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Mississippi State University Extension Service

Agronomy Notes

Corn
by Dr. Erick Larson

Roundup Ready Recommendations – Using a Roundup Ready program in corn may present a few more difficulties than with soybeans. Many problems often develop from late or poor application timing. This often results from accelerating corn growth during early May and/or rainfall/wet soils delaying herbicide application. In fact, corn may grow from 12-inches to exceeding V8 growth stage or 30-inches tall (the maximum legal height to broadcast glyphosate on Roundup Ready corn) in less than 10 days. Thus, all glyphosate applications should be completed by V8 growth stage or 30-inch tall corn, unless growers are prepared to use drop-nozzles to avoid leaf contact. Drop-nozzles will improve herbicide coverage when corn gets tall, so they are a good choice for any late-postemergence applications, particularly when targeting morningglories. I highly recommend supplementing your Roundup Ready corn system with atrazine or other herbicides which offer residual broadleaf weed control. Atrazine greatly enhances the effectiveness of the Roundup Ready system by providing economical residual weed control of some key weeds, such as morningglories, that glyphosate may have difficulty controlling. Atrazine may be tank-mixed and applied with glyphosate on Roundup Ready corn less than 12-inches tall. The first glyphosate application timing should be based primarily upon emerged weed species, size and density as these factors affect competition. Precise timing of the first Roundup application is critical to minimizing early weed competition, which can drastically affect corn yield potential. I believe residual control of broadleaf weed species is more important than grass species for most Mississippi growers using Roundup Ready Corn. Glyphosate is extremely effective on most grass species and proper application timing should not be a significant problem when conditions are dry. Furthermore, grass species are normally less competitive than broadleaves after corn canopies, and grasses generally cause little harvest difficulty.

Mid-Season Nitrogen Application – Growers which applied their intended nitrogen rate, likely will have little need supplemental mid-season nitrogen this season, since dry conditions have minimized potential loss due to denitrification and leaching, unless urea sources were surface applied and likely had substantial volatility loss. Some producers may be obligated to consider mid-season nitrogen fertilizer application, after sidedressing no longer possible, because the crop is too tall to permit equipment passage. Thus, these growers must apply their remaining nitrogen by airplane or high clearance applicator. The primary limitation with applying granular nitrogen fertilizer during mid-season is leaf burn resulting from fertilizer granules falling into leaf whorls. Thus, broadcast application should be limited to 100 to 150 pounds of granular nitrogen fertilizer per acre. If growers need more nutrients than this amount of fertilizer will supply, then two applications will be necessary to attain the needed nitrogen for the crop, rather than applying one large application (200 to 300 pounds of fertilizer material/a. – or 70 to 140 lbs./a. of N). Delaying the second application a week or more will allow sufficient growth to prevent further burning on the same leaves. Two sources of granular nitrogen fertilizer are feasible for mid-season salvage application on corn – ammonium nitrate and urea. Ammonium nitrate is generally the preferred nitrogen source because it is not subject to volatilize, compared to urea. When urea is broadcast on the soil, it reacts with the enzyme urease converting it to ammonia. If this process occurs on the soil surface, particularly if crop residue is present, substantial ammonia may be lost as a gas in the air (volatilization). Rainfall or tillage is needed to incorporate urea into the soil where ammonia becomes ammonium and binds to the soil. Volatility is a significant problem during the early summer, compared to early spring applications on wheat, because warm temperatures and rapid evaporation encourage loss. Urease inhibitors, such as Agrotain, may be applied to granular urea or UAN-solution to reduce volatility potential by temporarily slowing the activity of the urease enzyme. However, rainfall or overhead irrigation is still critical to incorporate urea-based N into the soil for plant utilization. Thus, I prefer ammonium nitrate for most mid-season applications, unless the grower has center-pivot irrigation or an almost certain chance of subsequent rain to incorporate the urea. Foliar nitrogen fertilizers and lower analysis nitrogen sources are not feasible for these situations because they cannot economically supply sufficient nitrogen to meet crop demand.

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Corn
by Dr. Erick Larson

Not Growing Off Well? - Many corn fields differ in early plant health. These growth problems can be caused by a multitude of factors, but can normally be attributed to nutritional limitations and/or poor root development. Many initially believe these problems result from inadequate or poor nitrogen availability, but this is rarely the case. Nitrogen is very mobile in the soil and corn requires relatively little nitrogen until rapid growth begins, so nitrogen fertilizer placement and amount rarely limit early season corn growth. However, soil pH, phosphorus, potassium, magnesium and zinc commonly limit early season corn growth in Mississippi. Field scouting will frequently reveal symptoms indicating a specific problem. However, the best method to diagnose fertility limitations is to collect soil and plant tissue samples from stunted and adjacent healthy field areas and submit these samples to a soil testing laboratory, such as the MSU Soil Testing Laboratory, for analysis and recommendations. This method is particularly useful for identifying marginal problems, which may not show up when using a composite soil-sampling technique.

Why did the freeze kill some corn? The recuperation potential of young corn plants completely defoliated by freezing temperatures was very contingent upon favorable growing conditions. However, cold, cloudy weather lasting 10 days or more after the freeze slowed corn growth to a standstill, regardless of the extent of freeze-defoliation. Daily temperatures did not exceed 75 degrees high and 50 degrees low F for twelve days after the initial freeze in north MS. Growing degree day (based upon 50 degree F for corn) accumulation during this time was only about 25-45 DD50's, which is equivalent to what is normally collected in 2 to 3 days. Thus, some corn plants did succumb because the poor growing conditions kept plants largely dormant for an extended period, during which they had no ability to produce food via photosynthesis. Freeze-injured plants which don't recover typically die from starvation and/or secondary pathogens infecting plant tissue. Inspection of dissected plants revealed many plants likely died resulting from the development of brown, rotting tissue in the stem below the freeze-line (Figure 1). This condition is known as Bacterial Soft Rot. The degree of this problem was often correlated to presence of substantial crop residue, low-lying areas, or irrigation immediately prior to the freeze (Figure 1). Some have claimed that a subsequent frost event on April 16 was responsible for "finishing off" plants – however, I don't believe it was a significant factor. Little, if any regrowth occurred prior to April 16, so there was no above-ground live tissue to physically impair by the April 16 frost. Furthermore, regrowth of healthy plants did begin within a day or two of April 16. I believe it was largely a coincidence that the subsequent frost occurred during the same time when soft rot became readily apparent.

Figure 1. A plant showing brown, rotting tissue in the stem below the freeze-line, likely resulting from bacterial infection.

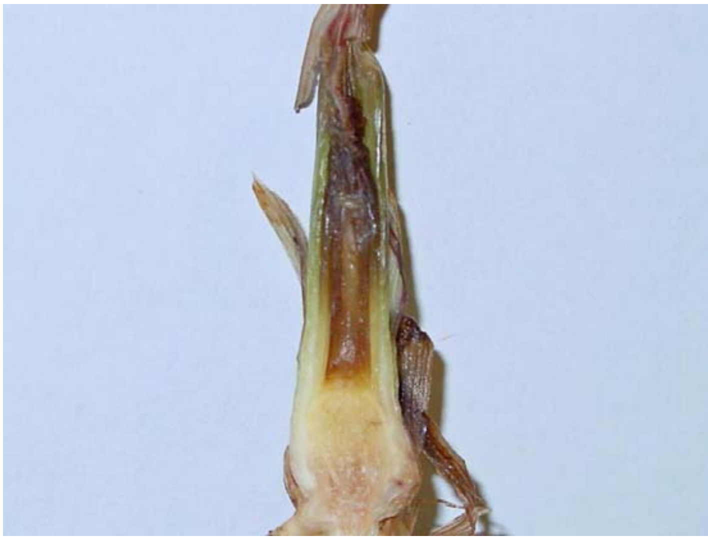


Figure 2. Freeze-damaged corn field illustrating how the presence of substantial crop residue reduced corn recovery following the freeze.

Corn and Grain Sorghum
by Dr. Erick Larson

Fungicides on corn? – Timely fungicide application can be expected to help preserve corn yield potential of production fields when foliar disease threatens. However, current university data and knowledge do not justify that fungicide application on corn at a predetermined growth stage (tassel) will consistently produce a profitable response in our region. Such a program approach does not account for the substantial effects environment, culture and hybrid resistance are known to have on potential disease incidence, or the value that crop consulting/field scouting can have in addressing this issue.

Corn foliar disease development in Mississippi has been quite infrequent in the past and by no means consistent with tasseling, or any other corn growth stage. During the last 12 years in Mississippi, only two years produced widespread, substantial corn foliar disease problems – Common rust in 1997 and Northern and Southern corn leaf blight in 2004. The Common rust (1997) developed prior to tassel and leaf blight (2004) began developing 20-35 days after tassel. Another threatening foliar disease, Southern rust, has only typically developed very near the end of the corn growing season (50-60 days after tassel) in late July or August. Therefore, past corn yield losses from Southern rust in Mississippi largely have been limited.

This unpredictable disease timing presents major limitations for producers, because corn grain yield can be limited by stress over a much longer period (~60 days) than what a single fungicide application can provide protection (~20 days). Accordingly, proper fungicide application timing largely determines the magnitude of crop response.

Most foliar diseases of corn, except for rusts, are spread by fungi that survive in infested corn residue left on the soil surface. Thus, our routine rotation of corn with other crops substantially reduces the significance of foliar diseases which survive on corn residue, such as Northern and Southern leaf blight, Gray leaf spot, and Anthracnose, compared to the southern corn belt, where continuous corn, reduced tillage systems and these diseases are common. Conversely, corn grown in a field following corn is more subject to disease infection.

The following season, spores are produced during moist periods and are rainsplashed or wind-dispersed onto lower leaves, where infection may occur, if the hybrid is susceptible. Lesions develop and produce more spores that are spread to and may infect upper leaves, if environmental conditions are conducive to disease development (generally warm temperatures and wet, humid weather). Thus, crop consultants or others closely scouting their corn crop have ample opportunity to identify disease infection and recommend timely fungicide application, before the leaves producing the bulk of the photosynthetic energy are infected.

Furthermore, hybrid susceptibility to foliar diseases often varies considerably, with some hybrids proving to be quite resistant to specific a disease. This was quite evident during the 2004 season, when severe yield loss primarily due to Northern corn leaf blight was limited to about 12 out of 104 hybrids, as noted in the 2004 MSU Corn for Grain Hybrid Trials Bulletin (http://msucares.com/pubs/infobulletins/ib0416.pdf).

In summary, I believe producers will make more appropriate management decisions by closely scouting the crop, and accounting for the weather, culture, and hybrid to make fungicide applications when conditions warrant, rather than betting upon a programmed approach. If disease is present in the field, the weather is conducive for disease development, the hybrid is susceptible to the disease, and the crop is at a growth stage when that disease could hurt yield, then spray a fungicide capable of preventing that specific disease. If any one of these parameters is not met, then fungicide application may not be profitable.

Sorghum establishment - Scout sorghum fields diligently during establishment for stand, insect and weed problems. Sorghum seedlings have considerably less vigor than corn, which often translates to more difficult stand establishment. Chinch bugs also prefer sorghum compared to corn and since chinch bug populations thrive during warm, dry conditions like we have experienced during much of this spring, they can cause major sorghum establishment problems. Postemergence herbicide options for sorghum are quite limited, so timely identification and response also is imperative to control weed problems. Scout sorghum fields at least twice a week until sorghum exceeds six inches tall to identify and manage field problems.

Sorghum minimum stand - Grain sorghum has tremendous ability to compensate for low stands by producing tillers, especially if plants are spaced uniformily. Thus, the optimum plant population for sorghum is very broad, ranging from 40,000 to 70,000 plants per acre for dryland production. Replanting would be required only if stands were reduced to less than two plants per foot of row or skips exceeding five linear feet occur in adjacent rows.

Nutrient and Soil Management by Dr. Larry Oldham

Everyone wants to know what to do about high fertilizer prices. Figure 1 provides some fertilizer price history based on national agriculture statistics for this region. In this example, the nitrogen price is based on ammonium nitrate each year. The 2007 nitrogen price per pound on April 30 quoted by one Mississippi outlet was $0.45 for urea N, $0.44 for UAN solution N, and $0.47 for ammonium nitrate source N. It could be higher where you are.

What we need to do is manage better. If you are not soil testing, start now. Medium to very high soil test categories for phosphate or potash may mean no response to P or K fertilizer. So if the soil test is high or very high for these nutrients, you do not need to make this investment. If soil tests are in the medium range, you need to look at your whole system as to whether the investment is warranted.

Due to security concerns, anhydrous ammonia and dry ammonium nitrate use is decreasing so the nitrogen fertilizer of choice in much of Mississippi row crop production continues to be urea-ammonium nitrate solution. The urea in the solution is susceptible to loss via volatilization if surface applied, especially in warm temperatures with residue present, therefore

As discussed last month, some 34 – 0 – 0 fertilizers now available are not really ammonium nitrate. I recently found a bag labeled as such in a retail outlet, but supposedly all the nitrogen in it was obtained from urea (using the terminology on the bag itself). Again, if you are using these alternatives to replace ammonium nitrate, you may not be getting the same nutrient use efficiency.

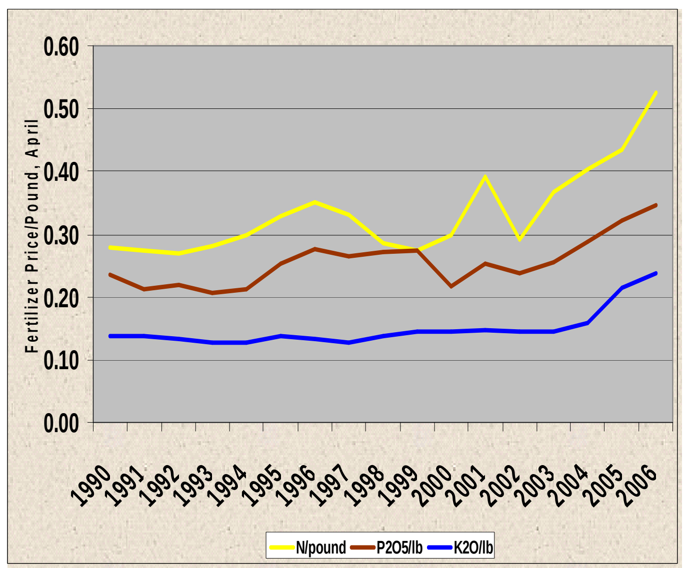
Timing and managing fertilizer applications correctly depends on the crop and production system, the fertilizer, and the weather. The most efficient nitrogen applications are made just about the time the plants need it, however some folks continue to put N well in advance of the crop. This is not the best policy monetarily, agronomic, or environmentally.

Equipment calibration is often overlooked in managing fertilizers for efficiency. Take time to maintain the equipment by replacing worn/broken parts such as belts or chains. Check the manufacturer specifications for settings, and know the properties of the material that will affect spreading rate and patterns. Make sure your custom applicators have calibrated their equipment properly.

Use sound business practices such as pricing fertilizers on the cost per pound of nutrient using (Price per ton of fertilizer)/(2000 x material N content as decimal value). For example: UAN at $280 per ton with 32% N content ($280/ton) / (2000 lbs/ton x 0.32 N) = $0.438/lb N or $0.44 cents per pound of N.

It may be too late this year, but look ahead to using alternative materials such as poultry litter, if you do not already. Plans are being developed to again offer cost share financial help through EQIP to facilitate the moving of litter from poultry production counties to non-production counties. Stay tuned for further announcements from the Mississippi state office of the Natural Resources Conservation Service.

Figure 1. Fertilizer prices per pound of material from 1990 to 2006. Data derived from annual National Agriculture Statistics Service prices paid reports for April of each year for the mid south area, including Mississippi.



Forages
by Dr. David Lang

Switchgrass

There's a lot of interest in switchgrass, but is it a grass for livestock producers to consider planting? President Bush has mentioned it in his past two 'State of the Union' addresses as a bioenergy or biomass crop. It is a native warm season tall growing grass that's part of the Great Plains Prairie and it is native to Mississippi. Once established it is very persistent and it will produce a lot of tonnage with limited moisture and low rates of fertilizer. Switchgrass begins growth very early in the spring about a month earlier than bermudagrass. Cattle will graze switchgrass and they will strip off the leaves and avoid grazing down the stems leading to average daily gains of 1.5 lbs per day and up to 400 lbs/acre live weight gain from May until August.

So what's the downside? Seed is very expensive and switchgrass can be very difficult to establish. It can take 2-3 years before full production can be realized. Also, the forage quality of switchgrass declines below even the maintenance needs of a dry cow once the seed head fully emerges. Seed heads begin to emerge in late June into the middle of July. Hay cut before the 1st of July can have reasonably good forage quality. Regrowth in July and August can have good forage quality. Fall growth following summer utilization is generally directed to seed head production so it does not provide critically needed fall forage. Over-seeding winter annuals does not appear feasible.

Establishment of switchgrass is the most difficult aspect of starting a switchgrass pasture or hay field. A soil test will help to determine if lime, phosphorus or potash is needed, but switchgrass won't need high levels of soil fertility. Select 'mixed-grass' as the crop located on the soil test form provided by the Mississippi Extension Soil Testing Lab. The field needs to be as weed free as possible. Use an application of burn down herbicides such as paraquat or glyphosate about 2-3 weeks apart during March and April. Go easy on the disking as this can encourage too many weeds. Switchgrass can be established no-till into an unplowed stale seedbed. Plant shallow about ½" deep at a seeding rate of 8-10 lbs/acre from April to May. Fall planting in August can also be successful. A grain drill provides satisfactory seed placement. Switchgrass seed should be kept cold until planting. Place the seed in a freezer or cold room for 2-3 weeks prior to planting. Switchgrass has the tendency to revert to "hard seed", or seed that is viable but will not readily germinate if it warms up for 3-4 weeks prior to planting. The best adapted variety for Mississippi is 'Alamo'. It was developed in Texas so it's adapted to the shorter days we have in the south. 'Cave-in-Rock', 'Shelter' and 'Trailblazer' are good varieties for the Midwest, but they mature too early and are less productive compared with Alamo in Mississippi.

This past summer (2006) was very dry throughout all of Mississippi. Most grass pastures produced only 25 to 35% of yield expectations. Switchgrass is very drought tolerant and has capability to produce in dry years after it's been established for two years. In test plots at Mississippi State University Alamo switchgrass produced nearly 3 tons of hay per acre cut at early seed head emergence with a cutting height of 3-4 inches on June 13th. Digestibility was 54% which is comparable to good bermudagrass hay but protein was only 7%. Another 3 tons of biomass for bioenergy purposes was produced from June until October but the forage quality of this material was too low to be utilized by any class of livestock. It was harvested in December and was only 32% digestible. Switchgrass has potential as forage and hay during the first half of the summer, but its decline in quality as fall stockpiled pasture makes it unsuitable for most livestock producers. That could change if switchgrass becomes a viable energy crop in the future and there's a market for low quality fall growth. This material may be a source of ethanol in the future, but until then, Wait!

Rice
by Dr. Nathan Buehring

To maximize yields and returns in 2007, early season weed control will be necessary. Two things that make early season weed control successful is timing and soil moisture.

Grass that has two leaves is a whole lot easier to control than grass that has five leaves. Research has proven this time and time again. Therefore, to achieve the most effective control of grasses, it will be imperative to make the herbicide application in a timely manor. Once the grass get big, you will never catch back up and get a good handle on them. On these clay soils, which we grow a majority of our rice on in Mississippi, a two shot herbicide program will generally be required and I would add something in the tank that has residual grass control each time an application is made if you are not going to flood up immediately. Do not hesitate in making that second application and just say we will just get it in the flood, especially if there is a high population of grasses present.

Soil moisture is key component in making herbicides work. For preemergence herbicides, the soil moisture conditions after the application are the most critical. A preemergence herbicide needs to be activated by rainfall or flushing soon after an application. This will move the herbicide into the soil so that it can work. If the activation of the preemergence herbicide is delayed, weeds can germinate and emerge before the herbicide is activated, which will result in a failure.

For postemergence herbicides, the soil moisture conditions at the time of application are the most critical. If weeds are drought stressed, they are harder control due to less of the herbicide being taken up by the weeds since they are not actively growing. As a result, it may be better to flush before an application to get the most effective control if a rain is not in the eminent future. Salvage situations are something we often face. I know these salvage situations are not always the result of poor management. In a salvage situation, a two-shot program may be necessary, especially under heavy grass pressure. Therefore, I generally try to start cleaning grasses up before the flood. This will allow for reduced competition between the grasses and rice at flooding. Also, if there is less grass at flooding, not as much costly nitrogen will be lost to grasses. Last year, I had good results with Regiment plus their new recommended adjuvant system for large barnyardgrass control. RiceStar is another good option if multiple grass species are present. On the second shot, I will go with 15 fl oz/A of Clincher in the flood. Also in a salvage situation, it is always best to use 10 GPA by air and 15 to 20 GPA by ground.

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