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1975 crop and fertilizer guidelines for Mississippi.

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1975 Crop and Fertilizer Recommendations for Mississippi

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MISSISSIPPI AGRICULTURAL & FORESTRY EXPERIMENT STATION

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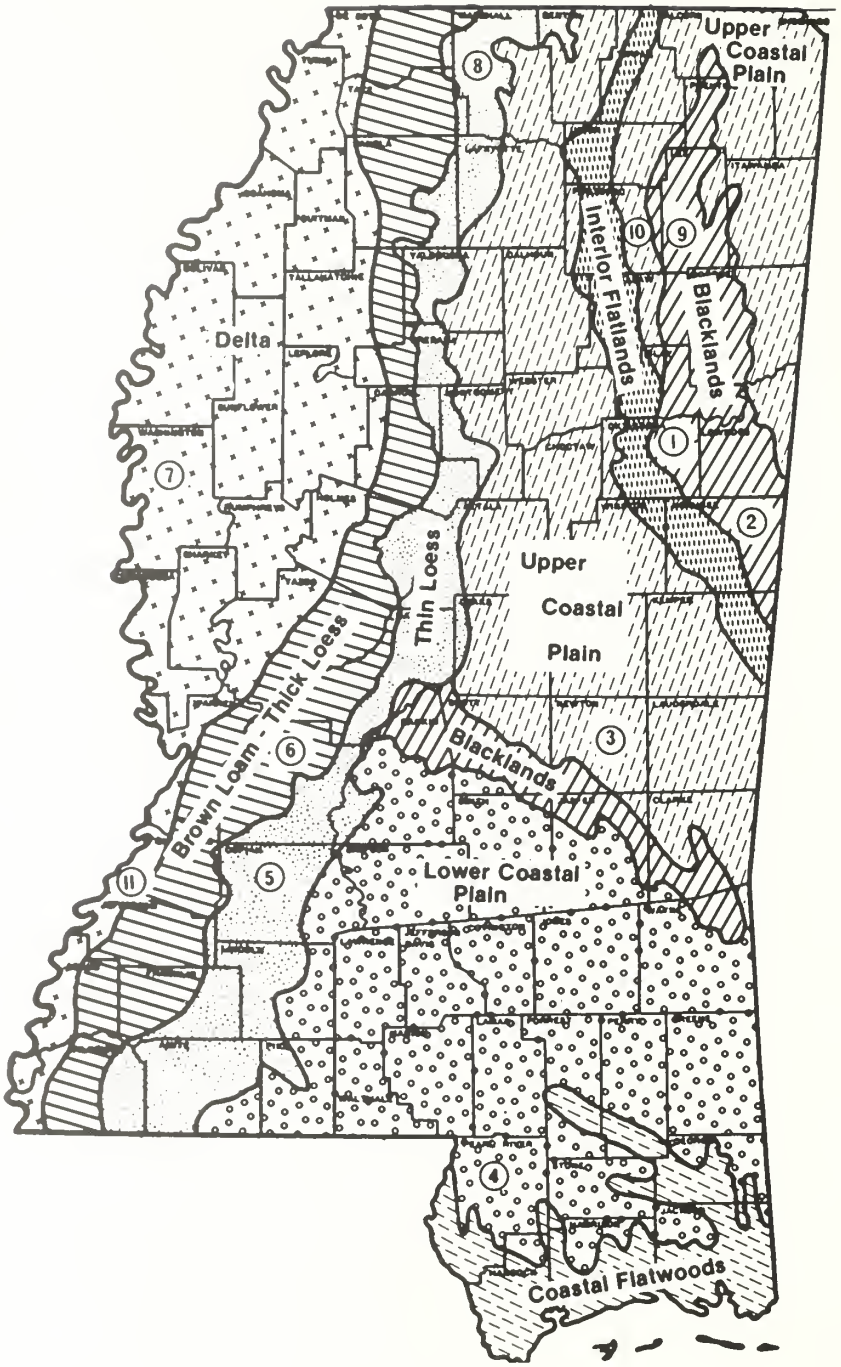

This map shows land resource areas of the state and how Experiment Station locations fit into them. Number 1 is the headquarters at Miss. State. Branch stations are: 2 Brooksville, 3 Newton, 4 Poplarville, 5 Crystal Springs, 6 Raymond, 7 Stoneville, 8 Holly Springs, 9 Verona, 10 Pontotoc, and 11 Alcorn.

1975 Crop and Fertilizer Recommendations for Mississippi

Crop and fertilizer recommendations are made annually by the Mississippi Agricultural and Forestry Experiment Station. These recommendations incorporate the latest research findings at Mississippi State and the Branch Experiment Stations. Included is information on varieties and fertilization and seeding practices for crops commonly grown in the state, as well as information on lawns and other turf areas.

Because of varying soil and weather conditions and other local factors, no single crop variety or fertilizer recommendation is suitable for all of the state; nonetheless, these general recommendations are useful guides for crop production. Of course these recommendations assume that other good farming practices will be followed.

If more specific information is needed, it may be obtained from the Cooperative Extension Service, the Experiment Station, your County Agent, or other trained agricultural workers in your locality.

Soil Testing Service

You get maximum profit from fertilizer only when you use the right kind and amount on each field. Through the Soil Testing Department of the Cooperative Extension Service every farmer can get this information as well as recommendations for exceptionally high production goals. Also, the Soil Testing Service provides information on liming practices.

Soil testing is a free service. Soil sample boxes, mailing cartons, and instructions for collecting samples are available in each county agent's office and in the offices of other agricultural agencies.

Plant Nutrients

Plant nutrients may be divided into two group---(1) those elements used by crops in relatively large amounts, the *macronutrients;* and (2) those needed in very small amounts, the *micronutrients.*

The first group includes nitrogen, phosphorus, potassium, calcium, magnesium, and sulfur. These are usually subdivided into the primary fertilizer nutrients---nitrogen phosphorus, and potassium---and the secondary fertilizer nutrients;---calcium, magnesium, and sulfur. The primary nutrients are applied to crops either as individual materials or as mixed fertilizers.

A fertilizer material usually contains only one fertilizer nutrient. Some examples are as follows: Ammonium nitrate (34% N), anhydrous ammonia (82% N), urea (45% N), concentrated superphosphate (45% P_2O_5), and muriate of potash (60% K_2O).

Mixed fertilizers contain two or more of the fertilizer nutrients. Each fertilizer bag is labeled with a set of numbers to show how much of each nutrient it contains. The first number shows the percentage of nitrogen (N); the second, the percentage of available phosphate (P_2O_5); and the third, the percentage of available (water-soluble) potash (K_2O). One hundred pounds of a 10-20-20 fertilizer thus contains 10 pounds of total N, 20 lbs. of available P_2O_5, and 20 lbs. of available K_2O.

Fertilizer ratio refers to the relative amounts of these nutrients. The fertilizer grade gives the guaranteed amounts of each fertilizer nutrient as a percentage. For example 8-8-8 and 10-10-10 are two different grades in a 1-1-1 ratio. Similarly 6-18-18 and 8-24-24 are two grades in a 1-3-3 ratio. Materials such as ordinary superphosphate may be labeled as 0-20-0.

Presently, fertilizer nutrients are either expressed as the oxide---phosphorus as P_2O_5---or as the element---nitrogen as N---but there is a trend toward expressing all fertilizer nutrients on the elemental basis. Accordingly, phosphate would be expressed as (P) and potash as (K) by using the chemical symbols for phosphorus and potassium, respectively. The primary "fertilizer nutrients" expressed on the elemental basis would then be shown as N-P-K on the fertilizer bag.

Some fertilizers are labeled both ways to familiarize consumers with the new labeling trend. When labeled on an elemental basis a 10-20-20 (N-P_2O_5-K_2O) would become a 10-8.2-16.5 (N-P-K). The conversion factors for potash are: K_2O x 0.83 = K; K x 1.21 = K_2O. The conversion factors for phosphate are:

P_2O_5 x 0.436 = P; P x 2.29 = P_2O_5. Only the method of labeling is changed, not the plant nutrient value of the fertilizer.

Fertilizer recommendations are given in this bulletin as pounds of N, P_2O_5 and K_2O needed per acre. Usually the farmer will have a choice of more than one fertilizer grade. For example, 48 lbs. each of N, P_2O_5 and K_2O may be supplied with 600 lbs. of 8-8-8 or 400 lbs. of 12-12-12. Since some deviation from the general recommendation does not affect net profit greatly, it is not necessary to apply exactly the amount of N, P_2O_5 or K_2O indicated.

Both the need for and the presence of the secondary nutrients in fertilizers vary. Research has shown that sulfur deficiency is likely to occur on soils in the Hill section when sulfur-free fertilizers are used. Accordingly, sulfur is recommended for crop production in this area, especially for cotton and legumes. A convenient and economical way to get the sulfur is to use mixed fertilizers that contain sulfur. Most solid mixed fertilizers sold in Mississippi contain adequate sulfur, but most liquid mixed fertilizers do not, unless special provision is made for adding it.

Scattered instances of sulfur deficiencies have been observed in the Delta. These deficiencies have been associated with land leveling on very sandy soils that are low in organic matter. Since mixed fertilizers are less commonly used in this area, other sources of sulfur may be more economical or convenient to apply.

Sources of sulfur that may be used include gypsum, elemental sulfur, ammonium sulfate, and ordinary superphosphate.

Calcium and magnesium are usually applied to soils as agricultural limestone.* On soils needing magnesium but not requiring lime, the addition of a water-soluble source of magnesium to mixed fertilizers is a very convenient method of supplying the magnesium.

The second group of nutrients is referred to variously as *trace elements, minor elements,* and *micronutrients.* They are needed by crops in very small amounts. Included are iron, manganese, zinc, copper, boron, molybdenum and chlorine. Thus far, only three (zinc, boron, and molybdenum) of these have been found to be appreciably deficient for crop production in Mississippi. These deficiencies have not occurred on all crops and have been restricted mostly to the Hill area.

Solid or Liquid Fertilizers

When used properly, solid and liquid mixed fertilizers are equally effective for crop production in most instances. Therefore, the choice as to which to use should be based primarily upon such factors as comparative costs, ease and uniformity of application, availability of application equipment and labor requirements rather than on differences in agronomic value.

Solid complete fertilizers that contain highly-ammoniated ordinary superphosphate (20% P_2O_5) are less effective than other complete fertilizers (both liquid and solid). Ammoniation of ordinary superphosphate converts some of the highly-effective water-soluble monocalcium phosphate to a much less effective water-insoluble apatite-like calcium phosphate, the quantity of which increases progressively with increasing ammoniation.**

In general, farmers are assured of good results from mixed fertilizer if 40 percent of the available phosphorus is water-soluble. Some manufacturers show the water-soluble phosphorus content of their fertilizers, though this is not required by law.

A substantial amount of nitrogen in liquid mixed fertilizers usually is derived from urea and-or ammonium nitrate. Nitrogen solutions containing either urea or urea and ammonium nitrate have been proven much less effective for surface application to permanent summer pastures than have either solid urea or ammonium nitrate. Therefore, solid complete fertilizers can be expected to be more effective for summer pastures than would liquid fertilizers containing urea.

Soil pH and Liming

Excessive soil acidity results in reduced crop yields. A recent summary of soil test results by the Cooperative Extension Soil Testing Department showed that 70 percent of the soils tested needed lime for legumes and 40 percent for non-legumes.

The degree of acidity or alkalinity of a soil is expressed by its pH; values below 7.0 indicate an acid soil, values above 7.0, an alkaline soil. Soil reaction, or pH, affects the availability of some of the more important plant nutrients in the soil.

Phosphorus and molybdenum, particularly molybdenum, are much less available to plants in

**The major objective of liming is to neutralize soil acidity.*

***Ammoniation of superphosphate to add nitrogen in the formulation and mixed fertilizers is a common practice. The production of ordinary superphosphate is declining rapidly. If the trend continues, its use in mixed fertilizers will be discontinued in the near future.*

very acid soils than in slightly acid to mildly alkaline soils. On the other hand, in strongly and very strongly acid soils (pH below 5.5), certain elements such as manganese and aluminum may become so available as to be toxic to plants.

Micronutrients such as iron, manganese, boron and zinc rapidly become less available as the pH of the soil is increased above 6.0. This is one reason why soils should not be overlimed.

Experience in Mississippi has shown that plant injury from deficiencies of boron and zinc is very likely to be associated with overliming. In the case of cotton and legumes, plant injury is very likely to be due to boron deficiency and with corn, and perhaps other grasses, to zinc deficiency.

Soils with a pH of 6.0 to 7.0 are well supplied with lime. If the pH is less than 5.5, the soil is strongly acid and needs liming. Most non-legumes grow best at soil pH values above 5.5 while most legumes do best if the pH is maintained above 6.0. Alfalfa does best at soil pH values above 6.5.

The amount of lime required to raise the pH of the soil to a desired value depends both on the initial pH and the lime-holding capacity of the soil. For soils of Mississippi having a pH of 5.5 or slightly below, the application of 3000 pounds of lime per acre to sandy loam soil, 5000 or 6000 pounds to loam and silt loam soil, and 7000 to 8000 pounds to clay loam and clay soils, respectively, has satisfactorily corrected lime deficiency for legumes. Since about two-thirds of the soils of the state have pH values of 5.5 or above (with 95 percent above 5.0) these rates of lime would bring the pH of most of the soils of the state within the range that is favorable for legumes. However, some soils need more, some less, and some none. *Therefore, the best practice is to test the soils for pH and lime requirement and apply lime as needed to maintain the pH within the desired range.*

Lime is lost naturally from the soil by crop removal and by leaching. The use of acid-forming sources of nitrogen and the turning under of legumes as soil builders accelerate leaching losses. For example, 100 pounds of nitrogen from such sources as ammonium nitrate, anhydrous ammonia and urea will cause the loss of calcium and other bases equal to about 200 pounds of lime. When applied annually at this rate, the loss would amount to one ton of lime every ten years due to fertilizer alone. Because of these losses, soils need to be limed periodically.

Generally, on sandy loam, loam and silt loam soils, a maintenance application of 2000 to 3000 pounds of lime per acre once every five to seven years is required for legumes and for non-legumes fertilized with nitrogen as recommended. On clay loam and clay soils, less frequent but larger applications are required. Except for the dark upland soils and the bottom soils of the Northeast Blackland area, maintenance application should be made to soils that have not been limed during the past five to seven years.

Although lime may be needed badly for non-legumes on some soils, the deficiency is not widespread enough to warrant a general recommendation for rates in excess of maintenance requirements. *When there is doubt have the soil tested.*

Areas going into permanent grass sod should receive the initial maintenance application of lime before sod is established. Subsequent maintenance applications may be broadcast on the established sod.

The principal liming materials available in Mississippi are ground calcic and dolomitic limestones, crushed chalk or marl from Mississippi deposits, and basic slag. Calcic limestones contain calcium carbonate while dolomitic limestones contain both calcium and magnesium carbonates. Liming materials from Mississippi deposits contain only calcium carbonate. Basic slag, a material containing a minimum of six percent P_2O_5 and the equivalent of about 60 percent lime, should be used only where both the lime and phosphate are needed. The cost of its use as a liming material only is prohibitive.

Research has shown that all of these materials are very effective in neutralizing soil acidity, providing the calcic and dolomitic limestones are finely ground. Particles not passing a 40-mesh (40 holes per linear inch) screen are not very effective in neutralizing soil acidity. For this reason, 90 to 100 percent of calcic and dolomitic limestones should pass a 10-mesh screen and 50 percent a 100-mesh screen. Particle size is not as important in the case of chalk because it contains clay impurity which causes the particles to break down within the soil. It must be crushed finely enough, however, to be spread uniformly.

Generally, the Delta and Loess soils are abundantly supplied with magnesium; therefore, dolomitic lime is of no advantage in these areas. In other soils of the state, however, magnesium levels tend to be lower and a liming material containing considerable magnesium, such as dolomitic lime, should be used, particularly in the Northeast Blacklands.

For best results lime should be mixed thoroughly with the top six to eight inches of the soil. However, depending on the texture of the soil, maintenance treatments of 1000 to 2000 pounds per acre may be made as a surface application to permanent pastures, or other permanent sods.

The primary benefits of liming acid soils are: (1) increased availability of phosphorus and molybdenum; (2) correction and/or prevention of aluminum and

manganese toxicity; (3) reduced loss of potash by leaching, especially on sandy loam and silt loam soils; and (4) increased supply of available calcium, and magnesium where dolomitic lime is used.

To be used most profitably lime should be applied before there are economic reductions in yield due to acid-soil infertility. Though soil productivity may be restored by liming, losses in yield due to acid-soil infertility can never be recovered.

When to Fertilize

The availability of fertilizers to plants decreases with the passage of time following application. This occurs because they may be lost by leaching and volatilization or be converted to less available forms within the soil. Nitrogen is both leached and volatilized. Potassium is leached from some soils but phosphate is not. But phosphate is changed to less available forms.

Fertilizers may contain nitrate or ammonium nitrogen, or both, or other forms (urea) that are changed rather rapidly to ammonium when applied to the soil. Nitrate salts found in fertilizers and in soils are highly soluble in water and are not retained chemically by the soil. Since they remain in solution and move freely with the soil water, they are easily leached from the root zone, particularly on sandy loams, loam and silt loam soils, or other soils where water percolates readily. Under water-logged conditions, which are more likely in clay soils, nitrates may be changed by soil bacteria to gaseous nitrogen (denitrified) which escapes into the atmosphere. Ammonium nitrogen is not denitrified nor is it easily leached, but it does not persist for long periods. It is changed (nitrified) by soil bacteria to nitrate.

Since nitrogenous fertilizers are not held in soils for long periods, they are used more efficiently for crop production when applied at or near planting time or during the growing season. In most instances, applying all of the nitrogen to row crops at or just before planting is just as effective as applying from one-half to all of it as a sidedressing. Exceptions are on deep excessively drained sandy loam soils, or clay loam and clay soils that become water-logged, either because of poor surface drainage or by stream flooding, or both.

Split applications of nitrogen are recommended for grass forages to increase the efficiency of utilization and distribution of forage production, to avoid nitrate poisoning, and to increase nitrogen efficiency by reducing leaching and denitrification losses.

Phosphate fertilizers are not lost by leaching because they react with certain soil constituents to become only sparingly soluble in water. In acid soils the reaction is mostly with iron and aluminum but in neutral and alkaline soils calcium phosphates of very low water solubility also are formed. The soil-phosphate reaction products become less available with time and the process is more rapid in acid soils, particularly at pH values below 6.0.

The formation of sparingly soluble phosphates and their subsequent reduction in availability to plants is referred to as "phosphate fixation." Because of fixation, greater efficiency generally is obtained from annual, seasonal applications of phosphate fertilizer than from less frequent or off-season applications, especially on moderately to strongly acid soils. Accordingly, it is usually suggested that phosphate fertilizers be applied at or just before planting, or near the beginning of the growing period for perennial crops.

Unlike phosphate, the effectiveness of potash fertilizers is not reduced greatly by fixation in Mississippi soils. But there is some loss by leaching, particularly from the more sandy soils. Where leaching is significant, annual or seasonal applications result in more efficient utilization of potash than do less frequent or off-season applications. Because of uptake of potash in excess of need and its removal in the harvested crop, annual and sometimes split applications are necessary for optimum efficiency for hay crops.

Farmers are becoming increasingly interested in further mechanization, in more use of custom services, and in spreading their work-load to increase efficiency. One way of spreading the work load is to combine fertilizer application with fall land preparation for spring-seeded crops, where this is feasible.

Fall application of nitrogen for spring-seeded crops is not practical in Mississippi. However, the level of phosphate and potash in most of the better crop land are such that recommended rates may be applied in the fall with little if any reduction in yield, except on very deep sandy soils where excessive leaching of potash may occur. Potash losses by leaching may be reduced by broadcasting the fertilizer and by liming acid soils to keep the pH above 6.0. Also leaching losses may be compensated by higher rates of application, which may be an acceptable alternative to spring application in some cases.

How to Fertilize

Attaining maximum utilization of fertilizers requires that the two components of availability (chemical and positional), be optimized concurrently. Chemical availability refers to the capacity of the fertilizer and its soil-reaction products to supply nutrients to plants. Positional availabili

efers to the location of the fertilizer ith respect to the plant roots. For xample, fertilizer placed in the soil foot or so from the row is ositionally unavailable to seed- ng plants.

The chemical availability of itrogen and potassium in fer- lizers usually is not affected eatly by degree of contact with ie soil. However, the effectiveness highly reactive phosphates is otected by reducing their contact ith the soil. This slows the rate of iosphate fixation and may be one either by band placement in e soil or by granulation of the fer- izer at the factory. Since most lid fertilizers sold in Mississippi e granulated or pelleted, method application has a greater effect positional than on chemical ailability in the soil.

To assure effective positional ailability, fertilizers should be aced so that they are moved to ant roots with the soil water or so at the fertilized zone is in- cepted by plant roots at the ap- opriate time. As plants grow and tend their roots both horizontal- and vertically, the volume of soil om which nutrients may be ab- rbed is increased. Consequently, tilizers that are positionally un- ailable during early plant owth may be available later.

Phosphate does not move ap- eciably in soils and the move- ent of potash is somewhat ited, especially on soils of edium to fine texture. Therefore, ese fertilizers must be placed so at the fertilized zone is in- cepted by plant roots. For drill- eded and row crops, phosphate d potash should be placed deeply ough to be in the moist soil where nts feed as they grow. For such ops, surface application or allow incorporation, such as by king, would be expected to give erior results because of poor sitional availability.

Nitrogen as nitrate moves with soil water to plant roots. Its over-all efficiency is not affected greatly by degree of concentration or its location within the root zone in soils of medium to coarse texture, but enough nitrogen should be positionally available for good growth of young plants. However, on clay loam and clay soils, band application in the soil at the edge of the root zone may be superior to broadcast application for row crops, because of increased positional availability and reduced risk of loss of nitrogen by denitrification.

Nitrogenous fertilizers applied to the surface of dry soils are positionally unavailable until dissolved and moved down into plants' root zone by percolating water. Before ammonium nitrogen in fertilizers is moved down into the root zone, it must be changed (nitrified) by soil bacteria to nitrate, a process requiring two or four weeks for completion in moist soil during warm seasons. Poor positional availability is avoided by applying nitrogenous fertilizers far enough in advance for the necessary transformation and movement into the root zone by moisture migration to occur by the time the nitrogen is needed by the crop.

Optimum efficiency of immobile fertilizer nutrients such as phosphorus and potassium results from localized concentration of materials near the row or drill, such as results from band application. This provides a very favorable opportunity for early interception by plant roots and for extensive root development within the fertilizer zone. An outstanding benefit from phosphorus is its favorable influence on the early growth and development of plants, which is enhanced by localized placement of fertilizer near the row.

Although maximum efficiency of phosphate and potash is usually obtained by band placement for row crops and drill-seeded crops, top yields can be obtained with broadcast application of these fertilizers. But on soils that are low to very low in phosphate and potash, attaining the same increase in yield requires higher rates for broadcast than for band application. This is especially true where the fertilizer is incorporated by shallow disking instead of being plowed under. Because of accumulation from previous application or because of high native fertility, only a small percentage of the land previously cropped to cotton and fertilized as recommended over a long period would be expected to require appreciably higher broadcast rates of phosphorus and potash.

Poor stands and stunted growth may result from localized placement of fertilizers too near the row because of salt injury to seeds and seedlings. Since fertilizer salts, such as nitrates and chlorides, move mostly upward and downward with soil water rather than laterally by diffusion, salt injury can be avoided by placing the fertilizer to the side of rather than beneath the seed. The distance of separation required depends upon the kind of fertilizer and the rate of application. For recommended rates of phosphate and potash and up to about 40 pounds of nitrogen per acre, the minimum distance of separation should be three to four inches to one side and three to four inches deeper than the seed. With higher rates of nitrogen or potash, both the horizontal and vertical distances between seed and fertilizer should be increased or the fertilizer should be broadcast and plowed under.

Surface application of phosphate and potash to sod crops is more effective than for row crops. This is due in part to the development and persistence of plant roots near the surface. Because it is both convenient and effective, this method of application is recommended for maintenance fertilizers on perennial, close-growing crops.

Solid sources of nitrogen are much more effective for surface application to summer pastures than are the urea-ammonium nitrogen solutions such as N-Sol-32 and URAN. These solutions have ranged in effectiveness from 66 to 74 percent of that of solid ammonium nitrate. Urea solid has been equal to ammonium nitrate when applied in June, but when applied a month earlier its relative value was about 85 percent of that of ammonium nitrate.

Surface application of solid urea should not be made to pastures or other areas in sod in the spring an summer when the soil is too wet t till or when the grass is wet. applied when either the soil c grass is wet excessive atmospher loss of nitrogen as ammonia is lik ly to occur.

Foliar Feeding

Plants absorb and utilize nutrients applied in solution to their leaves and, if a deficiency exists, yield and-or quality may be improved by foliar application. Because they are required in such small amounts, very dilute salt solutions of the *micronutrients* (trace elements) may be used quite satisfactorily as foliar sprays to correct deficiencies without injury (burning) to foliage.

In some areas foliar feeding of trace elements has become a somewhat standard practice in crop production. Frequently, *micronutrients* are applied conveniently and inexpensively along with insecticides and fungicides. A typical example is the application of boron to cotton with the insecticide. So far, under Mississippi conditions, there appears to be no need for both foliar and soil application of micronutrients where they are needed for crop production.

The primary (nitrogen, phosphorus, and potassium) and the secondary (sulfur, calcium, and magnesium) nutrients, are absorbed in relatively large quantities by crops. Thus, to supply a substantial part of the total requirement of these nutrients without burning the leaves of plants would require sever applications of rather dilu solutions during the growi season. Therefore, foliar feeding these nutrients is not as feasible is foliar feeding of t *micronutrients.*

Increases in the yield of cott have been obtained by foli feeding of the primary nutrien under certain conditions, but it h not been shown so far to be desirable or economical alternati to soil application of the nutrients. Therefore, foliar feedi is not now recommended routine in lieu of or as supplement to s application of *macronutrients.*

RECOMMENDATIONS FOR MAJOR FIELD CROPS

Corn

Hybrid: Detailed results of hybrid corn trials are published annually in MAFES Research Highlights.

Seeding Dates and Rates and Land Selection: Plant in North Mississippi from April 1 to April 25, in North Central Mississippi from March 25 to April 20, in South Central Mississippi from February 25 to March 15.

Corn should be planted on deep to moderately deep soil with fair to good surface drainage. Steep, droughty, and eroded hillsides are not suitable for corn.

Stands should be adjusted to yield and generally should be within the range of 12,000 to 18,000 plants for average yields of 80 to 120 bushels per acre. A good rule of thumb is to provide approximately 150 plants for each bushel of corn expected. Thus, on land that will produce an average yield of 80 bushels, the stand should be 12,000 plants per acre, for 100 bushels 15,000 plants, and for 120 bushels 18,000 plants. On land well adapted to corn, yields usually will fall within the range of 80 to 120 bushels per acre under good cultural practices. *However, average yield goals in excess of 100 bushels per acre generally should not be set unless supplemental irrigation is available.*

Fertilization — Hills: Soils of the Hills areas generally require a complete fertilizer for corn. Soils should be limed to maintain the pH above 5.5. Occasionally, following the application of lime, zinc deficiency may occur, especially on soils of medium to coarse texture. Therefore, a mixed fertilizer which contains enough zinc to give pounds per acre should be used two or three years after liming, p ticularly on sandy loam and loam soils. No other micronutri deficiencies have been observe corn.

Time: Apply all of the phosph and potash before planti Nitrogen may be applied bef planting or in split applications split, one-fourth to one-third bef planting and the remainder a side dressing by the time the cor knee high.

Rate: Rate of fertilization sh be adjusted to expected yield. expected yields of 120, 100, an bushels per acre, the respective P_2O_5-K_2O rates should be 160 60, 130-50-50, and 100-40-40 pou per acre. When corn is grown silage the respective N-P_2O_5-

ates should be 130-50-100 for ields of 16 to 18 tons per acre.

Method: All of the phosphate nd potash and up to 40 pounds of itrogen per acre may be placed in band located three to four inches o one side and three to four inches eeper than the seed; the remain-ng nitrogen may be drilled six or ıore inches from the row, broad-ast, or applied later as a side-ressing. All or part of the nitrogen ıay be broadcast as a mixture with hosphate and potash; however, ıe fertilizer should be plowed own as should all broadcast pplications of phosphate and otash. Preplant applications of nhydrous ammonia should be laced at least six inches to one side nd five to six inches deeper than ıe seed.

Varieties: Results of variety sts are published annually in AFES Research Highlights.

Seeding Dates and Rates: ant flat at a depth of two inches soon after April 1 as weather per-ıits, but not until the soil mperature is 68°F: hill dropped---to 22 pounds delinted seed per re; drilled---30 to 40 pounds of linted seed per acre; drilled for oss plowing---60 pounds of linted seed per acre. Seed should of good viability.

Fertilization: Many Delta soils ed only nitrogen for most ofitable yields but deficiencies of tash and phosphate do occur, es-cially of potash. For example it is timated that 20 percent of the ndy loam soils, 75 percent of the orly-to somewhat poorly-drained t loam soils and 30 percent of the ty clay loam soils will respond ofitably to potash. Thirty percent the sandy loam and silt loam ils may need phosphate. herefore, soils should be tested for osphate and potash needs, as ll as for lime. Also, sandy soils at are low in organic matter, or that have been leveled, should be tested for sulfur needs.

Place side-dress applications of nitrogen a foot or more from the row, non-pressure solutions and solid sources at a depth of four inches and anhydrous ammonia at a depth of six inches. Surface side-dress application of solid sources and non-pressure solutions is almost as effective as in-soil placement.

Fertilization — Delta: For soils in this area, generally only nitrogen is needed for top production. Soil test for phosphate and potash needs.

Time: Nitrogen may be applied just before planting or in split application: if split, use one-third to one-half at or before planting and the rest as a side-dressing before the corn is knee high.

Cotton in the Delta

Time: Apply nitrogen in the spring at or before planting, except on sandy loam soils having very good to excessive internal drainage and on clay soils with poor surface drainage. On such soils, make split application of nitrogen, one-third to one-half at or before planting and the rest as a side dressing, preferably by mid-June. Split application of nitrogen on clays with poor surface drainage is recommended because of possible loss of nitrogen by denitrification during wet periods.

Rate: On sandy loam, loam, and silt loam soils use 90 to 100 pounds of nitrogen per planted acre. Use one hundred to 120 pounds of nitrogen per acre on the silty clay loams, silty clays, and clays for all planting patterns, except that for clays with poor surface drainage use 120 to 150 pounds. In a 4x4 or 2x2 planting pattern it is obvious that only one-half of the land area is planted.

For cotton following soybeans or pasture sod, the nitrogen rate should be reduced 20 to 30 and 40 to 50 pounds per acre, respectively.

On soils where stalk growth is too rank, maturity too late, and boll rot is a problem because of excess nitrogen, the nitrogen rate should be reduced by 30 percent.

Sixty pounds of potash banded and 80 pounds broadcast are suggested for the poorly to somewhat poorly drained silt loam and silty clay loam soils (Forestdale and similar types). Phosphate is not recommended but, if applied with potash, use a mixed fertilizer having a P_2O_5-K_2O ratio of 1:3. Neither potash nor phosphate is recommended on other soils except when indicated by a soil test.

Method: Application practices for nitrogen are the same as for corn in the Delta area. Side-dress applications of nitrogen made after mid-June should be placed in the soil. Banded phosphate and potash should be placed three to four inches to one side and three to four inches deeper than the seed. Broadcast phosphate and potash should be worked into the soil by double disking with a breaking disk, or plowed in with a moldboard plow.

Rate: 100 to 160 pounds of nitrogen per acre, increasing the rate as the expected yield increases from 80 to 120 bushels per acre.

Method: Place preplant applications of nitrogen six or more inches from the drill row, non-pressure solutions and solid sources at a depth of four or more inches and anhydrous ammonia at a depth of five or six inches below the level of the seed. Sidedress applications of nitrogen should be placed one foot or more from the row, non-pressure solutions and solids at a depth of four inches and anhydrous ammonia at a depth of six inches. Surface application of solid sources and non-pressure solutions is only slightly less effective than in-soil placement.

Cotton in Hill Areas

Varieties: Results of variety tests are published annually in MAFES Research Highlights.

Seeding Dates and Rates: Plant between April 10 and May 10 as weather permits: hill dropped---use 16 to 22 pounds of machine delinted seed or 12 to 16 pounds of acid delinted seed per acre; drilled---use 20 to 30 pounds of machine delinted or 15 to 20 pounds of acid delinted seed per acre. Seed should be of good quality.

Fertilization: A complete fertilizer (NPK) containing sulfur and boron is needed in the Hill area. The fertilizer should supply 4 to 8 pounds of sulfur and 0.3 to 0.5 pounds of boron per acre. No more than 0.5 pounds of boron should be applied if the fertilizer is banded or drilled beside the row. Fertilizers for the dark upland soils of the Northeast Blackland area, having a pH above 6.0, should contain enough water-soluble magnesium to supply at least one-half and preferably as much magesia (MgO) as potash. On soils more acid than pH 6.0, magnesium deficiency may be corrected by applying dolomitic lime at the rate of one to two tons per acre, or as indicated by a soil test.

Acid soils should be limed according to soil tests to maintain the pH above 5.5.

Time: Apply the phosphate and potash and all or part of the nitrogen at or a few weeks before planting time. On deep sandy or sandy loam soils with very good to excessive internal drainage, side-dress one-half to two-thirds of the nitrogen for most effective results. Make side-dress applications of nitrogen by mid-June (a week or more earlier if anhydrous ammonia is used or where you surface apply solid sources and non-pressure solutions) or at early square formation.

On most soils, phosphate and potash may also be applied in the fall---see section on When to Fertilize, page 4.

Rate: A recent soil test summary shows that about 35 percent of the soils tested for cotton in the Hill area were high in phosphate and potash. An economic response of cotton to phosphate and potash is unlikely on high-testing soils and, on such soils, only maintenance fertilization is justified. An annual application of 25 to 30 pounds of phosphate and potash is usually adequate for maintenance with current yields. *Accordingly, farmers now applying rates higher than these to high-testing soils have an opportunity to reduce fertilizer costs through soil testing.*

Without a soil test, the nitrogen (N) - phosphate (P_2O_5) - potash (K_2O) rate should be either 72-40-60 or 72-48-48 pounds per acre except as follows: Increase the nitrogen t 120 pounds on the dark uplan soils of the Blackland areas and t 80 or 90 pounds per acre on the wel drained botton and the level gently sloping upland soils of th Upper Coastal Plain and on th bottom soils of the Blacklan areas.

Excessive stalk growth ar delayed maturity indicate t much nitrogen. Somewhat stunt growth associated with yellowis green foliage and the early yello ing and premature shedding of th leaves indicates too little nitroge When these conditions are obser ed nitrogen rates should be a justed accordingly.

Where a skip-row plantin pattern is used, the rate of nitrog per planted acre should be the sam as for solid-planted cotton. In a 4 4 or a 2 x 2 planting pattern, it is o vious that only one-half of the lan area is planted to cotton. Do not f tilize the unplanted area.

Method: Same as for corn in t Hill area. Contact placement seed and fertilizer or placemen directly beneath seed should avoided. Side-dress applications nitrogen made after mid-Ju should be placed in the soil.

If a preemergence herbicide is be broadcast and worked into t soil, phosphate and potash appli broadcast should be plowed do before the herbicide is applied.

Soybeans

Varieties: For all areas north of U.S. Highway 84, use Hill, Mack, Forrest, Tracy, Davis, Lee 68, Pickett 71, Semmes, and Bragg (listed in order of maturity).

South of U.S. Highway 84, use Bragg, Hutton, Coker 266A, Coker 338, Cobb, and Hardee.

Soils: Soybeans are adapted to all Delta soils and to most soils of the Hill area, but lower yields may be expected on droughty soils, such as eroded and shallow upland soils.

Seeding Dates and Rates: May 1 to June 15 except extreme South Mississippi, May 20 to June 20. Plant 40 to 50 pounds of good seed per acre.

Inoculation: If not planted on land where a crop of well-nodulated soybeans has grown within the last five years, the seed should be inoculated. To be effective seed must be moistened slightly before applying inoculum, or else the inoculum should be applied as a slur Applying inoculum dry into e planter box is very ineffective.

Because of injury to the bacter culture, the inoculant and sodi molybdate or other soluble mol date salts should not be premi for more than 24 hours before be applied to beans that are plan immediately following treatme The safest procedure is to apply inoculant and molybdate s separately and then stir the b

thoroughly to assure treatment of all beans.

Fertilization—Delta: Soybeans do not require either phosphate or potash on most Delta soils, but many soils need liming. The need for lime as well as phosphate and potash can be determined by a soil test.

Molybdenum usually is needed on sandy loam, silt loam, and clay loam soils having a pH below 6.0. The need for molybdenum is not as great on the clay soils; however, yields may be increased in some instances, particularly where the pH is below 5.5.

Molybdenum may be applied as a seed treatment or as a foliar spray. As a seed treatment, one-half ounce of sodium molybdate per acre, or its equivalent, is recommended. As a foliar spray, one ounce of sodium or ammonium molybdate per acre in 8 to 12 gallons of water is recommended when or just before the soybeans begin to bloom. Seed treatment usually is more convenient and less expensive.

Fertilization - Hill area: In the Hill area, phosphate, potash, sulfur, molybdenum, and lime usually are needed for top yields. Nitrogen does not increase yields where lime and molybdenum are adequate and the soybeans are nodulated with effective strains of *Rhizobia*. Lime and fertilizer needs are best determined by a soil test. In the absence of a soil test, use a sulfur-containing mixed fertilizer of 0-1-1 ratio at a rate to supply about 50 pounds each of phosphate (P_2O_5) and potash (K_2O) and 4 to 8 pounds of sulfur per acre. On newly cleared land or unimproved pasture land, which usually is very deficient in phosphorus, use a fertilizer of 0-4-3 ratio at a rate to give 70 to 80 pounds of phosphate per acre for 3 to 4 years before switching to one of 0-1-1 ratios. If fertilizer of 0-4-3 ratio is unavailable, use one of 0-1-1 ratio at a rate to give about 70 pounds each of phosphate and potash per acre.

The fertilizer may be banded or broadcast. If banded, it should be placed 3 to 4 inches to one side and 3 to 4 inches deeper than the seed. Avoid contact placement with the seed as well as placement directly beneath the seed.

Where double cropping of soybeans and wheat is practiced, all of the phosphate and potash recommended for both crops may be applied to either crop. The fertilizer should be broadcast and worked into the soil.

A recent soil test summary shows that 70 percent of the soils tested for soybeans in the Hill area (excluding the Northeast Blacklands) need liming for top yields when molybdenum is not applied. At soil pH values below 5.5, liming not only increases the availability of molybdenum but also increases yields by correcting manganese and aluminum toxicity (especially manganese toxicity) which sometimes causes crop failure.

When molybdenum is applied only 30 percent of the soils tested need liming for top yields. The use of molybdenum on soils with pH of 5.5 or higher reduces the response of soybeans to lime because the major and possibly only result of liming is to increase the availability of native soil molybdenum. This in turn increases the nitrogen-fixing capacity of the nodule bacteria, which increases bean yields.

Farmers planning to apply lime should have their soils tested and apply lime first to those soils having a pH below 5.5. Even farmers who rent land for only one year may find it profitable to apply a ton of lime per acre, especially to soils of medium to coarse texture (sandy loam, silt loam and loams) with a pH below 5.5. On such soils, liming usually increases the yield two to four bushels per acre even though molybdenum is applied.

Many soils show some yield increase for molybdenum even when limed to pH 6.0 to 6.5. Accordingly, its use is recommended for soybeans on all soils of the Hill area, the rate and method of application being the same as for the Delta area.

Rice

Varieties: *Long Grain*-Starbonnet, Bluebelle and Labelle which mature in 135, 125 and 118 days, respectively. *Medium grain*-Nova 66 and Vista which mature in 130 and 123 days, respectively.

Seeding Dates and Rates: Rice can be seeded from mid-April to mid-June, depending upon variety. The very early maturing varieties should not be planted until June. Plant 90 to 110 pounds if drilled and 110 to 135 pounds if broadcast or water seeded.

Fertilization: Apply 110 to 135 pounds of nitrogen per acre on old cropland. New land will probably require no nitrogen for the first one or two years. The ammonium forms of nitrogen such as ammonium sulfate and urea are recommended. Nitrogen fertilizer may be applied: All at one time at the time the field is being flooded (full season, continuous flood must be maintained); or one-half when the field is being flooded and one-half at the correct "joint stage". This occurs when the first internode to elongate is one-half inch in length for Starbonnet, three-fourths inch in length for Bluebelle and Labelle, and one and one-half inches in length for Nova 66 and Vista. Nitrogen may be applied into the water; it is neither necessary nor advisable to drain the field prior to fertilization.

Sorghums for Grain or Silage

Varieties for Grain: DeKalb BR-64 and Acco 1093 are bird-resistant varieties with good yield potential and have the best resistance to the leaf and stalk disease, anthracnose. Anthracnose infection is unpredictable and may vary in severity from year to year. The following bird-resistant hybrids will yield well if anthracnose does not develop: Funk's BR 79, Funk's BR 630 and McNair 546.

Non-bird-resistant varieties such as Funk's G 522, DeKalb C-42y, DeKalb E-57 and Acco R 1090 may be damaged by birds, but have good disease resistance and are much more desirable for high quality grain than bird-resistant types.

Varieties for Silage: Commercial Hybrids.

Seeding Dates and Rates: Plant from April 20 to July 15. The earlier date is preferred because yields are higher and first harvest by July 25 permits a second cutting if soil moisture is adequate. Seed 5 to 7 lbs. per acre in rows.

Fertilization - Grain: In the Delta, generally only nitrogen is needed. *Test soils for phosphate and potash.* Depending upon the average yield, apply 80 to 130 pounds of nitrogen per acre: the lower rate for yields of 60 to 70 bushels per acre, the higher rate for yields of 100 to 120 bushels, and 100 pounds of nitrogen per acre for yields of 80 to 90 bushels.

In the Hills, phosphate and potash as well as nitrogen usually are needed. On good land, yields should be in the range of 80 to 100 bushels per acre and for such yields the nitrogen rate should be 100 to 120 pounds per acre. On other land, yields are likely to be lower and the nitrogen rate should be reduced to 70 or 80 pounds per acre. Both phosphate (P_2O_5) and potash (K_2O) should be applied at the rate of 30 to 40 pounds per acre.

Except on soils of very low productivity, or because of extreme weather conditions, yields should be in the range of 60 to 100 bushels per acre for early plantings where good cultural practices are followed. Average yields for late plantings (after July 1) are considerably lower.

Where a stubble crop is grown apply an additional 40 to 60 pounds of nitrogen per acre after the first crop.

Fertilization - Silage: Same as for grain except double the rate of potash.

Sorghums for Syrup

Varieties: Dale, Brandes, and Theis.

Seeding Dates and Rates: Sweet sorghum in Mississippi should be planted during the first half of May. Plant two pounds of seed per acre in 40-inch rows. The best spacing averages one plant every six inches in the drill or four plants every 24 inches in hills.

Fertilization: At planting, apply 40 to 50 pounds each of nitrogen, phosphate (P_2O_5) and potash (K_2O) per acre. No side-dressing should be applied later.

Harvesting: Sweet sorghum should be harvested in the dough stage of seed development for the maximum yield of high quality syrup. Syrup quality is improved by stripping the leaves, removing the heads and the top joint, and delaying milling for a week after the stalks are cut.

Sugarcane for Syrup

Varieties: Plant C.P. 36-111 and C.P. 67-500, on deep, well drained soils of light texture.

Seeding Dates and Rates: Cut seed cane at the top mature joint and at ground level, but do not strip before planting. Plant in the Fall (October 15) at the rate of two stalks, that is, place stalks end to end with a whole stalk at the union. Plant the cane in four-foot rows on land that has been broken five to six inches deep a few weeks earlier. To protect from cold and to provide good drainage, cover the cane six to eight inches deep by forming a ridge over it so that the drainage furrows between the rows are two to four inches deeper than the cane.

Fertilization: In the spring, apply 40 to 50 pounds each of nitrogen, phosphate (P_2O_5) and potash (K_2O) per acre shortly after germination of the eyes or just before regrowth from stubble. Place the fertilizer in a band so that it will be four to six inches to the side of the row and three to five inches deep after the ridges have worked down (one to two inches deeper than the cane).

Harvesting: Strip, top and cut the cane before freezing weather. Harvesting as much as a month before processing improves syrup quality and reduces "sugaring."

Peanuts

Varieties: *Spanish type*---Star, Tifspan, Spancross, Spanhoma, and Comet.

Runner type---Florunner

Virginia type---Florigiant

Growers should be sure of a market before choosing a variety or planting a marketable acreage.

Planting Dates: April 1 to May 1 in South Mississippi and April 15 to May 15 in North Mississippi.

Inoculation: Planting seed

lways should be inoculated with ıe appropriate strain of *Rhizobia.*

Soils and Fertilization: Well ·ained sandy loam soils should be lected for peanuts---heavy soil ay present harvesting problems. il should be limed to a pH of 5.8 or gher. Soils in the Western part of e Delta generally do not require rtilization for peanut production. In other areas of the state, broadcast and plow-down 80 pounds each of phosphate and potash. The fertilizer should also contain enough boron to provide about 0.5 pounds per acre. A soil test is the best way to determine lime and fertilizer needs.

Peanuts do not require fertilization with nitrogen if properly inoculated. However, in some areas of the Southeast, 20 to 30 pounds of nitrogen per acre is recommended on Spanish types. Peanuts should not be planted behind either soybeans or peanuts. Crop residues should be buried deeply by plowing in the fall as a disease control measure. Commercial producers should check with their county agent for more details about production practices.

Grasses, Legumes, and Small Grains

Selection of Varieties: The use certified seed will reduce the risk infestation with noxious weed ed and will result in better perfor- ance.

Grass or Grass-Legume Mixres: In most instances a grass-gume mixture will provide less exnsive and more nutritious sture forage than grass grown one and fertilized with nitrogen. oper use of forage legumes may sult in better use of land sources by increasing total oduction, and extending the azing season. Therefore, where actical, new pastures should be nted to the desired grass plus e or more legumes. Major conslerations in the choice of the gume species are the availability d price of seed and the time that age will be needed.

Grass-legume mixtures for nter pastures sometimes "grow " more slowly than grass alone tilized with nitrogen; therefore, may be advisable to plant a porn of the winter pasture to grass all grain and ryegrass) alone d fertilize with nitrogen as ommended in the tables.

Inoculation of Clovers: All ed of clovers and other forage umes should be inoculated with proper culture of *Rhizobia* fore planting. *It is imperative at seeds of new clovers like rowleaf be inoculated.*

Planting: Where equipment is ailable, drill or band placement seed and fertilizer usually is re effective for the establishment of most pasture and forage crops.

With small-seeded legumes and grasses, care must be taken not to plant the seed too deeply. A seeding depth of no more than ten times the diameter of the seed is recommended. Where plantings are made by broadcasting the seeds on the soil surface, it is advisable to cultipack the seedbed immediately after seeding.

Renovation of Grass-Legume Pasture: Where the stand of legumes in a pasture has degenerated to less than 15 percent or has been lost entirely, it would pay to reseed legumes. This is best done in the fall season. The pasture should be closely grazed or mowed for hay and the clover seed broadcast or drilled. A fertilizer containing phosphorus and potash should be applied, preferably as indicated by a soil test.

Fertilization General: For established pastures, solid and liquid complete fertilizers and solid sources of nitrogen may be top-dressed. On summer grass pastures, however, the efficiency of top-dressed urea-ammonium nitrate (non-pressure) solutions has been quite low compared to solid ammonium nitrate.

Because of the wide variety of soils to which these pasture recommendations will be applied, and of the extensive nature of the typical commercial livestock operation in Mississippi, particularly beef cattle, the pasture fertilizer recommendations are generally presented as a range instead of a single and more arbitary figure.

The lower limit of the recommendation is estimated to be sufficient for plant establishment and (1) for reasonable yields of forage on soils well adapted to the particular pasture crop under consideration, (2) for periods of economic stress during which it is still necessary to maintain a reasonable supply of cheap forage, and (3) where acreage per animal unit is not a serious limiting factor.

The upper limit of the fertilizer recommendations should be used where the (1) soil type, (2) management systems, (3) type of livestock enterprise, and (4) economic trend are such as to justify the considerably higher yields of forage.

An estimate of the fertilizer requirements for the production of 100 pounds of beef in different enterprises on soils testing low in phosphate and potash is shown in Table 1.

With current beef and fertilizer prices (Fall, 1974) it is not profitable to fertilize permanent pastures with phosphate and potash at soil test levels of medium and higher. Therefore, cattlemen are encouraged to test their soils and use phosphate and potash on those testing low to very low where the need is much more critical.

Fall application of phosphate or potash to pastures is recommended if these nutrients are necessary to establish forage seedlings in the fall. However, spring application is slightly more effective for spring

and summer growth of perennial plants and those which come up in the spring. *In general, fertilizers should be applied as close as practical to the time they are to be used by plants, therefore seasonal, annual applications are indicated in Tables 2, 3 and 4. If phosphate and potash are applied only once in two years, double the annual application rate.*

Utilization of Forage: To insure maximum profit from fertilizer applied to pastures, livestock producers must adjust the stocking rate to use the additional forage efficiently.

Fertilization of Grass-Legume Mixtures: Grass-legume mixtures should be fertilized to meet the needs of the legume for phosphate, potash and lime. Liming practices and phosphate and potash rates that are sufficient for the legume will also be adequate for the grass. Because of symbiotic fixation by the nodule bacteria, legumes provides their own nitrogen and indirectly increase the amount of nitrogen available to grass. The application of nitrogen to grass-legume pastures reduces the nitrogen-fixing efficiency of the legume. Therefore, it usually is unwise to fertilize permanent grass-legume mixtures when the legume constitutes 15 percent or more of the stand.

Where permanent grass pastures are overseeded annually with crimson or arrowleaf clovers, or with a ryegrass-clover mixture, the application of nitrogen in late spring and early summer may be advantageous if additional forage is needed. It should be recognized that the extra forage must be reduced to a short stubble by intensive grazing or by close mowing for hay for successful overseeding or for obtaining stands where clovers have re-seeded.

Caution - Where conditions are especially favorable for legumes, the danger of bloat may prevent full utilization of legumes seeded alone, or of grass-legume mixtures such as Dallisgrass and white clover. The drilling of small grain or ryegrass (also orchardgrass in north Mississippi) into such a pasture will reduce the probability of bloat and supply additional forage.

Fertilization of Grass Pastures: The yield of grass forages is greatly increased by nitrogen fertilization and where weather conditions do not limit growth, excellent response is obtained to high rates of nitrogen. For example, the response of grasses such as Dallisgrass, common bermudagrass, sorghum-sudan hybrids, bahiagrass, and ryegrass-small grain mixtures is somewhat linear to rates of nitrogen as high as 200 to 300 pounds per acre, and for Coastal and Alicia bermudagrass this type of response may extend to rates greater tha 400 pounds per acre. The mos economical rate of nitrogen will de pend upon the weather, the efficien cy of forage utilization and th economic trends.

To increase the efficiency c nitrogen and to obtain a mor favorable distribution of forag production, split applications c nitrogen are recommended for bot summer and winter pasture Applications may range from 45 t 80 pounds per acre. Except fc Coastal and Alicia bermudagras where the last application may b in early August, the last applic tion of nitrogen to permaner summer pastures should be mad by mid-July, and two weeks earli if anhydrous ammonia is use Because of the frequency drought, mid-summer applicatior of nitrogen are usually less effe tive than applications of nitroge are usually made in the spring ar early summer.

For summer temporary grazir crops, one-half of the nitroge should be incorporated into tl seedbed with phosphate ar potash before planting. Tl remainder should be applied in o or two applications after grazing cutting.

Caution: Excessive amounts nitrogen applied in a sin application may result in nitr poisoning, or contribute to gr tetany.

Table 1. Approximate Fertilizer Requirement for the Production of 100 Pounds of Beef from Pastures on Soils Testing Low in Phosphate and Potash when Fertilized as Recommended in Tables for the Hill Area.

Type of Pasture	Enterprise and Pounds of Fertilizer for 100 Pounds of Beef					
	Cow-Calf[1]			Steer Grazing[2]		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Coastal Bermuda	75	25	25	54	18	18
Bahiagrass, Dallisgrass, Common Bermuda, or Fescue	90	30	30	63	21	21
Ryegrass or Wheat - Ryegrass Mixture	138	60	30	54 75	24 34	12[3] 17
Sorghum - Sudan Hybrid	138	46	46	75	25	25
Dallisgrass and/or Common Bermuda or Fescue with White Clover	0	64	64	0	42	42
Coastal Bermuda overseeded with Crimson or Arrowleaf Clover	0	64	64	0	42	42
Ryegrass-Crimson Clover Mixture	0	60	60	0 0	30 40	30[3] 40

[1]Based on the annual feed requirements for maintenance and replacement of brood cows and sires and growth of calves to 450-500 pounds with a calf crop of 85 to 90 percent.

[2]Average grazing weight of 700 pounds.

[3]Average grazing weight of 500 pounds.

Table 2. Recommendations for Delta Pasture and Small Grain Crops

Pasture or Hay Crop	Recommended Varieties	Rate of Seeding Per Acre	Time of Planting	Fertilization, lbs.-A [1] Annual Application
Alfalfa	Cody, Delta and Florida 66	15-20 lbs.	Sept.-Nov.	Test soil for lime, Phosphorus, and potash needs
Bermudagrass	Coastal or Alicia	20 bu. sprigs. or 1200-1500 lbs. fresh forage disked in	Feb.-May [2] June-Aug.	150-240 lbs. N, 2-3 applications beginning June 1, for grazing; for Hay, 300-400 lbs. N
Bermudagrass White Clover	Regal or La.S-1	2 lbs.	Plant Clover Sept.-Nov.	Test soil for lime, phosphorus, and potash needs.
Fescue and White Clover	Kentucky-31 Regal, La.S-1, Nolin or Tillman	Fescue 10-15 lbs. Clover 3 lbs.	Oct.-Nov. Feb.-May	Test soil for lime, phosphate, and potash needs [3]
Red Clover	Orbit, Kenland or Nolin's Red	10-15 lbs. seed alone or in small grains	Sept.-Nov.	Test for lime, phosphate, and potash.
White Clover	Regal, La.S-1 Nolin or Tillman	2-3 lbs.	Sept.-Nov.	Test soil for lime, phosphate and potash.
Arrowleaf Clover[4]	Meechee or Yuchi	12-15 lbs.	Sept.-Nov.	Test soil for lime, phosphate, and potash.
Sorghum-Sudan hybrids	Commercial Varieties	20 lbs. in rows 35 lbs. broadcast	Apr.-July	60 lbs. N prior to planting 60 lbs. N after 1st and 2nd cutting.
Korea Lespedeza	Climax or Summit	20-25 lbs. seed in small grains	Feb.-Apr.	Test soil for lime, phosphate, and potash.
Oats	Coker 227, Coker 234, or Florida 501	120 lbs. for grazing 90 lbs. for grain	For grazing: early Sept. For grain: mid-Oct.	Grazing: 120-180 lbs. N split-fall and spring. Grain: 50-60 lbs. N about March 1-March 15.
Wheat	Arthur 71 Coker 68-15	120 lbs. for grazing 90 lbs. for grain	Same as Oats	Grazing: Same as Oats Grain: 90-100 lbs. N about March 1.
Rye	Acco 118, Explorer, Elbon McNair's Vitagraze or Wren's Abruzzi	120 lbs. for grazing	Same as Oats	Grazing: Same as Oats Grain: 90-100 lbs. N about March 1.
Barley[5]	Dayton, Harrison, or Jefferson	Same asWheat	Same as Oats	Same as Oats

[1]All areas should be tested for lime, phosphorus, and potash needs.
[2]If irrigated, Coastal may be planted from April 1 to Sept. 1.
[3]Where clover disappears in the grass-clover mixture apply 60 lbs. in the fall.
[4]Specify scarified seed.
[5]Barley yields are generally quite low except in extreme North Mississippi. Barley yellow dwarf disease is a serious problem and none of the varieties are resistant.

Barley yields are generally quite low [illegible] of the varieties are resistant to yellow dwarf disease in certain [illegible]

Table 3. Recommendations for Pastures and Forages in Hill Area

Pasture of Hay Crop	Recommended Varieties	Rate of Seeding Per Acre	Time of Planting	Fertilization, lbs.-A [1] Annual Application
Established Warm Season Grasses (Permanent)				
Bahiagrass	Pensacola, Wilmington, (Argentine-South Mississippi only)	20 lbs./A	Feb.-May [2]	120-160 lbs. N in split applications and 30 to 40 lbs. each of P_2O_5 and K_2O. Total application in a 4-1-1 ratio.
Bermudagrass	Common	5lbs. seed	Feb.-May	Same as for Bahiagrass
	Coastal	20 bu. of sprigs	Feb.-May If irrigated plant as late as Sept. 1.	For Grazing: 120 to 200 lbs. N in split applications and 30 to 50 lbs. each of P_2O_5 and K_2O. Total application in a 4-1-1 ratio. For Hay: 200 to 300 lbs. N in split application; 50 to 90 lbs. of P_2O_5; 100 to 180 lbs. K_2O. Total application in a 4-1-2 ratio.
		1200 to 1500 lbs. fresh forage disked in	June-Aug.	
Dallisgrass	Commercial	10 lbs. (live seed)	Feb.-May	Same as Bahiagrass.
Johnsongrass	Commercial	15-25 lbs. (live seed)	April 1 to May 15	Same as for Coastal Bermudagrass
Established Cool Season Grasses (Permanent)				
Tall Fescue	Alta, Kentucky-31	15 lbs.	Sept.-Nov.	80 to 120 lbs. N, split-fall and spring; 40-60 lbs. each of P_2O_5 and K_2O in a 1:1 ratio.
Orchardgrass (North Miss. only)	Potomac or Boone	15 lbs.	Sept.-Nov.	Same as Tall Fescue
Warm Season Grass-Legume Mixtures (Permanent)				
Bahiagrass Bermudagrass Dallisgrass with one of the following legumes.		As before As before	As before	Establishment: 60 to 90 lbs. of P_2O_5 and K_2O in a 1:1 ratio and 0.5 lbs. of boron Maintenance: 40 to 60 lbs. each of P_2O_5 and K_2O in a 1:1 ratio and 0.5 lbs. of boron.
White Clover	Regal, La.S-1 Nolin or Tillman	3 lbs.	Sept.-Nov.	
Crimson Clover	Dixie, Chief, Autauga or Tibbee	25 lbs.	Sept.-Nov.	Same as for White Clover

(Table 3 continued next page)

(Table 3. Continued from last page)

Arrowleaf Clover [3]	Meechee or Yuchi	10-15 lbs.	Sept.-Nov.	Same as for White Clover
Annual Lespedeza	Climax or Summit	25 lbs.	Feb.-Apr.	Establishment: 60 lbs. each of P_2O_5 and K_2O in a 1:1 ratio. Maintenance: 40 lbs. each of P_2O_5 and K_2O.
Johnsongrass with One of the following for hay:	Commercial	15-25 lbs.	Feb.-June Sept.-Nov.	Establishment: 120 to 160 lbs. each of P_2O_5 and K_2O Maintenance: 60 to 80 lbs. P_2O_5 and 180 to 240 lbs. K_2O in a 1:3 ratio plus 1.0 lb. of boron
Alfalfa	Florida 66, Delta Cody	(live seed 15 lbs.	Sept.-Nov.	
Red Clover	Orbit, Kenland, Chesapeake. or Nolin's Red.	10 lbs.	Sept.-Nov. or March-April on clean land.	Same as with Alfalfa.
Rough Peas	Commercial, also known as Caley, Singletary, Wild Winter Peas	30 lbs.	Sept.-Oct.	60-90 lbs. P_2O_5 and 120 to 180 lbs. K_2O in a 1:2 ratio, 120 lbs. N after peas mature.
Warm Season Grasses (Annual or Temporary)				
Millet	All hybrid Varieties	15 lbs. in rows 35 lbs. broadcast	Apr.-June	120-150 lbs. N, split application; 60 lbs. P_2O_5 and 60 lbs. K_2O.
Sorghum-Sudan	Commercially available varieties	15 lbs. in rows 35 lbs. broadcast	Apr.-June	120 to 180 lbs. N in split applications; 60 lbs. P_2O_5 60 lbs.K_2O
Cool Season Grass-Legume Mixtures (Annual or Temporary)				
Annual Ryegrass with one of the following:	Gulf Magnolia, Blends (common in North Miss. only)	25 lbs.	Sept.-Nov.	60-80 lbs. each of P_2O_5 and K_2O in a 1:1 ratio at seeding time.
Arrowleaf Clover[3]	Meechee or Yuchi	10 lbs.	Sept.-Nov.	
Crimson Clover	Autauga. Chief Tibbee, or Dixie	20 lbs.	Sept.-Nov.	
Annual Ryegrass and wheat or oats with legumes (as with ryegrass	As above	25 lbs.	Sept.-Nov.	Same as Above
	See wheat and oats	90 lbs.	Sept.-Nov.	
Small Grains and Legume (Use same with ryegrass)	Oats, rye or wheat (see varieties under grass)	90 lbs. of small grain	Sept.-Nov.	Same as Above

Cool Season Grass-Legume Mixtures (Permanent)				
Tall Fesuce or Orchardgrass [4] with	Alta, Kentucky-31 or Goar	10 lbs. in 20" rows	Sept.-Nov.	Establishment: 60 to 90 lbs. each of P_2O_5 and K_2O in a 1:1 ratio
	Commercial, Boone or Potomac	10 lbs.	Sept.-Nov.	Maintanence: 40-60 lbs. each of P_2O_5 and K_2O in a 1:1 ratio.
White Cover	Regal, Tillman, La.S-1 or Nolin	3 lbs.	Sept.-Nov.	
Annual Cool Season Grasses and Small Grains				
Annual Ryegrass	Gulf or Magnolia (Common in North Miss. only)	30-40 lbs.	Sept.-Oct.	120 to 220 lbs. of N, split fall and spring; 60 to 80 lbs. P_2O_5 and 30 to 40 lbs K_2O in a 2:1 ratio
Barley (Grain only) [5]	Harrison, (Barsoy), Jefferson, Keowee or McNair 601	90 lbs.	Oct.-Nov.	10-20 lbs. N, 30-40 lbs. each of P_2O_5 and K_2O at seeding. Topdress with 60 to 90 lbs. N about March 1.
Oats	(North) Coker 242 Coker 234 or Coker 227	For Forage: 120 lbs.	For Forage Sept.-Nov.	Same as Ryegrass.
	(South) Coker 227 Coker 234, or Fla. 501	For Grain 90 lbs.	For Grain Oct.-Nov.	Same as Barley, use lower rate of nitrogen
Rye	Abruzzi, Balboa Elbon, Explorer Vitagraze	For Forage: 120 lbs.	For Forage: Same as Oats	Same as Ryegrass
		For grain: 90 lbs.	For grain: Oct.-Nov.	Same as Barley
Wheat	Abe, Arthur-71 Coker 68-15	For Forage: 120 lbs.	Same as for Rye	Same as Ryegrass.
		For Grain: 90 lbs.		10-20 lbs. N, 40 lbs. each of P_2O_5 and K_2O at planting. Topdress with 90 to 100 lbs. N about March 1.
Legumes [6]				
Alfaifa (Hay)	Florida 66, Delta, or Cody	15-20 lbs.	Sept.-Nov.	Establishment: 120 to 160 lbs. each of P_2O_5 and K_2O in a 1:1 ratio and 1.5 lbs. boron. Maintenance: 60-80 lbs. P_2O_5 and 180 to 240 lbs. K_2O in a 1:3 ratio and add 1 lb. boron

(Table 3. Continued from last page)

Arrowleaf Clover [3]	Meechee or Yuchi	10 lbs.	Sept.-Oct.	60 lbs. each of P_2O_5 and K_2O in a 1:1 ratio for Seed-production add 0.5 to 1.0 lb. boron.
Austrian Winter Peas	Commercial	50 lbs.	Sept.-Oct.	Same as for Arrowleaf Clover
Crimson Clover	Autauga, Chief, Dixie or Tibbee	20-30 lbs.	Sept.-Oct.	Same as for Arrowleaf Clover
Lespedeza (Annual)	Climax, or Summit	25 lbs.	Feb.-Apr.	Same as for Arrowleaf Clover
Sericea (Perennial)	Serala, or Commercial	30 lbs.	Feb.-June	Same as for Arrowleaf Clover
Red Clover (Hay).,	Orbit, Kenland, Chesapeake, or Nolin's Red	10 lbs.	Sept.-Nov. Mar.-Apr.	Established: 60 to 90 lbs. each of P_2O_5 and K_2O in a 1:1 ratio. Maintenance: 50 lbs. P_2O_5 and 100 lbs. K_2O in a 1:1 ratio. Maintenance: 50 lbs. P_2O_5 and 100 lbs. K_2O in a 1:2 ratio.
Rough Pea	Commercial-also known as Singletary, Caley and Wild Winter peas.	40 lbs.	Sept.-Oct.	Same as for Arrowleaf Clover.
Vetch	Warrior	30 lbs.	Sept.-Oct.	Same as for Arrowleaf Clover
White Clover	Regal, La.-S1	3 lbs.	Sept.-Nov.	Same as for Arrowleaf Clover

[1]Established stand. If clipped for hay, increase the K O rate about 30 pounds for each ton of hay. If phosphate and potash are applied on alternate years, double the annual rate.

[2]When irrigated, Coastal may be planted from April 1 to September 1.

[3]Specify scarified seed.

[4]Use orchardgrass in North Mississippi only.

[5]Barley yields are generally quite low except in extreme North Mississippi. Barley yellow dwarf disease is a serious problem and none of the varieties are resistant.

[6]All legume seed should be inoculated with the proper culture immediately before planting.

Table 4. Recommendations For Lawns And Similar Turf Areas

Grass	Recommended Varieties	Method of Planting	Rate of Planting	Fertilization per 1000 Sq. ft. per Yr. [1]
Bahiagrass	Pensacola or Wilmington	Seed	5-10 lbs/1000 sq. ft.	6 lbs. nitrogen 2 lbs. P_2O_5 4 lbs. K_2O split into 4 applications
Bermudagrass	Common	Seed	2 lbs/1000 sq. ft.	6-8 lbs. nitrogen
	Tiflawn, Ormond Tifway or Tifdwarf	Sprig or plug	Sprig or plug 6-12 ins. apart on 6-12 in. rows	2 lbs. P_2O_5 3-4 lbs. K_2O split into 4 applications
		Stolonize	2-5 bu./1000 sq. ft	
Carpetgrass	Common	Seed	5 lbs/1000 sq. ft	2-3 lbs. nitrogen 1 lb. P_2O_5 1-2 lbs. K_2O, split into 2-3 applications
Centipedegrass	Common, or Oklawn	Seed or Sprig or plug	4 oz./1000 sq. ft Sprig or plug 6-12 ins. apart on 6-12 in. rows	Same as carpet
Fescue	K-31	Seed	7-10 lbs./1000 sq. ft	4 lbs. nitrogen (2 in fall, 2 in spring) 2 lbs. P_2O_5 and 4 lbs. K_2O
Ryegrass	Gulf or Magnolia	Overseed permanent lawns	8-10 lb./1000 sq. ft.	1 lb. nitrogen in January and March
St. Augustine grass	Common	Sprig or plug	Sprig or plug 6-12 in. apart on 6-12 in. rows	Same as bahia
Zoysiagrass	Emerald, Matrella, or Meyer	Sprig or plug	Sprig or plug 6 in. apart on 6 in. rows	Same as bahia

[1]When establishing a new lawn incorporate 2-3 lbs. of N; 4-6 lbs. of P_2O_5 and 2-3 lbs. of K_2O per 1000 sq. ft. into the seedbed before planting.