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1. Scouting for Stalk Rots

Paul Vincelli, Plant Pathology

The drought stress during and following silking that many areas experienced this season may lead to reduced stalk strength and to stalks rots in corn. Grain fill is a period of heavy demand for photosynthate (the products of photosynthesis), and drought stress at that time can reduce stalk strength. Here is how this happens. Within the plant, biosynthetic metabolic pathways including photosynthesis are sensitive to even mild water stress, so less photosynthate is produced by plants when water becomes limited. Yet plants under water stress will still attempt to fill the grain. However, when photosynthesis cannot meet the demand, the plants draw carbohydrates from the stalk. This weakens the stalk, and it sets it up for invasion by stalk-rot fungi. In addition to the drought stress earlier this summer, the sustained cloudy, wet weather expected this week may favor stalk rots by reducing late-season photosynthesis and favoring fun gal infection.

Several stalk rots are possible under the conditions prevailing this summer: Fusarium stalk rot, charcoal stalk rot, and possibly late-season Gibberella rot. Fusarium stalk rot causes a whitish to light pinkish color in the pith, and no distinctive fruiting bodies are present on the plant. Thus, field symptoms and signs are nondescript, and a field diagnosis is not really possible. With charcoal rot, the pith contains many tiny black fungal structures, giving it a charred appearance. The roots may be rotted and black. Charcoal rot also attacks soybean, and has been diagnosed in several fields in Western Kentucky this season. Corn fields badly affected by charcoal rot may be best rotated to a crop other than soybean. Gibberella stalk rot produces a dark pinkish to reddish discoloration in or on infected stalks. Very tiny, dark purple to black fruiting bodies that can be scraped off with a thumbnail are often produced on stalks affected by Gibberella.

The weather experienced this summer may lead to enhanced stalk rot pressure in some fields. In addition, other factors can increase the risk of stalk rots and lodging. High plant populations are probably top on the list. High nitrogen level can also increase the stalk rot risk. Ear set in a high position on the plant can also

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increase the risk, by making the plant top-heavy.

While widespread and serious problems with stalk rots seem unlikely at this time, it is always advisable to scout corn for lodging potential as it approaches maturity. This practice helps identify fields that should be harvested early and dried down. A simple way to scout for lodging potential is to walk the field and push plants 12-18 inches from vertical at about chest height. Stalks that don't spring back have the potential to lodge. If 10-15% of the field shows such lodging potential, plan on harvesting the field soon after the grain is physiologically mature (development of black layer, about 30-35% grain moisture).

2. Estimating Corn Yields

Chad Lee and Jim Herbek, Plant and Soil Sciences

The equation used to calculate corn yield is:

(kernels per ear) x (ears per acre) / (kernels per bushel) = (bushels/acre)

Kernels per ear are determined by multiplying the number of rows on an ear by number of kernels in a row. Kernels near the tip that are less than half the size of kernels midway up the ear should not be counted. To get a good estimate of kernels per ear, this process should be repeated on ten consecutive plants. Use the average number of kernels per ear taken from the ten ears for the first part of the yield calculation.

Ears per acre are determined by selecting a length of row and counting the number of ears in that length. A simple length of row to select is one that equals 1/1,000th acre. Table 1 outlines the length of row needed for each row width to equal 1/1,000th acre. Ear counts should be multiplied by 1,000 to get ears per acre.

Table 1. Row width and length of row needed to equal 1/1,000th acre.

Row Width (inches)	Feet of row needed to equal 1/1000th acre
15	34 feet 10 inches
20	26 feet 2 inches
22	23 feet 9 inches
30	17 feet 5 inches
36	14 feet 6 inches
38	13 feet 9 inches

When corn is grown under stressful conditions, the plant stand and ear count can be erratic. In these cases, a better option may be to count the number of ears in 50 feet of a row. The longer row length can provide a more accurate estimate of ears per acre. Table 2 provides the multiplier to use when counting number of ears in 50 feet of row. Table 3 is designed for corn in 30-inch row widths and allows you to count the number of ears in 50 feet of row to estimate the total number of ears per acre. Use either one of the methods to determine number of ears per acre. Use this number for the second part of the yield calculation.

There are normally 90,000 kernels in a bushel of corn. In an average growing season, 90,000 kernels per bushel would be used in the third part of the yield calculation to estimate final yield. Since this growing season has been dry for some corn in Kentucky, kernel size will likely be smaller than normal. For this year, 110,000 kernels per bushel may be a better number to use in the yield calculation. If this had been an exceptionally good growing season, then 70,000 kernels per bushel might have been the correct number to use.

Example 1: In this example, you have counted an average of 600 kernels per ear of corn, 26,136 ears per acre, and assumed 110,000 kernels per acre. Putting these numbers in the yield calculation will provide a yield estimate of:

(600 kernels per ear) x (26,136 ears per acre) / (110,000 kernels per bushel) = (143 bushels/acre)

Remember that yield estimates are only as accurate as the field area that was sampled. The yield calculations mean little if you have selected the best or worst area of the field. Repeating yield estimates in several areas of a field will improve the accuracy of the yield estimate.

Table 2. Multiplier needed to calculate ears per acre from counts from 50 feet of row.

Row Width (inches)	Row Length Measured (Feet)	Multiplier to Equal Ear per Acre
15	50 feet	696.96
20	50 feet	522.72
22	50 feet	475.20
30	50 feet	348.48
36	50 feet	290.40
38	50 feet	275.12

Table 3. Number of ears per acre based on counting the number of ears in 50 feet of row in 30-inch row widths

Row Width (inches)	Measured Row Length (feet)	Total Measured Area (ft^2)	Number of Ears per Measured Area	Number of Ears per Acre
30	50	125	40	13,939
			60	20,909
			65	22,651
			70	24,394
			75	26,136
			80	27,878
			85	29,621
			90	31,363
			100	34,848

3. Currently Available Stored Grain Insecticides

Doug Johnson, Entomology

Listed below are the common stored grain insecticides. I have described there status and use as I understand them as of September 2005. This market is undergoing constant change and update. Watch this newsletter for further updates and new products. As always, be sure to follow the label on any product you choose to use.

Note that the section headings may be read as follows:
Product Name, (active ingredient common name), Company, Use.
Kentucky Crops

TalstarOne, (bifenthrin), FMC, Empty bin treatments only.
Do NOT apply to grain!
The label for this product does allow for use in "granaries" and other food and feed handling facilities. I therefore presume that it is legal to use (thought I am an entomologist not a lawyer!) in stored grain facilities.

However, in the section that applies to "granaries" use, there is no list of insect pests for which this product label claims control. Additionally, where specific insects are listed they tend to be the general structural insect problems (for example cockroaches, crickets, firebrats, silverfish, etc.) and not insects specifically known to harm stored grain. For these reasons I would expect that this product was not intended for the stored grain market. Also, since the label does not claim control of specific "stored grain" insects you may have little recourse if you were not happy with the control you get.

Tempo® SC Ultra, (cyfluthrin), Bayer, Empty bin treatments only.
Do NOT apply to grain!
The label for Tempo lists several common stored grain insects for which they claim control. Though the list is

not exhaustive, it does include several of the most important and most common pests.

I have no reason or data to suggest that either of these products will not work. However, it does appear that the Tempo label was written to reflect an intended use in the commercial agriculture stored grain market while the TalstarOne label was not. Just my opinion and food for thought.

Actellic® 5E, (pirimiphos-methyl), Douglas, Grain protectant (admixture) or Top Dressing.
Corn & Grain Sorghum
Actellic remains the only stored grain insecticide labeled for use on corn.

Reldan® 4E, (chlorpyrifos-methyl), Gustafson, Empty bin treatments, Grain protectant (admixture).
Barley, Oats, Sorghum, Wheat
Reldan is being replaced in the market with Storcide II, partially because the active ingredient does not control the lesser grain borer. Stocks on hand may be used through December of 2005.

Storcide™, (chlorpyrifos-methyl + cyfluthrin), Gustafson, Empty bin treatments, Grain protectant (admixture).
Barley, Oats, Sorghum, Wheat
Storcide is being replaced in the market with Storcide II, largely because one of the active ingredients in Storcide (cyfluthrin) does not have a CODEX MRL for use in international trade. The CODEX MRL is an international value, roughly similar to a residue value required by the US-EPA. Stocks on hand may used, but no new product will be sold. This product should be used on grain to be sold in the US domestic trade.

Storcide™ II, (chlorpyrifos-methyl + deltamethrin), Gustafson, Empty bin treatments, Grain protectant (admixture).
Barley, Oats, Sorghum, Wheat
Storcide II will replace Reldan and Storcide in the market place. The synthetic pyrethriod portion of the product (deltamethrin) is expected to provide the needed control of lesser grain borer and has a CODEX MRL for use in international trade.

There are of course, many other methods of insect management for use in stored grain. Just remember **S.L.A.M.**, **S**anitation **L**oading, **A**eration and **M**onitoring. Put clean dry grain in clean dry bins, use aeration to cool and dry the grain, and monitor for insect activity. Often the S.L.A.M. approach will be all the insect management you will need.

4. Hurricane Weather and High Energy Prices Impact Corn Drying
Sam McNeill, Biosystems and Agricultural Engineering

In the aftermath of hurricane Katrina and with the corn harvest at hand, Mid-South farmers have a lot on their minds as they ponder the annual question of whether to let their corn dry in the field or harvest early and dry with heated air to avoid weather related losses.

There is no doubt that either approach will likely be more costly this year since natural and liquid propane gas prices are at record high levels, while cash corn prices remain near last year's harvest low. Yet, leaving corn to dry in the field can mean excess losses in the amount of grain harvested, especially in fields suffering from heavy rains, high winds and/or insect damage.

A recent phone survey of LP gas prices in western Kentucky revealed a range from $1.30 to $1.55 compared to $1.15 last year. Natural gas prices are also higher, with one quote at $12.00 per 1,000 cubic feet compared to $8.00 a year ago, which is equivalent to $1.10 per gallon for LP and remains a better energy buy where both are available.

The balance of this cost equation for individual farms depends not only on energy and corn prices, but also on harvest capacity, dryer performance, labor costs and any equipment upgrades that might be needed for the handling or drying system. Even though several factors are involved, the trade-off for out-of-pocket costs often quickly boils down to weighing excess harvest losses against energy costs for drying. Excess losses are those incurred by leaving a crop in the field while it dries and can be 2 to 5% above a normal level of 1 to 2% that have been reported for timely harvest.

The table shown was put together to help producers evaluate their individual costs over a range of typical yield levels, harvest losses and corn prices for a fixed drying cost. Numbers in the table can be used to compare the value of harvest losses (with corn prices from $2.00 to $3.00 per bushel) to energy costs associated with drying the crop by 5 or 10 points of moisture. Note that at an average cost for LP of $1.40 per gallon and 7 cents per kilowatt-hour of electricity, the energy cost for corn drying will run about 2.9 cents per bushel for each point of moisture removed.

For an example, consider a potential corn yield of 150 bushels per acre, excess harvest losses of 5% (those above 'normal' losses of 1.5%), and a (forward contract) delivery price of $2.50 per bushel, the value of the extra corn left in the field (7.4 bushels/acre) is $18.47 per acre. Comparing this figure with the cost of artificial drying reveals that $20.34 per acre is required to remove 5 points of moisture from a bushel of corn (say from 20% to 15% moisture content). So, the economics for this situation only slightly favors field drying (saving $1.87 per acre), although that is a small price to pay to gain some peace of mind that the crop is secure. On the other hand, if corn is harvested at 25% (10 points of moisture removal) the cost for heated air drying increases to $40.67 per acre, which is $22.20 more than drying in the field.

The table reveals that field drying is favored for all yield levels and corn prices if harvest losses are no more than 2% above normal levels. Conversely, if harvest losses are much above normal (10%) heated air drying is highly favored for both 5 points of moisture removal for all yield levels and grain prices shown. Interestingly, when corn is sold for $ 2.60 per bushel the costs for 10% harvest losses equal drying 10 points of moisture with heated air.

Table 1. Cost comparison ($/acre) of excess harvest losses with drying energy to remove excess moisture from corn at different yield levels, grain prices and drying levels.

Potential yield (bu/ac)	Excess harvest loss[1] (bu/ac)	Cost of excess harvest loss ($/ac) at various corn prices ($/bu)			Energy cost [2]($/ac) to dry by 5 or 10 points	
		$ 2.00	**$ 2.50**	**$ 3.00**	**5 points**	**10 points**
2 % harvest losses						
100	2.0	$ 3.94	$ 4.93	$ 5.91	$ 13.99	$ 27.99
150	3.0	$ 5.91	$ 7.39	$ 8.87	$ 20.99	$ 41.98
200	3.9	$ 7.88	$ 9.85	$ 11.82	$ 27.33	$ 55.97
5 % harvest losses						
100	4.9	$ 9.85	$ 12.31	$ 14.78	$ 13.56	$ 27.12
150	7.4	$ 14.78	$ 18.47	$ 22.16	$ 20.34	$ 40.67
200	9.9	$ 19.70	$ 24.63	$ 29.55	$ 27.12	$ 54.23
10 % harvest losses						
100	9.9	$ 19.70	$ 24.63	$ 29.55	$ 12.83	$ 25.67
150	14.8	$ 29.55	$ 36.94	$ 44.33	$ 19.25	$ 38.50
200	19.7	$ 39.40	$ 49.25	$ 59.10	$ 25.67	$ 51.33

[1] Excess harvest losses are those above a normal level of 1.5% of potential yield.
[2] Energy cost is based on the following prices: $1.4 per gallon for LP gas and 7 cents per kwh for electricity (2.9 cents per bushel for each point of moisture removal). Total drying costs should include energy, labor (1 to 3 cents per bushel) and repairs/maintenance (1 to 3 cents per bushel).

The figures presented in Table 1 demonstrate that operators who normally have low harvest losses may be able to wait until corn dries in the field this year to avoid the costs of drying with heated air—provided that no lodging problems occur! In contrast, operators who anticipate high harvest losses and have forward contracts to fill should prepare to dry corn by 5 or10 points of moisture, provided they have the equipment in place to do so. This table provides an example of the costs associated with excess harvest losses and corn drying. Similar calculations can be made for a specific operation by using farm records or by accessing this spreadsheet tool at www.bae.uky.edu/ext/Grain_Storage/.

5. Harvesting on Wet Soils

Lloyd Murdock and Greg Schwab, Plant and Soil Sciences

Several places in Kentucky had 8 inches of rain in less than a week. This is enough to saturate the soil profile in the upper 2 feet, although all of it did not move into the soil. The top 1 or 2 feet have all the water they can hold. This could cause soil compaction if corn harvesting begins soon.

The most important factor in controlling compaction is soil moisture. If the soil is completely dry, it is almost impossible to compact it, as the soil moisture increases, the water acts as a lubricant, allowing soil particles to slip together and fit more tightly when force is applied. The potential for soil compaction increases to a maximum as soil moisture increases. As the soil moisture increases above this point, compaction potential goes down because larger soil pores fill with water, which prevents compression. Compaction potential is highest at the soil moisture where farmers begin considering tillage and other field operations. Waiting for the soil to dry just a day or two longer would significantly reduce the potential for compaction.

Compaction of wet soils is more severe on tilled soils that no-tilled soils. No-till soils have a stronger structure and drain better than tilled soils. One might consider harvesting these first.

If harvest begins before the soils have sufficiently dried, compaction may become a problem. To determine the amount of compaction taking place, look at the depth of the tracks behind the wheels of the combine. You can also push a penetrometer or sharp rod into the track. This will help determine the extent of compaction that may be occurring. If the compaction seems to be significant then one can:

1. Wait a day or two to begin harvest
2. Harvest no-till and upland fields first
3. Minimize traffic by restricting grain carts and truck movement in the field and not unload “on the go”.
4. Decrease axial loads by partially filling combine grain tank.
5. Decrease tire pressure to minimum recommendations.

If compaction can be prevented or restricted to small areas in the field it will be easier and cheaper to correct this fall.

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