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CORN

Diplodia Ear Rot and Hybrid Trails
By Paul Vincelli

In the previous issue of *Kentucky Pest News*, I wrote a short article on Diplodia ear rot (http://www.uky.edu/Ag/kpn/kpn_09/pn_090811.html#TobSee). One follow-up relates to corn hybrid strip trials. Commonly, hybrids are placed side by side in strips in commercial fields as demonstration trials. If you happen to observe severe Diplodia ear rot in one of those trials, you might see substantial differences among hybrids.

It is worth comparing the level of ear rot in strip trials, because some information is always better than none, but it is also easy to be misled by results in a trial like that. What do I mean by that? Let's say that Hybrid A has 50% of the ears with rot, and Hybrid B has 10%. All of us would want to plant Hybrid B in any fields where Diplodia infestation had been found. Except here is the wrinkle: these hybrids might actually be equally susceptible.

How is that possible, given the dramatic difference in ear rot? Because in the case of Diplodia, the timing of spore-splash and infection relative to silking is really, really important. Crops that are just began are more susceptible than crops at brown-silk. And Hybrid A might have had the bad luck of being exposed to spores and infection at precisely the peak of its susceptibility, Maybe Hybrid B would even be more susceptible than Hybrid A if they happened to be exposed to identical disease pressure on their respective day of silk emergence.

I wouldn't ignore Diplodia ear rot observations from commercial field trials: such information is better than no information. On the other hand, don't put much weight in a low Diplodia rating for a particular hybrid, unless the seed company confirms that the hybrid is known to have some resistance verified by their breeder. Of course, a hybrid that got hit hard by Diplodia in a strip trial probably is pretty susceptible, so one should think twice about using that hybrid in a field known to be infested with Diplodia.

Reasons to Scout Late-Planted Corn in 2009
By Paul Vincelli

Many corn crops planted before mid-May have experienced low pressure disease pressure. As a general rule, Kentucky corn crops planted early or on-time have a lower risk of foliar diseases than late-planted crops. Furthermore, cool temperatures and many days with low dew points helped keep gray leaf spot—our principal foliar disease—at bay in many fields. I suspect that fungicides will be of little value in most of these fields. However, many fields were planted late, because of the wet conditions this spring. Fields that are still silking or have just completed silking are more likely to benefit from fungicide applications than earlier crops.

Figure 1. Young lesions of gray leaf spot (Leaf is backlit by skylight, which highlights the yellow halo around lesions).

Figure 2. Mature lesions of gray leaf spot.

Why Are Disease Risks Higher in Late-Planted Fields?

Along with the generally higher disease risk of late-planted fields, weather has shifted during the past 3-4 weeks to become more favorable for disease, particularly gray leaf spot (Figures 1-2). Recent conditions have been generally warm and humid, with periodic thunderstorms in many areas, all of which favor gray leaf spot.

In addition, southern rust, caused by *Puccinia polysora*, has been found in the Madisonville area, and it is reported to be widespread at low levels in the Purchase Area of Western Kentucky. Southern rust is distinct from common rust (Figures 3-4). Common rust rarely causes significant yield loss, because breeding efforts have generally resulted in acceptable levels of resistance to that disease. In contrast, corn hybrids grown in Kentucky are commonly susceptible to Southern rust, which causes desiccation of foliage before crop maturity. This can not only affect grain yields but also stalk strength, by forcing the plant to draw on stalk reserves during grain fill. Premature desiccation can also affect silage crops planted very late. Normally if it comes in at all, southern rust blows in from the southern U.S. too late to generally affect Kentucky corn, but this is the earliest and most widespread I've seen southern rust in the 19 years I've worked at UK. Humid weather with temperatures in the high 70's and low to mid-80's°F will favor continued disease development.

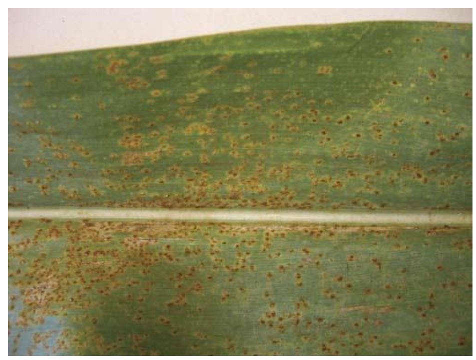

Figure 3. Southern rust pustules. These are typically oval, densely crowded on the upper leaf surface, and lighter colored than common rust. Source: Iowa State University Extension, http://www.ipm.iastate.edu/ipm/icm/2007/9-10/southernrust.htm.

Figure 4. Common rust pustules. These are usually a cinnamon-brown color, widely scattered over both the upper and lower leaf surface, and oval to elongated. Source: Iowa State University Extension, (see link Figure 3).

Weighing Disease Risk
I think there is good reason to scout corn crops as soon as possible. I'm not making a blanket recommendation to spray fungicide on all late-planted crops. However, these crops are the ones where it makes sense to consider whether or not to treat, depending on disease risk and stage of crop development.

If considering applying a fungicide, make the decision promptly. The later the fungicide is applied, the less overall benefit there is.

If considering a fungicide, base the decision to spray on overall disease risk, as follows.

- First, at what stage of development is the crop? The best resource for determining this is the Iowa State University publication, *How a Corn Plant Develops*, at http://www.extension.iastate.edu/hancock/info/corn.htm. In general, I would not consider applying fungicide to a crop that was in the late-blister stage or beyond if gray leaf spot were the only threat. I might stretch past that into the milk stage if southern rust were becoming active above the ear leaf, but I wouldn't treat a crop entering the dough stage.
- How much disease is present? And how high up the plant is it? The higher up the disease is, and the younger the crop, the greater the disease risk. Is any southern rust present?
- How susceptible is the hybrid to gray leaf spot? Hybrid susceptibility is probably the most important factor in driving gray leaf spot, so consider whether the hybrid is susceptible or partially resistant. The higher the level of partial resistance, the less benefit you'll get from a fungicide. Corn hybrids are generally all considered susceptible to southern rust.
- Other risk factors for gray leaf spot include no-till, continuous corn, and planting along foggy river bottoms.

The presence of disease lesions on the ear leaf means increased risk (depending on crop stage). Table 1 and Figure 3 provide an idea of the relationship between disease severity and yield.

Table 1 also illustrates the point that a corn crop can tolerate a little gray leaf spot during late grain fill. At current prices, a fungicide would probably have to provide at least an 8 bu/A yield increase to break even. And, of course, the possibility of improved stalk health may also be enough to justify a fungicide application in some producers' minds, but also factor in the potential for increased drying costs with a strobilurin application.

Table 1. Approximate relationship between disease severity at early dent and yield loss. Based on Extension materials originally published by Pat Lipps, The Ohio State University.

Percentage of ear leaf affected by the early dent stage	**Approximate yield loss expected***
5% or less (*see figure*)	0-2% loss
6-25%	2-10% loss
25-75%	5-20% loss
75% to dead leaf	15-50% loss

*A range in yield loss occurs partly because hybrids differ in susceptibility.

Figure 5. Example of corn leaf with 5% damage from gray leaf spot. Image generated using CORN PRO software, developed by Forrest Nutter, Iowa State University.

Which Fungicides to Use?
In crops where gray leaf spot is the only threat, my assessment of the research indicates that the strobilurin fungicides (Headline® and Quadris®) provide the most efficacious and longest-lasting control. Pre-mix products containing strobilurins (Quilt® and Stratego®) are also good choices. Depending on price, the DMI fungicides (also called "triazole" fungicides) (Tilt®, Bumper®, Folicur®, and PropiMax®) might be attractive options, but in university research trials, overall disease-control performance is sometimes better

with the strobilurins. Plus, be careful of pre-harvest interval restrictions with the DMI fungicides.

In crops where southern rust is of concern, DMI fungicides (Tilt®, Bumper®, Folicur®, and PropiMax®) make sense to me, for the following reason: all fungicides are best used as a preventive. This is especially true of strobilurin fungicides (Headline® and Quadris®). Strobilurin fungicides cause death and destruction to germinating spores, but often are weak at suppressing growth once the fungus has germinated. Think of this like pre-emergence vs. post-emergence herbicides. Strobilurins are like pre-emergence herbicides—they only attack the germinating spore (=seed). But they are weak at arresting growth once infection has begun (like a growing plant). So they won't do much to stop infections that have already started. The DMI fungicides and pre-mix products containing DMI fungicides (Quilt® and Stratego®) might make more sense if one wants to try to arrest an active outbreak of southern rust.   However, the DMI fungicides have pre-harvest restrictions on how long after treatment you must wait between treatment and harvest, so pay close attention to the label restrictions. It's in the best interest of the agricultural community to keep the good will of its consumers, by using pesticides as wisely as possible.

Thanks to Bill Meacham of Pioneer Hi-Bred for providing southern rust-infected plant material for lab analysis.

Fall Armyworm Reports in Kentucky

By Ric Bessin

There has been a string of reports of economic infestations of fall armyworm infesting sweet corn and late-planted field corn from multiple counties this last week. Extension entomologists from states to our south have described high populations of fall armyworm earlier in the year than is typical, so we need to watch for increasing numbers, particularly in southern and western counties as the summer progresses. It has been quite a few years since we have had fall armyworm populations that have arrived early enough to threaten corn. This is also compounded by the wet spring and cool early summer which has delayed corn development and kept fields vulnerable to fall armyworm egg laying longer into the summer. Fall armyworm prefers to lay eggs on whorl stage corn rather than tasseled corn, so fields that have progressed into the ear fill stages are less at risk.

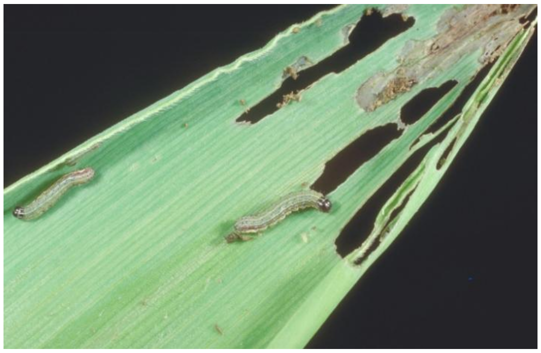

Figure 6. Small fall armyworm larvae.

Fall armyworms vary from light tan to black with three light yellow stripes down the back. There is a wider dark stripe and a wavy yellow-red blotched stripe on each side. Larvae have four pairs of fleshy abdominal prolegs in addition to the pair at the end of the body. Fall armyworm resembles both armyworm and corn earworm, but fall armyworm has a white inverted "Y" mark on the front of the dark head.

Fall armyworm can be a very difficult to control pest if infestations are not treated when the larvae are small. Early detection and proper timing of an insecticide application are critical. After the larvae reach approximately ¾" in length, they can form a frass plug in the whorl of the corn plant that reduces the ability of insecticides to contact the larvae. There are a number of insecticides that can be effective when applied while the larvae are small (See ENT-16 for field corn and ID-36 for sweet corn recommendations).

Figure 7. Fall armyworm egg mass.

Growers should be monitoring their corn fields, particularly all of their later plantings (read that as late May and later). Some Bt corn hybrids for corn borer control only provide suppression of fall armyworm, so these fields will need to be monitored as well. Control needs to be considered when 25% of the plants show damage symptoms and live larvae are still present.

Figure 8. A large fall armyworm larva.

For more information on fall armyworm in corn, read ENFACT-110, http://www.ca.uky.edu/entomology/entfacts/entfactpdf/ef110.pdf

SOYBEAN

Late Breaking – Fall Armyworm on Soybean Making Impressive Appearance in Nearby Southern States!

By Doug Johnson

Reports from Extension Entomologists in Tennessee and Arkansas indicate that fall armyworm (FAW) populations in soybean are building up earlier and in larger numbers than normal. In Arkansas fields are being treated for a combination of FAWs and Corn earworm (CEW). In Tennessee the populations do not appear to be as widespread but some fields were in need of treatment. We can have this combination of insects in Kentucky soybeans. It is unusual, but it does occasionally happen. Likely places to check are late planted beans and fields in which the canopy has never closed. Historically, when this problem has occurred it is usually found in the Purchase area and the southern tier of counties in the Pennyrile area. No problems have yet been reported in Kentucky. Nevertheless, producers, consultants and scouts should be scouting regularly for these pests. They are in Kentucky; that is not the question. The question remains as always; are populations large enough to warrant a control? See the following article on late season soybean pests for thresholds and controls.

Late Season Soybean Pests

By Doug Johnson

As our soybean crop passes through the reproductive stages and into the pod filling stages the insect pest complex of likely importance begins to change. This change is due to the increasing importance of pod and bean damage, and reduced importance of foliar feeding. For sure, severe foliar feeding can still reduce yield because these leaves, especially the upper 1/3 of the canopy, produces the nutrients that “fill” the beans. Nevertheless, we rarely see infestations of foliar feeding insects significant enough to reduce yields. The two foliar feeders that could present such a problem are green clover worm (GCW) and fall armyworm (FAW). Both of these insects are relatively easy to detect and to control if necessary. A treatable population is possible, but improbable.

Figure 9. Fall armyworm, note the inverted "Y" on the head.

Figure 10. Green cloverworm, note the three pairs of prolegs in the center of the body.

Both FAW and GCW may be detected by sweeping or shake cloth samples. As they are foliage feeders, their impact on yield will be directly dependent on how much foliage they remove and what stage the plant is in during this defoliation. To determine the need for control you should refer to Table 2 in ENT- 13, Insecticide Recommendations for Soybean - 2009, which is available from your County Extension Office or on line at: http://pest.ca.uky.edu/EXT/Recs/ENT13-Soybeans.pdf .

In late season the most problematic insects are those that feed directly on the pods. Generally, these are the corn earworm and the stinkbugs (green and brown). These pests are problematic because of their direct damage to the pods and seeds and because they are harder to detect than the foliage feeders. The damage of the corn earworm is visible on the pod, while stinkbug damage often is not.

Figure 11. Corn earworm damage on soybean pods.

Figure 12. Green stinkbug.

Neither of the two insects does much damage to the leaves during the pod filling stages. So, in order to detect these pests, one must examine the pods directly.

Using a shake cloth or direct examination, the economic threshold for corn earworm on soybeans is 2 CEW per row foot. This work was done on 30" rows, so the number is likely higher on narrow rows or solid seeded beans. For stinkbugs you can use a 15" sweep net to make counts. The economic threshold for stinkbugs is 3 / 25 sweeps at growth stages R1-R3 or 9 stinkbugs per 25 sweeps from full pod to full seed. (R4-R6).

Bean leaf beetles will also feed on soybean pods. Most often they do little damage, but occasionally they will eat completely through the pod wall like corn earworm. When deciding upon the need to apply a control for corn earworms or stinkbugs, take into consideration whether or not bean leaf beetles are present. If either corn earworm or stinkbug populations are near economic threshold and bean leaf beetle feeding is present then the application is likely warranted.

Figure 13. Bean leaf beetle, not the black triangle directly behind the head.

In the case where insecticide applications are needed you will find suggested products in ENT-13, Insecticide Recommendations for Soybean - 2009, which is available at your County Extension Office or on line at: http://pest.ca.uky.edu/EXT/Recs/ENT13-Soybeans.pdf .

FRUIT CROPS

Grape Crown Gall

By John Hartman

A recent visit to a Kentucky vineyard provided a reminder that crown gall is still a problem for many grape growers. Crown gall is especially devastating to grapes in Kentucky and some vineyards have been lost due to the disease. Crown gall can also affect other fruits such as apples, stone fruits, and brambles, but that crown gall bacterial strain is different from the one found in grapes. There are more than 600 types of plants susceptible to crown gall diseases. In grapes, *Vitis vinifera* cultivars are more susceptible to crown gall than *V. labrusca* cultivars.

Figure 14. Crown gall symptoms on a grapevine. Note the roughened, lumpy appearance along the trunk surface. (J. Strang photo).

Symptoms. The disease is characterized by galls or knobby overgrowths that form on susceptible plant tissues, generally on grape trunks (Figure 14) at or above the graft unions. Galls are rarely observed on the roots, but roots may develop necrosis. New galls first appear in early summer as white, fleshy, callus-like growth. Galls turn brown by late summer and in the fall become dry and corky. The woody tumors may be gnarled with rough surfaces (Figure 15). Galls can develop rapidly and completely girdle a young vine in one season, or they may take a few years to develop. Galled vines frequently produce inferior shoot growth, and portions of the vine above the galls may die. When galls are numerous they disrupt the translocation of water and mineral elements, from the roots to the top of the plant leading to poor growth, smaller and off-color leaves, gradual dieback, and sometimes death of vines (Figure 16). In general, affected plants are more susceptible to adverse environmental conditions, especially winter injury.

Figure 15. An individual large gall resulting from crown gall disease.

Figure 16. A vineyard with missing grapevines where crown gall has killed numerous vines.

Cause and biology of the disease. Grape crown gall is caused by the soil-borne bacterium, *Agrobacterium vitis*, formerly thought to be a strain of *Agrobacterium tumefaciens*, the cause of crown gall in other fruit crops. The bacterium survives at low levels for long periods of time in soil, and also in galls and in diseased plants. The crown gall bacterium is widely present in Kentucky soils and may be systemically present in many grape vines, but the bacterium seldom causes disease unless the vine is injured. Galls develop following an injury to grape cells permitting entrance of the pathogen into the plant cells. Once inside the cells, crown gall bacteria induce the grapevine to produce galls through excessive cell division. The initial cell injury permitting entry of crown gall bacteria often occurs as a result of intermittent freezing and thawing weather common to Kentucky each winter. This kind of frequent freezing and thawing may not occur as much in other grape growing regions such as New York or California. Overwintering bacteria may be spread to wound sites by splashing rain, running water, on cultivation implements, and on pruning tools. Contaminated nursery stock may be another source of the disease.

Crown gall disease management.

- Use disease tolerant cultivars. In general, *Vitis vinifera* grapes are more susceptible than *V. labrusca*. Highly susceptible cultivars include Baco Noir, Cabernet Franc, Cabernet Sauvignon, Chancellor, Chardonnay, Gewürztraminer, Limberger, Merlot, Muscat Ottonel, Pinot Blanc, Pinot Gris, Pinot Meunier, Pinot Noir, Riesling, and Sauvignon Blanc. Less susceptible cultivars include Catawba, Cayuga White, Concord, Cynthiana/Norton, Delaware, Einset Seedless, Foch, Fredonia, Ives, Mars, Steuben, Vanessa, and Ventura.
- Use crown gall resistant rootstocks. Susceptible grapes on *V. riparia* or *V. rupestris* rootstocks may get less crown gall than those on *V. vinifera*.
- Select planting sites with no history of crown gall, or wait a few years before replanting such sites.
- Soil fumigation is generally not effective for destroying the crown gall pathogen.

- Plant the vineyard on northeast facing sites to help reduce freeze injury.
- Plant vines in well drained soil.
- Minimize root injuries during planting.
- Plant only certified, disease-free nursery stock.
- Discard plants with galls.
- Adopt management practices that minimize wounding. Hill up soil around grapevines or otherwise protect the lower trunk in fall to reduce winter injury and resulting wound sites needed for infection. Hilling also ensures the development of new scion shoots that may be needed for trunk renewal. In some areas growers bury young vines in the fall to reduce freeze injury.
- Generally, remove and destroy infected plants, however, galls on the upper parts of the trunk or on canes can sometimes be pruned out. *A. vitis* does not invade green shoots.
- Where feasible, apply Gallex (AgBioChem, Inc.), a crown gall eradicant paint derived from petroleum compounds. This treatment is applied to already existing galls and following treatment, the galls gradually shrink and disappear. Gallex only affects treated galls and will not stop nearby untreated galls. Treatments may need repeating in future.
- The multiple trunk system of training may be a useful system for minimizing losses due to crown gall. If one or two trunks are infected, they can be removed. The remaining trunks can be pruned leaving a full number of buds until more trunks can be renewed.
- Grape vines with poor vigor are more susceptible to winter injury, thus it is important to use proper pruning practices and leave proper crop loads for maximum vine vigor to result in stronger plants that are less susceptible to winter injury. Manage other vine-weakening grape diseases such as downy mildew and powdery mildew so as to insure maximum vine vigor.

PEST OF HUMANS

High Activity Time for Lone Star Ticks

By Lee Townsend

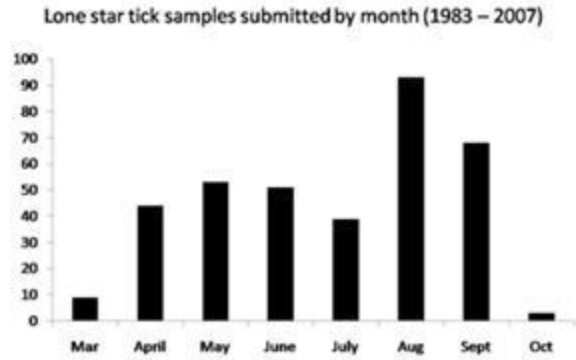

Figure 17. Lone star ticks have late burst of activity.

Figure 18. Lone star tick larvae (seed ticks) are tiny brown spots on pant leg. (Logan Minter photo).

The lone star tick is our most troublesome species based upon its frequency of attack on humans and animals; this is the time of year when they are at their peak (Figure 17). Anyone accidentally moving thru clusters of tiny, hungry seed ticks can face a miserable few days. Female ticks lay hundreds to thousands of eggs in clusters on the ground. The masses of 6-legged larval (or seed) ticks that emerge from these eggs climb vegetation and wait with front legs extended to latch onto a passing human or animal. They will wander on the skin for a time (in some cases up to 24 hours) before attaching to feed. Barbed mouthparts are inserted into the skin and a cement is secreted to hold ticks in place while they engorge, a process that can take from 2 hours to 7 days; then they drop from the host. Ticks inject an anesthetic material that makes the actual bite painless. However, the bite site may be red and painful for 1 to 2 weeks after the tick has fed.

Frequent, careful inspections are essential for those who are in situations that expose themselves to ticks. Here are some tips: 1) Look for movement of very small, freckle-like spots on clothing and skin – they may be seed ticks. The larger nymphs and adults are much easier to see. Wearing light clothing, especially pants, will make them easier to spot. 2) Avoid overgrown areas along trail edges or woods – ticks are more likely to occur there. 3) Use repellents or clothing treatments with permethrin when in areas where ticks are known to be active.

Ticks usually wander on people for some time before attaching. Regular inspections will help to catch them before this occurs. Also, it appears that infected ticks must feed for 24 to 48 hours before disease transmission occurs. More information on the lone star tick in Kentucky is available in http://www.ca.uky.edu/entomology/dept/entfacts.asp .

BUGS OF SUMMER

Giant Beetles of Summer – Hercules Beetles
By Lee Townsend

Figure 19. Male Hercules beetle.

The eastern Hercules beetle (Dynastes tityus) has a large (2" to 2-1/2" long) greenish-gray to black body. Males have a large distinctive horn on the head and sometimes are called rhinoceros beetles; females do not have the horn. The adults are attracted to lights during mid- to late summer and will eat overripe fruit.

Hercules beetle larvae are white grubs that feed on decaying plant material, especially logs, stumps, dead leaves, and rotten fruit. They may spend two years in this stage. The grubs are a food source for skunks, raccoons, and other mammals.

INSECT TRAP COUNT
August 7-14

By Patricia Lucas

Location	Princeton, KY	Lexington, KY
Black cutworm	23	11
Armyworm	121	248
Corn earworm	73	28
European corn borer	2	1
Southwestern corn borer	43	3
Fall armyworm	15	0

Graphs of insect trap counts for the 2009 season are available on the IPM web site at -http://www.uky.edu/Ag/IPM/ipm.htm. View trap counts for Fulton County, Kentucky at - http://ces2.ca.uky.edu/fulton/InsectTraps

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