Mississippi State University Extension Service

Agronomy Notes

JULY 2005

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Corn/Sorghum
By Dr. Erick Larson

CORN

Scouting needs—July is certainly not a fun time of year to be scouting hot, humid corn fields. However, growers will likely have some substantial choices yet to make, and scouting can provide valuable knowledge necessary to make rational management decisions. Scouting can provide valuable information regarding irrigation needs, corn borer infestation and disease development, to name a few potential problems. Mid-season scouting also may reveal whether inputs are fulfilling crop demand, or whether other potential problems are occurring. For example, an evenly-spaced, optimum plant population should intercept 90% or more of sunlight at midday, and have only one similar-sized ear on every plant. Nutrient deficiencies and post-emergence herbicide injury may also be apparent now.

Peak water demand—Corn's most critical and largest moisture requirement occurs during a four week period following tasseling, which will extend through mid-July for most of Mississippi's crop. Potential corn yield can be reduced up to 4 - 8 percent per day due to water deficit during this period. Thus, insufficient irrigation water and/or slight delays can quickly reduce yield potential and evaporate profitability. Corn plants use about 1.50-1.75 inches of water per week during peak water use, so producers nearly always must supplement rainfall with irrigation to meet crop demand during this extremely critical period.

Irrigation termination—A common irrigation error is terminating irrigation before physiological maturity (black layer) occurs. Most Mississippi-grown corn will not likely reach physiological maturity until late July to early August, depending upon the latitude and planting date. Premature irrigation termination will accelerate maturity, prohibiting kernels from reaching their full potential size and weight. Although kernels appear somewhat mature and corn water use begins declining at the dent stage, this is too early to terminate irrigation. Potential kernel weight is only about 75% complete at the dent stage. Thus, termination of irrigation at the dent stage can reduce grain yields as much as 15-20% when hot, dry conditions persist. Early irrigation termination will also likely reduce stalk strength and promote lodging.

Check the milk-line—Corn producers can monitor kernel maturity for irrigation scheduling purposes by observing the progression of the milk-line between dent stage and black layer. The milk-line is the borderline between the bright, clear yellow color of the hard seed coat outside the hard starch

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layer, compared to the milky, dull yellow color of the soft seed coat adjacent the dough layer. To observe the milk line, break a corn ear in half and observe the cross-section of the top half of the ear (the flat side of kernels opposite the embryo). It generally takes about 20 days for the milk line to progress from the kernel tip, down to the base. Growers can use this guideline to estimate the approximate maturity date. For instance, if the milkline is half-way down the kernels, it will take about another 10 days to reach physiological maturity. Thus, the field needs supplemental irrigation water to supply moisture for 10 more days.

Corn borers—Mississippi corn has avoided serious corn borer infestation the past several years. Accordingly, the utilization of Bt hybrids, which provide protection against corn borers, has generally decreased. Thus, if corn borers return, growers may need to diligently scout their fields, so they can make a well-timed insecticide application to minimize damage when necessary. The second generation of corn borers, which normally hatches in early July, can potentially cause considerable yield loss, because they disrupt energy utilization during early grain filling stages.

SORGHUM

Sorghum black layer—Grain sorghum physiological maturity is characterized by formation of a black layer similar to corn. However, the abscission layer is visible without scraping the seed coat. The sorghum black layer can be found at the kernel base opposite the embryo. Kernels at the top of the head mature first, followed by kernels at the base of the head. Seed weight accumulation is complete and moisture typically ranges from 25-35% when physiological maturity occurs. Herbicide harvest aid application or irrigation termination should not occur before the black layer signifies physiological maturity.

Forage
By Dr. Richard Watson

Johnsongrass: Valuable forage plant or annoying weed species? - Johnsongrass is a common sight at this time of the year in hay and pasture fields throughout the state. Johnsongrass is a member of the sorghum family (*Sorghum halepense*) and is an erect (3-4' tall) annual warm-season grass with wide leaves and a white mid-rib. Like other warm-season annuals, such as crabgrass, Johnsongrass readily volunteers where the opportunity arises. Johnsongrass usually starts to grow in May and will remain productive throughout September, or until the first frost comes. Johnsongrass generally prefers heavier clay soils and is very tolerant of poorly drained areas, which is why it grows so well in the Prairie region.

At one time, Johnsongrass was grown extensively in north Mississippi for hay production, and the seed has now spread far and wide. Because of its notoriety as a weed in row crops, Johnsongrass is on the restricted weed list for the state of Mississippi. This means that you cannot legally buy or import seed into the state that has more than 100 Johnsongrass seeds/pound. However, Johnsongrass is a prolific seed producer and there is enough seed in the ground to ensure that we will be seeing Johnsongrass in pastures and hay fields for a long time to come.

Johnsongrass in grazed pastures—In a grazed pasture, volunteer Johnsongrass is usually encouraged rather than resented. Johnsongrass is in fact a relatively high quality forage plant and compares favorably with the other common warm-season perennial grasses, such as bahiagrass and bermudagrass (See table 1). It is also one of the most drought tolerant species, which can be a life saver for some farmers during a dry spell in the summer. One drawback of Johnsongrass as a grazing crop is the relatively poor tolerance to heavy stocking rates under continuous grazing. Like many other warm-season annuals, such as Sudangrass, the growing point of Johnsongrass is 5-8 inches above ground level, so frequent defoliation below this point can

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eventually kill the stand. Ideally, Johnsongrass should be grazed when it is 16-20 inches tall to a residual of 8-12 inches, and then rested for 30-40 days. However, this is generally not possible where the grass has volunteered in a summer pasture that needs to be managed a lot differently, such as bermudagrass. It should also be noted that grazing animals would tend to graze the Johnsongrass before other forage species, which can further complicate management of these stands.

Table 1. Nutritional Quality of some Warm-Season Grasses

Species	Crude Protein	TDN
Bermudagrass (common)	9-11	50-56
Bermudagrass	10-14	52-58
Bahiagrass	9-11	50-56
Johnsongrass	10-14	50-60

Adapted from Southern Forages, 3rd Edition, Ball et al, 2003.

Johnsongrass in hay fields—Johnsongrass becomes more of a problem weed when it appears in bermudagrass hay fields. While the quality of Johnsongrass as a hay crop is generally pretty good, it needs different management than bermudagrass and the stems often prevent good drying of the hay crop. Johnsongrass can also affect the aesthetics of the hay for high end users such as the horse market. Therefore, most people would rather not have Johnsongrass in their hay fields. Unfortunately, for these producers there are very few labeled herbicides to control this grass in bermudagrass fields. Previously, the imazapic product, Plateau, has been used to effectively control Johnsongrass in bermudagrass fields. However, this product has since been removed from the pasture market leaving no effective chemical control measures (NB: MSMA is **NOT** labeled for use on pastures and hay fields).

There are some cultural practices we can employ to help control Johnsongrass in the hay fields. As Johnsongrass is not as resistant to frequent defoliation and needs a greater rest period than bermudagrass, keeping a regular 28-day cutting regime will help reduce infestations as well as improve the quality of your hay. Establishing your hay fields on sandier more free draining ground will also help reduce Johnsongrass infestation. And finally, keeping a well-maintained and managed bermudagrass stand goes along way to reducing all weed problems.

Prussic acid—As a member of the sorghum family, Johnsongrass does produce prussic acid, which can reach toxic levels under certain conditions. Avoid grazing Johnsongrass that has been severely stressed by drought, frost, or non-lethal herbicide applications. Levels of prussic acid will return to safe levels no sooner than 1 week after a killing frost, and hay made from stressed plant will also present no problem a week after baling.

Rice
By Dr. Nathan Buehring

This has been a year riddled with a variety of problems. I have heard many people say that this is the worst year they have seen. This is my first full growing season as specialist. So, from my perspective, it can only get better.

The biggest problem I have encountered recently is hydrogen sulfide toxicity. Many of you may have heard of this problem, but are not really sure really what causes it or why it happens. Generally, we attribute this problem to high amounts crop residue (organic matter) left from the previous year. In short, the decomposing crop residue contains bacteria that promotes the formation of hydrogen sulfide. However, this year there seem to be other factors that have contributed to this problem.

The first signs and symptoms of this problem have been yellow, chlorotic patches in or around the

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field. After further inspection, producers and/or consultants have found a very short root system with black and/or rust colored roots. I have included some pictures for examples.

The occurrence of hydrogen sulfide toxicity is dependent on three main factors: the amount of oxygen being released from the roots, root health, and hydrogen sulfide concentration. Under flooded conditions, rice transports oxygen to the roots so that it can survive in anaerobic conditions (flooding). As oxygen is being pumped to the roots, it is also being released from the roots. Oxygen release from the roots is needed to convert hydrogen sulfide (if present) into a non-toxic form in the root zone. After doing a quick literature search, I found that there could be a difference between varieties in how much oxygen is being released. However, there is no information on current varieties that we grow. The only reason I mentioned this is because we have not seen many problems with Wells, Francis, or any of the hybrids.

The second factor has to do with root health. Where I have seen hydrogen sulfide toxicity problems this year, the root system was not well developed before the toxicity became an issue. Areas that were either nutrient deficient (ie phosphorus) or affected by rice water weevils coincided with areas highly affected by hydrogen sulfide. Therefore, if we do not have a healthy, actively growing root system from the beginning, it cannot combat with oxygen the excessive levels of hydrogen sulfide that may be present. In most of the cases I have seen, the rice water weevil damage alone was not severe enough to cause an economic loss. However, the additional problems with hydrogen sulfide will affect the yield.

As previously mentioned, we generally associate high hydrogen sulfide levels with areas of high amounts of organic matter or crop residue. A field planted into a no-till or reduced tillage seedbed has the potential to produce hydrogen sulfide due to the presence of organic matter on the soil surface or in the root zone. Another underlying factor affecting the hydrogen sulfide concentration could be iron (Fe) availability within the soil. Iron is an soil nutrient that will convert hydrogen sulfide into a non-toxic form. With pH levels approaching 8 on some of our old traditional rice fields, the amount of iron available is reduced; therefore, the hydrogen sulfide cannot be converted. Iron availability has also been shown to be reduced by flooding and the presence of high levels of carbonates and bicarbonates, which could be coming from well water.

I have had a few people ask, "Does applying Ammonium Sulfate as a starter fertilizer increase or aggravate problems with hydrogen sulfide toxicity?" I do not have a firm answer to that. However, I can tell you that applying Ammonium Sulfate is definitely not helping the situation.

If you have now diagnosed that you have a problem with hydrogen sulfide toxicity, what can you do about it? If you are at or past mid-season, there is not much you can do, but live with it. If the problem is detected before mid-season, draining (as you would with straighthead) has shown to be a benefit.

As you can see, there are many factors that lead up to having hydrogen sulfide toxicity problem. It almost appears to be a domino effect. This is a complex problem; therefore, it is often hard to predict when and if you will have a problem. This year's problems certainly validate that more research needs to be conducted in this area.

In closing, this has not been a catastrophic problem where the whole field has been affected. For the most part, it has affected approximately 5 to 10% of the area within each field that I have looked at. I sometimes have a pessimistic view about our rice crop because I often look at sick rice. As a result, I sometimes have to remind myself that our rice crop across the state is not as bad as it sometimes appears.

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I do write a weekly rice update. If you are not on the emailing list and want to be added, email me at nathanb@ext.msstate.edu. This is the best way for me to get timely information out to producers and consultants.

Cotton
By Dr. Tom Barber

The Mississippi cotton crop is struggling its way into July. The USDA Agricultural Statistics service reported our acres at 1.21 million last week. As of the end of June approximately 70-80% of the crop is squaring and 20 percent blooming. We are still seeing a wide array of growth in many fields due to the rough start. The north Delta is still, by far, the hardest hit by the dry weather. In some spots they have not received a significant amount of rainfall since April. Needless to say the pumps have been running 24/7 in this area. Many other areas throughout the Delta have started irrigating as well. Where irrigating is possible, side-dress fertilizer applications and layby herbicides should be applied promptly to clear the way for timely irrigation. If you have been fortunate enough to catch some of the rain and have not started watering yet, be prepared to irrigate at first bloom if needed. Make sure to take all measures to be ready on time. The period between first bloom and open boll is the most critical time where moisture is needed to move nutrients to developing bolls.

When applying post-direct or layby herbicides be careful not to raise the rigs up and spray to high on the plant. Glyphosate (roundup) that is sprayed high on the plant could lead to reduced pollen production and result in boll shed. Other products such as Aim and Valor, if sprayed to high, will knock leaves off of the plant. For Valor the cotton needs to be at least 18in tall with 4in of bark, otherwise injury could occur. Be sure to watch for tractor speed and amount of bounce with the wheel units and hoods. If there is enough soil moisture, wait to irrigate after layby applications. This will help to activate and improve residual activity of whichever layby product is used.

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Once your cotton begins to bloom the number of nodes present above the first position white flower (NAWF) will give you a good indication of the health and "horsepower" of your crop. To take this measurement, count the number of nodes down from the terminal (terminal is 0) to the first white flower. When cotton first begins to bloom, it should be around 8 to 9 nodes above white flower. If the number of nodes is less than 7, the cotton is under stress and actions should be taken to identify, and if possible, alleviate the stress. If NAWF is greater than 9 at first bloom, it is an indicator that the vegetative growth may be out of control. This could be due to factors including square or boll retention, variety, moisture, and fertility, along with other weather factors. The square set above the first bloom should at least be around the 80% range but we would like to see 90-95%. As the season progresses, the white flower will catch up with the terminal until the crop is at cutout. Cutout is the stage when there are 5 NAWF.

PIX applications—I mention PIX as a relative term, there are several products out there that serve as plant growth regulators including Pentia, PIX Plus, Mepex, Mepex Ginout, Mepichlor and Mepiquat Chloride.

Moisture supply, high nitrogen availability and heat generally result in vigorous growth conditions in early season. Plant height may easily exceed 30 inches at bloom in some fields. Needless to say it is important to monitor plant growth and fruit retention in every field. Variety, history of vigorous growth, and the current moisture and crop condition are the major factors in helping to select the proper growth regulator program or determine if it is needed at all.

Several components need to be considered: If it is dryland cotton with no rain in site and there are 7 NAWF or less at first bloom, a pix application is not recommended. Applications of PIX where cotton is under stress and is not growing well could result in premature cutout, especially if applications are made at pin-head square. The best way to determine if PIX is needed is to look at the crop vigor or "horsepower".

This can be measured by several different methods. The first is internode length (height:node ratio, HNR). Information still needs to be gathered to fine tune this system. HNR will vary but should be in the 1.5 to 1.8 range during mid- to late square. If the HNR exceeds 1.8, perhaps PIX is in order if growing conditions are good. If HNR is above 2.0 at first bloom, it is an indication the plant has tremendous vegetative horse power, and plant growth and fruit set must be closely monitored and managed.

Another measurement I have used is what I call Top-5 Length:Node Ratio (LNR-T5). I think this measurement, along with fruit set and Nodes Above White Flower (NAWF) can be helpful in plant management. Why? Number one, because it is simple and can be measured quickly, thus increasing the likelihood it will be done. Second, the top five internodes represent the area of the plant where the vegetative expansion is occurring. To take this measurement, count the uppermost unfurled mainstem leaf as 0 (zero) and count downward, 1-2-3-4-5. Measure and divide the length by 5. The LNR-T5 is often similar to the HNR; it is not affected by earlier growth, but is an accurate refection of current growth. At early bloom, LNR-T5 perhaps should be in the 1.5-1.8 range. If greater than 1.8 the potential for rapid vegetative growth exists. Monitor NAWF and fruit set and make PIX decisions accordingly. As the NAWF progressively gets smaller (6 or 5), the LNR-T5 should also be getting shorter if the plant has an average boll load of about 60 percent retention of first position sites. As fruit retention goes down, the plant will want to grow more vegetative, and, therefore, the LNR-T5 will increase and the likelihood of a positive response to PIX also increases. If first position boll retention is around 55 to 60 percent and the LNR-T5 is less than 1.5, take a long look at such things as previous PIX used, NAWF, soil moisture, etc., and then make a decision. These measurements are tools and can be a tremendous help when properly measured and applied.

Please monitor your fields. Of the measurements discussed, fruit retention and Nodes Above White Flower (NAWF) are the most powerful. If you will keep track of development, you can make informed

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decisions regarding production practices.

Under conditions of good moisture and warm temperatures, cotton will want to produce vegetative growth. If you apply PIX be sure you use a high enough rate to do the job. As cotton grows bigger, it requires a higher rate, especially if the boll load drops.

Soybeans
By Dr. Alan Blaine

The 2005 soybean crop is not as early as last year, but is early in comparison to many areas across the south. Hopefully, by the time you read this we will have received a general rain statewide (7/3). The entire Mississippi crop is in need of a good general rain. The lack of rainfall has been more detrimental in some areas and, statewide, surprisingly the soybean crop has held up better than expected. However, a large portion of this crop is entering peak demand and moisture deficits from this point on will prove costly.

As every year, this crop is variable. Planting began in mid-March and some planting is just wrapping up. More replanting occurred than normal, but I feel it was primarily due to some trying to out-guess the weather. The bulk if the problems occurred where seed treatments were left off or the proper materials were not used. The cost of seed today, not to mention the time and effort involved in replanting, is not worth foregoing this input.

We saw widespread plant death in early June. Very few fields had to be replanted, but dry weather occurred earlier than most have ever seen. This crop (due to the earliness) needed greater amounts of moisture earlier than most felt. Where irrigation occurred, plant death was not a problem. I realize irrigating in May is not high on everyone's priority list but it made a difference. Early plantings needed moisture first because they were at a more optimum stage for peak demand. Delaying irrigation just causes greater stress. I know it is easier to talk about than to accomplish, but many of us need to rethink irrigation. Consider the stage of the crop, not the calendar.

As of today (7/3), no rust has been detected in the mid-South. The report of spores in Louisiana and Alabama caused panic in some areas, but it appears not enough inoculum is present in the U.S. to have caused a major problem yet. Given the low level of inoculum and dry up weather until now, I feel rust will be of minimal concern this year, if at all.

There is a lot of information available, but we tried to communicate our thoughts to you throughout the winter. We wanted to be sure if we sprayed we knew why and when. Based on the crop as of today, if you sprayed prior to small pods (R3), you were premature and will probably not recoup your investment.

Our hopes were that, based on past history, we could keep the bulk of the crop at one spraying. If you stayed tuned, you should have reached this goal. Once we got to R3 we were going to decide whether to spray based on yield potential, planting date, crop rotation, and variety. Hopefully you stayed tuned in, if not maybe in the future. If rust does not increase this season, it could possibly be several years before it becomes a major concern; time will be the determining factor.

All in all, this crop is fairly clean. We are seeing scattered problems from a few insects, but disease pressure is lower than we have observed in five or six years.

Potato leaf hoppers are being observed statewide. The degree of damage is based primarily on the variety, but we have damage more widespread than we have ever observed. All in all insect pressure is light. Spider mites have popped up and this has never been observed as a problem in beans. Stink bug numbers are not at treatable levels but that will probably change.

This issue of Agronomy Notes was edited by Emily Dabney.

Calendar of Events

JULY

9 Mississippi Boll Weevil Management Annual Meeting, Holmes Community College Forum, Grenada, MS, 10:00 a.m. For more information contact Jeannine Smith (662) 325-2993 or email msbwmc@ext.msstate.edu.

20 Cotton Field Day, Delta Research and Extension Center, Stoneville, Mississippi, 8 a.m.-noon. For more information contact Dr. James Smith (662) 686-9311.

21 Rice/Soybean Field Day, Delta Research and Extension Center, Stoneville, Mississippi, 8 a.m.-noon. For more information contact Dr. James Smith (662) 686-9311.

27-30 Mississippi Agricultural Industry Council and the Mississippi Seedsmens' Association Annual Summer Meeting, Orange Beach, AL. For more information contact Tracy Gregory (662) 325-3992 or visit MAIC's website at www.maicms.org.

AUGUST

4 Agronomic Practices Research and Demonstration Tour for Cotton, Soybeans, Corn and Sweet Potatoes, Pontotoc Ridge Flatwoods Branch Experiment Station, Pontotoc, MS, 7:30 a.m. For more information contact Dr. Mark Shankle (662) 566-2201.

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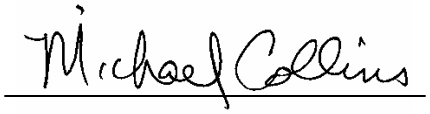

Dr. Michael Collins
Department Head