms may first develop on one branch or stem if the roots on one side are infected, and then the symptoms will spread to the rest of the tree or plant. Trees may decline within a season or over a period of years depending on the resistance of the plant variety, soil moisture and temperature. However, with the progression of root decay and degradation of the cambium layer, the entire plant may die quickly in the event of warm weather in late spring or early summer (Figure 2).

Figure 2. A rhododendron shrub with typical Phytophthora root and crown rot symptoms surrounded by healthy trees. (Photo credit: MM Rahman)

Disease diagnosis

Figure 3. Cherry tree crown cambium discoloration due to Phytophthora infection. (Photo credit: MM Rahman)

Dull red to reddish brown discoloration or cambium streaking in the crown area or canker is usually considered a diagnostic symptom. A pocketknife can be used to scrape the bark and expose the cambium layer near the soil line for inspection. The transition between the discolored area and the healthy area may be sharp, with a distinctive margin (Figure 3).

As many other biotic and abiotic problems can cause similar symptoms such as leaf discoloration, wilting and death of the plant, it is important to get the correct diagnosis before initiating a management option. A quick serological test can be done by taking suspected root tissues and testing them for the presence of Phytophthora (Figure 4). Suspected tissue samples can be sent to a diagnostic lab for confirmation.

Figure 4. Rapid serological test kit for Phytophthora detection in infected tissue from Agdia. (Photo credit: MM Rahman)

Management

In clay or heavy soil, it is extremely important to improve water drainage. Without proper drainage, all control measures may fail. Planting can be done in raised beds or on mounds of soil. Make sure trees are not planted any deeper than they were planted at the nursery. Watering should only be done when necessary and based on the water needs of the plant species. If Phytophthora is diagnosed in only a few plants in the low-lying areas, other plants in the surrounding areas can be treated with Aliette, Agri-Fos or Ridomil/Subdue MAXX.

Pruning for better health of your landscape and garden

During the winter months, many of us go through gardening catalogs, looking at those beautiful landscapes and imagining that our gardens could look the same. We mark the pages that have just the right plants to add to our landscapes; however, before we get to planting in the spring, there are some preparation steps we can be doing during the winter.

Why prune?

Winter months are when we can be doing some cleanup and sanitation to help improve the overall health and appearance of our landscapes and gardens. Sanitation through cultural practices, such as pruning, can prevent many future horticulture issues. With the leaves gone from the trees and shrubs, all dead, damaged and diseased branches and major limbs are easy to spot.

Figure 5. Watersprouts are shoots that grow straight up assuming the shape of a new tree. (Photo credit: M. Danilovich)

Those three Ds (dead, damaged, diseased) are major sources of inoculum for many diseases – as well as hiding and harboring places for several insects. These limbs should be removed first. After that, remove branches that are crossing over, rubbing or are growing as watersprouts often assuming the shape of an entirely new tree within the canopy (Figure 5).

By removing those out-of-place limbs, you are thinning out the interior of the crown and improving the micro-environment for better health, appearance and overall performance of the trees and shrubs. There is more space for the air to move freely, and it allows for faster drying conditions thus minimizing the potential for disease development.

How to prune

When trees and shrubs are in full dormancy, or in their "sleeping mode," is the ideal time to make major pruning cuts. Removing large diameter limbs from the trees can be done without ill-effect during this time period.

It is very important to know how to make a proper cut when pruning. Sometimes, more harm can be done by making incorrect cuts. For instance, leaving longer stubs behind will lead to decay and canker development streaking down the limb killing it. Another example of an incorrect cut would be making a flush cut and removing the collar, which prevents the wound from properly healing. In addition, removing a large diameter limb without observing the 1-2-3 cut method can result in having the weight of the falling limb pulling on the bark – ripping it all the way to the ground (Figure 6).

Figure 6. The result of an incorrect pruning cut. (Photo credit: David Davis, WVU Plant and Soil Science)

With the 1-2-3 cut method, the first cut should be the undercut that is about one-third of the way through the diameter of the limb. This will serve as a break as the limb starts to fall after the second cut is made just above the undercut with a purpose of removing the large section of the limb. The third cut is a finishing cut made just above the limb collar (Figure 7).

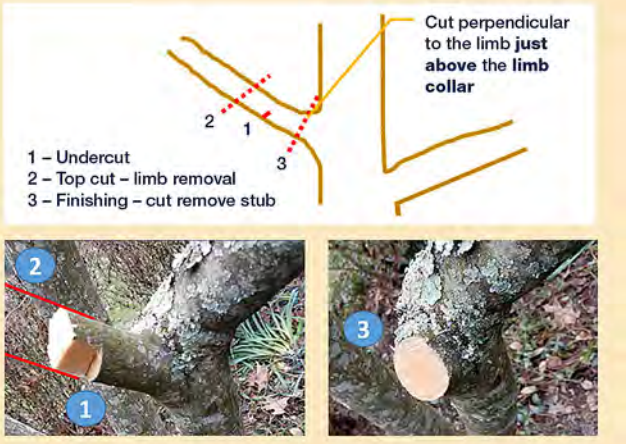

Figure 7. Proper pruning cuts according to the 1-2-3 method. (Photo credit: M. Danilovich)

Cover crops in orchard floor management

In conventional orchards, an herbicide strip is used to manage weeds in the tree rows, while the row middles are under a permanent sod. Recently, the use of cover crops has generated a renewed interest in various cropping systems. Cover crops have the ability to sequester carbon dioxide and convert it to soil organic matter eventually enriching the soil. They also can reduce soil erosion, provide habitat for beneficial organisms and moderate the microclimate in the orchard; however, they may compete for water and nutrients intended for trees. Hence, choosing the desirable plant species and employing proper cultural practices must be taken into consideration when using cover crops in orchards.

The two primary methods of cover cropping in orchard floors are the sandwich system and the use of living mulches.

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Sandwich system

The sandwich system of cover cropping was developed in Switzerland. In such a system, a 10-foot alleyway is maintained between tree rows using a leguminous cover crop, such as birdsfoot trefoil.

On each side immediate to the tree row, a 2-foot annual or perennial living mulch strip is maintained followed by a 1-foot tilled strip to minimize competition and for fertilizer application.

The clippings from the alleyway are mowed and blown into the tree rows for soil enrichment. Year-round use of the sandwich system can result in a higher fruit yield, better fruit quality, better soil quality and improved weed control when compared to using the sandwich system only during the growing season.

Living mulches

Different plant materials have been evaluated for their usefulness as a living mulch in orchards.

Asian ponysfoot *(Dichondra michrantha)*, a prostrate herbaceous perennial native to New Zealand and Australia, resulted in no reductions of fruit yield compared to trees grown conventionally.

Nimblewill *(Muhlenbergia schreberi)*, a shallow-rooted stoloniferous perennial grass typically considered to be a weed in several cropping systems, was compared to herbicide strip and other grasses for its effect on peach trunk growth over a period of five years.

It was determined that peach trees grown on nimblewill vegetative cover and herbicide strip exhibited maximum trunk diameter after five years when compared to that of peach trees grown on centipede grass *(Eremochloa ophiuroides)*, bahiagrass *(Paspalum notatum)*, brome (Bromus mollis) or weedy (control) plots.

Similarly, ground ivy *(Glechoma hederacea)*, which is native to Europe and Asia but was introduced to North America where it is considered a weed, was tested for its potential as a ground cover in apples.

It was compared with a grass mixture and white clover as ground covers, along with herbicide strip and mechanical methods to manage tree rows over a period of five years. Ground ivy caused only a 3.5% cumulative yield reduction per tree during that period.

In a research trial, it was determined that a leguminous living mulch improved soil quality and contributed to the nitrogen pool, but it elevated vole populations.

About IPM Chronicle

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

WVU Extension Contributing Authors:

Rakesh S. Chandran, *Weed Scientist* and *IPM Program Coordinator*

Mira Danilovich, *Consumer Horticulturist*

Carlos Quesada, *Entomologist*

MM (Mahfuz) Rahman, *Plant Pathologist*

WVU Extension Creative Team:

Greg Jacobs, *Graphic Designer*

Lindsay Wiles, *Editor*