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Fertilizers For General Farm Crops

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Lime and Fertilizer Got This Stand of Red Clover.

Maximum yields and quality of crops are obtained only on soils that deliver an ample supply of soil fertility to the plant throughout the growing season. The amount actually delivered varies during parts of the season and from year to year. When weather and other conditions are extremely favorable even a poor soil may release sufficient fertility for satisfactory yields. Where the previous crop has failed there may be an accumulation of sufficient fertility to meet the needs of the next full crop. Only fertile soils can meet the fertility needs of a full crop, year after year.

Many field experiments have shown that most Missouri soils are unable to provide a balanced supply of plant nutrients to the growing plant throughout the entire growing season year after year. Because of this fact plant food in commercial fertilizers has long been used to supplement the plant food released by the soil.

Crops Vary in Response

The most favorable response from fertilizers is usually obtained on such crops as wheat, barley, rye, grasses, and clovers. These crops are started and make their growth during the cool, damp weather at the beginning and toward the end of the growing season. These are times when the chemical, physical, and biological activities in the soil are at a low ebb and the amount of plant food released from the soil by these activities is small. Moreover, these crops usually follow other crops which have had first access at the fertility released by the soil. Fertilizer applied during this period reacts more completely with the soil, and the plant food is in an available form to supplement the short supply in the soil.

Plant food supplied in the commercial fertilizers to these crops can be expected to:

1. Stimulate top and root growth and thereby grow cover hastily to aid in checking erosion.
2. Reduce winter killing and disease damage through more vigorous plant growth.
3. Help establish living stands of legumes and grasses and to maintain them through droughty periods in summer.
4. Increase the yield and quality of pasture, forage and grain.
5. Replace a portion or all of the plant nutrients previously removed from the soil.

Oats, corn and other spring planted crops which must make rapid growth, requiring an abundant and readily available supply of fertility, also give a ready response to fertilizers.

Factors Influencing Crop's Response

Crop returns from fertilizers depend upon many factors such as organic matter content of soil, season, soil treatments applied previously, preceding crop on the land, characteristics of the surface soil, and the time and method of seedbed preparation.

Organic Matter Content of Soil.—Soils well supplied with organic matter usually give a better response to fertilizers than soils low in organic matter. Soils well supplied are better aerated, take in and hold more moisture, and have a larger, more active population of soil bacteria. On well-aerated humus-rich soil, we may expect that less of the fertilizer goes over into non-available forms, thus leaving more for the plant. Plants grown on soils that are well-aerated, and rich in organic matter develop a more extensive root system and make possible the full use of the fertilizer applied.

Season.—In normal seasons a satisfactory response is usually obtained from fertilizers. In excessively wet seasons fertilizers may make the difference between poor crops or crop failures, and fair to good crops. In exceeding-

ly dry seasons little or no response may be obtained but a residual effect can be expected on the crops following the next season. Fertilizers often hasten growth and maturity of crops and may enable them to escape damage from short droughts, floods, early frosts, or insect damage.

Previous Soil Treatment.—The previous soil treatments should be considered in selecting fertilizers. Fertilizers give best results on soils well supplied with lime. Soils with sufficient lime to be near neutral in reaction give a better response to phosphate fertilizers than very acid soils. In soils described as acid, the phosphate forms compounds that are less available to plants than when the soil is carrying sufficient calcium to make it nearly neutral in reaction. Increased action by soil micro-organisms takes place, hastening the breakdown of organic matter and the release of nitrogen and other nutrients from combinations in the organic matter.

Preceding Crops Grown.—Some crops draw much more heavily on the soil for nutrients than others. Consequently, the fertilizer needs of one crop may depend in some measure on what crop has preceded it. A 50-bushel corn crop, for instance, requires nearly twice as much plant nutrients from the soil as an average crop of small grain. New grass or legume seedings which occupy the land for several years require a heavier application of fertilizer at planting than do crops which occupy the land for only a single year. Crops such as corn or sorghum where the entire growth is removed, will deplete the supply of the available soil nutrients to a greater extent than a legume or grass crop utilized as pasture. Therefore, the rate and grade of fertilizer needed for a crop following a depleting crop or for a new grass or legume seeding which is to remain on the land for several years will differ from that needed for a crop following legumes or grass sod, which leaves the soil better supplied with organic matter, nitrogen, and other nutrients.

Soil Characteristics.—The soil itself is a very important factor in determining fertilizer returns. Dark-colored soils such as those found in western and northwestern Missouri are usually higher in organic matter and more fertile than light-colored soils. Since decaying organic matter furnishes the larger part of the nutrients used in plant growth, these dark-colored soils are usually able to supply more nutrients, especially nitrogen, than light-colored soils. However, many of these soils are not able to furnish plants a balanced nutrient supply. They often release relatively more nitrogen and potash than phosphorous. Small grains, under such conditions, make excessive vegetative growth at the expense of grain production. Fertilizers high in

phosphate are needed to remedy this condition. On light-colored soils, nitrogen and potash as well as phosphate may be needed. Heavily cropped or badly eroded soils should have fertilizer containing nitrogen, phosphorus, and potash.

Poorly drained and aerated soils will not deliver as much of the nutrients to plants as will well drained and aerated soils, and may require a different grade than similar soils that are well drained.

Light-colored soils such as those found in southern or northeastern Missouri that are well supplied with lime, and which have produced crops of red or sweet clover or alfalfa, or which have been recently plowed out of sod, will usually need little extra nitrogen. The decaying organic matter from the legume or grass sod will supply most of the nitrogen needed but may increase the need for phosphate and potash.

Dark-colored soils plowed out of clover or alfalfa sod usually need only phosphorus, but the light-colored soils usually respond to both phosphorus and potash. Where the legume crops are removed for hay the need for potash will likely be greater than where the crops are pastured or plowed under. Experiments indicate that potash gives less response on soils deficient in lime than on soils well supplied with lime. The use of a complete fertilizer is recommended for land that has not received either stable or green manure.

Time and Method of Seedbed Preparation.—The time and method used in preparing the seedbed should also be considered in selecting fertilizers. Where the seedbed preparation began several weeks before seeding there will be more available plant food present than where the entire seedbed preparation is begun only a short time before seeding. When the latter method is followed and where considerable quantities of dry vegetation such as lespedeza are disked into the soil, complete fertilizers should be used to supplement the nitrogen and other nutrients in the soil. Except on the more fertile soils where heavy crops of corn, sorghums, or soybeans have been harvested, complete fertilizers are suggested.

Fertilizer Grades

Mixed fertilizers are of various grades or composition. The first figure in a fertilizer formula is the percentage of total nitrogen, the second figure is the percentage of available phosphoric acid, and the third figure is percentage of water-soluble potash. A bag of 100 pounds of 4-12-8 fertilizer would contain 4 pounds of nitrogen, 12 pounds of available phosphoric acid, and 8 pounds of water-soluble potash.

Higher Fertilizer Grades.—The percentage of plant food in commercial fertilizers has been gradually increasing. In 1925, the average plant food content of all

fertilizers was 15.70 per cent. In 1944, it was 20.64 per cent. It may seem strange that a 4-12-8 should contain only 24 per cent plant food, that is, 4+12+8 or 24 per cent. But each nutrient must be supplied in materials in combination with materials containing other chemical nutrients. The element, therefore, is only a small part of the compound. For example, phosphorus is only about 43 per cent of the so-called phosphoric acid. Phosphoric acid is only 20 per cent of superphosphate and 45 per cent of treble superphosphate. Thus, it is impossible to provide a phosphorus fertilizer that contains 100 per cent of this nutrient. Pure phosphorus is not a compound or substance that can be safely handled. It takes fire in the air. Nitrogen as such is a gas. High concentrations of potash are caustic and cannot be used for fertilizers.

However, phosphate fertilizers are made which contain as high as 62 per cent phosphate (P_2O_5). Treble superphosphate containing 40 to 45 per cent phosphate (P_2O_5) is now a standard product.

These high analysis phosphates, along with nitrogen materials such as urea, ammonium nitrate, ammoniated phosphates and potash materials containing as high as 60 per cent potash (K_2O), make possible the production of mixed fertilizers of higher analyses such as 0-20-20, 0-20-10, 6-12-6 or 3-18-9. A grade such as a 3-18-9 which is of the same ratio as a 2-12-6 contains one-third more plant food. An 0-20-10 contains three-tenths more plant food than an 0-14-7, although they are of the same ratio.

The minimum composition of fertilizers recommended for Missouri is 24 per cent plant food. Higher grades should be used wherever possible. By using grades of high analysis, less material will have to be handled, hauled and spread. Less bags will be required for packaging. For example, one ton of 0-20-20 will furnish as much phosphorus and potassium as one and two-thirds tons of 0-12-12. A car load of 30 tons of 0-20-20 will furnish the same plant food as a 50 ton car load of 0-12-12. Aside from the saving of labor by using these higher grades, any saving in production and distribution costs to the farmer can be used either to reduce his expenditure per acre or apply more units of plant food per acre.

Some Fertilizer Suggestions for Different Soils

Most Missouri soils are lacking in phosphorus. Therefore, the chief constituent of the fertilizers used should be high in this nutrient. On many soils nitrogen and potash are also needed.

Where full crops of clovers or alfalfa have not been grown immediately ahead of a depleting

crop such as corn or small grain, a complete fertilizer containing nitrogen, phosphate and potash is usually needed.

The only exception is on the deep black fertile soils of Northwest Missouri which may not need potash. On such soils a fertilizer containing nitrogen and phosphorus should generally be used.

On light-colored, limed soils, where either alfalfa, red or sweet clover is plowed under, fertilizers containing both phosphate and potash are suggested.

Superphosphate.—On the dark-colored soils where full growth of clovers or alfalfa was on the land the previous year, superphosphate alone is usually all that is needed, especially for small grains.

Likewise, where manure is applied immediately ahead of the crop to be grown, superphosphate alone will usually give satisfactory results. However, if the manure applied contains considerable straw or stalks, a complete fertilizer will likely give best results.

Superphosphate to Reinforce Manure.—An application of 25 to 50 pounds of 20 per cent superphosphate scattered over the surface of a spreader load of manure will provide a more balanced supply of plant nutrients than manure alone. A ton of manure reinforced with the above amount of superphosphate would contain approximately the same amount of plant food as 100 pounds of a 10-10-10 fertilizer. An application of 10 tons per acre of the reinforced manure would be equivalent to an application of 1000 pounds per acre of a 10-10-10 fertilizer.

Rock Phosphate.—Rock phosphate when applied in liberal quantities on silt loam soils can be used in rotations or on permanent pastures to furnish phosphorus for legumes such as clovers and alfalfa. The minimum rates should be about 1000 pounds per acre. Rock phosphate becomes available slowly. When small grains are grown in the rotations where rock phosphate is used, additional readily available superphosphate or mixed fertilizers should be used to give the young small grain seedlings a quick start. Research studies are in progress on the use of rock phosphate.

Nitrogen.—Nitrogen fertilizers, such as ammonium sulphate, ammonium nitrate, sodium nitrate, cyanamid and others, can be used advantageously on many soils. On those well supplied with phosphorus and potash, nitrogen materials can be plowed under with a heavy growth of non-leguminous plant materials, such as straw, stalks or weeds. It hastens the decay of such materials, and the release of the plant nutrients they contain. Fertilizers high in nitrogen can also be used as a top dressing on pastures and meadows where there are insufficient le-

gumes to furnish nitrogen to the grass, and on small grains used for pasture.

It should be pointed out that their use on soils deficient in phosphorus or potash may bring increased tonnage at the expense of feeding value. Such fertilizers should be applied with more care than other materials because they are more soluble and may have an injurious effect on plants if present in too great concentration or if placed too near the plant roots.

Nitrogen is supplied through mixed fertilizer and nitrogen materials. The principal nitrogen materials on the market and their nitrogen content are as follows: Ammonium nitrate, 30 to 33 per cent nitrogen; Ammonium sulphate, 20 to 21 per cent nitrogen; Nitrate of soda, 16.5 per cent nitrogen; Cyanamid, 21 to 22 per cent nitrogen, and Urea, 42 to 46 per cent nitrogen.

Potash.—The nutrient potassium plays its major role in the plant's activities that make sugar, fibers and the woody parts of the plant body. Consequently, the straws and the stovers contain the major share of the potassium needed by a crop. Potassium is readily washed out of these plant parts as is shown by the better clover or wheat growth in the circle around the spot where a grain shock stood for a long time. Animals return considerable potassium. However, increasing crop removal and less manures and residues returned have been bringing on potassium shortages in our soils. The visible symptoms of the crop's deficiencies of potassium are becoming more common and point to the wider needs for putting potassium back into the soil as fertilizers.

Potash fertilizer material is supplied through mixed fertilizers and such materials as muriate of potash, (potassium chloride) containing 50 to 60 per cent potash (K_2O); potassium sulphate, 48.7 per cent potash (K_2O); and Kainit, 12 to 20 per cent potash (K_2O).

Application of Fertilizers

Rates.—When fertilizer is used regularly in the cropping system, the rate of application can be less than if fertilizer is applied only occasionally or irregularly. Where high grade materials are used, the rate of application can be proportionately less than for lower grade material. Thus, 60 pounds of an 0-20-20 fertilizer will supply as much fertility as 100 pounds of an 0-12-12 mixture.

When using a complete fertilizer or one containing only phosphorus and potassium, the rate per acre should be high enough to supply the phosphate needs, the nutrient most lacking in Missouri soils. Unless this is done, the results will probably be less satisfactory from the other nutrients. For instance, if it requires 30 pounds of phosphate (P_2O_5), equivalent to 150 pounds of 20 per cent

superphosphate, to meet the phosphate needs of a crop, it would require an application of 250 pounds of a 4-12-8 to supply an equal amount of phosphate.

The rate of application is also influenced by the crops grown. Where both small grain and lespedeza or small grain and clover are to be grown, fully one-third more fertilizer is required than for small grain alone. The two crops require more fertility than either crop alone. Alfalfa draws more heavily on the soil for fertility than does a small grain. Since alfalfa remains on the land for several years, the initial application should be double that for crops which occupy the land for a shorter period of time. Likewise, where new seedings of grass are made and are expected to occupy the land for several years, the rate per acre should be heavier than for crops occupying the land for a short period.

On Small Grains, Pastures and Meadows.—Potassium and, to a lesser extent, phosphorus move downward into the soil very slowly. Best results from their use are obtained when they are placed well into the soil in the zone of the feeding roots of the plant. This is usually several inches below the surface. In this position they can readily react with the soil and be most readily available to plants.

The most satisfactory means of applying fertilizers to small grains, newly seeded grasses, and clovers is a fertilizer grain drill. Where this implement is not available, fertilizers may be applied, broadcast and worked into the soil with the regular implements such as the disk, harrow or field cultivator used in preparing a seedbed. This method, however, does not use the fertilizer as efficiently for the crop following as does drilling the fertilizer into the soil.

On new alfalfa seedings about three-fourths of the application may be placed on the furrow with an attachment on the plow, or it may be either drilled or broadcast on the land and plowed under. The remaining fourth may be drilled or broadcast on the surface at seeding. By placing the larger part of the fertilizer in the lower soil layers where the moisture supply is more constant it will react with the soil more quickly as well as be in the zone where the roots are most abundant.

On established alfalfa, meadows and grass pastures, the fertilizer may be drilled into the soil deeply with a drill in the fall or early spring when the ground is soft. Where a fertilizer drill is not available it may be broadcast on the surface and worked into the soil with a disc, field cultivator, springtooth, or regular alfalfa harrow.

On Summer-Grown Crops.—So far as needs for plant nutrients are concerned, there are two critical periods in the life of the corn and soybean plant which make

their growths in the summer. One is the seedling stage before the plant has made much root development. The second is in midsummer when these crops are in the fruiting stage. This is the time when summer droughts are most likely to occur, and also when these crops must make heavy demands on the soil for fertility. To meet the demands at both of these periods, fertilizer should be placed in the lower soil layers and also near the surface for corn.

The fertilizer can be placed in the lower soil layers by either of the following methods:

1. Drilling or broadcasting on the surface and plowing under.
2. Applying in the plow furrow with an attachment on a plow.
3. Drilling deeply into soil after plowing.

The use of fertilizers in the above manner requires heavier applications per acre than those customarily applied. A rule of thumb that may be used as a guide, where 300 to 500 pounds per acre are used, is that about three-fourths of this amount should be plowed under and one-fourth applied as a starter or as a row application.

Complete fertilizers are recommended for use as a starter. They hasten early growth and thus make cultivation easier. On heavy soils the starter is usually more beneficial than on open, well-drained soils. It is beneficial on any soil when the early part of the growing season is cool and wet. It can be applied on the surface with a fertilizer attachment on the planter. Where this equipment is not available, it can be drilled or broadcast on the surface immediately before planting.

On extremely heavy soil or soils deficient in organic matter, unsatisfactory results are likely to occur when fertilizer is all placed in the lower soil layers. Poor aeration under such conditions probably prevents the penetration of the roots to the zone of the fertilizer. Moreover, under such conditions, the fertilizer, especially the phosphate, may change to forms unavailable to the plant. On clay soils it is always advisable to use some additional fertilizer in the row at planting time.

Price Relationships Favor Wider Use of Fertilizers

Previous to 1940 Missouri farmers spent less than one per cent of their gross income for fertilizers. The total amount of fertility applied to the land was only a fraction of what was needed for replacing the scarce nutrients removed by crops.

When the price relationship of fertilizers to farm products is favorable to the farmer, it is an opportune time to use fertilizers more extensively and at a higher rate per acre. In addition to increasing production without material increases in labor, wide use

of fertilizer will help to provide a reserve of fertility for periods when the price relationship may be less favorable.

It is obvious that the tonnage of fertilizer used should be materially increased to offset the larger supply of plant food removed by the increased cropping necessitated by the war; to provide for the wide use of improved crop varieties which in making higher yields draw more heavily on soil fertility; to supply the minerals for the increased acreage of legumes needed for forage and to restore organic matter; to replace the minerals removed from the farm by the larger number of livestock produced and sold; to produce quantity and quality of feed necessary for healthy productive livestock.

As an aid in selecting fertilizers, a guide as to grades and minimum rates of fertilizer to use for general farm crops on the different soils is given in the tables on pages 10, 11 and 12.

The grades listed may be exchanged for others and the rates per acre increased or decreased as necessary to supply the same amount of plant food. The rates suggested are the minimum necessary for satisfactory results.

Substitution of Fertilizer Grades

The stortage of fertilizer occasioned by sharing it with other nations has made it impossible to provide sufficient fertilizers of the higher grades. Therefore, until these high grades are available, grades of lower concentration will have to be used. Such grades as 0-14-7 can be substituted for the 0-20-10; the 0-12-12 for 0-20-20; the 4-12-4 for 4-16-4; 5-10-5 for 6-12-6; a 2-12-6 for a 3-18-9; 0-18-0 for 0-20-0 and 0-45-0. When the grade supplies less plant food than the grade listed, the rate per acre should be increased to furnish approximately the same amount of plant food. Likewise, if the grades substituted should contain more plant food than the grades listed, the rate of application can be reduced accordingly.

SUGGESTED FERTILIZER GRADES FOR GENERAL FARM CROPS

Light Colored Soils, Mainly Southern Half of State and Northeast Missouri

Crop	After Alfalfa or Clover Rate Per Acre and Fertilizer Grade	After Lespedeza, Grass or Any Grain Crop Rate Per Acre and Fertilizer Grade
Corn or Kaffir	200 lbs. 0-20-10 or 300 lbs. 0-14-7 200 lbs. 0-20-20 or 300 lbs. 0-12-12	200 lbs. 3-18-9 or 300 lbs. 2-12-6 300 lbs. 4-12-8 250 lbs. 6-12-6 or 300 lbs. 5-10-5 400 lbs. 8-8-8
Soybeans	200 lbs. 0-20-10 or 300 lbs. 0-14-7 200 lbs. 0-20-20 or 300 lbs. 0-12-12	200 lbs. 0-20-10 or 300 lbs. 0-14-7 200 lbs. 0-20-20 or 300 lbs. 0-12-12
Small grains with lespedeza, clover or clover and grass seedings	200 lbs. 0-20-10 or 300 lbs. 0-14-7 200 lbs. 0-20-20 or 300 lbs. 0-12-12	150 lbs. 3-18-9 or 200 lbs. 2-12-6 200 lbs. 3-12-12 or 200 lbs. 5-10-10 200 lbs. 4-12-8 200 lbs. 4-16-4 or 200 lbs. 4-12-4 250 lbs. 8-8-8 - for thin eroded soils
Alfalfa - new or established	300 lbs. 0-20-10 or 400 lbs. 0-14-7 300 lbs. 0-20-20 or 500 lbs. 0-12-12	300 lbs. 3-18-9 or 450 lbs. 2-12-6 400 lbs. 4-12-8 400 lbs. 3-12-12 or 500 lbs. 5-10-10
	With Legumes	Without Legumes
Established pastures meadows	(1) 300 lbs. 0-20-10 or 400 lbs. 0-14-7	(1) 500 lbs. 6-10-6 or 500 lbs. 5-10-5 500 lbs. 8-8-8 500 lbs. 10-6-4

(1) Where the soil is well supplied with phosphorus and potash, nitrogen materials may be advantageously applied in the early spring or fall on grass meadows or pastures. The rates should be such as to supply 40 to 50 pounds of nitrogen per acre. The mixed fertilizer should be applied every two or three years, or when weeds or other non-palatable vegetation begins to compete with the grasses.

FERTILIZERS FOR SOUTHEAST MISSOURI LOWLANDS

Area I - Light Sands and Sandy Loams - Charleston, Sikeston and Dunklin Ridge

Crop	After Clovers, Alfalfa or Vetch Rate Per Acre and Fertilizer Grade	After Other Crops Rate Per Acre and Fertilizer Grade
Corn	250 lbs. 3-12-12 or 300 lbs. 5-10-10 250 lbs. 4-12-8	250 lbs. 4-12-8 250 lbs. 6-12-6 or 300 lbs. 5-10-5 400 lbs. 8-8-8
Cotton or soybeans No potash deficiencies on previous crops	200 lbs. 0-20-10 or 300 lbs. 0-14-7	300 lbs. 4-12-8 200 lbs. 3-18-9 or 300 lbs. 2-12-6
Potash deficiencies on previous crops	200 lbs. 0-20-20 or 300 lbs. 0-12-12 200 lbs. 0-10-20 200 lbs. 0-9-27 or 100 lbs. muriate of potash	300 lbs. 3-9-18 300 lbs. 5-10-10 or 250 lbs. 3-12-12
Small grains where new legume seedings are to be established	200 lbs. 4-16-4 or 200 lbs. 4-12-4 200 lbs. 3-18-9 or 300 lbs. 2-12-6 200 lbs. 3-12-12 or 200 lbs. 5-10-10	200 lbs. 4-12-8 200 lbs. 5-10-10 or 200 lbs. 3-12-12 200 lbs. 6-12-6 or 250 lbs. 5-10-5
Alfalfa - new or established	200 lbs. 0-20-20 or 300 lbs. 0-12-12 300 lbs. 0-10-20 or 200 lbs. 0-9-27	300 lbs. 3-12-12 300 lbs. 3-9-18

Area II - Dark Sandy Loams and Clay Loams - Central and Eastern Lowlands

Corn or Kaffir	200 lbs. 3-18-9 or 300 lbs. 2-12-6 300 lbs. 3-12-12 or 300 lbs. 5-10-10	250 lbs. 4-12-8 250 lbs. 6-12-6 or 300 lbs. 5-10-5 400 lbs. 8-8-8
Cotton or soybeans No potash deficiencies on previous crops	200 lbs. 0-20-10 or 300 lbs. 0-14-7	300 lbs. 4-12-8 300 lbs. 6-12-6 or 350 lbs. 5-10-5

Potash deficiencies on previous crops	300 lbs. 0-10-20 200 lbs. 0-9-27 or 100 lbs. muriate of potash	300 lbs. 3-9-18 300 lbs. 5-10-10
Small grains with lespedeza or clover seedings	200 lbs. 0-20-10 or 300 lbs. 0-14-7 200 lbs. 3-12-12 200 lbs. 4-12-8	150 lbs. 4-16-4 or 200 lbs. 4-12-4 150 lbs. 4-12-8 200 lbs. 5-10-10
Alfalfa - new or established	200 lbs. 0-20-20 or 300 lbs. 0-12-12 200 lbs. 0-10-20	200 lbs. 0-20-20 or 300 lbs. 0-12-12 200 lbs. 0-10-20

Area III - Dark Gray Silt Loams and Loams Generally Poorly Drained - West Crowley's Ridge

Corn or Kaffir	200 lbs. 3-18-9 or 300 lbs. 2-12-6 300 lbs. 3-12-12 300 lbs. 4-12-8	300 lbs. 4-12-8 250 lbs. 6-12-6 or 300 lbs. 5-10-5 400 lbs. 8-8-8
Cotton or soybeans No potash deficiencies on previous crops	200 lbs. 0-20-10 or 300 lbs. 0-14-7	200 lbs. 3-18-9 or 300 lbs. 2-12-6 300 lbs. 4-12-8 250 lbs. 6-12-6 or 300 lbs. 5-10-5
Potash deficiencies on previous crops	200 lbs. 0-20-20 or 300 lbs. 0-12-12 200 lbs. 0-10-20 or 200 lbs. 0-9-27	300 lbs. 3-9-18 500 lbs. 5-10-10
Small grains with lespedeza or clover seedings	200 lbs. 0-20-10 or 300 lbs. 0-14-7 200 lbs. 4-16-4 or 200 lbs. 4-12-4 200 lbs. 4-12-8	200 lbs. 4-16-4 or 200 lbs. 4-12-4 200 lbs. 4-12-8 200 lbs. 5-10-10 or 200 lbs. 3-12-12 200 lbs. 6-12-6 or 200 lbs. 5-10-5

Fertilizer for cotton should be bedded into the soil about two or three weeks before planting, broadcast or drilled on the surface and plowed under or applied in plow furrow with an attachment on a plow.

High nitrogen fertilizer is suggested for heavily cropped low organic matter soils.

SUGGESTED FERTILIZER GRADES FOR GENERAL FARM CROPS

Dark Soils - Mainly Northern and Western Part of the State

Crop	After Alfalfa or Clover Rate Per Acre and Fertilizer Grade	After Lespedeza, Grass or Any Grain Crop Rate Per Acre and Fertilizer Grade
Corn or Kaffir	200 lbs. 0-20-0 or 100 lbs. 0-45-0 200 lbs. 0-20-10 or 300 lbs. 0-14-7	250 lbs. 4-16-4 or 300 lbs. 4-12-4 300 lbs. 6-12-6 or 300 lbs. 5-10-5 200 lbs. 10-20-0 400 lbs. 8-8-8
Soybeans	200 lbs. 0-20-0 or 100 lbs. 0-45-0 200 lbs. 0-20-10 or 300 lbs. 0-14-7	100 lbs. 0-45-0 or 200 lbs. 0-20-0 200 lbs. 0-20-10 or 300 lbs. 0-14-7
Small grains with clover or clover and grass or lespedeza seedings	100 lbs. 0-45-0 or 200 lbs. 0-20-0 200 lbs. 0-20-10 or 300 lbs. 0-14-7	200 lbs. 3-18-9 or 300 lbs. 2-12-6 200 lbs. 4-16-4 or 250 lbs. 4-12-4 200 lbs. 4-16-0 150 lbs. 10-20-0
Alfalfa - new or established	150 lbs. 0-45-0 or 300 lbs. 0-20-0 300 lbs. 0-20-10 or 400 lbs. 0-14-7	150 lbs. 0-45-0 or 300 lbs. 0-20-0 x 300 lbs. 0-20-10 or 400 lbs. 0-14-7
Established pastures and meadows	With Legumes 150 to 200 lbs. 0-45-0 or 300 to 500 lbs. 0-20-0 (1) 300 to 500 lbs. 0-20-10 or 400 to 500 lbs. 0-14-7	Without Legumes (1) 300 to 500 lbs. 4-16-4 or 400 lbs. 4-12-4 300 to 500 lbs. 4-16-0 or nitrogen materials to apply 40 to 60 lbs. of nitrogen 250 lbs. 10-20-0

River Bottom Land

Corn	100 lbs. 0-45-0 or 200 lbs. 0-20-0 x 200 lbs. 0-20-10 or 300 lbs. 0-14-7	x 200 lbs. 3-18-9 or 300 lbs. 2-12-6 200 lbs. 10-6-4 or nitrogen materials to supply 40 lbs. nitrogen 250 lbs. 10-20-0
Small grains with clover	100 lbs. 0-45-0 or 200 lbs. 0-20-0 x 150 lbs. 0-20-10 or 200 lbs. 0-14-7	x 200 lbs. 3-18-9 or 300 lbs. 2-12-6 200 lbs. 4-16-4 or 250 lbs. 4-12-4 200 lbs. 4-16-0 or 200 lbs. 10-20-0
Alfalfa - new or established	150 lbs. 0-45-0 or 300 lbs. 0-20-0 x 300 lbs. 0-20-10 or 400 lbs. 0-14-7	150 lbs. 0-45-0 or 300 lbs. 0-20-0 x 300 lbs. 0-20-10 or 400 lbs. 0-14-7
	With Legumes	Without Legumes
Established	(1) 150 to 200 lbs. 0-45-0 or 300 to 500 lbs. 0-20-0	(1) Nitrogen material to furnish 40 to 50 lbs. of nitrogen per acre in early spring or fall

x For Sands or Sandy Loams

(1) Superphosphate or mixed fertilizers for pastures, meadows should be applied every three to five years. Nitrogen materials should be applied more frequently.

General Suggestions for all Soils

Three-fourths of the fertilizer application for corn, soys, alfalfa and other summer growing crops should be broadcast or drilled on the surface and plowed or placed in the plow furrow with a fertilizer attachment on a plow. The remaining fourth should be placed in the surface several inches with a drill or on corn with a modern fertilizer attachment on a corn planter or other equipment. Fertilizers for small grains, pastures, grasses and clovers should be applied with a fertilizer drill or broadcast on the surface and worked well into the soil.

Fertilizer grades high in nitrogen are suggested for heavily cropped, medium to low organic matter soils or where large quantities of dry organic matter is disked into the soil or plowed under. Nitrogen materials may be used to supply nitrogen where fertilizers of no or low nitrogen content are used.

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J. W. BURCH, Director, Agricultural Extension Service
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