UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION

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CIRCULAR 204 Columbia, Missouri April, 1939

Development And Care Of Lawns

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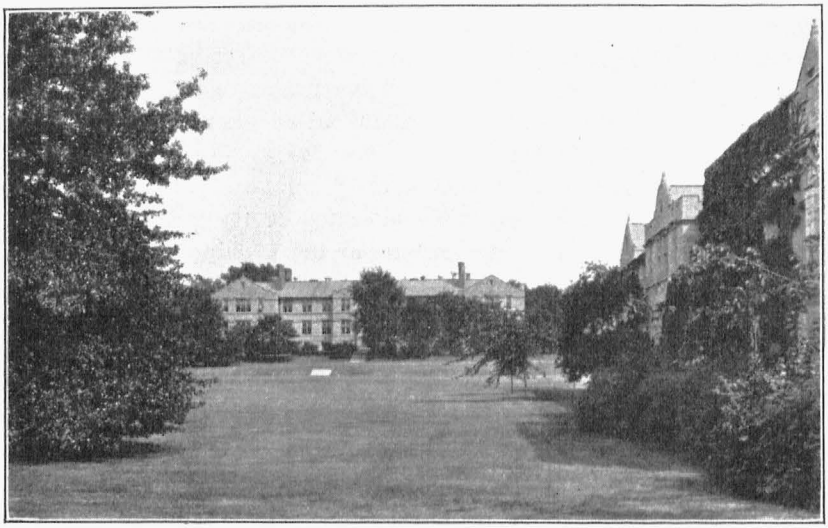


This portion of the Campus of the University of Missouri, with the Agricultural Chemistry Building in the background, is a good example of a well maintained lawn.

The art of lawn making is not so simple as the average person would like to believe. Always a lawn has been the first step in the improvement of home grounds, and the most desired setting for the house or public building. We may describe the lawn as the only satisfactory foreground and base of every landscape. Everyone who wishes to develop or maintain a beautiful lawn should inform himself of the many points involved toward its accomplishment.

By a lawn we mean an area of ground covered with grass to be maintained in a sheared or closely clipped condition. There

are two types of lawns that must be discussed, since there is a variation of the practical treatment to be given: (1) the new lawn, and (2) the old lawn.

New Lawn Making

When a new building is completed, or when a cultivated area is to be put into lawn, the first question that arises is that of preparation of the soil. Since the soil is the foundation of the lawn and must supply the plant growth with proper and sufficient food for an indefinite period of time, it is essential that we examine its condition and bring it to a proper state of fertility before attempting to do the seeding.

Grading.—Grading of the lawn involves the shaping of the ground to provide proper drainage and to give a pleasing appearance. Any rich soil well drained will produce a good lawn, but due consideration is seldom given to these requirements in the early stages of the work. Too often in excavating for a building a heavy subsoil impervious to moisture and devoid of plant food is thrown out and spread around to become the foundation of a stand of grass. This inevitably means failure. Also there is frequently embedded in the soil a considerable quantity of trash such as pieces of board, wire, cinders, cement, stone or brick chippings, and other debris. By all means this should be removed before attempting to develop a lawn.

Before excavating for any buildings or changing the grade at any place, the dark top soil should be removed and piled to one side for future use. Then after the cuts and fills have been made to establish the subgrade, the topsoil may be spread again over the entire surface, bringing it up to the finished grade. If the existing surface soil is not suitable for finishing, a sufficient quantity should be secured elsewhere.

The most satisfactory grade from the standpoint of drainage, general appearance, and later maintenance is a very gentle slope extending from the foundation of the house to the boundaries of the yard. Sometimes this ideal slope is not possible in all directions, but the following advice should be carefully adhered to at all times:

(1) In the lawn area there should be no hollow places that will collect water.

(2) Water must not be allowed to drain toward the foundation of the house or other buildings. Downspouts often empty near the house foundation. It is well to provide definite surface or sub-drains for this purpose. A fall of two feet in one hundred

away from the building will, in most cases, be satisfactory.

(3) Avoid terraces and terrace slopes wherever it is possible to develop a gentle sloping or undulating lawn area. Terrace slopes are costly both to develop and maintain and they tend to produce a super-artificial effect of landscape about the house. On the other hand, avoid absolutely level lawns, for unless the place is very small they appear monotonous and permit less interesting landscape treatments later.

Method of Soil Preparation.—The first step in soil preparation is a thorough cultivation of the soil. Especially is this desirable if the soil is clay or clay loam. This tends to produce proper aeration and pulverization. Frequently, if the soil is unusually tough or has been much packed, additional pulverization is accomplished by harrowing and rolling. Rolling is equally valuable in compacting, to the proper consistency, soil which is normally too loose. It may be said that **rolling** is indeed one of the essential factors in improving soil conditions for lawns both before and after seeding.

If the ground to be used is quite poor or very weedy, the above operations should be performed not only just before planting but also in the late summer or early fall of the preceding year if possible. When the operations are repeated the following spring, just before seeding, it will be found that the soil will have less weeds and the tilth will have been improved by freezing and thawing.

(1) A **heavy clay** must be mellowed. This can be accomplished by plowing or spading into it a considerable quantity of sand and humus, such as fine leaf mold and well rotted stable manure. Hydrated lime or ground limestone is beneficial if cultivated into the soil.

(2) A soil having the texture of a loam or silt loam grows the best grass.

(3) If the soil is very sandy, clay and humus must be added to keep it from drying out too quickly. A common test of soil is to squeeze a handful of moist dirt into a ball. If it will hold together and at the same time when pressed with the forefinger and thumb will readily crumble into fine particles, this is a favorable condition.

Levelling.—In levelling a lawn an attempt should be made to fill in any irregularities that occur in the general surface such as ditches produced by erosion or by the plow, and holes resulting from the removal of debris. If the yard has been made of clay, it is best to cover it with a topsoil about 6 inches deep. If it is absolutely impossible to get topsoil, one should spread over the top

a very heavy coat of thoroughly rotted stable manure. It is wise at this stage of the proceedings to disc the ground with a disc harrow, cutting both ways several times until the manure and soil are thoroughly mixed. It should be understood, however, that this will never take the place of surface soil. A drag or iron rail may then be used to help smooth and level the area. A harrow is often desirable, also, when used with the teeth lying slightly back to bring stones and debris to the surface to be removed. On small yards hand raking may be substituted for the use of this toothed or "smoothing" harrow, and this method usually produces a fine surface for seeding.

Summary of Cultural Process

Preparation of Ground for a New Lawn.—Plow around 6 inches deep. Remove all trash—sticks, roots, stones, debris, etc. Fill in holes, cut down humps and level off the surface with a gentle slope that will drain away from buildings toward the boundary of the place. Cultivate by disking, harrowing, or thorough raking, until the soil is finely pulverized. Sow the seed, scratch in with a rake, roll, and water if dry.

Plant Food.—One should be sure in the preparation of the seedbed that certain plant foods are available. An extremely acid soil may be limed, using hydrated lime or finely ground limestone. After the lawn is established it is usually both unwise and unnecessary to use lime. Lawns neither too acid nor too alkaline generally produce the most satisfactory turf when all factors are considered.

Phosphorus is lacking in most soils as a rule and must be supplied by the application of some commercial fertilizer with a relatively high phosphorus content. A lawn soil should by all means have a high availability in nitrogen; a condition usually present if the soil is rich in humus. Nitrogen can be supplied by applications of well rotted stable manure, but unless carefully selected, this often brings weeds. One of the best sources is decayed leaves, or as it is called, "leaf mold."

Seed and Seeding

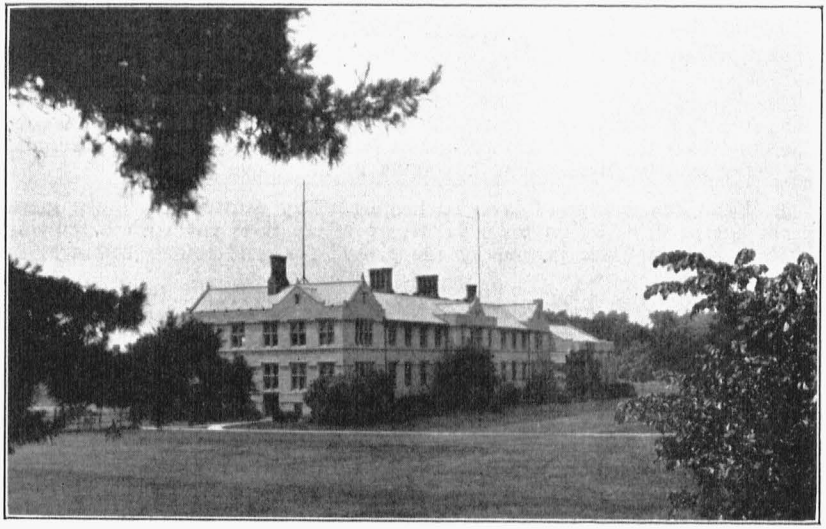
The seed used is indeed an important factor in producing a fine lawn; also the climatic conditions accompanying the seeding process. First, the necessary requirements must be carefully considered. For proper germination and growth, the requirements are (1) viable seed, (2) a good, mellow soil, (3) warmth supplied by sunlight, and (4) moisture.

These requirements are essential not only at the time of sowing the seed but must be present for approximately thirty days following. It will be seen, therefore, that lawn seeding may be done at any time when these factors are present or prospectively available. When rain is lacking, water must be supplied artificially.

Seed.—The seed should be of the proper variety or mixture of varieties for the kind of lawn desired and its geographical location. High quality and high percentage of germination are essential. Good seed has the following qualities:

(1) Free from foreign material and weed seed.
(2) High in percentage germination.
(3) True to variety and standard in weight per bushel.

Seed Varieties and Mixtures.—It is difficult to make a general recommendation of a single mixture of lawn grass seed which will meet all requirements for Middle Western conditions, and even for a state like Missouri, where there are many types and conditions of



Good blue grass.

soil and considerable differences in latitude. All of these conditions may reasonably permit of some differences in combination or amount of seed. It is intended, then, to recommend a mixture that as nearly as possible adapts itself to Central Missouri, including a radius of at least 200 miles, with a few suggestions regarding ad-

ditional seed to be added or omitted under specific conditions of climate and soil.

Table of Standard Weights of Grass Seed per Bushel

Blue grass (Canada or Kentucky)	14 lbs.	Meadow fescue (or Chewing's red fescue)	25 lbs.
English perennial rye grass	24 lbs.	Meadow foxtail	10 lbs.
Redtop	14 lbs.	White clover	60 lbs.
Timothy	45 lbs.	Red clover	60 lbs.

Note: These figures are good minimum requirements, and it is well to know that a higher grade seed, especially in blue grass, e. g. 20 pounds per bushel, can be obtained. The heavier the weight of pure seed per bushel, the better the results.

For the most part, blue grass is the best foundation for lawns in the United States, particularly in the Middle West. Except in the far South or arid regions it is very satisfactory. However, it is usually not sown alone, for the reason that when young it needs protection. Its use is recommended as follows:

A. For *general lawns* about the home grounds.

Blue grass, 1 bu.	14 lbs.
*English perennial rye grass, ¼ bu.	6 lbs.
Redtop	6 lbs.
White clover	2 lbs.
Total	28 lbs.

Using good quality seed, 40 to 60 pounds to the acre, evenly distributed and covered, is sufficient to establish a good stand. Where there is considerable shade or some damp ground in the yard, the amount of perennial rye grass may be increased to 8 pounds in the above mixture.

B. For meadow type of lawn on large country estates where the grass is not cut as often as on town yards, or where it is cut with a mowing machine or sometimes grazed by sheep, and for golf course fairways on links:

Blue grass, 1 bu.	14 lbs.
Timothy	10 lbs.
Redtop	5 lbs.
White clover	5 lbs.
Total	34 lbs.

This mixture is sown at the rate of about 40 to 60 pounds per acre. To this may be added 5 pounds of meadow fescue per acre.

C. For pasture lawns or "roughs" on golf links, and areas cut about three times a season or grazed moderately by cattle or sheep:

Blue grass, 1 bu.	14 lbs.
Timothy, ½ bu.	23 lbs.
Redtop, ¼ bu.	3½ lbs.
White clover	10 lbs.
Total	50½ lbs.

This mixture is sown at the rate of about 40 to 60 pounds per acre. To the mixture may be added meadow or red fescue in amounts of about 5 to 10 pounds each per acre.

*It is important to use English perennial rye and not other varieties of rye grass. Rye grass is not necessary, but it helps in giving a quick cover.

D. For finely matted grass such as is desired on the putting greens of golf courses the following should be used:

Blue grass .....
Western creeping bent ..... } in equal parts

Note: Washington and Western creeping bent are not satisfactory in Missouri unless plentifully watered throughout the summer months.

A small amount of redtop and sweet vernal may be added. Western creeping bent is one of the best of the northern turf grasses and is used at the rate of one pound of bent and one pound of blue grass to 200 square feet. New seedings are best if lightly covered with well rotted screened manure about 1 cubic yard to 1,000 square feet. This should be raked lightly and rolled.

Warmth and Moisture.—Warmth and moisture are essential to germination of the seed. Consequently, sowing is usually done in the spring or the early fall, though it may be done between these seasons when proper conditions are present. It is best to select a quiet day for seeding. Spring seeding is usually done in late March or early April. Fall seeding should be made preferably during the first two weeks in September.

Distribution of Seed.—On very large areas the seed may be drilled in by farm or motor drills, but in general the old-fashioned broadcast method is very satisfactory. The popular "knapsack broadcaster" or horn seeder, consisting of a seed sack which hangs from the shoulder and which feeds into a long tube, is one of the easiest means for securing an even distribution of seed. It is well worth while to obtain such a seeder where one has more than a half acre to sow.

Following the distribution of the seed on small lawns, it is well to rake it in carefully and evenly. If available, a light coating of well rotted manure may be spread carefully and evenly over the surface. Also a thin coating of loam mixed with sand is excellent.

It is important after seeding that the ground be rolled with about a 300-pound roller. The rolling should be done when the ground is not wet, but for best results the ground should be thoroughly watered within 24 hours after rolling. A good roller may be made from a piece of 20-inch vitrified tile with the collar cut away. The tile is set up on end on the ground and a ½-inch gas pipe 8 inches longer than the tile is placed in the center and driven 4 inches into the ground, thus leaving 4 inches standing above the top of the tile. Then the tile is filled with a good mixture of well tamped concrete. Wooden handles may then be attached to the projecting pipe ends. For very large lawns where the use of a horse-drawn roller is practicable, it is less expensive to buy a commercial roller.

Maintenance of Old Lawns

Some of the causes of deterioration of old lawns are:

(1) Poor soil or too thin a layer of good surface soil.
(2) Poor drainage or settling, resulting in irregular cutting.
(3) Lack of reseeding and rolling.
(4) Presence of old trees with roots near the surface.
(5) Too many trees branching low, causing heavy shade.
(6) Perennial weeds and undermining by pests.
(7) Too rough and constant hard use—usually worn out by play of children or by animals.
(8) Improper maintenance such as infrequent cutting or raking or general neglect, or too close cutting in dry seasons.

Soils may become greatly depleted after remaining in lawn for a number of years without fertilization. Almost all soils are lacking in nitrogen and especially phosphorus, and some in potash. These elements can be supplied in a complete fertilizer. Potash may also be applied in the form of wood ashes. Although this may be applied at any time, if not put on the ground in too great a quantity, it is best to apply it in early spring. All commercial fertilizers should be applied evenly, in proper quantity per acre, and should be watered thoroughly after applying.

Probably the most important plant food that should be added to the soil is phosphorus. This is usually obtained from superphosphate, bonemeal, or a complete fertilizer. Therefore, many prefer to use commercial fertilizers high in nitrogen content and superphosphates. Pulverized sheep, cattle, and chicken manure may also be used on lawns. One should note that these manures if applied unevenly or in too large quantity may injure the existing grass.

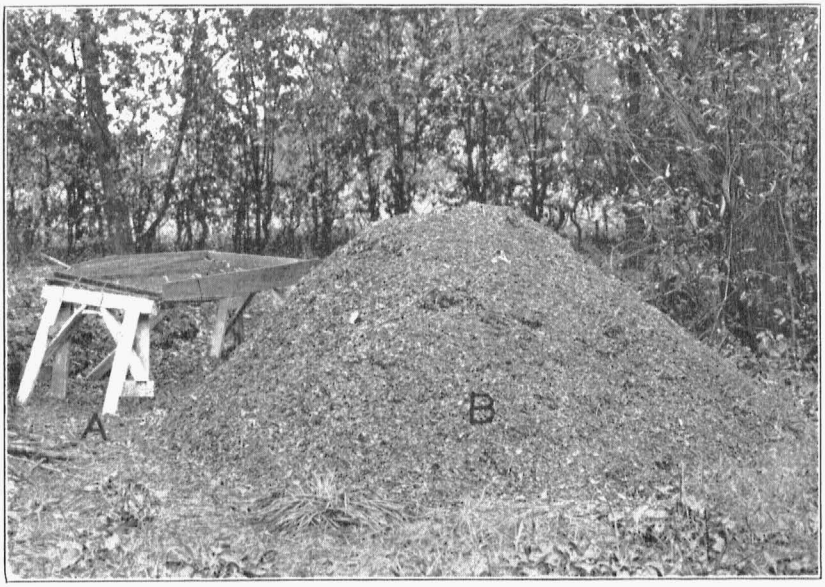
The use of leaf mold is highly recommended. This is nature's own method and supplies both humus and nitrogen. If well rotted, leaves furnish a wealth of cheap plant nourishment. Leaves left in a pit for a year or so, screened and turned over, will form a mold like sawdust which is free of odor, draws no flies, is clean and easily applied, and free from weed seed. It is also evident that a heavy application of leaf mold may help to drive out weeds from a lawn, especially dandelions, and increase the thriftiness of the blue grass and apparently intensify its color. Some of the advantages of leaf mold are as follows:

(1) It is rich in humus and nitrogen.
(2) It contains no weed seed and does not draw flies.
(3) It is odorless and light in weight, hence easily applied.

(4) It is not unsightly when applied to old lawns.

(5) A little of it goes a long way in results.

Leaves may be rotted down in one season. Sprinkle freely over each 6-inch layer of leaves a mixture of 1 part ammonium sulfate



Leaves collected for leaf mold.

to 5 parts crushed limestone. This will disintegrate more rapidly if turned over and watered every week or so. To screen out trash, use a sand screen with 2-inch mesh. To screen rotted leaf mold for top dressing, use ½-inch mesh.

Commercial fertilizers are of value when properly selected and usually are more easily obtained and distributed than stable manures. One might mention in this connection complete mixed fertilizers, or bonemeal, dried blood, and pulverized sheep or cattle manure. Good mixed fertilizers are the 4-12-4, 6-8-6, 5-10-5, or similar formulas.

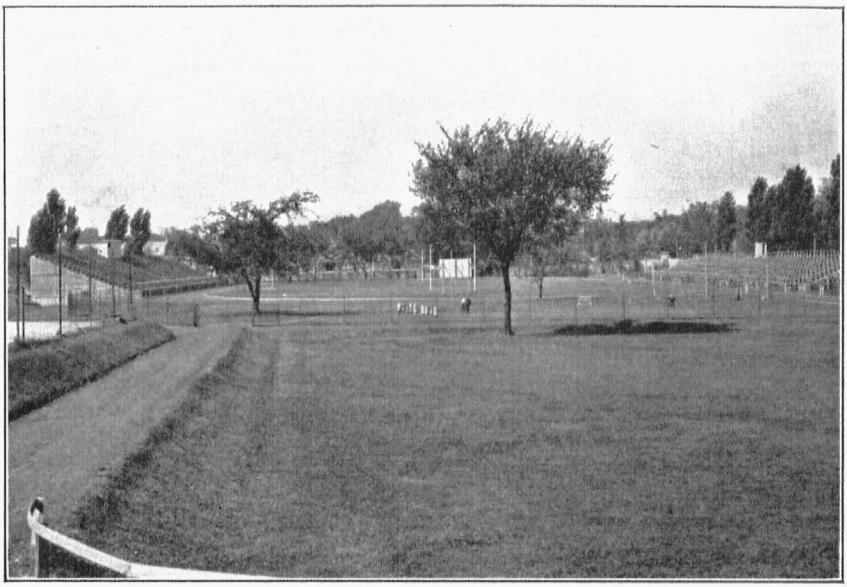
When fertilizer is applied, it should be thoroughly raked into the old lawn with an iron-toothed rake. After a lawn is established frequent top dressings greatly improve it. Cotton seed meal or feeding tankage, mixed with an equal weight of superphosphate, is a good top dressing. Apply 10 pounds per 500 square feet at any time. Similar top dressings of 4-12-4, 6-8-6 or 5-10-5 are very good. These should be washed in with a hose or applied just before a rain.

Rolling.—It is well to remember that with the heavy freezing and

thawing that may occur in many parts of the Middle West, rolling the lawn frequently is an excellent practice.

Drainage.—Where there is poor drainage, effort should be made either to underdrain, fill, or regrade the lawn in such a way as to eliminate unusually wet places.

Reseeding.—Too many people expect a little seed applied to a lawn to produce a thick sod that will last and improve through a lifetime or more. They cut the grass frequently, thus eliminating self-seeding, and depend upon the "spreading" of the grass by stolons to keep the surface covered thickly.



A well maintained turf.

Every lawn should have an occasional reseeding with fresh seed. Both blue grass and redtop may be used for this, and the quantity necessary depends somewhat on the condition of the lawn. From 30 to 50 pounds to the acre may be applied every five to eight years. Before sowing, the old grass should be cut and thoroughly raked with an iron-toothed rake as deep as possible without pulling up the roots of the old grass. On bare spots before reseeding, the ground should be either raked or preferably spaded up thoroughly. Usually fertilizer or new soil is added. When the seed is sown, it should be raked into the soil. A very tight old lawn should be cut up with a spiked roller, reseeded, fertilized, and rolled down smooth.

Cutting.—New grass need not be cut until it has reached a length that will not stand upright. The first cutting may well be left on the ground as a mulch. It will rot quickly and at the same time will keep the ground moist and the young grass protected.

Early spring cuttings may be left to decay, but after the month of May, in general, cut grass should be raked up and removed if the cuttings are heavy. The "set" of the lawn mower is important. Where grass is thin it should not be cut too close. On thick sod one may cut fairly close. Previous to the usual summer dry weather, or sometimes in the fall, grass may be allowed to grow long. This will protect young shoots and roots from burning out in summer or from freezing in winter. Occasional readjustment of the mower blades to suit these conditions is important.

Close to trees the grass should be cut away with hand shears, or the space about small trees may be kept cultivated. Avoid striking the base of young tree trunks with the lawn mower, as this may injure and eventually destroy the tree. Edging of walks and shrubbery beds greatly improves the appearance of neatness.

Watering.—It is well to remember that artificial watering should be resorted to only when necessary to preserve moisture, and when done should be applied in a very considerable quantity. Frequent applications of water in small quantity are undesirable. When water is applied, it should be in sufficient amount to wet the soil to a depth of about 2 or more inches, and then not applied again until danger of drought occurs. It is quite normal for blue grass to turn slightly brownish in dry weather, but as a rule it recuperates quickly after rains. Artificial watering during middle or late summer encourages the development of crab grass.

Trees.—It is difficult to produce a good sod under old trees where roots are near the surface. It is often practical to spade up the ground and remove most of these roots without injuring the trees. In very shady or damp places, the English rye grass spoken of in a previously described mixture or *Poa trivialis* (Shady Grass) will be found effective in helping to reestablish the lawn. Low limbs of trees or some foliage may be removed to let sunlight and air to the ground for the benefit of grass under the trees.

Weeds.—Where perennial weeds occur, about the only satisfactory way to be rid of them is to dig them out root and all. The most effective manner of extermination is by continuous hand digging. Soil and blue grass seed should be added in places where these are removed.

Excessive Wear.—While a certain amount of tramping is good for grass, it can be overdone and it may be necessary to discontinue

the use of a piece of ground until the grass becomes reestablished. This is true on athletic fields and school grounds, and in certain places in parks. The grass should be left to grow and mature, if possible, for a whole season, allowing it to reseed itself when the season permits. Additional seed should also be applied. On pasture and meadow lawns, too close grazing may ruin a stand of grass, and this should be watched and animals removed to other pasture at least temporarily.

Tools.—The yard tools should be kept in good condition. A mower that haggles the grass or skips in cutting is apt to ruin the appearance of a lawn. Remember that the lawn mower should be set to cut at different heights through the summer, depending on climatic conditions.

System of Lawn Fertilization Over a Period of Years

It is advisable to plan a system of fertilizing the ground over a series of years, using a different one each season until the lawn soil is thoroughly built up to a point of high fertility. The following suggestions will be found beneficial in determining the amount of fertilizers to be applied to lawns:

On Newly Cultivated Ground.—Barnyard manure should be applied at the rate of from 15 to 40 tons to the acre, depending upon the fertility of the original soil.

For Established Lawns.—For top dressing established lawns any of the following fertilizers may be used. The amount specified in each case is sufficient for 500 square feet of lawn.

(1) Well rotted, screened stable manure, 300 pounds. To this may be added either nitrate of soda, 3 pounds, or ammonium sulfate 3 pounds. A couple of months later another 3 pounds of either nitrate of soda or ammonium sulfate may be spread over the lawn and washed in with a hose, or made into a solution at the rate of 1 pound to 10 gallons of water and sprinkled on the lawn.

(2) Commercial fertilizer, similar to 4-12-4, 6-8-6, or 5-10-5 formula, 8 to 10 pounds.

(3) A mixture made up of sulfate of ammonia, 2¼ pounds; superphosphate, 5 pounds; and muriate of potash, ¾ pound. Apply as soon as mixed and leach in with a hose.

(4) Leaf mold, rotted and screened, 100 pounds.

(5) Cotton seed meal or feeding tankage mixed with an equal weight of superphosphate, 10 pounds.

(6) Pulverized sheep or chicken manure, 100 pounds.

Note: This circular does not treat of special areas such as golf greens, irrigated lawns, or soil types and climatic conditions unusual to Missouri and other midwest states.