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Cooperating Departments: Agricultural Economics, Biosystems and Agricultural Engineering, Entomology, Plant and Soil Sciences, Plant Pathology
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In this Issue:

1. Weak Corn Stalks from Drought

Chad Lee, Plant and Soil Sciences

- **Lack of water usually weakens stalks.**
- **Cornfields should be scouted for stalk strength.**

The drought conditions most likely have weakened corn stalks. Stands will need to be checked prior to harvest this year.

Corn plants require water to receive most nutrients from the soil. In drought conditions, those nutrients cannot be pulled from the soil at high rates. Corn kernels need nutrients to develop properly. If the roots are unable to take in nutrients from the soil at adequate rates, then the corn plant will pull nutrients from the stalks to fill out the kernels.

This cannibalization of the roots will leave them with poorer structural integrity. Corn plants are more likely to fall over with heavy winds or heavy rains. Ear drop from the stalks is more likely as well.

Corn fields will need to be scouted for stalk integrity. Grab stalks above the ear and pull them about 10 to 12 inches from center. Let go. If the stalks return to their normal upright position, then stalk strength is acceptable. If the stalks fail to return to their normal position, then weak stalks are likely a problem.

Be prepared to harvest fields as soon as moisture levels are acceptable. Corn may need to be harvested wet and dried to 15 or 14% moisture.

2. Mycotoxin Risk Higher During Drought

Paul Vincelli, Plant Pathology

- **Dry weather at key periods favors fumonisins and aflatoxins.**
- **Early harvest and quick dry down of grain will reduce the risk.**

Mycotoxins are toxic substances produced by fungi that can develop in grain before harvest or during improper storage conditions.

Fumonisins are a class of mycotoxins which cause toxicity to horses, swine, and other animals. There is also concern about possible detrimental health effects of fumonisins to humans. Fumonisins commonly are produced by the fungus *Fusarium verticillioides*, the fungus that causes Fusarium ear rot.

Fumonisin contamination in the field is often associated with hot, dry weather prior to and during silking, conditions many fields experienced this summer. Fumonisins also have been reported following late- season rains on corn where harvest has been delayed.

Aflatoxins are probably the most well-known mycotoxin, because they have been long regulated by the US Food and Drug Administration. Although aflatoxins are very uncommon in Kentucky corn as it comes out of the field, they can occur preharvest in crops that were exposed to sustained drought stress and high temperatures during grain fill.

In a year like this with conditions that might enhance mycotoxin risk, prompt harvest will help reduce the risk of contamination. Leaving a crop in the field for an extended period increases the risk of mycotoxin buildup. It also may be advantageous to harvest at a moisture concentration of 25 to 28% and dry down the grain to no more than 15.5% within 24 hours. Rapid dry down of the grain should help to reduce the risk of fumonisin buildup, as compared to letting the crop dry down in the field.

Keep in mind that, even if the corn was not contaminated in the field, mycotoxins can accumulate in corn in storage, if environmental conditions permit. Spores (microscopic fungal "seeds") of mycotoxin-producing fungi can be present on the outside of kernels as the grain is harvested and stored. By themselves, the spores do not produce significant levels of mycotoxins. However, when warm, moist conditions develop in storage, the spores can germinate and infect the harvested grain, which can then result in contamination. For these reasons, it is recommended that grain be cooled to 60 degrees F or lower as soon as possible after drying to control storage temperatures and mold and insect activity.

If there is any doubt about the condition of corn already in storage, it should be inspected for mold and tested at the UK Grain Quality Testing Laboratory.

Additional Resources

More information on fumonisins in corn is available online at http://www.ca.uky.edu/agc/pubs/id/id121/id121.pdf.

More information on aflatoxins is available at http://www.ca.uky.edu/agc/pubs/id/id59/id59.pdf

Grain storage recommendations are available in the Extension publication, *Principles of Grain Storage* (AEN-20).

Information on laboratories that do mycotoxin testing is available at
http://www.ca.uky.edu/agcollege/plantpathology/ext_files/PPFShtml/PPFS-MISC-1.pdf

A multi-state Extension publication entitled *Moldy Grains, Mycotoxins, and Feeding Problems* is available at
http://www.oardc.ohiostate.edu/ohiofieldcropdisease/Mycotoxins/mycopagedefault.htm

3. Charcoal Rot Likely to be a Problem this Season

Don Hershman, Plant Pathology

- **Charcoal rot is usually a problem with dry weather.**
- **Once the disease is present, management options are limited.**

With the excessively dry conditions that exist in most parts of the Commonwealth, I believe the odds are quite high that many soybean fields in Kentucky will take a pretty significant yield hit due to charcoal rot. Most fungal diseases of soybean are diminished when hot, dry weather prevails. Charcoal rot, however, is favored by such conditions. The causal fungus, *Macrophominia phaseolina*, is present in all agricultural soils in Kentucky where soybeans are commonly produced. The fungus infects plants at emergence and at the cotyledonary stage, and 80 to 100% of plants can be infected 2 to 3 weeks after planting. These infections remain largely dormant and symptomless unless high temperatures and low soil moisture coincide with plants in the reproductive stages. Charcoal rot is also exacerbated in weakened plants which can result from poor soil fertility and excessive seeding rates.

The disease increases as the stressed soybean plants approach maturity and premature death of affected plants is a common outcome. Yield can be severely compromised by charcoal rot. However, because the disease is most common during drought conditions, most producers attribute low yields in dry years to lack of sufficient soil moisture and do not usually realize that charcoal rot has also taken a toll. Under moderate drought conditions, affected plants usually occur in patches associated with compacted soils or on hills. In a severe drought, large percentages of fields may show evidence of disease.

Symptoms and Survival

Plants affected by charcoal rot will show a light gray or silvery discoloration of the surface tissues of taproots and lower stems. Leaves from infected plants are smaller than normal and plants may wilt and eventually die as symptoms progress. When the surface tissues of lower stems and taproots are removed by scraping with the thumb nail, extremely small, jet-black fungal structures called microsclerotia will be found embedded in the diseased tissue. These structures are usually so numerous that they resemble charcoal dust (or "pepper") and provide the name for the disease. Splitting the taproot often reveals dark gray to blue-black streaks within. Seed may become infected in severe cases, as is evidenced by “blackseed”, which is often cracked with embedded microsclerotia.

The fungus survives between seasons as microsclerotia in plant debris or in soil under dry conditions.

Control Options for this Year

Because of the widespread distribution of *M. phaseolina* in Kentucky row crop soils, and due to the near uniform susceptibility of soybean

varieties, excellent control of charcoal rot is very difficult to achieve when growing conditions favor infection and subsequent disease development. Escape is perhaps the best way to avoid serious problems with charcoal rot. If irrigation is available, irrigate fields so as to avoid excessive water stress in plants during the reproductive stages.

Control Options for Next Season

Genes for tolerance or moderate resistance to charcoal rot have been identified by researchers, and one or more of these may be incorporated into varieties available for planting in some maturity groups. However, few seed companies have good information about charcoal rot tolerance or resistance for the varieties they sell. Still, it is a good idea to ask your seed salesman for that information just in case they have access to it. Rotating affected fields to non-host crops, such as cereals (1 to 2 years), or to corn or grain sorghum (3 years or more), may help reduce charcoal rot by lowering soil populations of microsclerotia, which serve both as the infectious and the survival unit.

Avoidance of the disease with irrigation during the reproductive stages is an option next year. Where irrigation is not possible, it may help to avoid excessive seeding rates and low soil fertility, both of which stress plants and predispose them to charcoal rot. Maintaining soil moisture by planting soybeans no-till, may also help moderate the disease. Finally, it may be possible to avoid charcoal rot using planting date and maturity group combinations that avoid the most common drought period from late-July through August. According to UK grain crops specialist Dr. Jim Herbek, planting a maturity group 2 soybean variety in late April has the best chances of success in avoiding drought during the R1 to R7 reproductive stages. Planting a late maturity soybean variety in mid-June may also work in some years, but the risk of an early freeze makes this option less desirable than the former one.

4. Soybean Forage: A Rescue Option?

Chad Lee and Garry Lacefield, Plant and Soil Sciences

- **Soybeans can be harvested for forage.**
- **Ensiling is a better option than trying to make hay.**

The dry weather has some farmers concerned about whether or not double-crop soybeans will complete seed fill. Many of the plants in these fields are only about 15 inches tall and have not filled the canopy. Farmers are hoping to capture some yield from drought-stressed soybeans by harvesting them for forage.

Soybeans for hay will yield about 2 tons/acre of dry matter under the most ideal conditions. Soybeans that are only 15 inches tall may yield less than 1 ton/acre of dry matter.

Ideally, soybeans should be harvested when green, plump seeds fill the pod cavity (R6 growth stage) to maximize yield and quality. When harvesting drought-stressed soybeans, seed size will be much smaller, meaning that much of the feed value will come from the leaves. Ensiling or wrapping the soybeans for balage will retain more leaves and may be a better option than baling the soybeans for hay.

Soybeans harvested for silage should be about 35% dry matter for trenches or upright silos, but 40 to 50% dry matter for balage. Crude

protein could exceed 15% and TDN could exceed 50% if seed fill is completed and most of the leaves are retained. Small soybeans harvested before seed fill may have very different feed values.

Before harvesting the soybeans, try to estimate yield. Harvest an area of soybeans (for example, 10 square feet) and weigh the harvested soybeans. Take a subsample of the soybeans, weigh them and then dry them to get a dry weight. Using these numbers, you can calculate dry matter concentration of the soybean plants and ultimately, dry matter yield. In some cases, yields may be so low, that they soybeans are not worth harvesting for forage.

Check the labels of all herbicides and other pesticides used on the soybean crop to for any restrictions for grazing or harvesting soybeans as a forage.

Harvesting soybeans for forage should be the very last option employed. If yields appear to be adequate and you can properly ensile the soybeans, then harvesting them for forage could be the last best option.

5. Ryegrass Cover Crop Risks in Kentucky Fields

James R. Martin, William W. Witt, and J.D. Green, Plant and Soil Sciences

Seeding annual ryegrass as a cover crop has been promoted in a number of areas in annual and perennial cropping systems. While there may be benefits with this practice, grain crop growers need to be aware of the potential drawbacks encountered when seeding ryegrass as a cover crop in Kentucky.

- **If ryegrass is to be used as a cover crop, careful attention to management must be followed.**
- **Any mistakes could lead to weed problems for subsequent crops.**

Corn Problems

Ryegrass can compete with young corn plants during early spring and often harbor rodents that eventually feed on corn seed. Therefore, killing ryegrass vegetation well in advance of planting no-till corn is necessary to avoid these problems.

Controlling ryegrass in no-till corn requires good management skills and additional expense. A high rate of glyphosate may provide acceptable control, but it requires several weeks for ryegrass to die. This slow activity of glyphosate during early spring may not be acceptable for managing a heavy infestation of ryegrass prior to planting no-till corn.

University of Kentucky research shows that sequential applications offer the best method for managing ryegrass in no-till corn. One approach is to apply paraquat or glyphosate as two burndown applications with an interval of 7 to 10 days between treatments. If rapid kill of top growth of ryegrass is needed, paraquat should be included in at least one of the burndown treatments. Another approach is to apply a single burndown spray of either paraquat or glyphosate at planting followed by a postemergence spray of Accent, Option, Steadfast, Lightning (in Clearfield Corn) or glyphosate (in Roundup Ready corn), 3 to 5 weeks after planting.

It is important to recognize that sequential programs will not provide 100% control of annual ryegrass consistently. Furthermore, sequential programs require extra time and additional expense that can range from $ 10.75 to $ 31.50/A.

Transitioning to Other Crops

The risk of ryegrass emerging as a 'weedy' plant in subsequent crops is another factor to consider when using ryegrass as a vegetative cover in a grain crop rotation. This problem is very likely to occur where ryegrass plants initially escape control in corn and are able to produce viable seeds that germinate the following fall.

Carryover of seeds in the soil can also contribute to future problems with ryegrass. While most ryegrass seeds germinate soon after exposure to a favorable environment, research has shown that a small percentage of seeds can remain viable in soil six to seven years. Therefore, even if a ryegrass cover crop is completely killed, there is a chance that seeds remaining in soil can develop as a problem in subsequent crops such as wheat.

Wheat Problems

Ryegrass is especially competitive in wheat because it can emerge quickly in the fall and grow rapidly in early spring. One ryegrass plant per square foot can reduce wheat yield by approximately 4 percent.

Management skills are as important in wheat as they are in corn. Sporadic emergence patterns of ryegrass challenges the grower in determining the optimum time to spray for this weed. Preventing ryegrass plants from producing seed is particularly important since its seeds are easily spread during the harvesting process. A few ryegrass plants that escape control in wheat can evolve into a major infestation in subsequent crops in a short period of time.

A large drawback in dealing with ryegrass in wheat is the cost of using herbicides which can range from $16.75 to $29.50/A.

Potential "Fit" for Ryegrass

Good seedling vigor, fast emergence, and low cost make ryegrass attractive for certain areas prone to erosion. A seed mixture of ryegrass with tall fescue may help establish a sod cover for waterways or highly eroded slopes that are not used for grain crop production. Nevertheless, these areas need to be properly managed to limit spreading ryegrass seed to fields used for producing grain crops. This includes clipping or mowing these areas before ryegrass plants mature to limit new seed production, especially areas in close proximity to fields used for grain production. Keeping mowing equipment clean of seed will also help contain ryegrass.

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Corn is in the dent stage across much of Kentucky. Drought conditions will reduce yield potential.

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