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CORN

Consider Where the Susceptible Hybrids go in 2009

By Paul Vincelli

Two back-to-back years of generally droughty conditions in much of Kentucky (2007 and 2008) probably had the effect of "knocking back" several foliar diseases of corn. The reason is this: the fungi that cause gray leaf spot and northern leaf blight both survive in infested corn leaf residue. Drought conditions during mid- to late-season suppress these diseases. Less disease during one growing season means that there will be less of a spore load in that field next season. Thus, for these diseases, spore loads going into the 2009 growing season were probably low.

The 2009 growing season was certainly wet, which fungi love. Weather conditions in Kentucky were generally too cool to favor aggressive gray leaf spot, but there was some gray leaf spot activity in some fields. The cool, wet weather last season was highly favorable for northern leaf blight, and this disease was highly destructive in some fields of susceptible corn. In any case, the wet weather last season probably has resulted in some buildup of both of these fungi in corn residue.

What This Means for Producers

Pay some attention this year to a hybrid's level of resistance to gray leaf spot and northern leaf blight in disease-prone fields. Some of the factors that increase disease risk include:

- Conservation tillage
- Continuous corn
- Late planting
- History of disease
- Foggy sites (river-bottom fields, etc.)

On The Other Hand…

This article is not meant to be a "call to arms" against corn diseases. The "cynic" in me can see this article being used to promote widespread fungicide use in corn. Yes, fungicides do have a place when disease risk is significant. On the other hand, based on field tours and diagnostic samples from last year, in most fields, spore loads for both diseases are probably only modestly higher than last year. So I don't think "heavy chemical artillery" is needed just yet. Just pay some attention to the

kinds of hybrids you put in the most disease-prone fields. This costs the producer nothing extra and it causes no environmental harm.

FRUIT CROPS

Apples Vary in Resistance to Powdery Mildew

By John Hartman

In Kentucky apple orchards, particularly following mild winters (where temperatures do not drop below +10F), powdery mildew can appear. Powdery mildew is caused by the fungus *Podosphaera leucotricha*. This time of year, the fungus is overwintering as mycelium in dormant buds. In early spring, spores produced on the overwintering mycelium infect nearby young leaves, blossoms, and fruit. These primary infections provide more spores for secondary infection of young leaves, shoots, and fruit. Powdery mildew thrives during dry spring and summer weather, so there may have been less infection during the rainy 2009 season and there may be less overwintering inoculum in spring 2010.

Figure 1. White circular spots on leaf surfaces are the spores and mycelium of the powdery mildew fungus.

On apple leaves, powdery mildew appears as whitish patches of fungal mycelium and spores which may spread to the entire leaf (Figure 1). Powdery mildew developing on leaves that are still expanding may cause the leaves to be deformed (Figure 2). Infected

Figure 2. Powdery mildew-infected leaves in this cluster are rolled and distorted.

Figure 3. Severe shoot distortion and leaf death resulting from powdery mildew. Powdery mildew infections occur at moderate temperatures under humid, but not wet, conditions.

shoots are often stunted with curled and deformed emerging foliage covered with a silver-gray mat of mycelium (Figure 3). Later in summer, the grayish-white fungal growth turns brown. When apple fruits are infected their growth is stunted and the fruit surface is russeted (brown corky cells) in a net-like pattern (Figure 4). Chronic foliar and fruit infection can result in reduced vigor and yield.

Figure 4. Net-like pattern of russet symptom on fruit due to powdery mildew (J. Strang photo).

A recent article in the journal *Plant Health Progress* (Biggs, et al, November 2009, "Relative Susceptibility of Selected Apple Cultivars to Powdery Mildew Caused by *Podosphaera leucotricha*") provides data on the reaction of dozens of apple cultivars to powdery mildew disease. As part of a northeast regional research project going on for over a decade, apples were evaluated simultaneously over the years in New York, West Virginia, and Virginia. University of Kentucky Extension personnel can access the details of this and other plant related research on-line from the Plant Management Network through U.K.'s subscription sponsored by the U.K. Plant Pathology Department.

Results of the powdery mildew evaluations found in this report can be summarized as follows:

- In general, the cultivars Crimson Crisp, Delblush, Ginger Gold, GoldRush, and

Suncrisp, and the selection CQR10T17 were the most susceptible. In these trials, incidence of powdery mildew reached 40-50% on the most susceptible cultivars.

- The cultivars Enterprise, Gala Supreme, Hampshire, Pristine, September Wonder, and Zestar, and the selections NY 75414-1 and NY 79507-72 had the lowest incidences of mildew.
- In one trial, high levels of fruit symptoms were found on Crimson Crisp and Pinova and the selection NY 65707-19.
- Fruit symptoms were not significantly related to disease incidence or severity on the foliage.
- It is noteworthy that the scab-resistant cultivars Pristine and Enterprise and the selections NY 65707-19, and NY 75414-1 are among the most resistant to powdery mildew. The latter three are also among the most resistant to cedar apple rust based on previous results from these plantings.
- By contrast, the scab-resistant cultivars Crimson Crisp, GoldRush, Princess, Scarlet O'Hara, and Sundance, and selection CQR10T17 are highly susceptible to powdery mildew and would require early season fungicide applications for mildew and rust management in high inoculum areas in spite of their resistance to scab.
- Other apples in the trial, with intermediate levels of powdery mildew susceptibility included Ambrosia, Arlet, BC 8S-26-50, Braeburn, Cameo, Chinook (BC 8S-27-51), Creston, Cripps Pink, Fortune, Fuji Red Sport #2, Golden Delicious, Golden Supreme, Hampshire, Honeycrisp, NJ 90, NJ 109, NY 65707-19, NY 79507-49, Orin, Pioneer Mac, Princess (CQR12T50), Runkel, Rogers McIntosh, Sansa, Scarlet O'Hara (Co-op 25), Senshu, Shizuka, Sundance (Co-op 29), Sunrise, Yataka.

Many of the cultivars that are grown in Kentucky are known to be moderately or highly susceptible to powdery mildew. These include Ginger Gold, Golden Delicious, Granny Smith, Idared, Jonagold, Jonathan, Paulared, Rome Beauty, Stayman Winesap, and Winesap. In seasons where powdery mildew is a threat, Kentucky growers attempting to grow apples as certified organic will want to select scab-resistant cultivars that are also resistant to cedar rusts and powdery mildew. Cultivars with resistance to mildew could result in increased profitability for producers from increased yields and decreased management costs.

SHADE TREES & ORNAMENTALS

Poison Hemlock: A Growing Concern in Kentucky

By J.D. Green

Poison hemlock (*Conium maculatum*) has been increasing in Kentucky during the past several years. Although this plant was often seen along roadways, abandoned lots, fencerows, and other non-cropland sites, in more recent years, it has expanded out into grazed pasture lands and hay fields. The concern not only stems from its invasive nature, but the fact that it is one of the most toxic plants in the world. Throughout history, the toxicity of poison hemlock is well known for accidental deaths of humans and other animals. The death of Socrates in 329 B.C. is perhaps the most well known case involving the death of a human.

Figure 5. Mature poison hemlock plants growing in hayfield.

Poison hemlock is known to be a native of Europe and was introduced into the United States as an ornamental in the 1800's. Since that time this aggressive plant has been extremely successful in distributing itself throughout most of North America. It is now widespread throughout most counties in Kentucky. Although poison hemlock is often associated with areas that have moist soil conditions, it can also survive in dry sites.

Description– Poison hemlock is classified as a biennial that reproduces only by seed. It is capable, however, of completing its lifecycle as a winter annual in Kentucky if it germinates early during the fall months. Flowers and new seed are typically produced in late May and June. Although plants emerge as a cluster of leaves that form a large rosette, poison hemlock is most noticeable at this stage of growth in early spring with its parsley-like leaves which are highly dissected or fern-like (Figure 6). The individual leaves are shiny green and triangular in appearance. As the plant begins to send up flower stalks, the leaves are alternately arranged on the main stem. Each individual leaf is pinnately compound with several pairs of leaflets that appear along opposite sides of the main petiole. As the plant matures, poison hemlock can grow upwards to about 6 to 8 feet tall. At maturity the plant is erect, often with multi-branched stems, and forming a deep taproot. Poison hemlock has hollow stems which are smooth with purple spots randomly seen along the lower stem that help distinguish it from other plants similar in appearance. The flowers, when mature, are white and form a series of compound umbels (an umbrella-shaped cluster of small flowers) at the end of each terminal stalk.

Figure 6. Rosette growth stage of poison hemlock.

Toxicity-All classes of livestock are known to be affected by poison hemlock. Cattle, horses, and goats are considered to be the most susceptible domestic animals although other animals can be affected as well. Symptoms of poisoning can occur rapidly anywhere within 30 minutes to 2 hours depending on the animal, quantity consumed, and other factors. Initial symptoms can include nervousness, trembling, muscular weakness and loss of coordination, dilation of pupils, coma, and eventually death from respiratory paralysis. Lethal doses for cattle are considered to be in the range of 0.2 to 0.5% of the animal's body weight. Poison hemlock is also known to cause fetal deformation when pregnant animals consume the plant.

Fortunately most animals tend to avoid grazing poison hemlock if other forage is readily available. However, animals may be more prone to consume green plants during the late winter and early spring when other forage species are more limited. All parts of the plant, including the seeds, are considered to contain the toxic principles (coniine and coniceine). Toxicity may be somewhat reduced in dried plants, but the potential for toxicity still exists, particularly when a sufficient quantity is consumed in dried hay. Therefore, extreme caution should be considered before feeding animals hay known to contain poison hemlock.

Control-The principle control strategy for poison hemlock is to prevent seed production which can be a challenge since a fully mature plant is capable of producing 35,000 – 40,000 new seeds. It is too late to utilize herbicide control methods after plants have produced flowers. Therefore, mechanical control efforts (if feasible) such as mowing or cutting down individual plants should be initiated just before peak flower production to avoid or reduce the amount of new seed being produced. Make note of areas heavily infested with poison hemlock this spring and begin to look for emergence of new plants in the fall. During the late fall (November) or early spring (March) is the best time of year for herbicide treatment. In grass pastures and hayfields herbicide products containing 2,4-D can be effective when applied to young, actively growing plants that are in the rosette stage of growth. Spot treatments with products containing 2,4-D, triclopyr, or glyphosate can also be used depending on the location.

Figure 7. Emerald Ash Borer adult emerging.

Emerald Ash Borer Products and Treatment Window for Homeowners
By Lee Townsend

There are several products that homeowners can use for do-it-yourself protection of landscape ash trees. While most of the treatment options involve one insecticide

active ingredient – imidacloprid – there are several brand names and treatment approaches available. Also, there is an important timing factor. First, the product choices.

Imidacloprid is available in several different product lines and formulations. Amounts of product applied vary with the product formulation and concentration but the amount of active ingredient applied per inch of tree diameter / circumference is essentially the same.

Here are some examples of formulations / applications that are available. It is important to read the product labels carefully and to be aware of some of the differences.

A **flowable formulation** contains the active ingredient in the form of finely ground insoluble particles suspended in a liquid. It is easy to measure and pour specific amounts based on tree circumference. However, the suspended particles will settle to the bottom of a bucket or container so the diluted liquid must be stirred or agitated regularly.

When buying a product, look for the percentage of active ingredient on the label. Most imidacloprid liquid formulations are 1.47% but at least one is 2.94%. Protect & Feed formulations include fertilizer to promote general tree health. No studies show that the presence of a fertilizer increases insecticide uptake or improves performance.

Label directions will result in the same amount of active ingredient being applied per inch of circumference of tree at 4.5 feet above ground. This is the standard height for determining tree circumference or diameter for treatment. Rates for home owner-applied products are expressed in fluid ounces per inch of circumference. Product rates and treatment cost estimates for many products applied by commercial applicators and arborists are given in units per inch of DBH (diameter at breast height). Dividing tree circumference in inches by 3.14 will convert it to inches of DBH (30-inch circumference tree has a 9.5" DBH).

Bayer 12 Month Tree & Shrub Insect Control Concentrate (1.47% imidacloprid)
Bonide Annual Tree & Shrub Insect Control (1.47% imidacloprid)
Bayer 12 Month Tree & Shrub Protect & Feed (1.47% imidacloprid) with 2-1-1 fertilizer
Bayer 12 Month Tree & Shrub Insect Control II
Landscape Formula Concentrate (2.94% imidacloprid)
Apply 1 fl oz (OR ½ fl oz – higher concentrate) for each 1 inch of circumference around the ash tree in 1 gallon of water (2 gal for trees with a circumference > 50 inches) around the base of the tree. Follow with one gallon or water.

Pesticides sold with a **hose-end spray applicator** draw a concentrated formulation from a reservoir container into water stream going thru the hose. The amount of imidacloprid in the diluted spray varies with the flow rate of the water (gentle to strong) going through the hose and the amount of time that the spray is directed to the target.
Ortho MAX Tree & Shrub Insect Control (1.47% imidacloprid)
Apply as a hose end spray at the rate of 1 fl oz per inch of circumference. According to the label, a "gentle shower" applies approximately 1 ounce of product every 5 seconds. There is a greater chance of over- or under-application of the insecticide with this approach.

Granular formulation
Bayer Advanced Tree & Shrub Protect & Feed Granules (1.1% imidacloprid) with 2-1-1 fertilizer
Use approximately ¼ cup of granules (about 1.5 oz) for every inch of trunk circumference. For trees with a trunk circumference of < 30 inches, apply the product evenly in a circle 2 feet from the tree trunk. Trees with a circumference of > 30 inches apply the product evenly in a circle 3 to 4 feet from the trunk. This is a slow release product; uptake of this insecticide formulation is likely to be slower that with the liquid formulations because the active ingredient has to be released from the granules before it can be taken up by the roots. Follow the application immediately with enough water to cause the soil to be wet to a depth of 3 to 4 inches. The label lists flatheaded borers but does not specifically include the emerald ash borer.
Correct dose and application timing are critical to successful borer control. The dose rate is determined by careful measurement of tree trunks at 4.5 feet above ground. This just requires a tape

measure and a little time. However, the product must be applied at the right time in order to be in place in the tree when borer larvae begin to feed. Uptake should be good as long as the soil around the base of the tree is neither frozen nor waterlogged. Application should be delayed if either of these is the case. If the soil is excessively dry, then the area around the base of the tree should be irrigated.

Most homeowner treatments are applied as drenches poured around the base of the tree. It takes about 6 weeks for the insecticide to be taken up and distributed within the tree. EAB adults emerge from infested trees at an accumulation of 450 to 500 degree days. Historical weather data tells us that will be around April 21 – 25. That puts a good treatment window during the 2nd or 3rd week of March. The main consideration is that applications made in early to mid-April are late and may not be very effective.

Eastern Tent Caterpillar Outlook – 2010
By Lee Townsend

Figure 8. Eastern tent caterpillar egg mass.

Based on observations, eastern tent caterpillar (ETC) populations have been increasing over the past few years. A gradual build-up to a large population, followed by a sudden collapse due to natural enemies of diseases is a normal pattern for this and many other insect species. The ETC's involvement in MRLS accentuates the need to keep up with caterpillar fluctuations. This fact sheet http://www.ca.uky.edu/entomology/entfacts/ef449.asp describes how to check on ETC egg masses.

Eggs of the eastern tent caterpillar (ETC) that were laid on twigs of wild cherry and related trees last summer will begin to hatch soon. Historically, this occurs around the third week of March in central Kentucky but will vary depending on spring weather. Assessments and management decisions can be made in a few weeks as the silvery baseball-sized tents start to show up on branches.

The ETC is an early spring insect so the caterpillars can cope with the erratic weather patterns that can occur in March and April. Development, including egg hatch, occurs when the temperature is above 37° F. At 50° F it takes about a month for all eggs to hatch. Warmer conditions will promote hatch over a shorter period of time and give a more synchronized population. A degree day-based predictive model will be used to provide updates on ETC development this spring.

LAWN & TURF

What's making my yard "lumpy"?
By Lee Townsend

Night crawlers are one of the first creatures to become active as signs of spring begin to appear. Their presence is often heralded by small conical mounds of soil around approximately ½" diameter holes. Frequently, the soil surface is bare between grass clumps because the worms have removed the accumulated thatch.

In addition to reducing thatch, night crawlers aerate the soil, deposit their castings, and provide channels for water penetration. However, they can make the ground rough and uneven and large numbers may accumulate in sidewalks and driveways following saturating rains. The value of night crawlers generally outweighs the temporary nuisance they may seem to cause. They will move deeper as soils warm and dry in the summer.

Figure 9. Night crawler activity in lawn and close-up (T. Campbell Photo).

DIAGNOSTIC LAB HIGHLIGHTS

By Julie Beale and Paul Bachi

Samples this winter in the PDDL have included a number of greenhouse ornamentals and vegetable transplants. We have seen impatiens necrotic spot virus on snapdragon and gloxinia; tobacco mosaic virus on calibrachoa; Botrytis blight on petunia; bacterial spot on ivy; Pythium blackleg, high soluble salts and oedema on geranium; Colletotrichum needle blight on araucaria (Norfolk Island pine); cold injury on fig; and magnesium deficiency, high soluble salts, growth regulator injury and cold injury on tomato.

A few agronomic and landscape samples have also been seen, including curing problems in tobacco and Stenocarpella ear rot on corn; and brown spot (*Mycosphaerella*) on pine; wet feet on boxwood; and winter injury on holly.

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