

Fertilizer for Warm Season Grasses

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(At GCSA convention)

The basic principles of turf grass fertilization are the same essentially for warm and cool season grasses. Timing of the applications is the main difference. The problem is simply one of first eliminating any deficiency of phosphorus and/or potash and then furnishing enough nitrogen, at the right time, for dense, tight turf.

Lime should be used on Bermuda grass turf when the soil is moderate to strongly acid. Best practice is for lime applications to precede fertilization.

The soil supply of available magnesium is sometimes low in strongly acid soil. The laboratory should be asked to test for available calcium and magnesium when determining acidity. A dolomitic limestone containing 20 per cent magnesium, reported as the oxide, should be used on acid soils of low magnesium content. By applying it, grass is assured of an ample supply of magnesium.

Plants require as much sulphur as phosphorus. That fact has been ignored for an obvious reason. In the past sulphur requirements were satisfied automatically because mixed fertilizers have contained ammonium sulphate and superphosphate made by treating rock phosphate with sulphuric acid. These grades of superphosphate have a high content of calcium sulphate, in the form of gypsum.

The 45 per cent grade of superphosphate does not contain sulphur in appreciable amount. It is made using phosphoric acid instead of sulphuric acid. Unlike ammonium sulphate, the newer types of nitrogen fertilizer such as ammonium phosphate, ammonium nitrate, urea and the new synthetic organics of the urea-formaldehyde type do not furnish sulphur. The same is true of high analysis liquid fertilizers. An acute shortage of sulphur is not likely in the foreseeable future, but it is an eventual possibility.

Sulphur can be provided by using lower analysis grades of superphosphate, by applying gypsum, or supplying some of the nitrogen from ammonium sulphate. Any one of the heat-dried activated sludges contain about as much sulphur as phosphorus. A sulphur deficiency is not likely where they are used as the main source of nitrogen.

A nutritional disorder commonly called "iron chlorosis" is on the increase. It affects warm season as well as cool season grasses. Many of you have heard the word "chlorosis" and know its meaning. Others do not. The dictionary definition is, "A diseased condition in plants, shown by the yellowing of green parts".

The green pigment in the leaves of grass, and of all other plants, is chlorophyll. This complex substance contains a minute amount of iron. When deprived of it the leaf turns chrome yellow and becomes soft and tender. Then grass falls prey to every known type of disease, such as *helminthosporium*, *curvelaria*, anthracnose and other unknown ones. The disease strikes with devastating effect because the grass is in a weakened state.

Had there been no iron chlorosis, or had it been stopped promptly by the use of a little soluble iron such as ferrous sulphate, the grass could have resisted the casual organism. The same is true among humans. The puny, weak individual is plagued with many diseases which the strong, robust person can resist.

Look for Work Faults First

When disease is secondary to something else, such as iron chlorosis, there is no point in rushing specimens to the over-worked pathologist. A microscopic examination is almost sure to disclose parasitic organisms in any specimen of turf. It does not tell anything about weakness in fertilizer and maintenance practices, or in water management. The better way is to review and evaluate maintenance practices first and correct faulty ones. After doing that the microscopic examination may not be needed. Should disease persist, the pathologist is then in position to render a useful service. By reversing the order of procedure, turf will be better and superintendents will have fewer ulcers.

Iron chlorosis is inducted by a high soil pH. That is why it is so prevalent on all grasses in semi-arid regions. It is aggravated by high levels of soil phosphorus, by a high content of organic matter, and by excessive wetness, or high soil moisture content.

Almost every soil contains plenty of iron.

Plants are unable to absorb it under the conditions enumerated above. Foliar feeding is the best to stop iron chlorosis. Promptness is important to restore plant vigor and prevent loss of turf. The secret is to deposit a small amount of an iron salt on the grass leaves with a minimum of water. In this way burning is prevented.

Ferrous sulphate (Copperas) is commonly used at not more than 2 oz. per 1,000 sq. ft. with not to exceed 5 gals. of water. On some courses a little ferrous sulphate is used each time fungicide is applied. The usual amount is about ½ lb. per green of approximately 5,000 sq. ft.

The newer chelated forms of iron have not lasted longer than ferrous sulphate on heavy soils. Several manufacturers claim to have produced longer lasting types. Their development will be a real contribution to turf grass maintenance in many places.

Warm Season Fertilizer Needs

Bermuda grass has been and is the chief warm season golf turf grass for greens, tees, and fairways. Several other warm season grasses have been used in a limited way or are present on golf courses. The list includes carpet grass, Zoysia, Bahia, centipede, and St. Augustine grass. Information about their fertilizer requirements is less specific than for Bermuda grass because of their limited use.

Some of the carpet grass fairways on low-lying, damp, dark colored soils are good. Carpet grass responds to fertilizer, especially nitrogen, but the amount needed is less than for Bermuda grass.

The Zoysias have received much publicity in recent years. They are shade tolerant and may be the answer to summertime turf on shaded tees in the warm season grass belt and possibly farther north. Slow turf formation is the principal deterrent to fairway use. Generous fertilization after planting is said to hasten turf development. After that Zoysia is presumed to do well with much less fertilizer than other warm season grasses, excepting centipede.

Centipede is called the "poor man's grass" because of its low fertility requirements. It will never find wide use on golf courses where there is an adequate budget for the development of Bermuda grass turf. Centipede seems to require an acid soil. Iron chlorosis appears and persists unless the soil is moderately acid. One course in Florida lost their centipede fairways by applying lime. It proved a blessing in disguise because they now have an excellent

Looking Ahead on Spalding Line



Spalding executives and pro consultants assembled recently at Chicopee, Mass., factory to work on designs for Spalding's 1957 golf clubs. Top secret features had the experts excited. Among pros at the gathering: Wiffy Cox, Al Watrous, Jimmy Nichols, Jimmy Thomson, Shelley Mayfield, Ralph Hutchinson, Harry Cooper, Jay Hebert and Al Brosch.

cover of Bermuda on all fairways,

St. Augustine grass finds its way into golf course roughs and fairways in the deep South. Its main use has been for lawns because it is more shade tolerant than Bermuda grass. Zoysia is fast replacing St. Augustine on lawns because of its greater resistance to the chinch bug, which ruins St. Augustine turf and is hard to control because of the constant succession of broods.

In Florida and in the Houston, Tex., areas clubs have been successful in eliminating St. Augustine from fairways by using sodium arsenite to kill it. From three to four treatments are needed spaced 7 to 10 days apart. They use 2 to 4 lbs. per acre each time. Fertilizer is applied generously after the first treatment to foster growth of Bermuda. Over-seeding with hulled Bermuda seed is desirable on large bare areas. Seeding is done before spraying the last time.

Bermuda Responds Quickly

Because Bermuda grass is so common and widespread in the South, many assume it will grow and thrive anywhere without care or fertilization. Nothing is farther from the truth. No other grass responds as quickly to good care and the use of fertilizer. An excellent turf can be developed in a matter of weeks. It takes one to two years or more to accomplish the same result with cool season grasses.

The Bermuda grasses can grow in moderate to strongly acid soil. This fact is misleading and has blinded some to the benefits derived from the use of lime.

Bermuda turf resists adversity better when the soil is no more than slightly acid. It stays green longer at the onset of drought. The greener grass along lime lines on some football fields attest to that fact. The use of lime on Bermuda grass turf is justified when soil reaction is below pH 6.0. Degree of acidity determines the amount to use.

The golf ball does not run true over a stemmy sparse-leaved Bermuda grass green. The golfer wants a dense, leafy turf. The tendency toward stemminess is most marked at the time of normal seed head formation. It is aggravated then and at other times by the generous use of phosphate and or potash with little or no nitrogen. The way to produce and keep Bermuda grass turf vegetative and leafy is to use little or no phosphate and potash and apply nitrogen generously. This type program is imperative on greens. It applies to fairways also. The best fairways receive just enough phosphate and potash to provide minimum requirements for growth and an ample amount of nitrogen to keep the turf dense and leafy.

Bermuda grass needs less phosphoric acid than bluegrass or rye grass. It resembles the bent grasses in that respect.

Clippings are not removed from fairways and seldom from tees. As they undergo decay, their phosphorus, potash, and other mineral elements are released in forms grass can utilize. The oppsite is true on greens. The crop of clippings is removed. That accentuates the need for phosphate and potash on greens to replenish loss by removal of clippings.

There is no published data on the yield of clippings from Bermuda grass greens, or its plant food content. Such information is desirable.

Green Clippings Analysed

In 1955 J. E. Hammer of Memphis (Tenn.) CC, weighed the clippings from the 14th green of common Bermuda grass. He collected samples for chemical analysis. This was done in the laboratory of the Milwaukee Sewerage Commission. They separated foreign matter from the samples, determined dry weights, and analyzed the grass for nitrogen, phosphoric acid, potash, and sulphur.

When the 1948 National Amateur championship was played at Memphis Aug. 30 - Sept. 4 the contestants praised the putting quality of the greens. Many club officials from other Southern clubs asked Hammer to reveal his secret.

Mowing on the 14th green started on May 9 and stopped September 11, making a total of exactly 18 weeks. The dry weight of clippings produced during that time was 120.19 lbs. These and all other figures are on the basis of 1,000 sq. ft. The average amount of plant food elements removed per month and for the 18 week period were as follows:

	Per Month	Total for Season
Nitrogen	1.34 lbs.	5.62 lbs.
Phosphoric Acid	0.35 lbs.	1.48 lbs.
Potash	0.80 lbs.	3.36 lbs.
Sulphur	0.29 lbs.	1.22 lbs.

The first column of figures, pounds of plant food removed per month, are represented by the following amounts of fertilizer. For nitrogen 27 lbs. of 6 per cent grade fertilizer, or 6.7 lbs. of 20 per cent grade; for phosphoric acid 1.75 lbs. 20 per cent superphosphate or 8.75 lbs. of 4 per cent grade; for potash 1.29 lbs. of 60 per cent grade muriate of potash; for sulphur 1.45 lbs. 20 per cent grade ammonium sulphate or 18 lbs. of 2.5 per cent grade sulphur containing fertilizer. A 100 lb. bag of 6-2-4 fertilizer would restore all the plant food removed from 1000 sq. ft. during the season at Memphis.

The data does not include the amount of plant food contained in the turf on the green, and ignores the requirements for root development.

Year-Round Bermuda Program

The fertilizer program for Bermuda grass greens which are overseeded for winter play must be devised for the entire year. That is the only way to have good playing turf summer and winter and lessen damping-off troubles at seeding time in the fall.

A plentiful supply of phosphate and potash with little or no nitrogen is best before seeding. They make the young seedlings more robust. The rate of superphosphate need not exceed 10 lbs., and a rate of 10 to 15 lbs. muriate of potash per 1,000 sq. ft. is ample. The above rates will take care of Bermuda also.

Nitrogen fertilization should begin after the young winter grass has gotten off to a good start. Rates should be moderate in the range of $\frac{3}{4}$ to $1\frac{1}{2}$ lbs. actual nitrogen per 1,000 sq. ft. per month.

Little or no phosphate or potash need be used on Bermuda grass during the summer. That is the way to keep it leafy and vegetative. Nitrogen fertilizer should be

used generously to furnish 2 to 3 pounds actual nitrogen per month. The highest rate should be approached during warm weather when Bermuda makes its best growth.

The new fine textured Bermuda grasses should be handled much like the bent grasses. Topdressing should be at light rates to avoid smothering. Nitrogen should be used at moderate rates but continuously. Phosphate and potash should be applied at the time the grass is vegetative and not when it throws seed heads.

The Bermuda grass on tees should be fertilized generously with nitrogen throughout the growing season. The amount should be in the range of 2 to 3 lbs. actual nitrogen per 1,000 sq. ft. per month. One application of phosphate and potash usually suffices. Early spring — just before or when growth starts — is a good time to apply them. Where a mixed fertilizer is used, the nitrogen content should be high with from one-third to one-half as much phosphoric acid and potash.

The best fairway turf on golf courses in the warm season belt is Bermuda grass. Fertilization and water management are the two most important items in their maintenance, and in that order. Many reverse it and try to grow grass with water only. To their dismay, the ground cover soon becomes crabgrass, clover, fennel, chickweed, and every other type of creeping weed. Then fairway renovation becomes necessary.

The way to produce good fairway turf is to use ample fertilizer and reasonable amounts of water. Workers in Missouri found it necessary to use five times more water to produce a bushel of corn than was needed on an well fertilized plot.

Testing of representative soil samples is the first step in formulating the fairway fertilizer program, providing sampling is done correctly and reliable methods are used. Such tests will disclose need for lime and provide an inventory of the soil stock of available phosphorus, potash, and other mineral elements. In semi-arid regions it is well to learn something about saline conditions.

An application of lime should be made on Bermuda grass fairways if the soil is more than slightly acid. A dolomite should be used if the soil supply of magnesium is low. Then deficiencies in phosphorus and/or potash should be corrected by the

Top Brass at Party



At the Nadco-Scoggins cocktail party and fashion show which began the round of festivities of PGA Senior week top officials of PGA and of Scoggins Golf Supply Co. and Nadco Sporting Goods Co. viewed in pleased amazement as record was set in consumption of wet and dry hors d'oeuvre.

L to R are Vic East, Nadco club designer; Carlton Waller, Scoggins pres.; Marty Cromb, 1955 PGA Seniors' pres.; Leo French, Nadco sales executive; Jack Russell, Scoggins vp; Harry Moffitt, PGA pres., and Herbert Johnson, Nadco pres.

application of phosphate and/or potash. After doing these things, nitrogen fertilizer becomes the key to a dense turf. Very few clubs use enough.

As much as 100 to 150 lbs. actual nitrogen per acre are used on many watered bent grass fairways in the North. Some Bermuda grass fairways need 50 to 100 per cent more than that, especially where the growing season is nine months or more.

Split Fertilizer Applications

At one time it was customary to apply all or most of the nitrogen at the start of the growing season. The trend has been toward split applications throughout the growing season. Clubs in South Florida have applied nitrogen fertilizer always in November and December. This has been done to hold color in cool weather and to insure a renewal of growth after a cool snap.

Bermuda grass fairways badly infested with clover, crabgrass, etc., are not hopeless. Good turf can be developed without interrupting play seriously. The best way is to fertilize generously and then spray with sodium arsenite three to four times. The sodium arsenite will hold the weeds in check or kill them while the fertilizer encourages the Bermuda grass to spread.