
Purdue Cooperative Extension Service

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## In This Issue



## Insects, Mites, And Nematodes

**Wheat, Aphids, Disease, and a Warm Fall** – (*John Obermeyer and Larry Bledsoe*)

- Aphids commonly seen in emerging wheat.
- Aphids can be carriers and vectors of barely yellow dwarf virus.
- Unseasonably warm fall temperatures may allow for longer than normal aphid infestation/feeding.
- Treating for aphids may pay in some circumstances.

To say that this fall has been warm and dry would an understatement. We know that warmer weather seems to almost uniformly favor insect pest populations. So as wheat emerges throughout the state and folks begin to observe aphids feeding on the seedlings, the hard questions begin: How long will the aphids feed and are they harming the wheat?

English grain aphid adult and nymphs on wheat leaf

Aphids feed on wheat leaves by sucking plant juices with their straw-like mouthparts. This feeding has very little effect on the growing plant when moisture is available in the fall. This season, some wheat seed and/or seedlings may be in dry soil struggling to emerge and grow, making aphid competition for water even more critical. More importantly, aphids are vectors of barley yellow dwarf (BYD) virus. Aphids ingest the virus when they feed on diseased grasses (including volunteer grains) and then transmit the agent

while feeding on wheat. Severity of BYD (remember that symptoms don't show until next spring at green-up) is NOT dependent on aphid numbers. Not all aphids are carriers of the virus, so in a BYD year, a few aphids can do a lot of damage and vice versa. The level of BYD inoculum is an unknown that likely fluctuates from year to year.

Aphids stay active, feeding and moving in the fall, as long as temperatures stay at 50ºF or above. After a killing freeze many aphids die and feeding drops off drastically. Some aphids manage to survive even the coldest of winters under clumps of wheat, though their feeding ceases. Therefore if temperatures remain warm, aphids may be feeding, multiplying and migrating to other fields through the months of October and November.

Aphid control with foliar insecticides to prevent BYD, especially with a potentially extended warm fall, is difficult at best. First, as already alluded to, as soon as aphids infest wheat they begin to feed. If a virus carrier, the disease transmission likely occurs shortly after aphid feeding commences. If aphids are already present in a field, treating may prevent further spread within the field, but some infection will already have occurred. Secondly, the insecticide is only efficacious for a relatively brief period. After a couple weeks (at most), the wheat is vulnerable to a new flush of migrating aphids. Finally, transmission of BYD virus also occurs in the late winter and early spring, after surviving aphids "awake" from their winter's nap.

Wheat that is likely to benefit, not necessarily economically, from aphid control this fall:

- is under drought stress with aphids present
- is a variety known to be susceptible to BYD with aphids present
- is being grown for seed
- is highly intensively managed, 100+ bu/A potential yield
- was planted before the fly-free date

**Insecticides Labeled for Aphids in Wheat**

| Product | Rate Per Acre |
|---|---|
| Baythroid XL* (cyfluthrin) | 1.8 - 2.4 fl. oz. |
| Lannate SP* (methomyl) | 0.25 - 0.5 lb. |
| Malathion 57EC<br>Mustang Max* (zeta-cypermethrin) | 1 - 1.5 pts.<br>3.2 - 4.0 fl. oz. |
| Penncap-M* (methyl parathion) | 2 - 3 pts. |
| Proaxis* (gamma-cyhalothrin) | 2.56 - 3.84 fl. oz. |
| Warrior* (lambda-cyhalothrin) | 2.56 - 3.84 fl. oz. |

*Restricted Use Product

# Plant Diseases

**2008 Ear Rot and Mycotoxin Survey** - (*Charles Woloshuk and Kiersten Wise*)

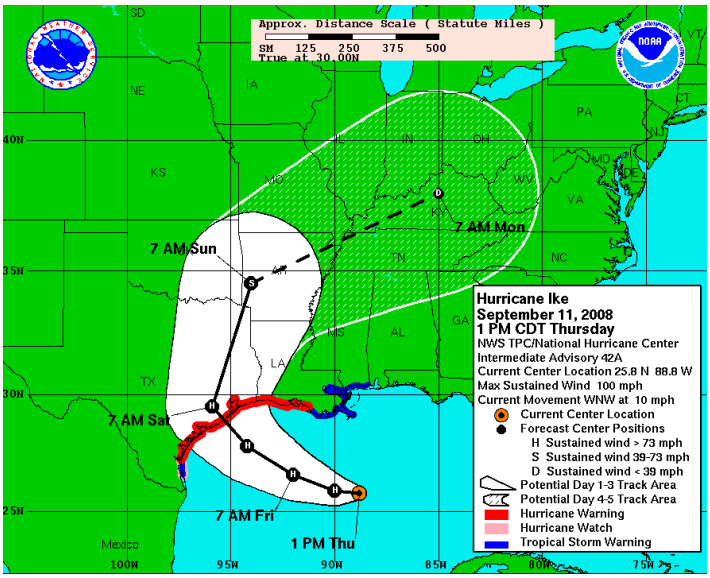
Every year since 1989, the Department of Botany and Plant Pathology has conducted an annual ear rot and mycotoxin survey in collaboration with the Indiana Agricultural Statistics Service (IASS) and the Animal Disease Diagnostics Laboratory (ADDL). The purpose of the survey is to assess and quantify the level of ear rots and mycotoxins in the Indiana corn crop. IASS personnel submit about 300 samples to the department. Each sample contains five ears with the husks attached. We examined and rated the ears for ear rots, and samples with significant ear rot are analyzed for mycotoxins by the ADDL. So far this season we have examined 256 samples. Ten of the samples warrant mycotoxin analysis for either DON (Gibberella ear rot) or fumonisins (Fusarium ear rot). We have seen some ears with pinkish mold at the tips of the ear, which is likely the mold that produces DON, also known as vomitoxin. The number of ears with these symptoms is far less than we observed in the 2006 crop. Nevertheless, we advise producers to harvest their crop as soon as possible. In 2006, late rains caused the ear rot to become worse resulting in widespread problems with DON contamination.

Our survey indicates that Diplodia ear rot may be a problem for many producers this year. Thus far 7% of the samples have had at least one ear with this disease, which is much higher than the normal 3%. Although this level of Diplodia ear rot is far less than that in the 2000 crop (17%), there is reason to be concerned. Mycotoxins are NOT associated with Diplodia, however storability is an issue. To learn more about the impact of Diplodia ear rot please read the Purdue extension bulletin currently posted at <http://www.kingcorn.org/cafe>.

# Agronomy Tips

**Yield Losses and Harvesting Challenges for Severely Lodged Corn** - (*Bob Nielsen*)

The remnant of Hurricane Ike moved through southern Indiana about two weeks ago packing winds in excess of 60 mph that caused damage to corn crops ranging from mild stalk lodging to nearly totally flat fields. Some of the fields were already mature and not far away from harvest moisture, while other fields were late-planted and still immature (ranging from about early dent to half-milkline). Some of the lodging occurred primarily in areas of fields where stalk rot development was also severe, but not in all cases. Severe lodging also occurred in perfectly healthy, albeit very late-planted, corn. Assessing the yield losses prior to actually harvesting damaged fields is difficult because the losses will be a mixture of physiological (death of immature corn), mechanical (challenges of harvesting downed corn), and quality-related (kernel molds and premature kernel sprouting) factors.




Some of the key issues with corn that lodges severely late in the growing season are listed below. Unfortunately, the consequences of many of them are simply unavoidable. The sooner farmers can harvest these fields, the better, with the understanding that grain moisture still needs to be low enough to avoid mechanical injury by the combine (no wetter than about 25% moisture).

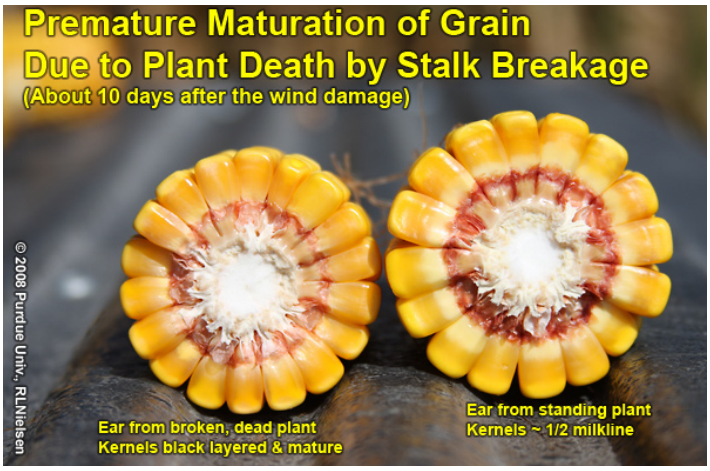
**Physiological Yield Loss**

Physiological yield loss caused by severe stalk lodging late in the growing season depends primarily on stage of kernel development (Nielsen, 2008). If the grain was already physiologically mature (i.e., kernel black layer), then technically no physiological yield loss occurs from severe stalk lodging. If the grain was not yet physiologically mature, then the magnitude of the physiological yield loss will depend on how close the grain was to maturity and whether the lodged plants die completely or hang on for some time.

It is important to remember that corn grain will always develop a kernel black layer whether healthy, stressed, or killed prematurely. If the stalks were crimped but not broken by the strong winds, the plants will die a slow death and kernel black layer will develop prematurely. If stalk-crimped plants slowly die over a 2 to 3 week period, some remobilization of stored carbohydrates from the stalks and leaves to the yet maturing grain will likely occur that will minimize potential yield losses. If stalks were literally broken by the strong winds, the plants technically die within hours and premature kernel black layer will develop even more quickly. Much less, if any, carbohydrate remobilization will occur and yield loss will be severe. Premature kernel black layer development is usually accompanied by smaller than desired kernels and resulting “rubbery” ears that can be difficult to shell without re-adjusting combine settings.








We can use information documented from completely defoliated corn published by Afuakwa and Crookston (1984) as a guide for estimating yield loss due to death of stalk lodged corn. These researchers completely defoliated corn at three different kernel stages; then either harvested ears immediately (a mimic of complete plant death) or harvested ears when they had reached the kernel black layer stage (time for remobilization). Yield loss to immature corn by complete stalk breakage will likely be similar to plants that are simply harvested at immature stages (the defoliation column in Table 1). Yield loss to immature corn by crimped stalks and a slow plant death will likely be similar to plants that were completely defoliated but not harvested until kernel black layer had occurred (the maturity column in Table 1). The "late dent" stage listed in Table 1 is approximately the so-called half-milkline stage of kernel development (Nielsen, 2008).

**Table 1. Estimated yield loss due to complete defoliation at different kernel development stages and harvested at either time of defoliation or at time of kernel maturity.**

| Stages of Kernel Development | Harvested At | |
|---|---|---|
| | Defoliation | Maturity |
| | % Yield Reduction | |
| Soft dough | 51-58 | 34-36 |
| Fully dented | 39-42 | 22-31 |
| Late dent | 11-12 | 4-8 |

Source: Afuakwa, J.J., and R.K. Crookston. 1984. Using the kernel milk line to visually monitor grain maturity in maize. Crop Sci. 24:687-691.

### Mechanical Yield Loss

Obviously, the mechanical challenges of harvesting severely downed corn can be daunting and the risk of significant mechanical harvest loss due to severe stalk lodging can be significant. Leaving whole ears on the ground increases mechanical harvest loss much faster than the usual shelling losses of combine harvesting. Corn reels are the most common combine attachment used to facilitate picking up downed corn during harvest (Roth, 2008), but severe mechanical harvest losses can still occur if stalk breakage is severe enough. Harvesting severely lodged in only one direction may help the header pick up the downed stalks, but necessitates a lot of "deadheading" as you navigate without harvesting back to the other side of the field to harvest in the same direction again. Some growers advocate harvesting a full header width in the direction the stalks are broken, "deadheading" back, shifting over less than a header's width, harvesting another header's width in the direction of the broken stalks, then harvesting the partial header width strip back in the opposite direction and repeating the process (Hicks, 2004).

## Grain Moisture & Quality Challenges

Grain moisture at harvest in fields where immature corn suffered varying degrees of stalk lodging will likely be quite variable because of the varying times of plant death and kernel maturation. Grain from plants that remained standing will mature later than that of immature stalk lodged plants that die prematurely (see above photo of ear comparison). Coupled with variable kernel maturation timing is the moisture consequence of grain on ears of lodged plants that may be lying directly on the ground or in close proximity to the soil surface and, in many instances, shaded by stalks and leaves of the lodged plants (photo below).


The prolonged contact or near contact with the moisture and higher humidity of the soil surface will delay grain drying and increase the risks of the development of fungal ear molds and premature kernel sprouting prior to harvest (photo below). Growers will be challenged to find the best compromise in grain moisture between the standing and lodged plants. The combination of variable grain moisture, possible kernel molds, and premature kernel sprouting all increase the challenges of successfully storing the grain in good condition. Grain from severely lodged fields or areas of fields may need to be segregated from that harvested from better standing fields. A number of grain storage publications are available at Purdue's Post Harvest Grain Quality & Stored Product Protection Program Web site <http://cobweb.ecn.purdue.edu/~grainlab>.


## Related References

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**Corn Stover Baling - Phosphorus and Potassium Removal** – (*James J. Camberato*)

- Consider the value of phosphorus and potassium removed from the field when baling corn stalks.
- A 150 bushel per acre corn crop produces about 2.5 tons of harvestable stover.
- Each ton of dry stover contains about 3.6 pounds of $P_2O_5$ and 20 pounds of $K_2O$.
- A ton of stover contains $18 of $P_2O_5$ and $K_2O$ at $0.75 per pound of these nutrients.

Corn stover baling removes valuable crop nutrients from the field. The amount and value of phosphorus (P) and potassium (K) in stover clearly should be considered a cost of stover baling. Other essential plant nutrients, such as nitrogen, calcium, magnesium sulfur, and the micronutrient are removed in the stover and may be figured into the nutrient cost of stover baling, especially in low nutrient soils and with long-term stover removal.

The amount of dry stover produced by a corn crop is approximately equal to the weight of grain at 15.5% moisture. Therefore, a 150 bushel per acre corn crop would leave about 4 tons of stover in the field. The usual assumption is that about 60% of the stover is gathered, approximately 2.5 tons per acre.

Corn stover contains about 3.6 lb $P_2O_5$ and 20 lb $K_2O$ on a per ton basis *. The 2.5 tons per acre removed from a field producing 150 bushels per acre contains about 9 pounds of $P_2O_5$ and 50 pounds of $K_2O$. The value of these nutrients at current prices ($0.75 per pound of $P_2O_5$ or $K_2O$) is about $44 per acre or $18 per ton of stover.

Crop residue is not only an important recyclable source of crop nutrients it is also valuable for reducing soil erosion and replenishing soil organic matter. Soil organic matter is responsible for many soil quality characteristics, such as soil structure, porosity, drainage, aeration, and water holding capacity. Corn stover removal eventually will lead to reduced soil quality through a reduction in soil organic matter. Compaction during stover removal is another factor that may reduce soil quality and should be minimized.

* Nutrient removal calculation is based on the stover concentrations of 0.18% $P_2O_5$ and 0.99% $K_2O$.


Don't over look the lost value of phosphorus and potassium when baling corn stalks

## Bits & Pieces

**North Central Weed Science Society and the Midwest Invasive Plant Network Team Up** - (*Glenn Nice*)

**WHERE:** Indianapolis at the Hyatt Regency, Dec. 8-11

The conference is a teaming up of the North Central Weed Science Society (NCWSS) and the Midwest Invasive Plant Network (MIPN). It will be held in Indianapolis at the Hyatt Regency, Dec. 8-11. Registrants can either register for the complete three day meeting including the MIPN Invasive Plant Symposium, banquet and proceedings for $230, or register for the MIPN Invasive Plant Symposium and Annual Meeting only for $75, banquet and proceedings not included.

The NCWSS is a society of professionals interested in weed science and its many perspectives. Members are affiliated with universities or the crop protection industry; others are crop consultants, state or federal agency or private research personnel, extension educators and others. Graduate students in weed science are a vibrant and important segment of the membership. The NCWSS facilitates the exchange of ideas, experiences and information related to any facet of weeds and their management in rural and urban habitats that include crop and vegetable fields, pastures and range land, forests, lakes, industrial areas, nurseries, roadsides and green areas like golf courses, parks and sod farms.

MIPN is a network of professionals that are involved in the control of invasive plant species in the Midwest. It is comprised of individuals in industry, government, and for non-profit organizations and land managers.

Some of the sessions include are:

- Integrated Weed Management Strategies: Tools of the Trade
- Herbicide Resistant Crops
- Invasive Plant Management
- What's New in the Industry
- Soybeans, Legumes, Forage & Range
- Corn & Sorghum
- Weed Biology, Ecology, and Management
- Horticulture and Ornamentals
- Extension

This is a natural partnering of these two groups for the main interest in the management of plant species that have negative economic and environmental impacts. Bringing these two groups together at one venue is a great opportunity to learn and facilitate ideas in this realm.

For more information or to register please go to the NCWSS web site and select "Annual Meeting." <http://www.ncwss.org>.

## Weather Update