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Mississippi State University Extension Service

Agronomy Notes

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Corn and Wheat
by Dr. Erick Larson

Addressing Fertility Problems – Fertility will surely be a key factor determining crop profitability for all crops this coming season. (For more information - see Dr. Oldham's notes, pages 5-7). Right now is the best time to assess and address many fertility issues, so they do not cut crop productivity. Applying and incorporating lime during the fall is necessary to allow pH neutralization before the cropping season. Of course, soil testing is the foundation of a sound fertility program. Soil testing eliminates guesswork, allowing you to address nutrient limitations with appropriate fertilizers before problems arise. Thus, you apply only the necessary fertilizer, which will likely reduce expense and improve crop response! You should test soil at least every three years, using good sampling techniques and proper equipment. Since Mississippi corn is normally grown in yearly rotation with other crops, more frequent or even yearly soil testing may be beneficial, because crop nutrient demands often differ substantially. Phosphorus deficiency often occurs following cotton or soybeans, because corn requires double the amount needed for cotton or soybeans. Potassium deficiency often occurs following a high-yielding soybean crop, since 70 bu./a. soybeans remove about 100 pounds of potassium from the soil. However, wait until the spring to apply potassium on low CEC or sandy soils, because of leaching problems.

Keys to High Wheat Yields – Mississippi wheat growers produced an estimated record 62 bu/a state average yield last year, and some produced farm averages over 90 bu/a. What were the keys to these yields? I believe proper management timing is critically important. While many inputs, such as wheat variety selection and fertility needs are essential to high yields, spending money on inputs will not generally substitute for poor timing. One of the most important issues, wheat planting date, will be highlighted this issue.

Don't Plant Wheat Early – Planting date might appear to be a relatively trivial factor in the grand scheme of wheat production (particularly since wheat is often grown for forage), but is absolutely critical to high grain yield. For example, a summary of management practices from the Kentucky Wheat Production Contest (where the winners all exceeded 100 bushels per acre) showed only one entrant planted their field prior to the recommended optimal time. Planting wheat early unnecessarily exposes it to potential development, fertility, weed and numerous pest problems which ultimately reduce yield potential. The fact that southern winters are mild often aggravate this situation, because the onset of dormancy may vary considerably from year to year and temperatures may be warm enough to encourage substantial growth during the winter. Thus, growers accustomed to gaining developmental advantages from planting summer crops early, such as corn and soybeans, may run into severe problems by using the same strategy with winter wheat. The adverse effects from excessive fall growth potentially include winter and/or spring freeze damage, development of Barley yellow dwarf virus, Hessian fly and armyworm infestation, disease problems, more weed competition, poor nutrient use, and increased lodging. In fact, growers in north and south Mississippi have experienced severe freeze injury during the past two seasons - only the heart of the Delta region has escaped serious damage. The extent of yield loss associated with spring freeze injury normally increases drastically with early-maturing wheat. Thus, we need to carefully manage variety maturity and planting date, as these factors both affect wheat maturity. Early-maturing varieties should be planted during latter stages of suggested planting dates to avoid excessive development, exposing these varieties to substantial freeze damage in the spring. Conversely, late-maturing wheat varieties should be planted before early varieties. We should also plant multiple varieties differing in maturity, to spread risk, since temperatures can also influence wheat maturity tremendously.

Figure 1. Early wheat planting is prone to failure, due to many potential problems, including spring freeze injury.

Wheat continued... by Dr. Erick Larson

Optimum Planting Dates - The suggested wheat planting dates (within 10 to 14 days of the average first frost date in the fall) should provide warm enough temperatures and long enough days for seedling emergence and tillering to begin before dormancy occurs. This normally corresponds to:

North and Central Mississippi: October 15 - November 10
Delta Region: October 20 to November 15
South Mississippi: November 1 to November 25
Coastal Region: November 15 to December 10

Suggested Seeding Rates – Wheat growers should strive to establish 1.0 to 1.3 million plants/acre or 23 to 30 plants/ft.^{2}. Wheat seed size can range from 11,000 to 18,000 seeds per pound, so a grower should base seeding rate on the number of seeds (seeds per pound), rather than on the volume or weight of the seeds (bushels per acre) – particularly since seed price is high. Suggested seeding rates vary considerably for different planting methods. Planting with a grain drill should produce good emergence (80 to 90 percent of planted seed) under normal conditions. Thus, plant about 1.1 million to 1.6 million seeds per acre (varies from 75 to 125 pounds of seed per acre) with a grain drill. This seeding rate corresponds to 18-21 seeds/ft. for 7-8 inch drill spacing, or 26 seeds/ft. for 10-inch drill spacing. Growers broadcasting and incorporating seed should use higher seeding rates (40-45 seeds/ft.^{2}), because emergence success will likely be modest (60 -70% of planted seed). Growers broadcasting small grain seed on the soil surface should generally utilize very high seeding rates (50-60 seeds/ft^2), because emergence and seedling survival can be relatively low (around 50% of planted seed). For more information, please refer to Publication 2401 "Planting Methods and Seeding Rates for Small Grain Crops." http://msucares.com/pubs/publications/p2401.pdf

High Yield Seeding Rates? – Many wonder whether wheat yield can be improved by drilling more seed than standard. However, wheat grain yield is relatively unresponsive to seeding rate, unless planting dates are considerably later than normal. In fact, a recent University of Arkansas study (Dr. Jason Kelley) showed no significant yield difference for seeding rates from 60 to 180 pounds per acre. Thus, utilizing a drill and conservative seeding rates, may substantially improve enhance your bottom line. Healthy wheat has tremendous tillering ability to compensate for less than optimum stands and the south's warm winter climate typically allows wheat to fulfill this potential. Higher than normal seeding rates may also promote lodging and disease infection.

Wide Drill Row Spacing – Many consider planting wheat with a wide-spaced drill (10-15 inch), more appropriate for soybeans. Research data generally indicates only slight yield difference between 10-inch drill spacing and narrower widths. However, expect about 5-15% yield reduction with 15-inch spacing compared to normal widths (8-inch or less). This yield loss cannot be overcome by increasing seeding rate. In fact, seeding rates (per acre) can be reduced somewhat in 15-inch rows with little yield loss, because the optimal seeding rate per linear foot will be comparable. When planting wheat in 15-inch rows, I would suggest relatively tall varieties that develop lush canopies and tiller well.

No-Till Planting - You can successfully establish and produce small grains in no-till systems, but you need to closely manage drill performance. The presence of heavy plant residue in no-till systems, may restrict drill penetration, seed placement, and furrow closure. Thus, you should closely check drill performance in the field, reduce drill ground speed, and increase seeding rate by 10-15%, compared to drill rates in conventionally prepared seedbeds, to compensate for difficult planting conditions. Drill performance in standing stalks may be improved by drilling at an angle slightly different from the direction of the existing crop row. This redistributes the residue concentration zone continuously along the drill's frame, minimizing residue accumulation.

Weed Control - A burndown herbicide applied prior to planting and/or before crop emergence is essential to eliminate weed competition during emergence and early tillering stages, if weeds are present in a no-tillage system. Tillage may also serve the same purpose in conventionally prepared seedbeds. In fact, tillage may be the most practical option to control volunteer Roundup Ready prior to planting wheat. Maintaining a weed-free environment during planting and stand establishment is essential because weeds are very competitive with young wheat plants, particularly if they have a head start in size.

Figure 2. Early weed pressure can effectively choke out wheat, even when it is controlled in the spring.

Forages
by Dr. Rocky Lemus

The first step in establishing winter annuals is selecting a suitable site. The best soils for winter annuals are well-drained and fertile. Winter annuals can be established using tillage or no-till (sod seeding). The primary advantage of using tillage to establish winter annuals is that stands can be planted earlier and established faster to produce more fall forage when competition from existing sod is absent. Winter annuals can be broadcast planted, but risk of failure is higher than with drilling. Broadcasting is better suited to ryegrass than to small grains. Light disking before or after (or both) broadcasting may improve soil-seed contact and result in better stands. When seed is broadcast planted, planting rates should be increased by at least 20 percent. Winter annual seed can be mixed with fertilizer and broadcast planted with a fertilizer spreader. However, if this is done, it is vital that seed be planted immediately after mixing because prolonged contact with fertilizer may kill seeds.

Competition from warm-season sods that have not yet gone dormant is the most serious problem for early sod-seeding of winter annuals. Warm-season grass on no-tilled sods must be controlled in some way prior to planting winter annuals. Actively growing warm-season grasses rob water and soil nutrients from winter annual seedlings, and shade from a tall grass canopy slows down seed germination and seedling growth. Even if already dormant, thick dried grass residue also shades seedlings and can interfere with correct seed placement when drilling. For best annual stands, warm-season grass residue should be no more than 2 inches in height when annuals are drilled, and the warm-season grass should not be actively growing. Residue can be managed by close grazing, bush-hogging or making hay prior to drilling. Shallow (1 inch) disking of sods to destroy no more than one-third of the sod before or immediately after planting may allow earlier planting and earlier growth of winter annuals on sandy or loamy soils. Disking of heavy clay soils also is undesirable because it increases roughness of the field. Establishment of winter annuals into bahiagrass is likely to be more difficult than into bermudagrass because of the extremely competitive nature of bahiagrass, which grows later into the fall than bermudagrass. The easiest method of sod control is to delay planting until the sod is dormant or nearly so. Overseeding permanent grass pastures with winter annuals usually decreases annual yield of the perennial grass to some extent as a result of shading and competition in spring. This is especially a concern with annual ryegrass because it grows so late into summer. Pastures should be stocked heavily enough in April and May to prevent formation of a dense canopy of headed-out ryegrass that will shade the understory warm-season grass and delay its growth.

Seeding Depth and Planting Rates — Recommended planting date for winter annuals in southern Mississippi late September to late October. In northern Mississippi winter annuals are sod-seeded in early September to early October. Ryegrass and clover seeds should be planted shallower (1/8 to ¼" depth) than large seeded small grains (½ to 1" depth). Ball clover should be broadcasted. Planting rates vary depending on the planting method used and the species mixtures. Mixing ryegrass seed with fertilizer and broadcasting with spreader equipment is popular. Plant the seeds the same day they are blended, especially where high rates of nitrogen fertilizer are used. If legumes are included in the seeding mixture, do not mix freshly inoculated legume seed with fertilizer because fertilizer can damage the inoculant.

Cultivar Selection — When selecting a variety, the key is to select one with a proven track record of good performance in the same region where it is to be used. Adaptation to soil conditions (soil type, drainage, pH), local climate (rainfall, minimum and maximum temperatures) and tolerance or resistance to local plant diseases and insect pests are the critical issues. When planting a cool-season pasture, it is wise to plant a mixture of species as each has slightly different growth habits. Planting mixtures of winter annual species stretches the supply of high-quality forage over a longer period when an early-maturing species is grown in combination with a later-maturing one. This will extend the grazing time and prolong the productivity of the pasture. Inclusion of legumes in the mix is also a good idea. Annual ryegrass is usually the most common planted species. It could also be mixed with small grains (rye, wheat, oats, and triticale). Commonly used mixtures are wheat/annual ryegrass and rye/annual ryegrass. A three-way mixture, such as wheat/rye/annual ryegrass, provides early-, mid-and late-season grazing.

Fertility — The three primary nutrients of concern for pastures in cool-season annual pastures are nitrogen (N), phosphorus (P), and potassium (K). Grasses generally use nitrogen (N), phosphorus (P) and potassium (K) in a 4-1-3 ratio. Testing a soil sample is the best way to determine which nutrients are adequate, which are lacking and at what amounts. With a soil analysis, a fertility program can be structured to add the insufficient nutrients. Without the analysis, nutrients may be wasted and add to ground or surface water pollution, or be insufficient for maximum production.

Phosphorus is essential for early root development, particularly in cold soils during fall and winter. Phosphorus is less available to plants in cold soils. If phosphorus is limited, tillering can also be reduced. If a prepared seed bed, incorporate the phosphorous.

Potassium is important to reduce plant stress (cold tolerance). Nitrogen improves both grass yield and protein content. It also improves the vigor of grass plants, which can thicken stands and reduce weed invasion. When adequate soil moisture is present, economical rates of nitrogen more than double forage production. Apply N just prior to the period of most rapid grass growth and when animals will get the best forage utilization.

Forages continued... by Dr. Rocky Lemus

Do not apply N at seeding since it could leach out of the system reducing nitrogen use efficiency by the emerging plants. A good rule to remember is that it takes 0.36 pounds of nitrogen to produce 10 pounds of forage to produce 1 pound of gain in livestock.

Pasture Program

Seeding: apply nutrients recommended in soil report.

After Emergence (2 to 4 leaf stage): 30 – 45 lb N/ac.

After First grazing: 45 – 60 lb N/ac.

After each subsequent grazing (or monthly): 30-45 lb N/ac.

Hay or Silage Program

At Seeding: apply nutrients as recommended in soil report.

After Emergence (2 to 4 leaf stage): 30 – 35 lb N/ac.

After first cutting: 60 to 75 lb N/ac.

After 2nd cutting: 45 – 60 lb N/ac.

If third cut is harvested or if RG is grazed.

Legumes — Legumes can improve the production and nutritional value of pastures while reducing nitrogen fertilization requirements. It is important that a pH of at least 6.0 is maintained. A good legume stand should be 30% to 40% clover in the pasture. Legumes have several benefits: (1) they reduce the need for nitrogen fertilizers (they can provide form 50 to 200 lb N/ac/yr to the pasture), (2) they improve seasonal distribution of forage dry matter by boosting yields and extending the grazing season and (3) they improve forage quality by increasing protein levels and overall digestibility of the forage.

Several clover species are suitable for winter forage production. **Red clover** also is an upright, crown-forming legume adapted to tall grazing heights and long rest periods. Although it is a short-lived perennial throughout much of the U.S., it tends to behave as an annual in the South. Red clover is more persistent under rotational grazing. **White clover** is a low-growing, clone-forming legume well adapted to continuous grazing. In the northern regions of the U.S., it can be a long-lived perennial. In the far southern regions, it tends to behave as an annual. **Arrowleaf clover** has been a highly productive, annual clover with excellent reseeding potential. It matures later than most annual legumes and can grow 2 to 4 feet tall. Arrowleaf clover remains more productive if grazed to a height of 2 to 4 inches in early spring. Regrowth is limited after cutting for hay. **Crimson clover** also is a winter annual legume. Although it produces excellent forage, it has relatively poor reseeding abilities, necessitating reseeding each fall. Crimson clover will produce more forage at lower temperatures than other clovers and can be grazed throughout winter. **Hairy vetch** is a dependable, widely adapted, cool-season annual legume. If allowed to mature, hairy vetch has good reseeding capability. **Ball clover** is very tolerant to poor drainage. Bloat can be a problem. Ball clover is more tolerant to acidity than crimson clover. It tolerates heavy grazing and has good reseeding potential.

Grazing Management — Winter annual pastures are suitable for beef and dairy cattle, sheep, goats and horses. Forage quality is excellent. Consider the plant first when deciding on a grazing management plan. Plant leaves capture sunlight and convert it into energy. Without leaves, the plant cannot create energy. If the leaf area is reduced radically, plants start robbing the root system to replace the foliage. The root system starts to die if plants are not allowed to maintain sufficient foliage to develop or regrow after grazing. Before turning livestock on the field, forage should be at least 6 to 8 inches tall, 4 to 6 weeks after emergence and well tillered and well rooted. To maintain enough leaf area for continued growth, do not allow animals to graze forage to below 3 to 4 inches.

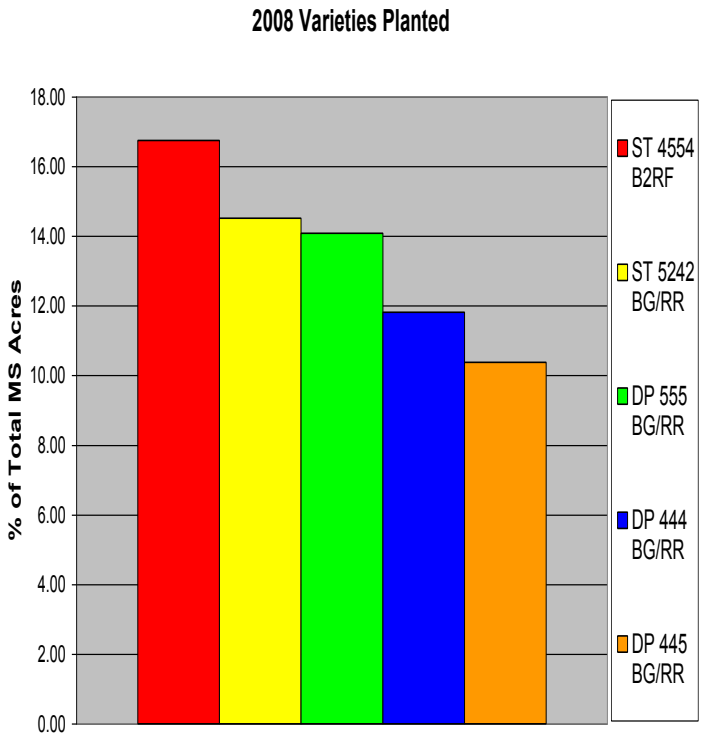
If only cool-season grass pastures are to be used, extra management is required to ensure adequate forage for season long grazing. Forage production and quality can be optimized by splitting the pasture into paddocks then grazing in a rotation allowing time for regrowth to occur between grazing periods. Limit grazing is also a good strategy with annual ryegrass. If a producer is using strip grazing, makes sure that it begins close to water source to minimize losses by animal trampling. Rotational grazing requires more management than continuous grazing. Managers must decide when to rotate based on: (1) how many animal units a rotation can maintain, (2) when to move to another pasture; (3) when and how much additional nitrogen to apply; (4) whether to allow peak-hour grazing (i.e., 2 hours in the morning and 2 hours in the afternoon); and (5) how long to rest pastures before grazing.

Stocking rate is a critical factor in the success of winter annual pastures. If stocking rate is too high during periods of slow grass growth, overgrazing will decrease the ability of the grass to recover during favorable period. Stocking rate will vary according to the productivity of the particular pasture and the amount of nitrogen applied, but 1 to 1.5 (fall/winter) and 1.5 to 2 (spring) stocker calves per acre is a realistic target in most cases. The minimum ADG for profitable stocker cattle production is 1.5 pounds per day, and this goal is easily achieved on winter annuals. Winter annual pastures can provide an abundance of high-quality forage. Producers can earn the most profits when they use best-management practices that fertility, variety, and grazing management.

Cotton
by Dr. Darrin Dodds

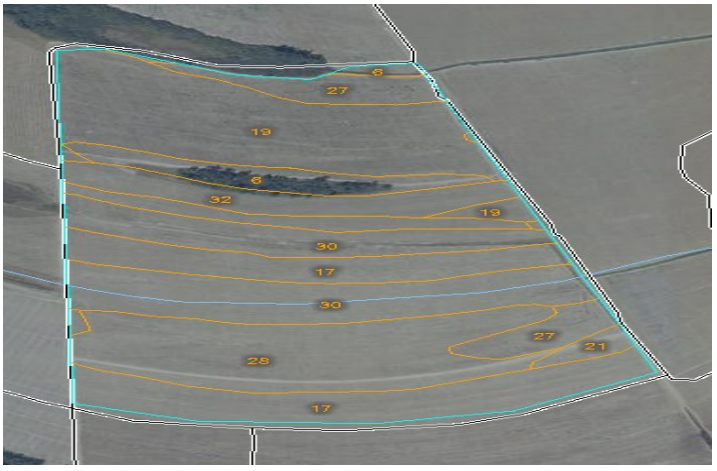
Crop Update: As of this writing (October 10), approximately 15-20% of the 2008 crop has been harvested compared to 58% at this time last year. 54% of the crop is rated as good to excellent based on USDA projections. However, boll rot and hardlock have caused significant yield reductions for many growers. We have observed fields this fall that have had up to, and in some cases, exceeding 60% of the bolls hardlocked or rotten. Yields have also been highly variable depending on location. In a recently harvested variety trial in the south Delta, the highest yield in the test was 1.5 bales. However, other areas are reporting 2 to 2.5 bale cotton. This year is shaping up to be one that didn't want to start (weather) and one that doesn't want to end (weather).

Varieties Planted: The USDA recently released their annual cotton varieties planted report for 2008. A major change has occurred compared to the past several growing seasons. 'DP 555 BG/RR' has been planted on ~30% of the acres in Mississippi over the past several growing seasons; however, this was reduced by over 50% in 2008. Additionally, 'ST 4554 B2RF' was planted on 7% of our acres in 2007 whereas in 17% of our acres were planted to this variety. The percentage of our acres planted to 'DP 444 BG/RR' and 'DP 445 BG/RR' have declined somewhat from 15% last year to about 11-12% this year. For those of you who are planning to plant cotton next year, I would strongly encourage you to start and/or continue to examine the Bollgard II or Widestrike varieties as next year will be the final growing season for Bollgard I varieties.



Soil Sampling: No matter what crop you are growing this year or are planning to grow next year, a sound soil fertility program is essential. With record high fertilizer prices, the cost of soil sampling as well as analysis of the samples will more than likely pay for itself in potential savings on fertilizer. Historically, our recommendations for soil sampling have called for samples to be collected every three years; however, in light of current fertilizer prices as well as profit margins, it may be beneficial to collect samples every two years. Keep in mind that not all soil samples are created equal. There is a vast difference between hurriedly collected a sample from a location near the truck or four wheeler and collecting a quality sample that will provide useful information. The soils map below is from Leflore County, Mississippi and clearly illustrates how soil types (and potentially fertility needs and recommendations) can change drastically within a given field.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6	Alligator clay	11.1	5.2%
17	Dubbs loam	40.9	19.3%
18	Dubbs very fine sandy loam	7.0	3.3%
19	Dubbs-Dundee complex	43.8	20.6%
21	Dundee loam	2.4	1.1%
27	Tensas silty clay	13.4	6.3%
28	Tensas silty clay loam	36.8	17.3%
30	Tensas-Alligator complex	43.5	20.5%
32	Tutwiler very fine sandy loam	13.5	6.3%
Total		212.2	100.0



Cotton continued…
by Dr. Darrin Dodds

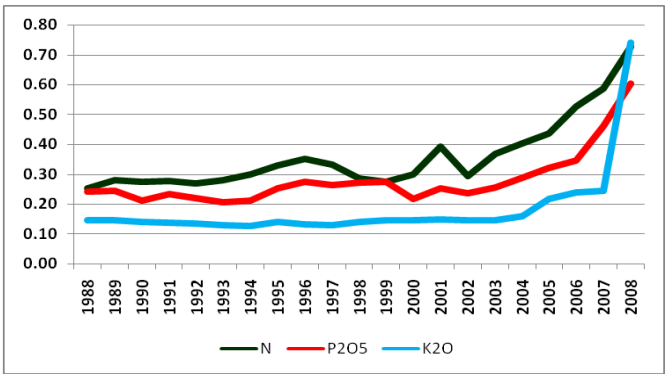
Regardless of whether you are collecting samples on a completely random basis every 10 acres or collecting samples based on soil type changes using GPS/GIS technology, it is important to collect a composite sample. A composite sample should consist of a minimum of 6 to 8 soil cores in each sampling unit (i.e. grid, etc.). Collecting a composite sample will help to capture the true nature of what the fertility level of each sampling unit is and also help provide the most accurate estimate of what the fertility needs for a given crop are. Generally speaking, we do not like to have one composite sample represent more than 20 acres; however, in a perfect world we would like to see one composite sample for every 2.5 – 5 acres depending on the situation.

2008 Cotton Short Course: The 25th Annual Cotton Short will be held at the Bost Extension Center on the campus of Mississippi State University on December 1-2, 2008. Speakers will include experts from Mississippi State University and surrounding institutions, Mississippi Farm Bureau, and USDA-ARS. The program for the 2008 Short Course is nearly complete and will be available in the near future. Pre-registration fees are $80 (until November 25, 2008) and $100 thereafter. Pre-registration for the 2008 Cotton Short course is now available on-line at: http://msucares.com/crops/cotton/short-course08/index.html

Nutrient and Soil Management
by Dr. Larry Oldham

Fertilizer Prices — Fertilizers cost more in late 2008 than ever. The price per pound of nitrogen (based on ammonium nitrate, 34-0-0), phosphate (based on triple superphosphate, 0-46-0), and potassium (based on muriate of potash, 0-0-60) as reported by the National Agricultural Statistics Service in the Mississippi region for the period April, 1988 to April, 2008 is shown in Figure 1. Since April prices have increased even more, including one major potassium supplier raising wholesale prices $250 per ton effective September 1. In mid-August urea prices in Mississippi were approximately $1 per pound of nitrogen in the material.

Figure 1. Prices per pound of nutrient in three fertilizers, 1988-2008, April Prices Paid reports, National Agricultural Statistics Service.



Several factors contributed to these increases including increased domestic demand due to higher domestic grain prices, increased demand by India, China, and Brazil, the crude oil and natural gas markets, and the decreased value of the dollar in international trade.

The Fertilizer Decision — Some basic questions need to be answered to manage fertilizer well:

- Are fertilizers necessary to produce the crop?
- How much fertilizer is needed if necessary?
- What fertilizers are available if needed?
- When is the best time to apply fertilizer?
- How should the fertilizer be applied?

The answers to these questions address plant nutrition requirements and supplies, but remember many factors interact to determine the success of a crop. Variety selection, water management, insects, nematodes, diseases, weed pressure, and climatic conditions all influence nutrient use efficiency.

Soil testing is critical — Soil testing is the first response to this situation. All growers should test their fields at least every three years and preferably every other year. Materials, forms, and directions for soil testing are available from each local Extension office. Commercial soil testing laboratories are also available.

Soil pH and lime — The most important information on the lab report is the soil pH level, and whether lime should be applied to adjust it. Against other budget considerations in managing nutrients, liming is the most important aspect of nutrient management in a particular soil.

Soil pH controls the plant availability of many nutrients present in the soil. This is particularly crucial for P. At higher and lower pH values, much of the P in soils is in forms that plants cannot use. In the 6 to 7 pH range, P is more available for plant use. Maintaining pH levels also benefits plant nutrition through better root growth, enhanced microbial activity, and better soil physical properties.

Lime prices have not been as volatile as fertilizers, although it is a significant investment in Mississippi. The 'hard' lime products, calcitic and dolomitic limestones, must be transported via train, barge, or truck into the state. Soft lime products (marl) are produced within the state, and are good options for soil liming programs. However more of the material is needed to decrease soil acidity problems because marl has less chemical neutralizing capacity than calcitic or dolomitic limestones.

Soil test based recommendations — Based on the results of the testing, there will be recommendations offered by the laboratory that should indicate whether the soil can provide sufficient nutrition without fertilizer. The phosphate (P2O5) and potash (K2O) equivalents are usually given as pounds per acre; each number given as pounds per acre is rated within a category. MSU uses five: very low, low, medium, high, and very high. This relates the amount measured in the soil to the probability of a response to added nutrients. Very high P or K levels mean there is a small chance of plant response to fertilizer. Conversely, soils testing very low are more likely to respond if fertilized.

If the category is high or very high, there is no need to apply P and/or K fertilizers because the soil has capacity to grow plants in the current year. Soils in the medium may or may not respond to fertilization, the fertilizer recommendations for P and K in the MSU system in this category are 'maintenance' levels.

Nutrient and Soil Management continued… by Dr. Larry Oldham

Soils in the very low or low categories should respond to fertilizer, therefore the fertilization decision depends on the relative risks of not fertilizing versus fertilizing.

Many farmers work with private laboratories, consultants or crop advisers for their soil fertility assessment and management program. In these cases, both sides of the arrangement should discuss the goals of the farm business, the appropriateness of the testing laboratory methods and recommendations for Mississippi soils and climates, the philosophy of the recommendations, and budget considerations.

Other considerations in fertilizer rate selection and application — It is easy to determine the amounts of nutrients that various crops utilize (total uptake) and how much is removed by harvest. However, this information does not differentiate between soil supplied nutrients versus fertilizer supplied nutrients, and may lead to inefficiency and unneeded expense if application rates are based solely on them.

Equipment maintenance and calibration are fundamental to efficient nutrient applications. Know the appropriate application width of the equipment for the material being applied. Avoid applying near surface water bodies.

Precision technologies may allow more efficient fertilizer management through identifying nutrient deficient or acid soil areas, or more responsive zones. However, if not these tools are not already employed by a farm, information management software, equipment acquisition or rental, consulting charges, soil and mapping charges, and training time and costs can be significant investments.

Band applications may increase fertilizer efficiency, and, root growth may be stimulated in the application zone. Some Midwestern advisers current suggest cutting P and K rates in half when banded applications are used. However, research results on band applications in the Mid-South have not been sufficiently consistent to recommend this practice in our more weathered soils. Do not confuse this with applying or incorporating N fertilizer in the soil to decrease loss by volatilization (discussed below). With this uncertainty, in Mississippi soils, banding may improve N efficiency due to less volatilization, and may improve K use efficiency, but P and K rates should not be decreased on this factor alone.

Nitrogen management — Nitrogen fertilizer management in warm and humid Mississippi is not based on analyzed soil tests. To now, N soil testing techniques have had limited applicability however research is continuing. Nitrogen fertilization strategies are crop specific, and, where applicable, based on common sense attainable yield goals.

Nitrogen fertilizer efficiency depends on the particular product and how it is applied. Urea and urea-ammonium nitrate solutions are used widely, however N in each may be lost by volatilization to ammonia gas which drifts away from the field. Conditions that contribute to loss in this manner include: no-till management, temperatures above 65°F, high organic matter/surface residues, high humidity, and not incorporating the material. If surface application is necessary in these conditions, time it to approaching rain or irrigation. Some products that slow the conversion to ammonia have shown promise in Mississippi tests.

Ammonium nitrate is an excellent fertilizer, and does not volatilize. It is the fertilizer of choice by many hay and pasture growers in the state. It is also an explosive; therefore many retail outlets do not stock it due to insurance, liability, and security issues. Many of those dealers do have an alternative available with the same fertilizer content listed, 34-0-0, that is usually a 50-50 blend of urea and ammonium sulfate. While containing the same amount of N, the alternative mixture also retains the management considerations of urea N loss via volatilization, and the higher soil acidifying capacity of ammonium sulfate.

Legume derived nitrogen— Soybeans and other legumes have the ability to fix atmospheric N_2 for their own use through species-specific bacterial symbiotic relationships. Therefore bacteria which work with soybeans will not work with peanuts. The bacteria will persist in soils for a few years without the host plant being present. However, if it has been three years or longer without the host in the field, it is imperative that the legume seed be inoculated with the proper rhizobia species at planting.

The increased cost of N fertilizer has stimulated interest in legumes as cover crops. Factors to consider in selecting a legume cover crop include ease of establishment, seed cost, fall and spring production potential, N production potential, and winter hardiness. Research by MAFES in the 1980's found that crimson clovers and hairy vetch were the most consistent. Nematodes can be an issue with these crops, so soils should be sampled for nematodes and submitted to the MSU Plant Pathology Laboratory for analysis prior to investment in this crop. Additionally, seed prices have increased in 2008, and local availability issues may exist.

Poultry litter as fertilizer— There is unprecedented interest in broiler litter as fertilizer for row crop production in Mississippi. There is no doubt litter is an excellent source of plant nutrients. We have about five decades of experience using it in forage and pasture management in south central and northeast Mississippi; however there is little row crop production in the chief poultry producing region.

Nutrient and Soil Management continued… by Dr. Larry Oldham

Providing nutrients to growing plants hopefully results in a response that can be measured with dollars. Litter also improves soil properties such as tilth, water holding capacity, and nutrient holding capacity. There is a tendency to credit it as a liming material, and while it seems to increase pH, it is not a predictable response.

We know it is an excellent source of N, P, and K; it also contains calcium, sulfur, magnesium, and micronutrients. The actual nutrient content of litter varies due to different bird and litter management programs. The best option is analysis of the actual litter that will be used by the Mississippi State Chemical Laboratory or commercial laboratories.

Variability in nutrient content leads to several necessary agronomic considerations. Broiler litter is a slow release organic fertilizer with about 50% of the N applied used by plants in the year of application. A significant percentage of the P is available, and practically all litter K is plant available the year of application. Litter is relatively light (31 pounds per cubic foot), so using the proper equipment, calibrating it, and maintaining proper spreading widths are important for uniform application.

Another issue affecting nutrient efficiency of litter is timing application with respect to plant use. It is most efficient to apply litter to perennial crops when plants are actively growing because the N becomes available over the first one to three weeks after application. In row crops, litter is most efficient when applied a few days prior to planting. With no actively growing cool season crop, fall applications are inefficient, particularly for N use.

Litter storage is important when litter cleanout time and field application are not well-calibrated. Many poultry growers have dry stack sheds to store litter and prevent nutrient runoff, however other farmers acquiring litter from a grower or broker may need to temporarily store it. Auburn University researchers recently compared uncovered litter piles to various cover options (6 mil plastic, Haygard, polyacyrlic coating). All systems apparently lost mass while sitting; the lower mass increased P concentrations regardless of cover. Nitrogen was lost from both covered and uncovered piles, but 50% more was lost in the uncovered piles. Potash concentrations decreased from leaching out. There were significant nutrient losses in runoff from the pile systems. Covering litter with 6 mil plastic or Haygard should protect the investment in the nutrient content of the litter.

Growers interested in using broiler litter, but not in a poultry area may contact potential suppliers through the Mississippi Farm Bureau Federation clearinghouse at http://www.msfb.net/PCH.aspx. Again, it is best to have nutrient analysis of the actual litter in question. How much is it worth? The actual value is determined on the open market factoring in demand, supply, transportation, storage, competitive products, and other factors.

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