1973 crop and fertilizer recommendations for Mississippi.

Mississippi State University

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# 1973 Crop and Fertilizer Recommendations for Mississippi

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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 main station at State College. 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.
CROP AND FERTILIZER RECOMMENDATIONS
FOR MISSISSIPPI

Preliminary crop and fertilizer recommendations are
made annually by the Mississippi Agricultural and Forestry Experiment Station. The recommenda-
tions incorporate the latest research findings at State College and
Branch Experiment Stations. Included is information on varieties and fertilization at 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
stable for all the state; nonetheless, these
general recommendations are useful guides
to crop production. Of course these
recommendations assume that other good
fertilizing 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
specialists in your locality.

Soil Testing Service

Maximum profit is obtained from fertil-
izer only when the right kind and amount are
applied in each field.

Through the Soil Testing Department of
the Cooperative Extension Service every
farmer can get this information as well as
information on liming practices. Furthermore,
the Soil Testing service makes recommenda-
tions for exceptionally high produc-
tion goals which may not be provided for in
the general recommendations.

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

Plant Nutrients

Plant nutrients may be divided into two
categories: (1) Those elements used by crops in
relatively large amounts, the macronutri-
ts; and (2) those needed in very small
amounts, the micronutrients.

The first group includes nitrogen,
phosphorus, potassium, calcium, magnes-
ium, and sulfur. These are usually subdivid-
ed 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
materials or as mixed fertilizers. A fertilizer
material usually contains only one fertilizer
nutrient. Some examples of fertilizer
materials are listed below:

<table>
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<tr>
<th>Material</th>
<th>Total Nitrogen</th>
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<tbody>
<tr>
<td>Ammonium nitrate</td>
<td>34 percent</td>
</tr>
<tr>
<td>Anhydrous Ammonia</td>
<td>82 percent</td>
</tr>
<tr>
<td>Urea</td>
<td>45 percent</td>
</tr>
<tr>
<td>Available Phosphate</td>
<td></td>
</tr>
<tr>
<td>Superphosphate</td>
<td>18 to 20 percent</td>
</tr>
<tr>
<td>Available Potash</td>
<td></td>
</tr>
<tr>
<td>Muriate of potash</td>
<td>60 percent</td>
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</table>

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 one the percentage available
phosphate (P₂O₅), and the third the
percentage water-soluble potash (K₂O). One
hundred pounds of a 5-10-10 fertilizer thus
contains 5 lbs. of total N, 10 lbs. of available
P₂O₅, and 10 lbs. of available K₂O. 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 6-8-8 and 9-12-12 are two
grades in a 3-4-4 ratio. Materials such as
ordinary superphosphate may be labeled as
0-20-0.

At present fertilizer nutrients are either
expressed as the oxide, phosphorus as
phosphorus pentoxide (P₂O₅), 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-P₂O₅-K₂O) would become a 10-8.2-16.5 (N-P-K). The conversion factors for potash are: K₂O x 0.83 = K; K x 1.21 = K₂O. The conversion factors for phosphate are: P₂O₅ x 0.436 = P; P x 2.29 = P₂O₅. Only the method of labeling is changed not the plant nutrient value of the fertilizer.

For the most part fertilizer recommendations are given in this bulletin as pounds of N, P₂O₅ and K₂O needed per acre. Usually the farmer will have a choice of more than one fertilizer grade. For example, 48 lbs. N, P₂O₅ and 48 lbs. K₂O 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, P₂O₅, or K₂O as indicated.

Both the need for and the presence of the secondary nutrients in fertilizers is variable. 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 its addition.

Scattered instances of sulfur deficiency have been observed in the Delta Area. These deficiencies have been associated with land leveling and 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, although a major objective of liming is to neutralize soil acidity. A more complete discussion of liming is given elsewhere. In 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) have been found to be deficient-to an appreciable extent for crop production in Mississippi. These deficiencies have occurred on all crops and have been restricted almost entirely to the Hill Section. Specific recommendations for micronutrients are given later for crops which need them.

Solid or Liquid Fertilizers

Mixed fertilizers are available in both solid and liquid forms. Liquid fertilizers have given, or would be expected to give excellent results in most cases, but they are more effective than many, if not most, solid mixed fertilizers.

The inferiority of some solid mix fertilizers to liquid mixed fertilizers and other solids can be attributed primarily to the phosphate component of these fertilizers. Only highly water soluble phosphates are, of necessity, used in the formulation of liquid mixed fertilizers, but the water solubility as well as other characteristics of the phosphate materials in solid mix fertilizer may vary widely. All highly water soluble phosphates are very effective fertilizers but all those of low water solubility are not.

Solid mixed fertilizers formulated with ammonium phosphates and not ammoniated superphosphate contain a ve
CROP AND FERTILIZER RECOMMENDATIONS

High percentage of their phosphorus in a water-soluble form and are just as effective liquid mixed fertilizers. Ammoniation of ordinary and concentrated superphosphates to add nitrogen during the formation of mixed fertilizers, which is a common practice, converts some of the highly effective water-soluble mono-calcium phosphate to water-insoluble calcium phosphate some of which may be somewhat effective for crop production. This is particularly true with ordinary superphosphate (20 percent) because of the formation of an apatite-like calcium phosphate, the quantity of which increases progressively with increasing ammoniation. In a sense new phosphates formed. Consequently, fixed fertilizers formulated from highly ammoniated ordinary superphosphate are not as effective as liquid mixed fertilizers, or the high quality solids. Unfortunately, most of the phosphorus in the apatite-like phosphates formed upon ammoniation of ordinary superphosphate is determined to be available’ by the chemical method currently used for control purposes.

With the sources of phosphorus commonly used in the formulation of mixed fertilizers in Mississippi farmers are abundantly assured of good results if 50 to 60 percent of the “available” phosphorus is also water-soluble. Some manufacturers give the water-soluble phosphorus content of their fertilizers though this is not required by law. A substantial amount of nitrogen in liquid mixed fertilizers is derived from urea and ammonium nitrate. As will be indicated later, nitrogen solutions containing either urea or urea and ammonium nitrate have been much more effective for surface application to summer pastures than either solid urea or ammonium nitrate. Therefore, liquid complete fertilizers would not be expected to be as effective for summer pastures as solid complete (NPK) fertilizers.

Soil pH and Liming

Excessive soil acidity and associated factors reduce crop yields. A recent summary of soil test results by the Cooperative Extension Soil Testing Department showed that some 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, above 7.0 an alkaline soil. Soil reaction, or pH, affects the availability of some of the more important plant nutrients in the soil. Phosphate is much less available in very acid soils than in slightly acid to mildly alkaline soils. In strongly and very strongly acid soils (pH below 5.5) certain elements such as manganese and aluminum may become so available that they are toxic to plants. On the other hand, 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 has shown that overliming injury in Mississippi is very likely to be associated with deficiencies of boron and zinc. In the case of cotton and legumes, it 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 soils, 5000 or 6000 pounds to loam and silt loam soils, and 7000 to 9000 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, and 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

Where clover disappears in the grass-clover mixtures apply lots in the row.
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 accelerates 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 5 to 7 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. Although lime may be needed badly on some soils for non-legumes, the deficiency is not widespread enough to warrant a general recommendation for rates in excess of maintenance requirements for these crops in the absence of a soil test. Areas going into permanent grass sod should receive the initial maintenance application of lime prior to establishment. Subsequent maintenance applications may be applied to the surface.

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 5 to 7 years.

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 calcium carbonate only. Basic slag, a material containing a minimum of 6 percent P04 and the equivalent of about 60 percent lime should be used only where both the lime and phosphate are needed. The cost of it 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) 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 fine enough, however, to be spread uniformly.

Generally, the Delta and Deep Loessill areas are abundantly supplied with magnesium, therefore, dolomitic lime is of no advantage in these areas. In the other soil areas of the state, however, magnesium levels tend to be lower and a liming material containing considerable magnesium, such as dolomite 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, a maintenance application of 1000 to 2000 pounds per acre may be made in a surface application to permanent pasture or other permanent sods.

When to Fertilize

Following their application to the soil fertilizers become less available to plan. This occurs because they may be lost to leaching and volatilization or be converted to less available forms within the soil. Nitrogen is both leached and volatilize. Potassium is leached from some soils but phosphate is not. But phosphate is change to less available forms.

Fertilizers may contain nitrate (ammonium nitrogen, or both, or other form (urea and Cyanamid) that are change to ammonium when applied to the soil. Nitrate salts found in fertilizer and in soils are highly soluble in water and are not retained chemically by the soil.
Therefore, they remain in solution and move
ably with the soil water being easily leached
from the root zone, particularly on sandy
fms, loam and silt loam soils, or other soils
where water percolates readily. Under water-
aged conditions, which are more likely in
sandy soils, nitrates may be changed by soil
bacteria to gaseous nitrogen (denitrified)
which escapes into the atmosphere.
Ammonium nitrogen is not denitrified nor is
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 ap-
pIed at or near planting time or during the
falling season.

Phosphate fertilizers are not lost by leach-
ing 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 phosphor-
es are very low water solubility also are
formed. The soil-phosphate reaction produc-
tucls themselves become less available
with time but the process is more rapid in
acid soils, particularly at pH values below
6.5.

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

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

Because of rising costs and labor short-
ages, farmers increasingly are more
interested in greater mechanization, custom
services, and in spreading their work load to
increase efficiency. One way of spreading the
work load is to increase land preparation
and application of fertilizers in the fall where
feasible for spring-seeded crops.

Fall application of nitrogen for spring-
seeded crops is not practical in Mississippi
but there are opportunities for fall applica-
tion of phosphate and potash where fall
plowing is practiced. Because of previous
fertilization or native fertility, levels of avail-
able phosphorus and potash in much of our
good crop land now are at the point where
only small increases in yield, if any, are ob-
tained each year from the application of
these fertilizers. At these fertility levels,
which a soil test will show, no more than
maintenance rates are needed for maximum
economic returns from fertilizer. Under such
conditions the crop yield is affected only
slightly, if at all, by the time or method of ap-
plication of the fertilizer. Here there is an op-
portunity for fall application of phosphate
and potash in connection with fall plowing.

Fall application of phosphate and potash
need not be restricted to conditions where
maintenance rates are required. On slightly
acid to Alkaline clay and clay loam soils of
the Blackland Area that are very deficient in
phosphorus, fall application of phosphate
has been just as effective as spring
application. Similar results would be
expected on other soils having similar native
pH values. Top yields also can result from
fall application of phosphate or other soils
that are low in available phosphorus; but,
because of fixation, a higher rate would be
needed in the fall than in the spring, especial-
ly on acid soils having a pH below 6.0. Even-
tually, though, the phosphate would build
up in these very deficient soils to the point
that a maintenance rate would be sufficient
either for fall or spring application.
Except for leaching losses, potash applied in the fall for spring-seeded crops would be expected to be as effective as that applied in the spring. Leaching losses are not particularly significant on clay and clay loam soils. But, as indicated before, leaching losses do occur on the lighter soils. Leaching losses are reduced by broadcasting the fertilizer and maintaining the soil pH above 6.0 by liming. With broadcast application on properly limed soils, substantial losses by leaching probably would not occur except on light sandy soils. Potash losses by leaching can be compensated by higher rates of application which might be an acceptable alternative to spring application in some cases.

**How to Fertilize**

To obtain maximum utilization of fertilizers, the two components of availability, namely chemical and positional, must be optimized concurrently. Chemical availability refers to the capacity of the fertilizer and its soil-reaction products to supply nutrients to plants. Positional availability refers to the location of the fertilizer with respect to the plant roots. For example, fertilizer placed in the soil a foot or so from the row is positionally unavailable to seedling plants.

The chemical availability of nitrogen and potassium in fertilizers usually is not affected greatly by degree of contact with the soil. However, the effectiveness of highly reactive phosphates is protected by reducing their contact with the soil which slows the rate of phosphate fixation. This may be done either by band placement in the soil or by granulation of the fertilizer at the factory. Since most solid fertilizers sold in Mississippi are granulated or pelletized, method of application has a greater effect on positionally available than on chemical availability.

To assure effective positional availability fertilizers should be placed so as to be intercepted by plant roots at an appropriate time, or be moved to plant roots with soil water. As plants grow and extend their roots both horizontally and vertically the volume of soil from which nutrients may be absorbed is increased. Consequently, fertilizers that are positionally unavailable during early plant growth may be available later.

Phosphate does not move appreciably in soils and the movement of potash is somewhat limited, especially on soils of medium to fine texture. Therefore, these fertilizers must be placed so as to be intercepted by plant roots. For drill-seeded and row crops they should be placed in the soil deep enough to be in the moist soil where plant feed as they grow. For such crops, surfacing application or shallow incorporation, as disk being expected to give inferior results because of poor positional availability.

Nitrogen as nitrate moves with the water to plant roots. Its over-all efficiency is not affected greatly by degree of concentration or its location within the root zone except that enough nitrogen should be positionally available for good growth of young plants.

Nitrogenous fertilizers applied to the surface of dry soils remain positionally available for the most part until dissolved and moved down into the root zone by percolating water. Before ammonium nitrog 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. Unfavorable positional availability is avoided by applying nitrogenous fertilizers far enough in advance of the necessary transformation and movement into the root zone by rainfall and occur by the time the nitrogen is needed by the crop.

Localized concentration of immobile fertilizer nutrients, such as phosphorus and potassium, near the row or drill, as result from band application, provides a very favorable opportunity for early interception by plant roots as well as for extensive root development within the fertilized zone late a condition which contributes to optimum fertilizer efficiency. An outstanding benefit from phosphorus is its favorable influence on the early growth and development of plants. This benefit is enhanced by localize placement of fertilizer near the row.
Although maximum efficiency of phosphate and potash is usually obtained by band placement for row crop 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, higher rates are needed for broadcast than for band application to obtain the same increase in yield. This is especially true where the fertilizer is incorporated by shallow disking instead of being plowed under.

Because of accumulation from previous applications, or because of high native fertility, only a small percentage of the rowcrop land previously cropped to cotton and fertilized as recommended over a long period would be expected to be so low in phosphate and potash as to require an appreciable increase in the recommended rate to obtain essentially the same yields when broadcast as when banded beside the row.

A hazard of localized placement of the fertilizers near the row is salt injury to seeds and seedlings resulting in poor stands and hindered growth. 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 3 to 4 inches to the side of and not to 4 inches below 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 low 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 nitrate solutions such as N-Sol-32 and urea. 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.

**Foliar Feeding**

Plants absorb and utilize nutrients applied in solution to their leaves and if a deficiency exists, yields and-or quality may be improved by foliar application. Because they are required in such small amounts, very dilute nutrient salt solutions of the micronutrient (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 for 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. However, 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 several applications of rather dilute solutions during the growing season. Therefore, foliar feeding of these nutrients is not as feasible as foliar feeding of the micronutrients. Increases in the yield of cotton have been obtained in Mississippi under certain conditions from foliar feeding of the primary nutrients, but it has not been shown so far to be a desirable or economical alternative to soil application of these nutrients. Therefore, foliar feeding is not now recommended routinely in lieu of or as supplement to soil application of primary plant nutrients.
Recommendations for Major Field Crops

Corn

Hybrid: Detailed results of hybrid corn trials are published annually in MAFES Research Highlights. Ample seed of hybrids with N-cytoplasm (resistant to Southern Corn Leaf Blight) should be available for 1972 planting. Seed sold in 1972 will be labeled as to type of cytoplasm and only N-cytoplasm hybrids should be grown.

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 March 15 to April 15, and in South 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 hillside are not well suited to 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 100 bushels per acre, increasing with the yield. A good rule of thumb is to provide approximately 150 plants for each bushel of corn. 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—Hill and Delta Foothill Areas: Soils of the Hill and Delta—Foothill Area 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 be encountered, especially on soils of medium to coarse texture. When this occurs, a mixed fertilizer which contains enough zinc to give 2-3 pounds per acre should be used for two to three years. No other micronutrient deficiencies have been observed in corn.

Time: Apply all of the phosphate and potash before planting. Nitrogen may be applied before planting or in split applications: one-fourth to one-third before planting and the remainder as a side dressing by the time the corn is knee high.

Rate: Apply 120 to 210 pounds of nitrogen and 40 to 70 pounds each of phosphate (P₂O₅) and potash (K₂O) in approximately 3:1 ratio, but adjust the rate to the expected average yield. For an expected yield of 1 bushel per acre the rate is 210 lbs. N, 70 lbs. P₂O₅, 70 lbs. K₂O. At lower yields the rate should be reduced proportionately, being 162 lbs. N, 54 lbs. P₂O₅, 54 lbs. K₂O per acre for a 10 bushel yield and 120 lbs. N, 40 lbs. P₂O₅, 40 lbs. K₂O for one of 80 bushels. If corn is grown for silage for more than one year, double the rate of K₂O.

Method: All of the phosphate and potash and up to 40 pounds of nitrogen per acre may be placed in a band located 3 to 4 inches one side and 3 to 4 inches below the seed. The remaining nitrogen may be drilled at least 6 inches from the row, broadcast, or applied later as a side dressing. All or part of the nitrogen may be broadcast as a mixture with fertilizer and potash, however, the fertilizer should be plowed down as shown in all broadcast applications of phosphate at potash. Preplant applications of anhydrous ammonia should be placed at least 6 inches to the side of and 6 inches below the seed.

Place side-dress applications of nitrogen foot or more from the row, nonpressurized solutions and solid sources at a depth of 6 inches and anhydrous ammonia at a depth of 6 inches. Surface, sidedress, application solid sources and nonpressure solutions almost as effective as in-soil placement.

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

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

**Rate:** 120 to 210 pounds of nitrogen per acre, increasing the rate as the expected yield creases.

**Method:** Place preplant applications of nitrogen 6 or more inches from the drill row, in-pressure solutions and solid sources at a depth of 4 or more inches and anhydrous ammonia at a depth of 6 inches below the level of the seed. Side dress applications of nitrogen should be placed 1 foot or more from the row, non-pressure solution and solid at a depth of 4 inches and anhydrous ammonia at a depth of 6 inches. Surface application of solid sources and non-pressure solutions is only slightly less effective than in-soil placement.

**COTTON IN THE DELTA**

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

**Seeding Dates and Rates:** Plant as soon after April 1, as weather permits, but not in cold soil. Hill dropped—16 to 22 pounds of delinted seed per acre. Drilled—30 to 40 pounds of delinted seed per acre. Drilled for broadcast—60 pounds of delinted seed per acre. Seed should be of good viability.

**Fertilization:** Delta soils generally need only nitrogen for most profitable yields but deficiencies of phosphorus and potash do occur occasionally. This is especially true for cotton on sandy loam and silt loam soils of the Eastern Delta and Foothill Area. Therefore, soils should be tested for phosphorus and potash needs. Also, sandy soils that are low in organic matter or that have been leveled should be tested for sulfur needs.

**Time:** Apply nitrogen in the spring at or prior to planting, except on sandy loam soils having very good to excessive internal drainage and on clayey soils with poor surface drainage. On such soils, split application of nitrogen should be made, one-half at or prior to 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 rates from 90 to 100 pounds of nitrogen per acre are recommended for solid planted cotton and for all skiprow patterns. One hundred to 120 pounds of nitrogen per acre is recommended for the silty clay loam, silty clay, and clays regardless of the planting pattern, except that for clays with poor surface drainage the rate should be 120 to 150 pounds of nitrogen per acre.

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.

All nitrogen fertilizer recommendations are on the basis of a planted acre regardless of the planting pattern, that is, whether skip-row or solid.

**Method:** Same as for Delta Area corn.

**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 well delinted seed or 12 to 16 pounds of acid delinted seed per acre. Drilled—use 20 to 30 pounds of well delinted seed or 15-20 pounds of acid delinted seed per acre. All seed planted should be of good quality.

**Fertilization:** A complete fertilizer (NPK) containing sulfur and boron is needed in the Hill Sections. 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 magnesia (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.
Enough boron is provided when the mixed fertilizer contains boron and phosphate in the proportion of 0.3 pounds to 48, respectively, or boron to phosphate ratio of 1:160. No more than 0.5 pounds of water-soluble boron should be drilled with the fertilizer.

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 at early square formation.

Phosphate and potash may be applied in the fall under certain conditions—see section on When to Fertilize.

**Rate:** Apply 72 pounds of nitrogen (N) and 48 pounds each phosphate (P₂O₅) and potash (K₂O) per acre except as follows: Increase the nitrogen to 120 pounds and the phosphate and potash to 60 pounds each per acre on the dark upland soils of the Blackland Areas, and increase the nitrogen to 90 lbs. per acre on the well-drained bottom and on the level to gently sloping upland soils of the Upper Coastal Plain. Excessive stalk growth and delayed maturity indicate too much nitrogen. Somewhat stunted growth associated with yellowish green foliage and the early yellowing and premature shedding of the leaves indicate too little nitrogen. When these conditions are observed nitrogen rates should be adjusted accordingly.

Where a skip row planting pattern is followed the rate of nitrogen per planted acre should be the same as is recommended for solid cotton but the rate of phosphate and potash should be increased to 60 pounds of each per acre where a lower rate is recommended for solid cotton. In a 4 x 4 or 2 x 2 planting pattern there is, of course, only one-half acre of planted cotton.

**Method:** Same as for corn in Hill and Delta Foot Hill Areas. Contact placement of seed and fertilizer or placement directly beneath seed should be avoided.

If the phosphate and potash are applied broadcast, the rate should be increased to 120 pounds of each per acre on soils known to be somewhat low in these nutrients. A soil test will indicate such conditions. However, if indicated before an increase in rate generally will not be required on land previously cropped to cotton and fertilized as recommended. If a preemergence herbicide is to be broadcasted and worked into the soil, phosphate and potash applied broadcast should be plowed down before the herbicide is applied.

**SOYBEANS**

**Varieties:** For all areas north of U.S. Highway 84 use—Hill, Dare, Davis, Lee, Lee 68, Mack, Pickett 71, Seemes and Brad (listed in order of maturity.)


**Soils:** Soybeans are adapted to all Delta soils and to most soils of the Hill area. Upper soils may be expected on drough soils such as eroded and shallow upland soils.

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

**Inoculation:** If not on land where a crop well nodulated soybeans has grown with the last five years, the seed should be inoculated.

**Fertilization—Delta Area:** Soybeans require no fertilizer on most Delta soils but many need liming. A soil test will indicate the need for lime as well as phosphate at potash.

In the Eastern Delta and Foothills Area, molybdenum seed treatment is needed for top yields on all soils that were previous acid regardless of current lime status, at elsewhere in the Delta on soils having a pH below 6.0. A seed treatment of 1/2 oz. sodium molybdate per acre, or its equivalent is recommended.

**Fertilization—Hill Area:** In the Hill Area phosphate and potash as well as lime usual
CROP AND FERTILIZER RECOMMENDATIONS

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

Fertilization: Apply from 100 to 140 pounds of nitrogen per acre on old crop land. 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. Fertilizer may be applied before seeding if covered by approximately 2 inches of soil. Otherwise, it may be applied just before the first flood or one-half before the first flood and one-half at the correct "joint stage." This stage occurs when the first internode or distance between the lowest two joints is ¾ inch for very early varieties, ½ inch for Starbonnet and 1½ inches for other varieties. If all the nitrogen is applied before the first flood, do not drain the field but maintain a continuous flood for the entire season.

SORGHUMS FOR GRAIN, SILAGE

Varieties for Grains: DeKalb BR 64, RS 700 and Acco 1093 are bird-resistant varieties with good yield potential which have the best resistance to anthracnose disease. 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: Funks BR 79, Penngrain BR, Funks BR 630 and McNair 546.

Bird-resistant varieties may be used for high energy silage, but these varieties may cause palatability problems especially when fed to milk cows in high production. Non-bird resistant varieties such as Funks G 522, DeKalb E 57 and Acco R 1090 may be damaged by birds, but are much more desirable for a high quality silage, or for grain in areas where birds are not a problem. The resistance to weathering found in bird-resistance is not as important when the grain is harvested for silage in a slightly immature stage.

Varieties for Silage: FS1A, FS24, NK300, Funks 102F.

RICE IN THE DELTA

Varieties: Long Grain: Bluebonnet 50, Starbonnet, Dawn and Bluebelle which mature in 150, 142, 130, and 115 days respectively. Medium Grain: Nova 66 and Vista which mature in 125-130 days.

Where cover crops are grown on the grass-clover mixtures apply 100 to 140 pounds of nitrogen per acre on old crop land.
Varieties for Syrup: Dale and Brandis.

Seeding Dates and Rates: April 20 to July 15. Earlier dates are preferred. If first harvest is made by July 25, a second cutting can usually be made if soil moisture is adequate. Seed 5 to 7 lbs. of seed per acre in rows.

Fertilization: For comparable yields the soil fertility and fertilizer requirements of grain sorghum and corn are quite similar except that grain sorghum apparently requires less nitrogen.

For Grain: In the Delta Area only nitrogen is needed generally. Depending upon the average yield, apply 80 to 130 pounds of N per acre, the lower rate for average yields of 60 to 70 bushels per acre and the higher rate for average yields of 100 to 120 bushels per acre. For intermediate yields, intermediate rates of nitrogen are recommended.

In the Hill Areas phosphate and potash as well as nitrogen generally are required. For average yields 50 to 60 bushels per acre, apply 60 to 75 pounds of nitrogen (N) and 30 to 40 pounds each of phosphate (P₂O₅) and potash (K₂O) per acre. For average yields of 90 to 100 bushels per acre 100 to 130 pounds of N and 50 to 60 pounds each of P₂O₅ and K₂O.

Where a stubble crop is desired, apply an additional 40 to 60 pounds of nitrogen after the first crop.

Depending on soil productivity, average yields can be expected to range from 50 to 90 bushels per acre for early plantings where proper cultural and fertilization practices are followed. Average yields from late plantings (after July 1) would be considerably lower.

Sidedress applications of nitrogen should be made by the time six leaves are showing which normally occurs before the sorghum is ten inches high.

For Silage: Apply as for grain, except double the rate of potash.

Method of Application: Same as for corn.

SUGARCANE FOR SYRUP


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 F (October 15) at the rate of 2 stalks, that place stalks end to end with a whole stalk in the union. Plant the cane in 4-foot rows of land that has been broken 5 to 6 inches deep a few weeks earlier. To protect from cold air to provide good drainage, cover the cane 6-8 inches deep by forming a ridge over it that the drainage furrows between the rows are 2 to 4 inches deeper than the cane.

Fertilization: In the spring apply 40 to 5 pounds each of nitrogen and phosphorus (P₂O₅) and potash (K₂O) per acre shortly after germination of the eyes or just before re-growth from stubble. Place the fertilizer in a band so that it will be 4 to 6 inches to the side of the row and 3 to 5 inches deep after the ridges have been worked down or 1 to 2 inches deeper than the cane. Sidedress with about 30 pounds of nitrogen per acre before July. Place sidedressing nitrogen in the edge of the root zone deep enough to be in moist soil without being disturbed by subsequent cultivation.

Top and cup the cane before freezing weather. Harvesting as much as a month before processing improves syrup quality and reduces “sugaring.”

GRASSES, LEGUMES, AND SMALL GRAINS

Supplementary Information on Pasture Recommendations for the Hill Section.

Planting: In most instances a grass-legume mixture will provide less expensive and more nutritious pasture forage than grass alone. Therefore where practical new pastures should be planted to the desired grass plus one or more legumes. The pasture should then be fertilized to meet the needs of the legume, namely phosphorus, potash and lime, which are needed. Rates of these nutrients sufficient for the legume will also be adequate for the grass. The legume should provide adequate nitrogen for both species through fixation. In general, it is unwise to apply fertilizer containing nitrogen to grass-legume mixtures.

Renovation of Grass-legume pasture: Where the stand of legumes in a pasture has degenerated to less than 15 percent or b.
CROP AND FERTILIZER RECOMMENDATIONS

If a pasture is lost entirely, it would pay to reseed with clover, forages, and grasses. This is best done in the fall season. The pasture should be closely grazed or mowed and the clover seed broadcast or drilled along with a fertilizer containing phosphorus and potash as indicated by soil test (See page 19).

**Planting:** If equipment is available, drill or broadcast the seed and fertilizer is recommended for the establishment of all pasture and forage crops. With small-seeded grasses and clover, care must be taken not to seed too deep. A seeding depth no more than 1/2 inch is recommended. Most plantings are made by broadcasting the seeds on the soil surface. It is advisable to cultivate the seed bed immediately before or after seeding.

**Fertilization General:** For established pastures, solid and liquid complete fertilizers and solid sources of nitrogen may be applied. On summer grass pastures, the efficiency top-dressed 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 extreme 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 arbitrary figure.

The lower limit of the recommendation is estimated to be sufficient for plant establishment and (1) for reasonable yields 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 system, (3) type of livestock enterprise, and (4) economic trend are such as to justify the considerably higher yields of forage.

Fall application of phosphorus 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 the following tables on forage and pasture crops. If phosphate and potash are applied only once in two years, double the annual application rate.

**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. The most economical rate will depend upon temperature, availability of moisture, and the use made of the additional fertilizer.

**Utilization of Forage:** To insure maximum forage profit from fertilizer applied to pastures, livestock producers should add additional animals to fertilized pastures to use additional forage.

**Caution:** Excessive amounts of nitrogen applied in one application may result in grass tetany or nitrate poisoning.

To increase the utilization of the nitrogen or to obtain a more favorable distribution of pasture production, split applications of nitrogen are recommended for both summer and winter grass pastures, at 60-80 pounds each time.

Except for Coastal bermudagrass, where the last application may be as late as August 15, the last application of nitrogen to permanent summer pastures should be made no later than July 15, and two weeks earlier if anhydrous ammonia is used. Because of the frequency of drought, mid-summer applications of nitrogen are generally less effective than applications made in the spring and early summer. So more nitrogen should be applied in the spring than in summer.

It may be economical to apply up to 200 pounds of nitrogen per acre to millet and...
sudangrass; 180 pounds to common bermudagrass, dallisgrass, and bahiagrass, and 240 pounds to Coastal bermudagrass.

For summer temporary grazing crops, at least 50 percent of the total nitrogen should be incorporated into the seedbed with phosphorus and potash prior to planting. Use the remainder on the surface after each grazing or cutting.

**Fertilization of Grass-legume Combinations:** Forage legumes may be effectively used to supply nitrogen required by the associated grasses. When properly used, forage legumes, extend the grazing season, increase total forage production, increase forage quality and result in better utilization of land resources. The choice of legume species and cultural practices should be determined by when the forage is needed, availability of seed and price of seed. The application of nitrogen fertilizer to grass-legume swards will reduce the N-fixing efficiency of the legumes. Nitrogen should not be used on permanent grass-legume mixtures when legumes make up 15 percent or more of the stand.

**Caution:** Where conditions are especially favorable for legumes the danger of bloating may prevent full utilization of legumes seeded alone or of grass-legume combinations such as dallisgrass and white clover, particularly in the Deep Loess area. Drilling of small grains or ryegrass into such a pasture in North Mississippi orchardgrass will lessen the bloat problem and supply additional forage.

For winter growing grass-legume combinations, the legume will supply the nitrogen needed by the grass. However since grass-legume mixtures sometimes "grow of more slowly than grass alone fertilized with nitrogen; it may be advisable to plant a portion of the winter pasture to grass alone and use nitrogen fertilizer as recommended in the tables.

**Inoculation of Clovers:** All seed of clovers and other forage legumes should be inoculated with the proper culture prior to planting. It is imperative that seeds of needed clovers like Arrowleaf be inoculated.

**Selection of Varieties:** The use of certified seed will reduce the risk of bringing noxious weed seed onto the farm and result in better performance.
<table>
<thead>
<tr>
<th>Pasture or Hay Crop</th>
<th>Recommended Varieties</th>
<th>Rate of Seeding Per Acre</th>
<th>Time of Planting</th>
<th>Fertilization, lbs. N, Annual Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bermudagrass</td>
<td>Coastal</td>
<td>20 bu. sprigs</td>
<td>Feb.-May</td>
<td>150 to 240 lbs. N, 2-3 applications beginning June 1, for grazing. For hay, 300-400 lbs. N.</td>
</tr>
<tr>
<td>Fescue and White Clover</td>
<td>Kentucky-31 Fescue, Regal or La. S-1 White Clover</td>
<td>Fescue Clover Oct.-Nov.</td>
<td>Feb.-May</td>
<td>Test soil for lime, phosphorus, and potash needs.</td>
</tr>
<tr>
<td>Red Clover</td>
<td>Orbit or Kenland</td>
<td>10-15 lbs. seed alone or in small grains</td>
<td>Sept.-Nov.</td>
<td>Test soil for lime, phosphate and potash.</td>
</tr>
<tr>
<td>Sorghum-Sudan hybrids</td>
<td>Commercial Varieties</td>
<td>20 lbs. in rows 35 lbs. broadcast</td>
<td>Apr.-June</td>
<td>60 lbs. N prior to planting. 60 lbs. N after 1st and 2nd cutting.</td>
</tr>
<tr>
<td>Korean Lespedeza</td>
<td>Climax or Summit</td>
<td>20-25 lbs. seed in small grains</td>
<td>Feb.-Apr.</td>
<td>Test soil for lime, phosphate, and potash.</td>
</tr>
<tr>
<td>Wheat</td>
<td>Arthur 71, Blueboy II</td>
<td>120 lbs. for grazing 90 lbs. for grain</td>
<td>Same as Oats</td>
<td>Grazing: Same as oats grain; 60 to 90 lbs. N about March 1.</td>
</tr>
<tr>
<td>Rye</td>
<td>Explorer or Elbon</td>
<td>120 lbs. for grazing 90 lbs. for grain</td>
<td>Same as Oats</td>
<td>Same as Oats.</td>
</tr>
<tr>
<td>Barley</td>
<td>Dayton, Harrison or Jefferson</td>
<td>Same as Wheat</td>
<td>Same as Oats</td>
<td>Same as Oats.</td>
</tr>
</tbody>
</table>

* All areas should be soil tested for lime, phosphorus, and potash needs.

* If irrigated Coastal may be planted from April 1 to Sept. 1

* Where clover disappears in the grass-clover mixtures apply 60 lbs. N in the fall.
### RECOMMENDATIONS FOR PASTURES AND FORAGES IN HILL SECTIONS

<table>
<thead>
<tr>
<th>Pasture or Hay Crop</th>
<th>Recommended Varieties</th>
<th>Time and Planting</th>
<th>Rate of seeding Per Acre</th>
<th>Fertilization, lbs./A Annual Fertilization&lt;sup&gt;7&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ESTABLISHED WARM SEASON GRASSES (PERMANENT)</strong></td>
<td></td>
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</tr>
<tr>
<td>Bahiagrass</td>
<td>Pensacola, Wilmington, (Argentine—South Mississippi only)</td>
<td>Feb.-May</td>
<td>15 lbs.-A</td>
<td>120 to 180 lbs. N in split applications and 30 to 45 lbs. each of P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt; and K&lt;sub&gt;2&lt;/sub&gt;O. Total application in a 4-1-1 ratio.</td>
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</tr>
<tr>
<td>Bermudagrass</td>
<td>Common</td>
<td>Feb.-May</td>
<td>5 lbs. seed</td>
<td>Same as for Bahiagrass.</td>
</tr>
<tr>
<td>Coastal</td>
<td></td>
<td>Feb.-May If irrigated plant as late as Sept. 1.</td>
<td>20 bu. of sprigs per acre</td>
<td><strong>For Grazing:</strong> 120 to 240 lbs. N in split applications and 30 to 60 lbs. each of P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt; and K&lt;sub&gt;2&lt;/sub&gt;O. Total application in 4-1-1 ratio. <strong>For Hay:</strong> 200 to 300 lbs. N in split application; 50 to 90 lbs. of P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;; 100 to 180 lbs. K&lt;sub&gt;2&lt;/sub&gt;O. Total application in a 4-1-2 ratio.</td>
</tr>
<tr>
<td>Dallisgrass</td>
<td>Commercial</td>
<td>Feb.-May</td>
<td>10 lbs. (live seed)</td>
<td>Same as Bahiagrass.</td>
</tr>
<tr>
<td>Johnsongrass</td>
<td>Commercial</td>
<td>April 1 to May 15</td>
<td>15-25 lbs. (live seed)</td>
<td>Same as for Coastal Bermudagrass.</td>
</tr>
<tr>
<td><strong>ESTABLISHED COOL SEASON GRASSES (PERMANENT)</strong></td>
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<tr>
<td>Tall Fescue</td>
<td>Kentucky-31 or Goar</td>
<td>Sept.-Nov.</td>
<td>15 lbs.</td>
<td>80 to 140 lbs. N, split—fall and spring; 40 to 60 lbs. each of P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt; and K&lt;sub&gt;2&lt;/sub&gt;O in a 1:1 ratio.</td>
</tr>
<tr>
<td>Orchardgrass (North Miss. only)</td>
<td>Jackson or Boone</td>
<td>Sept.-Nov.</td>
<td>15 lbs.</td>
<td>Same as Tall Fescue</td>
</tr>
</tbody>
</table>

<sup>7</sup> Established Stands
<table>
<thead>
<tr>
<th>Pasture Crop</th>
<th>Recommended varieties</th>
<th>Time of Planting</th>
<th>Seeding Per Acre</th>
<th>Fertilization, lbs./A. Annual Application</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warm Season Grass-Legume Mixtures (Permanent)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bahiagrass, Bermudagrass</td>
<td>As before</td>
<td>As before</td>
<td></td>
<td>Establishment: 60 to 100 lbs. As before $P_2O_5$ a 1:1 ratio. <strong>Maintenance:</strong> 40 to 60 lbs.</td>
</tr>
<tr>
<td>Dallisgrass with one of the following legumes. White Clover</td>
<td>Regal, La. S-1 Merit</td>
<td>Sept.-Nov.</td>
<td>1-3 lbs.</td>
<td>a 1:1 ratio. Same as above. For seed production add 0.5 to 1 lb. of boron.</td>
</tr>
<tr>
<td>Crimson Clover</td>
<td>Dixie, Chief, Autaug or Tibbee</td>
<td>Sept.-Nov.</td>
<td>25 lbs.</td>
<td>Same as Crimson Clover <strong>Establishment:</strong> 60 lbs. each of $P_2O_5$ and $K_2O$ in a 1:1 ratio. <strong>Maintenance:</strong> 40 lbs. each of $P_2O_5$ and $K_2O$.</td>
</tr>
<tr>
<td>Arrowleaf Clover* Annual Lespedeza</td>
<td>Meechee or Yuchi Climax or Summit</td>
<td>Sept.-Nov.</td>
<td>10-15 lbs. 25 lbs.</td>
<td></td>
</tr>
<tr>
<td>Johnsongrass with one of the following for hay: Alfalfa</td>
<td>Commercial</td>
<td>Feb.-June</td>
<td>15-25 lbs. (live seed)</td>
<td>Establishment: 120 to 160 lbs. each of $P_2O_5$ and $K_2O$ in a 1:1 ratio. <strong>Maintenance:</strong> 60 to 80 lbs. $P_2O_5$ and 180 to 240 lbs. $K_2O$ in a 1:3 ratio plus boron. Same as with Alfalfa.</td>
</tr>
<tr>
<td>Red Clover</td>
<td>Orbit, Kenland or Chesapeake</td>
<td>Sept.-Nov. or March-April on clean land.</td>
<td>10 lbs.</td>
<td></td>
</tr>
<tr>
<td>Rough Peas</td>
<td>Commercial, also known as Caley, Singletary, and Wild Winter Peas.</td>
<td>Sept.-Oct.</td>
<td>30 lbs.</td>
<td>60 to 90 lbs. $P_2O_5$ and 120 to 180 lbs. $K_2O$ in a 1:2 ratio, 120 lbs. N after peas mature.</td>
</tr>
<tr>
<td><strong>WARM SEASON GRASSES (ANNUAL OR TEMPORARY)</strong></td>
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<tr>
<td><strong>Millet</strong></td>
<td>All hybrid varieties</td>
<td>Apr.-June</td>
<td>15 lbs in rows</td>
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<td></td>
<td></td>
<td></td>
<td>35 lbs. broadcast</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>120-150 lbs. N, split application; 60 lbs. P\textsubscript{2}O\textsubscript{5} and 60 lbs. K\textsubscript{2}O.</td>
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</tr>
<tr>
<td><strong>Sorghum-Sudan Hybrids</strong></td>
<td>Commercially available varieties</td>
<td>April-June</td>
<td>15 lbs. in rows</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>35 lbs. broadcast</td>
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<td></td>
<td></td>
<td></td>
<td>120 to 180 lbs. N in split applications; 60 lbs. P\textsubscript{2}O\textsubscript{5} and 60 lbs. K\textsubscript{2}O.</td>
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</table>

### COOL SEASON GRASS—LEGUME MIXTURES (ANNUAL OR TEMPORARY) 4/)

<table>
<thead>
<tr>
<th><strong>COOL SEASON GRASS—LEGUME MIXTURES (ANNUAL OR TEMPORARY)</strong></th>
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<tbody>
<tr>
<td><strong>Annual Ryegrass</strong> with one of the following:</td>
</tr>
<tr>
<td>Arrowleaf Clover 4/</td>
</tr>
<tr>
<td>Crimson Clover</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>Small Grains and Legume (Use same as with ryegrass)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Tall Fescue</strong> or</td>
</tr>
<tr>
<td><strong>Orchardgrass</strong> 4/ with</td>
</tr>
<tr>
<td><strong>White Clover</strong></td>
</tr>
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<td></td>
</tr>
</tbody>
</table>

### COOL SEASON GRASS—LEGUME MIXTURES (PERMANENT)

<table>
<thead>
<tr>
<th><strong>COOL SEASON GRASS—LEGUME MIXTURES (PERMANENT)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tall Fescue</strong> or Orchardgrass 4/ (North Mississippi only) with White Clover</td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td>Establishment:</td>
</tr>
<tr>
<td>Maintenance:</td>
</tr>
</tbody>
</table>

4/ Use of Orchardgrass in North Mississippi only.
### ANNUAL COOL SEASON GRASSES AND SMALL GRAINS

<table>
<thead>
<tr>
<th>Crop</th>
<th>Variety Details</th>
<th>Sowing Period</th>
<th>Fertilizer Application</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Ryegrass</td>
<td>Gulf, Magnolia, or Florida Rust Resistant (Common in North Miss. only)</td>
<td>Sept. - Oct.</td>
<td>120 to 220 lbs. N, split fall and spring, 80 to 100 lbs. P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt; and 40 to 50 lbs. K&lt;sub&gt;2&lt;/sub&gt;O in a 2:1 ratio.</td>
<td></td>
</tr>
<tr>
<td>Barley (Grain only)</td>
<td>Harrison, (Barsoy.) Jefferson, Keowee or McNair 601</td>
<td>Oct. - Nov.</td>
<td>90 lbs.</td>
<td>10-20 lbs N, 30-40 lbs each of P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt; and K&lt;sub&gt;2&lt;/sub&gt;O at seeding. Topdress with 60 to 90 lbs N about March 1</td>
</tr>
<tr>
<td>Rye</td>
<td>Abruzzi, Balboa, Elben, Explorer, or Vitagraze</td>
<td>For Forage: Same as Oats</td>
<td>For Grain: 120 lbs For Grain: 90 lbs.</td>
<td>Same as Ryegrass. Same as Barley</td>
</tr>
<tr>
<td>Wheat</td>
<td>Arthur, Arthur-71 Blueboy II, Coker 68-15 Holley</td>
<td>Same as for Rye</td>
<td>For Forage: 120 lbs For Grain: 90 lbs.</td>
<td>Same as Ryegrass. 10-20 lbs N, 40 lbs each of P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt; and K&lt;sub&gt;2&lt;/sub&gt;O at planting. Topdress with 60 to 90 lbs N about March 1</td>
</tr>
</tbody>
</table>
### LEGUMES

<table>
<thead>
<tr>
<th>Legume</th>
<th>Variety</th>
<th>Establishment</th>
<th>Maintenance</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa (Hay)</td>
<td>Florida 66, Delta, or Cody</td>
<td>Sept.-Nov.</td>
<td>15-25 lbs.</td>
<td>Each of $P_2O_5$ and $K_2O$ in a 1:1 ratio and 1.5 lbs boron.</td>
</tr>
<tr>
<td>Arrowleaf Clover</td>
<td>Meechee or Yuchi</td>
<td>Sept.-Oct.</td>
<td>10 lbs.</td>
<td>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.</td>
</tr>
<tr>
<td>Austrian Winter Peas</td>
<td>Commercial</td>
<td>Sept.-Oct.</td>
<td>50 lbs.</td>
<td>Same as for Arrowleaf Clover.</td>
</tr>
<tr>
<td>Crimson Clover</td>
<td>Autauga, Chief, or Tibbee</td>
<td>Sept.-Oct.</td>
<td>20-30 lbs.</td>
<td>Same as for Arrowleaf Clover.</td>
</tr>
<tr>
<td>Lespedeza (Annual) Sericea (Perennial)</td>
<td>Climax, or Summit Seralo, or Commercial</td>
<td>Feb.-April, Feb.-June</td>
<td>25 lbs. and 30 lbs.</td>
<td>Same as for Arrowleaf Clover.</td>
</tr>
<tr>
<td>Red Clover (Hay)</td>
<td>Orbit, Kenland or Chesapeake</td>
<td>Sept.-Nov., Mar.-Apr.</td>
<td>10 lbs.</td>
<td></td>
</tr>
<tr>
<td>Vetch</td>
<td>Warrior</td>
<td>Sept.-Oct.</td>
<td>30 lbs.</td>
<td>Same as for Arrowleaf Clover.</td>
</tr>
<tr>
<td>White Clover</td>
<td>Regal or Merit</td>
<td>Sept.-Nov.</td>
<td>2-3 lbs.</td>
<td>Same as for Arrowleaf Clover.</td>
</tr>
</tbody>
</table>

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8/ All legume seed should be inoculated with the proper culture immediately before planting.
| Grass            | Recommended Varieties                  | Method of Planting | Rate of Planting | Fertilization per 1000 Sq. ft. per Yr. 9/
|------------------|----------------------------------------|--------------------|------------------|------------------------------------------------------------------------------------|
| Bahiagrass       | Pensacola or Wilmington                | Seed               | 5-10 lbs./1000 sq. ft. | 6 lbs. nitrogen  
2 lbs. P$_2$O$_5$  
4 lbs. K$_2$O split into  
4 applications |
| Bermudagrass     | Common                                 | Seed               | 2 lbs./1000 sq. ft. | 6-8 nitrogen  
2 lbs. P$_2$O$_5$ |
|                  | Tiflawn, Ormond, Tifway or Tifdwarf   | Sprig or plug      | Sprig or plug 6-12 ins. apart on 6-12 in. rows  
3-4 lbs. K$_2$O, split into  
4 applications |
|                  |                                        | Stolonize          | 2-5 bu./1000 sq. ft. | 4 applications |
| Carpetgrass      | Common                                 | Seed               | 5 lb/1000 sq. ft.  | 2-3 lbs. nitrogen  
1 lb. P$_2$O$_5$  
1-2 lbs. K$_2$O, split into  
2-3 applications |
| Centipedegrass   | Common, or Oaklawn                     | Seed or            | 4 oz/1000 sq. ft.  | Same as carpet |
|                  |                                        | Sprig or plug      | Sprig or plug 6-12 ins. apart on 6-12 in. rows. |
| Fescue           | K-31                                   | Seed               | 7-10 lbs./1000 sq. ft. | 4 lbs. nitrogen  
(2 in fall, 2 in spring)  
2 lbs. P$_2$O$_5$ and 4 lbs. K$_2$O |
| Ryegrass         | Gulf, or Magnolia                      | Overseed permanent | 8-10 lb./1000 sq. ft. | 1 lb. nitrogen  
in January and March |
| St Augustinegrass| Common                                 | Sprig or plug      | Sprig or plug 6-12 ins. Same as bahia  
apart on 6-12 in. rows |
| Zoysiagrass      | Emerald, Matrella, or Meyer            | Sprig or plug      | Sprig or plug 6 ins. apart on 6 in. rows | Same as bahia |

9/When establishing a new lawn incorporate 2-3 lbs. of N; 4-6 lbs. of P$_2$O$_5$ and 2-3 lbs. of K$_2$O per 1000 sq. ft. into the seedbed prior to planting.