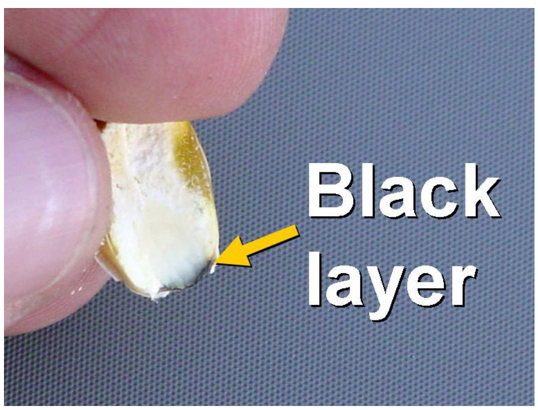
September 2008

Agronomy Notes

Corn
by Dr. Erick Larson

Why is the corn not drying down? – Corn normally dries about 0.6% per day in Mississippi after it reaches physiological maturity or black layer (when grain moisture is around 30%) down to 15% moisture. The "black layer" is an abscission layer that effectively cuts off moisture transfer between the plant and the grain. Thus, corn grain drying rate is primarily dependent upon environmental conditions. Of course, frequent rainfall, cloudy days, high humidity and low temperatures have dominated our weather since early August. These conditions have considerably slowed or totally suspended field drydown of corn grain, compared to normal August and early September weather.

Figure 1. A cross-section of a physiological mature corn kernel showing the "black-layer."



Aflatoxin tips – Aflatoxin is a wildcard that can further complicate harvest timing and grain management. If aflatoxin is present during harvest, there are several things you can do to reduce the threat of a problem.

Aflatoxin is a naturally occurring chemical by-product from *Aspergillus* fungi, which commonly infect corn. However, fungal presence does not necessarily mean aflatoxin will develop. Historically, aflatoxin contamination is most likely to occur during seasons with extreme drought stess in dryland fields. Therefore, if you suspect any problems, harvest visibly drought-stressed, stunted or damaged areas and field edges separately from good areas or irrigated corn.

You should also be keenly aware that aflatoxin can develop either in the field and/or storage. Many problems encountered this season are likely related to rainy weather slowing grain drying, encouraging harvest of high moisture corn. Problems can quickly develop because high moisture corn (18-20%) harvested and stored during warm weather (80-90 deg F) are optimum conditions for *Aspergillus flavus* growth, which can rapidly escalate aflatoxin contamination. If you are hauling high moisture corn directly to an elevator, **deliver it absolutely as quickly as possible** for the reasons noted above. Do not store grain in trucks, combines, bins, or any non-aerated site for more than 4 to 6 hours.

These same precautions should be followed if you intend to dry it on farm. Corn should be dried to less than 15% moisture with 24 hours after harvest. High capacity continuous flow driers are generally capable of immediately drying corn to 15 percent moisture or less, but the corn should also be cooled thereafter as well. Fungal growth and subsequent aflatoxin development is dormant when grain moisture drops to about 12 percent, especially when grain temperatures decline to around 55ºF, so this should be your goal for long-term storage (through the fall-winter).

Figure 2. Storing and drying high moisture corn presents considerable challenges when the threat for aflatoxin is likely.

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Corn and Wheat
by Dr. Erick Larson

Drying grain using in-bin systems are considerably more challenging because of the inherent drying limitations of these systems. These systems rely on air flow through a large grain mass to slowly dry grain as it reaches equilibrium with the air. Therefore, in order to dry grain within the necessary constraints previously noted, you must normally minimize grain depth (commonly 3-6 feet deep) to quickly dry high-moisture corn. As grain depth increases, static pressure against the fan increases, decreasing air output and grain drying capability. Supplemental heat and use of stirring devices will assist drying but cannot overcome air flow limitation that extends drying time in deep-layered grain. Producers should also thoroughly sanitize all handling and storage facilities before and during harvest.

We have limited experience with storing corn in poly bags, particularly related to aflatoxin, so be very cautious and use sound grain storage principles with these systems.

Fungal infection is more likely in underdeveloped, shriveled, cracked kernels and foreign material. Also, the percentage of kernels generally contaminated by aflatoxin is very small. Thus, grain quality may be significantly improved by removing these potential sources of contamination from your grain. You should carefully adjust, monitor and operate your combine so that it not only threshes, but also effectively cleans grain while minimizing kernel damage. Cleaning small grain particles and foreign material from the grain is very dependent upon proper sieve and fan settings. A post-harvest mechanical cleaner or gravity separator may also help clean contamination sources from your grain. Combine efficiency is best when ground speed is sufficient to keep the machine full, without overloading. Excessive cylinder or rotor speed is the leading cause of kernel damage during combine harvest. Kernel damage during harvest and handling should be avoided because fungi infect broken kernels more readily than intact ones.

Figure 2. Careful combine adjustments can greatly enhance grain quality and reduce aflatoxin threat.

Wheat Production Videoconference – The MSU Extension Service will host a Wheat Production Videoconference on **Friday, September 26 from 9-11am**. This program can be broadcast to any of the state's county or district Extension offices, but you need to call the location beforehand, to make sure they intend to carry the program. Several speakers will likely present from the Capps Center classroom at the Delta Research and Extension Center in Stoneville. Topics will include economics, fertility, weed control, insect control, disease control, and management practices. Thus, please make arrangements with your local extension office, if you would like to attend.

Wheat Varieties – The 2008 MSU Wheat and Oat Variety Trials and a "Short list" of wheat varieties which have had superior yields over the past several years are now available on MSUcares.com or at your county MSU Extension Service office. Plant characteristics, maturity, straw strength, disease resistance and other helpful information are noted for each variety. Variety evaluation should be based primarily upon yield history (particularly on different soil types or management regimes), plant characteristics (including maturity, straw strength and height) and disease resistance for predominant pathogens in the region.

Preparation for Wheat Planting – Inadequate preparation plagues wheat yield potential perhaps more than any other crop grown in Mississippi. Drainage, field selection/ preparation and fertility are extremely important factors governing wheat yields which should be addressed in the fall. Wheat is grown during the rainy season, potentially exposing it to saturated conditions at any time. Optimal water drainage is critical to Mississippi wheat production because extended waterlogging may reduce stands, stunt growth and development, encourage pathogen infection, and reduce nutrient availability. Thus, field selection and soil physical improvements capable of improving drainage, such as multiple surveyed water furrows, raised beds and clean ditches, can enhance wheat yield tremendously. Soil tillage hardpans may also substantially limit yield potential by inhibiting internal drainage. Thus, disruption of soil hardpans with moderate to deep tillage equipment is encouraged, if needed. You should also heed cropping intervals for herbicides used in the previous crop. You should keep fields weed-free for several weeks prior to planting to eliminate a "green bridge" for pests. Likewise, you need to prepare fields now, so they have a smooth, firm, moist seedbed at planting time. Wheat yield potential is extremely dependent upon nutrient availability because it is a very shallow rooted crop grown during the wet season. This makes it nearly impossible for wheat to mine nutrients from the soil profile. Thus, wheat growers need to take soil tests now, so they will know how much phosphorus, potassium, zinc, magnesium and lime are needed to meet crop demand and correct soil pH before planting, or yields will suffer tremendously.

Forages
by Dr. Rocky Lemus

Winter feeding programs can contribute heavily to the overall ownership costs of a livestock production system. In Mississippi, annual production cost per cow could range from $400.00 to $650.00, with grazing and winter feeding cost per cow representing 50 to 80% of the total annual cost. While the costs of some of the supplemental feed, fuel, and fertilizer are on the rise, stockpiling should be aimed at reducing feed costs. When properly implemented, it could reduce the hay feeding period by two months or more. Stockpiling is defined as the accumulation of forage at one time of the year for grazing at a later time. It works well with cool- and warm-season perennial grasses, but today we are going to focus on stockpiling warm-season perennial grasses.

Warm-season perennial grasses (WSG) such as bermudagrass and bahiagrass could provide grazing from late October to early January. Availability of stockpiled warm-season forages is much shorter than tall fescue (late November or early December to late February) because of faster dry matter deterioration with WSG. Stockpiling works well with bermudagrass or bahiagrass as monocultures or mixed with most legumes. Clovers (white or red) are good choices for stockpiling. This could help to fill the gap until some of the annual cool-season grasses such as annual ryegrass and small grains are available for grazing. A three year study (2003-06) conducted in Arkansas indicated that stockpiling bermudagrass can provide an average savings of $20.14 per animal unit when compared to feeding hay (Univ. of Arkansas, 2007). Although most perennial warm-season grasses are good for stockpiling, quality will be lower than with cool-season species such as tall fescue.

Stockpiling involves much more than just excluding livestock from the pasture for a few weeks before the winter starts, it requires management. Graze pastures to a 3" stubble height or harvest the final cutting of hay approximately 8 weeks prior to the first estimated frost. Mowing the existing biomass is used as the last resort, but it is not recommended because it places a thatch on top of the grass which delays new growth. Stockpiling warm-season grasses should start mid-August to early September provided that there is adequate moisture and the appropriate fertility program. This will give grasses the opportunity to grow for two months before going dormant in mid- to late October. Nitrogen application should be between 50 and 70 lbs of N per acre when stockpiling pure or mixed warm-season grasses (no legumes present) to produce the required forage quantity and nutritive value. Phosphorous and potassium should be applied based on soil test recommendations.

Stockpiled warm-season grasses (bermudagrass or bahiagrass) can provide the required nutrition for dry mature cows and spring-calving cows (with good body condition) late in the fall if properly managed until overseeded annual ryegrass can provide necessary nutrition throughout the remainder of the winter feeding period. Stockpiling of warm-season perennials in the autumn depends on forage variety (**Table 1**), precipitation, temperature, nitrogen fertilization, and duration of the stockpiling period. Studies have suggested that forage quality is maintained through late autumn (Evers, et al., 2004; Scarbrough et al., 2001). Crude protein (CP) remains relatively stable while neutral detergent (NDF) and acid detergent fiber (ADF) increase slightly (**Table 1**). One of the most significant increases is lignin concentration. Most stockpiled warm-season perennial grasses should provide 8 to 14% CP and >50% total digestible nutrients through January (**Figure 1**). Dry matter digestibility during fall and winter is highly dependent on the stage of maturity when dormancy occurs. Leaves of bermudagrass or bahiagrass are not as tolerant to freezing damage as tall fescue so the amount of leaf material and palatability declines steadily after the onset of freezing weather. There is the possibility that appropriate supplementation will likely be required.

Table 1. Biomass Production and forage quality of warm-season perennial grasses from November to February.

Biomass Accumulation (Nov. – Feb.)	Yield	Crude Protein	ADF
	------ lb/ac -----	---------------------%	------------------
Bahiagrass			
Tifton 9	588.5	13.6	35.8
Pensacola	458.1	13.9	35.0
Bermudagrass			
Coastal	666.2	11.6	33.0
Common	725.1	--	34.1
Cheyenne	761.7	14.0	32.4
Giant	714.4	--	38.2
Tifton 85	1068.9	12.5	37.4
Wrangler	513.5	--	30.7

Source: Evers et al., 2004.

Forages continued...
by Dr. Rocky Lemus

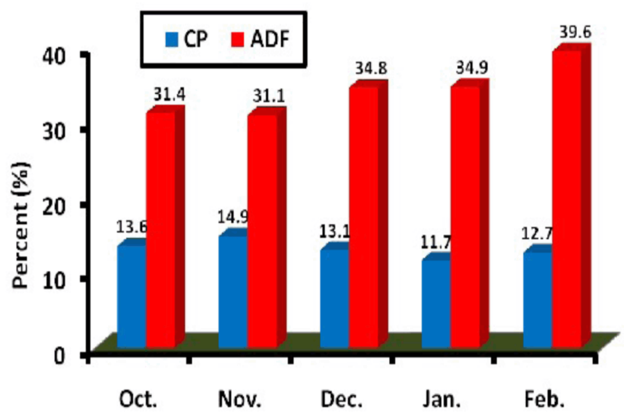

Figure 1. Changes on crude protein (CP) and acid detergent fiber in warm-season perennial grasses (bermudagrass and bahiagrass) from October to February. Source: Evers et al., 2004.

Strip grazing is the recommended method to obtain a better return. If grazing is not controlled, much forage will be wasted because cattle will select the leafy material the first 4 to 6 weeks. The goal is to efficiently harvest the forage by manipulating access so that they will graze down only the top 2/3 of the grass which is primarily leaf. Leave the bottom one-third of the grass, which is mostly low-quality stem, to protect the pasture against winter freeze and help control erosion. Use a single-strand electric fence to partition the available forage in the paddocks and graze for a 2 to 3 day period, allowing the cows to harvest 65% of the standing forage. Always begin grazing the area close to water to avoid wasting forage due to animal trampling. When properly grazed, stockpiled WSG could provide 45 to 60 days for grazing. It is important that free choice minerals are supplemented during the grazing period and their body condition is closely monitored. Observe the manure consistency in the animals to determine if protein deficiency might be an issue. In this case, resume the traditional hay feeding program, add protein and/or energy supplements if the average body condition starts to decline, or initiate grazing ryegrass if ready to be grazed. Gains will generally be considerably better in November and early December rather than later in the season. The extent of deterioration of the accumulated warm-season grasses growth will also affect animal gains.

Many Mississippi beef producers in the winter make daily hay-feeding runs. Grazing stockpiled forages is not a new concept. Stockpiling helps cut hay consumption and saves labor and time. Some producers usually comment that strip grazing is too labor intensive, but it only takes 30 minutes to move a fence that could provide two or three days of grazing. On the other hand, it takes about three hours to feed hay everyday and about 7 hours per acre to produce that hay during the summer. These changes in winter feeding/grazing programs can substantially reduce winter feeding costs.

Cotton
by Dr. Darrin Dodds

Reports of boll rot have been pouring in after the recent rainfall activity. Boll rot is a generic term that refers to a rot that can be attributed to numerous bacteria and fungi that can damage bolls, seed, and lint. At least 170 microorganisms, mostly fungi, have been reported to cause boll rots. In the Mid-South these may include: species of *Alternaria*, *Aspergillus*, *Colletotrichum*, *Diplodia*, *Fusarium, Glomerella, Nigrospora, Phytophthora, Rhizoctonia,* all of which are fungi, and a specific species of *Xanthomonas*, a bacterium. Each of these particular organisms has a distinctive appearance on the boll and can infect the boll through different mechanisms. There are several species of *Fusarium* that have been reported to cause boll rot and these organisms typically enter cotton bolls through the base of the boll. In general, species of *Fusarium* may cause the inside of the boll to appear brown to black in color and cause a pink to white coloration on the outside of the boll (see attached photos). Members of the genus *Diplodia* will usually attack the bracts although with adequate moisture it can infect cotton bolls through the suture lines or the carpel wall. *Diplodia* can cause the boll to turn black in color, after which the boll will dry and open (hard lock). *Glomerella* generally causes reddish-brown spots on the surface of the boll, which will turn black with time. *Xanthomonas* is also responsible for bacterial blight and angular leaf spot diseases. Initial symptoms include a water-soaked or greasy lesion on the surface of the boll. The organism will only enter the boll through pre-existing openings; however, once it enters the boll, it can cause hard lock as well as lint with yellow spots. Diseases caused by *Xanthomonas* can be carried over to the following growing season through the seed. *Rhizoctonia* can infect bolls as it moves up the stem from the soil during periods of high humidity. The result will be mycelial growth on the boll. *Alternaria* commonly appears in Mississippi in the form of leaf spot disease. However, this disease can also enter cotton bolls through the suture line resulting in bolls that will hard lock (see attached photos, specifically the bottom photo) or even totally destroyed if the proper conditions are present.

Essentially three conditions must be met for the organisms that cause boll rot to become problematic. First and foremost, the causal agent(s) responsible for the disease must be present in a given field. These bacteria or fungi may be soil borne, located within plant tissue present in the field, or, in most cases, the organisms produce spores that are airborne in nature and can travel distances with the aid of wind or rain. Additionally, a susceptible host, in our case, cotton must also be present. There are several mechanisms by which these pathogens will infect a plant including through wounds from insects, through stomates, nectaries, and along sutures on bolls, and some are even capable of penetrating through the boll wall. Cotton susceptibility to boll rot can be influenced by variety, stage of growth, growth habit of the plant, level of insect damage, and whether or not a plant is nutrient stressed. However, we suggest that ALL of our cotton varieties have some form of susceptibility to these fungi, it is likely that there is no true resistance to this situation. This year in particular we have seen more boll rot in some locations than in years past, this is a function of a strong cotton crop as well as extremely dry weather during June and July followed by wet weather conditions over the past several weeks. Generally, moisture is a controlling factor in the appearance of boll rot. Additionally, optimum ranges for relative humidity and temperature are 95-100% and 60 - 90°F. Fungal growth will slow and/or stop when the relative humidity drops to 80%.

Field selection, controlling rank growth and insects, as well as proper fertility can reduce the severity of boll rot. Attempting to stop a boll rot problem can be frustrating and unproductive. Defoliation of the lower portion of the plant to reduce humidity can be effective; however, it is difficult to remove only the leaves from the lower portion of the plant and not damage the leaves on the upper portion of the plant that are needed to mature the uppermost bolls. Premature defoliation is not recommended as it will most likely reduce yield and quality of your crop. Although Headline and Quadris fungicides are labeled for use in cotton; applications at this point in the growing season have not been proven to be effective in reducing or arresting boll rot. Remember, these two fungicides are labeled for a preventative situation which essentially means if you have a disease in your field and apply either of these two fungicides you will NOT stop the disease you have, but you MIGHT prevent spread of the disease if further infection has not occurred. There are several reasons for this including spray penetration and coverage of the lower canopy where boll rot is occurring. There is some evidence indicating that fungicide applications during flowering may reduce the severity of hard lock; however, data regarding the effect of fungicides on boll rot and/or hard lock in Mississippi is lacking. Due to these factors, fungicide application to control boll rot is **NOT** recommended at this time.

Cotton continued...
by Dr. Darrin Dodds

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