Integrated Pest & Crop Management


# Cold, Wet October

*By Pat Guinan*

October 2009 will go down as one of the Top 5 wettest and coldest Octobers on record for Missouri (Figure 1). Preliminary numbers at the end of the month indicate statewide temperatures averaged about 6 degrees below normal with nearly three times the normal rainfall. Some locations witnessed their wettest October in more than a century. St. Louis, MO recorded their wettest October on record, with 12.38 inches officially tallied at Lambert International Airport. That's an amazing statistic considering St. Louis has precipitation records that extend back 137 years.

Initial October rainfall reports indicate October 2009 will rank as Missouri's second wettest October on record. Officially, October 1941 ranks as the wettest October on record for the Show Me state, with an average statewide total of 10.47 inches. Preliminary numbers for 2009 are indicating a statewide average of just over 10 inches. Regionally, 4-7 inches were reported across northwestern sections, but these totals were offset by heavier amounts, in excess of a foot, across several east central and southeastern counties. A few locations in southeastern Missouri reported more than 15 inches of rain during October. It will be close in regard to breaking the 1941 record, but it's safe to say most Missourians have seen their wettest October.

Temperatures for the month were much below normal and preliminary numbers are indicating 2009 will rank between the 3rd and 5th coolest October on record, and the coolest October in more than 30 years. A very active weather pattern during the month led to frequent rain events and extended cloudy periods. These conditions, combined with cool temperatures, slowed evaporation and brought persistent wet soils across Missouri. Similar weather conditions were reported across much of the Midwest, as well as a growing concern for major harvest delays.

Fortunately, a significant weather pattern change occurred during the beginning of November with drier and milder conditions anticipated for the first half of the month. Temperature and precipitation scenarios are more uncertain for the latter half of November.

The latest winter outlook for Missouri, according to the Climate Prediction Center, calls for above normal temperatures for the northwestern half of the state and equal chances for above, below and near normal temperatures for the rest of Missouri. Below normal precipitation is anticipated across far southeastern sections with equal chances of above, below and near normal precipitation for the rest of the state.

**Figure 1.**

| Top 5 Wettest Octobers in Missouri | | Top 5 Coolest Octobers in Missouri | |
|---|---|---|---|
| Year | Precip. (in.) | Year | Precip. (in.) |
| 1941 | 10.47 | 1925 | 47.8 |
| 2009* | 10.17 | 1917 | 49.1 |
| 1919 | 7.23 | 1976 | 50.5 |
| 1984 | 7.17 | 1895 | 50.5 |
| 1967 | 6.61 | 2009* | 50.6 |

*Preliminary. Period of Record: 1895–2009

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# Corn Grain Storage Management

*By Bill Wiebold*

**Editors Note: The following article originally appeared in an Iowa State University publication, "Integrated Crop Management News". The authors were Dr. Charles Hurburgh (tatry@iastate.edu), a professor in the ISU Department of Agricultural and Biosystems Engineering and Dr. Roger Elmore (relmore@iastate.edu), a professor in the ISU Department of Agronomy. The document was edited, slightly, to better fit Missouri's situation.**

In Missouri, frequent rain and cool temperatures have greatly slowed natural drying in the field of corn and soybean grain. Grain will be harvested much wetter than desired and careful handling of grain will be necessary to minimize loss of grain quality. There is less room to accommodate problems from this year because the grain market system is already overloaded with poor quality corn from 2008 crop. However, we learned from 2008 – extra cost in additional handling and drying logistics is likely to pay off in terms of avoiding spoilage losses later on. This would not be a good year to take chances that wetter corn will keep and can be absorbed in the spring/summer.

### Storage Management

Grains have a shelf life just like any food product. Shelf life is primarily determined by moisture content and temperature. It is gradually used through the time before use, and each operation or storage regime consumes a portion of the life. Table 1 gives the storage life for corn and soybeans at varying moistures and temperatures.

**Every action taken after harvest affects the ultimate length of time grain can be stored and the quality at the time of use.** Check combine settings between fields for fines and cracked kernels. Fines and cracked kernels spoil much faster than whole, sound kernels. Grain that starts to heat or get moldy has essentially used its storage life. The goal of grain storage management is to reduce the rate at which the storage life is lost. Always cool grain quickly and minimize variations within the grain lot both from the dryer and from the field.

**Always place wet corn into an aerated storage immediately.** Holding wet grain, especially without aeration, shortens shelf life considerably. Fungi grow very fast in corn above 20 percent moisture. Overnight storage of wet corn in a wagon or truck can have a marked effect on future storability. Likewise, the practice of holding medium moisture corn (16 to 20%) for future blending or feeding opportunities will cause problems for corn stored (even after drying) into the following summer.

**Wet corn should be checked weekly, and monitored for temperature increases.** Wet corn should have 0.2 cfm/bu of well-distributed aeration, double the normal rates for dry corn. Storage problems may begin this fall during periods of warm weather or in February and March as air temperatures rise. Wet corn should not be held in bunkers, piles, flat storages, sheds or other structures where airflow is not well distributed.

**Options when wet corn volume exceeds drying capacity**

1) Dry to 17 to 18% moisture and cool in the storage bin. Corn will end up at about 16 percent moisture. Good aeration should be able to manage 16% corn down to the 14% needed for midsummer storage.
2) Dry to 20% moisture, cool in bin, hold wet corn for spring but not summer.
3) Dry in two passes – first down to 17 to19%, then the rest of drying later after the actual harvest is over. This requires more handling and logistics, but could be profitable if the market carry increases to encourage storage. Last summer, 16 to 19% moisture corn was still coming to market (in Iowa), in poor condition. This corn could have been dried, albeit at additional cost and effort. The less you dry, the more risk you are accepting. But spreading out the drying into spring may be the only choice. Risk will require more constant attention.

**Be selective about what corn is placed in storage versus moved at harvest.** Deliberately decide which corn and bins are going to be kept into the summer. This should be your best (highest test weight) corn, harvested below 20% moisture with careful combine settings to minimize trash and placed in storage bins with good aeration rates/airflow distributions. Low test weight corn should not be put in temporary storages or outdoor piles.

It is also not wise to mix corn of different crop years in the same storage bin; the mix is less stable than each year's crop stored separately. The 2008 corn (in Iowa) was very susceptible to mold and heating in storage; the 2009 crop looks to be similar. Holding wetter corn should be done with a plan for drying or other options to halt spoilage if it starts.

Remove the center core and use a grain distributor if possible. Check your grain at least every two weeks, with some way to take grain temperatures. If a slow rise is noted, aerate. If a hot spot starts, make that the next corn to be moved out; one storage problem always leads to another.

Understand your buyers' needs, and match storage and drying practice to intended marketing time. For example, corn presold for July or August delivery should be dried more fully right away.

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# Wet Weather and Weeds

*By Kevin Bradley*

As with everything else, the extremely wet conditions we have experienced this fall will have an impact on your winter annual weed populations and also on your plans for managing these winter annual weed populations. Winter annual weeds like henbit, purple deadnettle, and chickweed have already emerged in many corn and soybean fields throughout Missouri, but with the wet weather we have experienced this fall it doesn't look like there will be as many opportunities for fall herbicide applications as there are in most years. However, as I have said in many previous newsletter articles and talks on this issue, our research indicates that applications of residual herbicides made in the early spring can provide similar levels of winter annual weed control as applications of these same herbicides in the fall. In addition, our data indicate that early spring applications of residual herbicides provide better control of emerging summer annual weed seedlings than fall herbicide applications. This is especially the case with our current herbicidal options available in soybeans.

The wet weather may also have an influence on fall or winter herbicide applications that were planned to be made in wheat. Although I have been a proponent of this timing especially for the control of winter annual grass weeds in wheat, most of the herbicide applications that are made in wheat production in Missouri are typically made in the spring anyway. So, I don't

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## Grain Storage Management *continued from page 148*

### Table 1. Maximum Storage Time (Months) for Corn and Soybeans*

| Corn Temperature ° F | Corn, soybeans moisture content | | | | | | |
|---|---|---|---|---|---|---|---|
| | 13% 11% | 14% 12% | 15% 13% | 16% 14% | 17% 15% | 18% 16% | 24% N/A |
| 40 | 150 | 61 | 29.0 | 15.0 | 9.4 | 6.1 | 1.3 |
| 50 | 84 | 34 | 16.0 | 8.9 | 5.3 | 3.4 | 0.5 |
| 60 | 47 | 19 | 9.2 | 5.0 | 3.0 | 1.9 | 0.3 |
| 70 | 26 | 11 | 5.2 | 2.8 | 1.7 | 1.1 | 0.2 |
| 80 | 15 | 6 | 2.9 | 1.6 | 0.9 | 0.9 | 0.06 |

* Based on 0.5% maximum dry matter loss—calculated on the basis of USDA research at Iowa State University. Corresponds to one grade number loss; 2-3% pts in damaged seeds. Soybeans approximated at 2% lower moisture than corn.

1. The numbers assume that temperatures are held constant – such as with aeration. Grain heats when it spoils, and gives off moisture. Grain not aerated will shorten its own shelf life through moisture and heat.
2. Lower test weight corn will spoil faster than Table 1 indicates. In 2008 in Iowa, storage times were about one-half of those expected.
3. If corn is held at higher moisture then dried, the storage time can be used up by the wet conditions. The dry corn will still experience hot spots or other problems in the summer. This was common for the 2008 crop in Iowa.

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# Guidelines for Feeding Moldy Corn

*By Marcia Shannon*

The best solution is to buy clean grain for swine and dairy as they are most susceptible. Thus, some moldy feed may be fed to beef cattle. Feeder cattle should be able to safely consume levels five to 10 times higher than swine and dairy. Thus, ruminants older than 4 months can withstand 10 to 20 ppm of vomitoxin. Signs of toxicity with vomitoxin/deoxynivalenol (DON) are usually feed refusal or feed intake reduction. At concentrations of 5 to 10 ppm vomitoxin vomiting is observed in swine.

Zearalenone concentrations should not exceed 2 ppm in growing and finishing pigs. Signs of toxicity that may be observed in swine with zearalenone are a disrupted estrus cycle, enlarged mammary glands, and swollen vulva.

If contaminated corn must be fed, the following table lists FDA advisory levels for vomitoxin/deoxynivalenol (DON) in animal feed.

### Table 1. FDA Advisory Levels for vomitoxin/deoxynivalenol (DON) animal feed

| Species | Vomitoxin (DON), ppm | Not to exceed % of Ration |
|---|---|---|
| Swine | 5 | 20 |
| Grow/Finish | 1 | 20 |
| Breeding | 1 | 20 |
| Ruminants | 10 | 50 |
| Chickens | 10 | 50 |
| All Other | 5 | 40 |

## Corrective steps:

- Clean moldy grains, remove fines and light weight grains suspected of contamination.
- Dilute mold or mycotoxin contaminated corn with mold-free grains .
- If moldy corn is fed to pigs, a reduction in feed intake and growth rate will be approximately 10% for each 1 ppm of vomitoxin in the diet.
- No zeolites are effective in alleviating vomitoxin toxicity.
- If mild contamination is suspected, increase the nutrient levels by 5 to 20 % of the diet to help compensate for the reduced intake.
- Store moldy grain separately at 13% moisture and feed before summer temperatures rise.

## Calculate the maximum inclusion level of moldy corn:

- % max inclusion rate = safe level/ level in corn DM x 100

if corn analysis is 5 ppm DON then:
1 / 5 x 100 = 20% maximum inclusion level based on DON level .

- despite these calculations, poor palatability of moldy corn may lower feed intake. If in doubt, be conservative and watch for problems!

## Need mycotoxin analysis:

Send a sample to the University of Missouri Veterinary Medical Diagnostic Laboratory:

Address: **Veterinary Medical Diagnostic Laboratory**
Atten: Toxicology
1600 East Rollins Street
Columbia, MO 65211
Phone 573-882-6811

If a grain handler has questions call: Missouri Department of Agriculture, Plant Industries Division, Bureau of Feed and Seed at 573-751-4310.

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# Wet Weather Can Cause Seeds to Sprout before Harvest

*By Bill Wiebold*

Corn and soybean seeds possess several mechanisms that prevent sprouting before maturity. The primary mechanism is a growth hormone called abscisic acid (ABA). The concentrations of ABA in corn and soybean seeds peak during the middle of seed filling and begin to decrease as the seeds near maturity. There are mutants of both corn and soybean that do not make ABA. These mutants are called viviparous plants. Nearly all the seeds on these plants germinate before maturity and their ears or pods become masses of germinating seedlings.

For normal corn and soybean plants, only small amounts of ABA remain in the seed at maturity. For this reason, corn and soybean seeds can be planted shortly after harvest, and they will germinate. Unfortunately, this also means that, seeds from normal corn and soybean plants can germinate on the ear or in the pod if certain weather events occur.

*Figure 1. Kernels sprouting from corn ear.*

The two primary requirements for seed germination are temperatures above a minimum and moisture. The minimum temperature for corn seed germination is about 50°F or a little cooler. Unfortunately, water for germination has been abundant this fall. Normally, corn husks protect mature kernels from moisture that may cause germination. If the ear turns downward at maturity, the husks shed water and the chances of kernels sprouting on the ear are almost eliminated. But, if the ear remains upward and the husks do not completely cover the ear tip, water from rain or even a heavy dew may run down the inside of the husks and pool at the butt end of the ear. Under these conditions, the husks trap water near the kernels and if temperatures are above 50°F kernels will likely germinate. Even if the kernels contained small amounts of ABA, ABA is water soluble and will leach out of the wet kernels. Sprouting on the ear is almost always limited to several rows of kernels at the butt end of the ear because this is where water is trapped. Sprouting may occur from uncovered kernels near the ear tip, but weather conditions, such as multiple days of fog or continuous drizzle that keeps kernels constantly wet, are rare.

The minimum temperature for soybean seed germination is also about 50°F. The pod wall helps prevent mature soybean seeds from absorbing water by shedding rain water. Frequent rains, continuous drizzle, or foggy days and nights can bathe the soybean pod in enough water that the water soaks through the pod wall and wets the soybean seed. As with corn, even if the mature soybean seeds contain some ABA, continuous or frequent wetting will leach the ABA from the seeds.

A more common reason for soybean seeds sprouting in the pod is that the pod wall has separated or broken. This allows water access to the seeds. During wetting and drying cycles, mature soybean seeds expand and contract. Expanding seeds exert heavy pressure on the soybean pod wall. Soybean pods walls do not expand as much as soybean seeds. The two halves of the pod wall are sutured together and these sutures can rupture if enough pressure is provided by expanding seeds. If the two halves of the pod wall separate and the seed dries and shrinks, the seed may fall from the pod. This is shattering and is the normal way in which the weedy ancestor of soybean dispersed its seeds. Under wet conditions, the seed remains swollen and will not fall from the pod. But, the now exposed seeds will likely germinate if wet enough and if the temperature is above the minimum.

Premature sprouting is quite damaging to grain quality. During germination, seeds release enzymes that break down carbohydrates, proteins and fats. This breakdown releases free sugars, amino acids, and fatty acids. These simple compounds spoil easily in storage. The soybean seed coat and the corn kernel pericarp rupture during germination, and this makes the grain vulnerable to invasion by fungi and insects. The broken seed coverings decrease grain storage time and grain quality.

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# Soil Management for Harvest Ruts

*By Bill Wiebold*

**Editors Note: The author, Dr. Mark Hanna (hmhanna@iastate.edu) is an Extension Agricultural Engineer in the Iowa State University Department of Agricultural and Biosystems Engineering.**

Wet conditions have caused ruts to form in some fields as combines work to harvest crops. About three-fourths of combine mass and virtually all of loaded grain tank weight are carried on the combine's front axle. With good yields, grain tank extensions, and a 12-row head, front axle load can be 18 to 20 tons.

Compacted soil created beneath the rut may interfere with subsequent crop rooting. In addition, ruts deeper than about two inches can interfere with maintaining seed depth during planter operation next spring unless they are leveled.

Soil loosening by using tillage to relieve compaction requires soil to be dry enough so that soil shattering is effective. Because soil moisture has re-filled the top 12 to 24 inches of the soil profile, deep tillage with a chisel plow or subsoiler this fall or next spring will use fuel and time but is unlikely to loosen soil effectively between tillage shanks. The full soil moisture profile in upper layers will however aid freeze/thaw cycles to help loosen soil during winter depending on air temperatures and snow cover.

Ruts deeper than planting depth will need to be leveled before planter operation. A good strategy may be to wait until a week or two before planting next spring and use a light tillage pass such as with a field cultivator, light disk, harrow, or soil finisher. If only a portion of the field is rutted, consider tilling only that area to avoid re-compacting subsoil in other parts of the field. Waiting until warmer weather next spring allows potential for some drying of the top two or three inches of soil and avoids further compaction of wet, plastic soil on the surface that would be done with a tillage pass this fall. If compaction effects are observed during the 2010 growing season and soil is dry after harvest, tillage next fall may be considered deep enough to break through the compacted layer.

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# The Wet Weather Over the Past Month or so has been both Bad and Good for Forage Crops

*By Robert Kallenbach*

The wet weather over the past month or so has been both bad and good for forage crops. First, the bad news. Growth rates on established cool-season grasses have been slower than usual. Most years, growth rates of 60 lb/acre/day are possible in the first few weeks of October. This year growth rates were a little more than half that. This was due to at least three factors: 1) limited sunshine 2) water logged plants, and 3) low soil nitrogen availability. The last factor might surprise some, but given that we had wet conditions most all year long and generally good forage growth statewide, much of the N was used by plants earlier in the season unless N fertilizer applications were made in late summer or early autumn.

That said, tall fescue pastures can still make some significant growth in the next month. While growth rates in November are typically in the 10 to 25 lb/acre/day range in Missouri, this could still supply a good bit of forage for grazing on most farms. The key here will be utilizing this forage efficiently. Use of rotational stocking or the likes could nearly double animal utilization.

Now a little more bad news. I have seen serious soil erosion on some newly planted forage fields, where conventional tillage was used. While perennial forage crop fields typically have some of the lowest soil erosion rates, they are quite vulnerable to soil erosion just after planting when conventional tillage is used. While "what's done is done", I must say that use of no-till establishment of forage crops is often cheaper, faster, and reduces the potential for soil erosion.

Now a little good news. This past autumn was good in terms of establishing a new forage field, if soil erosion was kept in check. The moist conditions have allowed for excellent germination in most cases and since young seedlings are susceptible to even short periods of drought following germination, the wet weather has allowed for near perfect establishment in many cases.

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# Moldy Corn and Soybeans

*By Laura Sweets*

The extended period of cold, wet weather this fall has resulted in many questions and concerns about moldy corn and soybeans. Corn ear and kernel rots were covered in the September 3rd issue of the *Integrated Pest & Crop Management Newsletter* and discolored or moldy soybeans were covered in the October 7th issue of the *Integrated Pest & Crop Management Newsletter.* Please see those issues for more detailed descriptions of mold problems on either corn or soybean.

Since those articles were written it has become evident that Diplodia ear rot and the Fusarium/Gibberella complex are the most widespread and severe problems on corn. When the husks are peeled back on ears infected with Diplodia, dense white to grayish white mold growth will be matted between the kernels and between the kernels and the husks. In severe cases the entire ear may be grayish-brown, shrunken, very lightweight and completely rotten. Many of the kernels infected with Diplodia are quite lightweight and may be blown out of the combine during harvest. Adjusting the fan speed to remove as much of the shrunken, lightweight kernels and fine material without removing or damaging good kernels is important.

Fusarium and/or Gibberella many develop on the tips of ears when the husks have not completely covered the ear, around sites of insect damage or in hail-damaged areas on the ear. These fungi tend to produce a whitish-pink to reddish pink mold growth on the ears. These are also the fungi which can produce mycotoxins such as vomitoxin (DON), zearalenone, T-2 toxin, and feed refusal factor. See accompanying article, "Guidelines for Feeding Molds Corn"

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# Soybean Plants Killed before Maturity Possess Grain that Remains Green

*By Bill Wiebold*

Delayed planting of soybean in the spring and early summer resulted in delayed maturity this fall. This delayed maturity was increased by the unseasonably cool temperatures in August through October. Unfortunately, many soybean fields in Missouri experienced freezing temperatures before plants were fully mature. When temperatures drop quickly, ice crystals form inside plant cells. Because water expands upon freezing, plants cells and their membranes are literally torn apart. As temperatures rise and plant tissues thaw, cell contents leak outside the cells and the plants quickly die.

If soybean plants are killed before physiological maturity, seeds on those plants will not mature normally. Immature soybean seeds contain chlorophyll and are green because of this pigment. After plants reach physiological maturity, chlorophyll production in seeds ceases. Chlorophyll that is present in seeds and pods is broken down, partially by bleaching in sunlight, but also through natural metabolism. Premature death stops this natural degradation of chlorophyll and the seeds remain green. The extent of the green color depends on timing of premature death. If death occurs late in seed-filling, the green color is usually confined to the seed coat. This color may lessen over time with field drying or in storage. If death occurs during early to mid seed-fill, the green color remains throughout the interior of the seed. This color will probably not disappear even with long term storage.

Premature death of soybean plants will have little effect of concentrations of protein and oil in the seeds. Oil percentage may be slightly lower because oil accumulation occurs mostly in the later phases of seed filling, but the effect will be small. However, the oil may be more difficult to extract. During soybean oil processing, both free fatty acids and green color are chemically removed. Prematurely dead soybean seeds often have increased levels of free fatty acids. If not removed during processing, these fatty acids combine easily with oxygen, turn rancid, and reduce shelf life of the oil. Chlorophyll will remain in the oil during extraction and must be removed from the oil. This extra processing will add to the expense and may reduce the amount of salable oil for processors.

*Figure 1. Soybean Seeds from prematurely killed plants.*

Frost damaged soybean grain should store almost as easily as normal soybean grain, although aeration is strongly recommended. Seed moisture content will be higher than expected because seeds killed prematurely will not dry as quickly as seeds that mature normally. The usual precautions of foreign material and damaged seed coats apply to all stored soybeans. Plants killed by frost will retain leaves and stems may remain green. This can add moisture to grain or make grain difficult to separate from other plant parts. Prematurely killed soybean seeds will shrink to smaller than normal size and the shape will be more oblong than normal. Combine settings should be adjusted to account for these differences.

Nearly all USA soybean grain is classified and sold as yellow soybeans according to the "Official US Standards for Grain". Seeds with green seed coats should be classified as yellow soybeans and not docked. However, seeds in which less than 90% of the cross-section is yellow will likely be classified as "soybeans of other color." If the grain lot has more than 10% seeds of other color it may be graded as "standard" and may receive substantial dockage.

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## Moldy Corn and Soybeans *continued from page 151*

in this issue of the newsletter. Again adjusting the combine to blow out as much of the small, damaged kernels and fine material should be considered.

There have been some questions about aflatoxin and whether that mycotoxin is an issue this year. Aflatoxin is the mycotoxin produced by *Aspergillus flavus* or *Aspergillus glaucus*. These two Aspergillus species are problems when hot, dry conditions occur as the corn is silking and beginning grain fill. Most of Missouri did not have weather conditions favorable for the development of *Aspergillus flavus* or aflatoxin this season. Part of the confusion about this may be because *Aspergillus niger* has been fairly common on corn this fall. *Aspergillus niger* produces masses of black, powdery spores on the tips of ears or around sites of insect damage. *Aspergillus niger* does not produce aflatoxin. Again kernels infected with *Aspergillus niger* may be lightweight and many should be blown out of the combine during harvest.

Adjusting the combine to try and remove as much of the lightweight, mold infected grain as possible without losing or damaging good grain is more important than ever this fall. Also drying grain as quickly as possible to below 15% moisture is important. This should minimize any additional mold growth during storage. Proper ventilation will be critical. Storing moldy corn for as short of time period as possible would be recommended. Stored grain should be checked on a regular basis to make certain hot spots are not developing and to insure that grain quality is not deteriorating.

Fewer grain quality issues have been reported on soybean. Phomopsis seed decay, purple seed stain and a general brown discoloration of the seed are the main problems thus far. With Phomopsis seed decay and the general brown discoloration of the seed, infected seed may be oblong rather than rounded and lightweight. Again some of this seed may be blown out during harvest. Drying grain as quickly as possible and proper storage of grain will be critical this season.

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## Wet Weather and Weeds *continued from page 148*

think it will hurt to just plan on making these applications in the early spring if necessary. Most of our winter annual broadleaf weeds are not very competitive and it is unlikely that they will have much of an impact until "green-up" of wheat in the spring. If you have winter annual grasses, however, these can be very competitive with wheat and I would try if at all possible to make a herbicide application for the control of these weeds sometime yet this year.

Although it has been really, really wet, and it certainly will be difficult to get across fields without tearing them up, I don't believe all hope is lost just yet. I believe there will still be opportunities for fall or winter herbicide applications yet this season, but these opportunities are fading fast. The problem is, we're getting closer to the time where air temperatures will not be conducive to the application of systemic herbicides like glyphosate and 2,4-D, which are usually included with a residual herbicide in a fall herbicide program. These herbicides need air temperatures to be in the 50's for at least a couple of hours a day over a 3- or 4-day time period in order to penetrate and translocate effectively.

One final thing to keep in mind is that many of these winter annual weeds germinate at two peak periods during the year, usually September-October and February-March in Missouri. With all the rainfall we have experienced this fall, it wouldn't surprise me to see another big flush of these winter annual weeds in the early spring.

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# Missouri Cotton Producers Should Prepare Now for the 2010 Crop

*By Allen Wrather*

I realize that harvest of the 2009 Missouri cotton crop has just started and is much later compared to previous years. However, farmers should now start preparations for the 2010 cotton crop. The following is a check list of items to consider.

- identify areas where yields of cotton this year were less than acceptable and then take the time to troubleshoot these areas to determine why yields were low.
- Dig cotton roots after harvest this fall in areas of the field where nematode problems are suspected and examine them for root-knot nematode (RKN) galls. University of Missouri research shows that root gall severity due to RKN is a reliable indicator of the presence of this nematode and the severity of RKN damage to cotton. Producers should complete this soon after harvest because the roots begin to rot by December. Contact me for more information about this method. If RKN is a problem, farmers should make decisions this winter about how to manage it in 2010.
- Select the fields you intend to plant to cotton in 2010 and test a sample of the soil from each field for pH and nutrients if this has not been done since 2006.
- Apply needed lime, phosphorus, and potassium fertilizer this fall or early next spring.
- Break hardpans by subsoiling, it is probably too wet to do this until early next spring.
- Improve drainage of the fields this fall or next spring to reduce wet soil problems for the 2010 crop.
- Select varieties for planting in 2010 based on University of Missouri cotton variety yield trials and the yields of varieties in your own and your neighbor's fields. The University of Missouri cotton variety yield trial results for 2009 will be available by early-November on the web at http://aes.missouri.edu/delta/cotton/index.stm,
- Select treatments to add to seed before planting next year. There are several different treatments available including those to protect the seedling from diseases, insects, and nematodes. Your selections should be based on the problems with pests anticipated next year.
- Hire a cotton scout or consultant to weekly inspect your 2010 crop for pests.

Following these suggested procedures will give Missouri cotton producers a better chance of producing higher yields and greater profits in 2010. For more information contact Allen Wrather at the University of Missouri Delta Center (Phone: 573-379-5431, E-mail: wratherj@missouri.edu) or check the Delta Center Web Page (aes.missouri.edu/delta).

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# Missing Out on Fall Applications of P & K

*By Peter Scharf*

Traditionally most P and K fertilizer applications have been made in the fall. Timing is not crucial and usually more field days are available in the fall.

That is not the case this year. The weather has delayed harvest way past normal dates for most of Missouri and much of the midwest and mid-south. For producers, getting their crops in is their main concern. Fortunately, missing normal P & K applications this fall will not affect next year's production in most fields.

No matter what past fertility management has been, applications of P and K next spring should produce the same yield as P and K applied this fall. It will add to the spring workload for both producers and service providers, and it's doubtful whether there is enough equipment to apply P and K to every field in the spring. As many producers found out last fall and this spring, there may not be any time in the spring for P and K applications after missing them in the fall.

For fields that missed P & K applications last fall and this spring, potential for some yield loss is increased if applications are missed again this fall and next spring. However, where fertility has been maintained at soil test levels recommended by the University of Missouri or private labs, most fields can probably make full yield even with two years of missed applications. Fields that have lower test levels are at more risk of yield loss and should be prioritized for P and K applications whenever that becomes possible.

Wheat is a special case in that spring applications won't help. Fall is the time when P nutrition makes the biggest difference. P is crucial to get adequate fall growth and tillering, which in turn is crucial to yield. For wheat that has already been planted, adequate soil test P can substitute for fall P applications if they were missed. If wheat was planted, P was not applied, and soil tests are marginal or low, it's already too late unless we get a long mild spell after application becomes possible. If anyone is still considering wheat planting, ensuring adequate P and some N before or near planting gives the greatest chance of success. In most years, soil can supply adequate fall N for wheat, but with all the rain we've had it's probably not wise to count on that this year. If wheat is far behind and an opportunity comes, a small N application during a warm spell any time during the winter may pay off.

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# Crop Insurance in a Wet Fall

*By Ray Massey*

The wet conditions across Missouri affect crop insurance in two ways. Perhaps of greatest importance to farmers is the impact that the delayed harvest will have on yields and quality of corn, grain sorghum and soybeans. But the wet fall is also impacting planting of wheat covered by insurance.

For spring planted crops, the end of insurance period in Missouri is the date the crop is harvested or abandoned or December 10, whichever comes first. If harvest has not occurred before December 10, the farmer, he needs to contact his insurance company to determine the best course of action. Wet field conditions that hinder harvest is an insured loss. If the farmer has decided not to harvest the crop, an adjuster will appraise the production in the field which will be used to adjust the loss. If the farmer decides that he will harvest the crop after the December 10 deadline and the adjuster determines that the delay is due to an insurable loss (e.g. wet field conditions rather than an inoperative combine), the adjuster can, on case-by-case basis, authorize additional time to harvest the crop. Any subsequent damage to the crop is covered provided that it is determined that the insured has made every reasonable attempt to harvest the crop timely and properly.

When your crop insurance company authorizes additional time to complete loss adjustment, the calendar date for the End of Insurance Period is NOT extend, however, the insured is given additional time to attempt to harvest the crop in order to settle any loss on the basis of harvested production.

This fall there also is considerable evidence that many fields have grain quality problems. Crop insurance does have a quality adjustment factor for crops with low grade, low test weights, excessive kernel damage, musty or sour odors and the presence of conditions that are injurious to human or animal health (e.g. aflatoxins and vomitoxins). Each quality problem has its own adjustment factor and special conditions for obtaining the adjustment. If you are experiencing quality problems during grain harvest, contact your insurance agent to discuss what you need to do to document the problem. For example, any samples proving high levels of vomitoxin need to be obtained by the adjuster or a disinterested third party rather than by the farmer. Also, samples may need to be obtained while the grain is in the field rather than in storage since crop insurance is for crops in the field rather than for crops in storage.

While perhaps not as pressing an issue right now, prevented planting of wheat may be a concern to some. October 31 is the final planting date for wheat grown north of the Missouri River; November 15 is the final planting date for wheat grown south of the Missouri River. As you can guess, prevented planting provisions within crop insurance are complicated. For example, if you were going to plant wheat after soybean harvest but have not finished soybean harvest, then whether or not you have a prevented planting claim depends on the maturity of your soybeans on the final planting date for wheat.

Wheat farmers who did purchase insurance prior to the September 30 deadline and have not been able to plant wheat by the final planting date have several options. They can claim prevented planting and get a prevented planting payment equal to 60% of what they would have received had they actually planted the crop and suffered a loss. They can plant late but have their coverage adjusted to account for the late planting. Or they can plant a second crop. Whatever they decide it will affect their indemnities, their coverage on second crops and there production history. Farmers with prevented planting should contact their insurance agent to discuss the impact of various options on their business.

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# Effect of Planting Date on Wheat Yield

*By Bill Wiebold*

With corn and soybean harvest slowed by uncooperative weather, wheat planting is also delayed. Missouri farmers will need to decide soon (if they have not already) whether or not to plant wheat this fall. An important piece of information needed to make that decision is the effect of planting date on wheat yield. Wheat yield greatly affects profitability, and low prices for soft red winter wheat had already put downward pressure on wheat planting intentions in Missouri.

Predicting the response of wheat yield to planting date is complicated because seedling emergence and grain filling occur in two different years separated by a winter dormant period. For corn and soybean, we can accurately predict that delayed planting will move grain filling of these two crops later into the season. Decreased sun energy and more adverse weather conditions during grain filling will often reduce corn and soybean yields. Delaying wheat planting may have little effect on the timing of grain fill. Instead, the effect of planting date on wheat yield is much less direct and highly dependent on weather conditions between planting and establishment of dormancy.

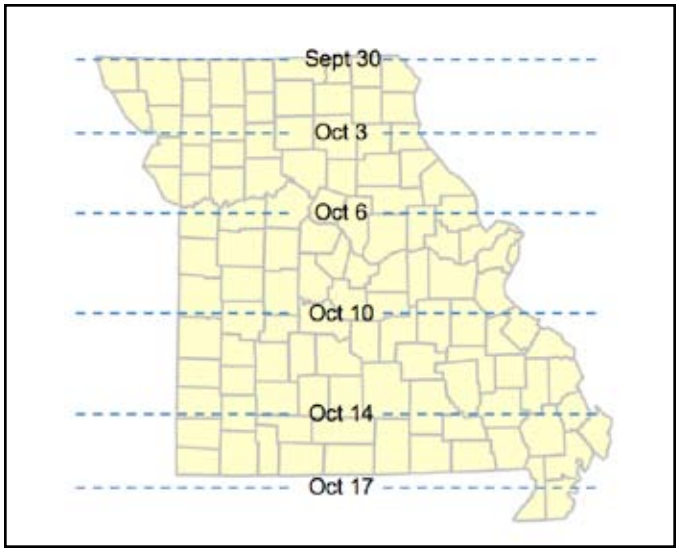
Wheat is a cool season grass with a minimum temperature for growth of 40°F or slightly cooler. But, wheat grows very slowly near this minimum temperature. To maximize yield, we depend on wheat plants to accomplish three things during the autumn growth period. First, it must develop a root system that will resist heaving. Heaving occurs when water freezes and thaws underneath the wheat crown. The expanding ice raises the plant upward and can completely jack the plant out of the soil. If this happens, the plants desiccate and die. Second, sugars are stored in the wheat crown. These sugars are needed to feed early growth in spring, but also help protect the growing point from freezing during the winter. With low concentrations of sugars and other solutes, wheat plants are vulnerable to winter kill. Third, wheat plants produce tillers (branches) in the fall. These tillers will produce grain heads the next spring. Wheat yield is severely decreased by inadequate tillering. Wheat plants can tiller in the spring, but it is unlikely that spring tillering can produce enough tillers to maintain yield potential.

These processes require active plant growth that is diminished if temperatures are too low or the time between emergence and dormancy is short. Since growth rate is so tightly linked to temperature, temperature after planting will greatly affect winter survival and the number of tillers. In turn, winter survival and the number of tillers will affect yield the next year.

Few data exist that can be used to predict wheat yield responses to planting date. I found data collected in Ohio and Kentucky, and those data will be the focus the following discussion. The best place to begin a discussion on wheat planting date is with the fly free date. Figure 1 presents the fly free dates for Missouri. The female Hessian fly lays eggs on wheat seedlings. The maggots that hatch from those eggs feed by rasping leaf surfaces and drinking plant juices. The adult flies die in early fall. The timing of fly death is affected by cooling weather, thus, the fly free date in Missouri ranges from September 28 along the Iowa border to October 17 in the bootheel.

Even if Hessian fly did not exist, the fly free date is recognized as the optimum date for planting wheat. Figure 2 presents the effect of planting date on wheat yield. These data are expressed as the percentage of normal maximum yield that would have occurred if wheat had been planted on the fly free date. The x-axis is the number of days after the fly free date so the graph can be used throughout Missouri. However, I suspect if we had been able to use Missouri data, the curve would be slightly flatter for southern Missouri and slightly steeper for northern Missouri. When using the graph to predict yield lost from delayed wheat planting, remember the importance of fall weather. The data used for the graph come from two states to the east of Missouri so their fall weather patterns might differ from Missouri. The data are averages for several years and experiments and years differ, greatly for weather and yield responses. Warmer than normal temperatures will allow additional wheat plant growth, so the yield loss would be less. Cooler than normal temperatures will decrease growth and yield loss could be greater than depicted in the graph.

## Table 1. Hessian Fly Free Dates




## Table 2. Effect of Planting Date on Wheat Yield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# Weather Data for the Week Ending November 2, 2009

*By Pat Guinan*

| | | Weekly Temperature (°F) | | | | | | Monthly Precipitation (in.) | | Growing Degree Days‡ | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Station | County | Avg. Max. | Avg. Min. | Extreme High | Extreme Low | Mean | Departure from long term avg. | Oct 1 - Oct 31 | Departure from long term avg. | Accumulated Since Apr. 1 | Departure from long term avg. |
| Corning | Atchison | 64 | 41 | 76 | 33 | 52 | +3 | 3.73 | +0.83 | 3243 | -152 |
| St. Joseph | Buchanan | 62 | 42 | 74 | 33 | 51 | +1 | 4.22 | +1.20 | 3158 | -278 |
| Brunswick | Carroll | 62 | 42 | 73 | 35 | 51 | 0 | 7.31 | +4.18 | 3240 | -252 |
| Albany | Gentry | 62 | 39 | 74 | 27 | 50 | +1 | 4.42 | +1.74 | 3060 | -312 |
| Auxvasse | Audrain | 62 | 43 | 68 | 36 | 51 | -1 | 9.70 | +6.79 | 3237 | -300 |
| Vandalia | Audrain | 61 | 42 | 68 | 33 | 51 | 0 | 11.13 | +8.43 | 3212 | -306 |
| Columbia-Bradford | Boone | 62 | 43 | 69 | 36 | 51 | -1 | 9.81 | +6.64 | * | * |
| Columbia-Jefferson Farm | Boone | 62 | 44 | 69 | 38 | 52 | 0 | 9.51 | +6.35 | 3313 | -364 |
| Columbia-South Farms | Boone | 62 | 44 | 69 | 37 | 52 | 0 | 10.41 | +7.24 | 3311 | -365 |
| Williamsburg | Callaway | 63 | 43 | 70 | 33 | 52 | 0 | 12.48 | +9.11 | 3234 | -251 |
| Novelty | Knox | 59 | 40 | 67 | 35 | 50 | -1 | 8.84 | +5.84 | 2924 | -498 |
| Linneus | Linn | 62 | 41 | 71 | 32 | 50 | 0 | 6.56 | +3.38 | 3031 | -298 |
| Monroe City | Monroe | 60 | 42 | 67 | 35 | 51 | +1 | 7.69 | +4.89 | 3091 | -390 |
| Versailles | Morgan | 64 | 45 | 74 | 39 | 54 | +1 | 8.82 | +5.01 | 3480 | -285 |
| Green Ridge | Pettis | 63 | 44 | 74 | 37 | 53 | +1 | 9.54 | +5.89 | 3299 | -160 |
| Lamar | Barton | 63 | 44 | 73 | 37 | 53 | -1 | 6.85 | +2.84 | 3505 | -448 |
| Cook Station | Crawford | 65 | 43 | 72 | 31 | 53 | -1 | 10.58 | +7.13 | 3242 | -538 |
| Round Spring | Shannon | 62 | 42 | 76 | 31 | 52 | -1 | 9.98 | +6.37 | 3287 | -310 |
| Mountain Grove | Wright | 62 | 44 | 71 | 36 | 52 | -1 | 9.33 | +5.79 | 3203 | -3.86 |
| Delta | Cape Girardeau | 64 | 44 | 72 | 36 | 54 | -1 | 11.57 | +7.87 | 3765 | -405 |
| Cardwell | Dunklin | 67 | 47 | 73 | 39 | 56 | -1 | 9.79 | +5.42 | 4159 | -391 |
| Clarkton | Dunklin | 66 | 46 | 72 | 38 | 55 | -1 | 10.79 | +7.75 | 4038 | -445 |
| Glennonville | Dunklin | 66 | 47 | 73 | 39 | 56 | 0 | 10.02 | +7.00 | 4086 | -366 |
| Charleston | Mississippi | 64 | 46 | 72 | 37 | 55 | -1 | 9.76 | +6.35 | 3985 | -177 |
| Portageville-Delta Center | Pemiscot | 66 | 48 | 73 | 39 | 56 | -1 | 9.90 | +5.87 | 4265 | -230 |
| Portageville-Lee Farm | Pemiscot | 66 | 48 | 73 | 39 | 56 | -1 | 10.00 | +6.08 | 4277 | -184 |
| Steele | Pemiscot | 67 | 48 | 74 | 40 | 57 | 0 | 9.77 | +5.88 | 4355 | -144 |

* Complete data not available for report

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

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