There's Sugar In that Turf

Grass wouldn't have a framework without it . . . It builds needed protein . . . And supplies a reserve for revival in the spring . . . But without ample nutrients it could never do this vital work

By O. J. NOER

Grass, like every other living thing, cannot live on water alone. At a Missouri experimental station, it took five times more water to produce each bushel of corn on check plots than was needed in the adequately fertilized ones. So instead of relying on water only, the secret of a good turf is to use adequate amounts of fertilizer first, and then apply just enough water to keep it that way.

Every living plant is a factory. It manufactures a simple sugar, the basic product from which every other plant constituent is produced. Sugar production occurs in the green portion of the plant, mainly in the leaves. Some of the sugar is changed to cellulose, which becomes the structural framework of the plant. Part is used to build protein, the most important plant substance. A portion is converted into starch or oil, and is stored for future use when they are needed to revive dormant perennial grass in the spring, and for the same purpose when turf falls prey to any type of injury, short of death.

Survive Defoliation

It is customary to assume that plants produce sugar in abundance. Plenty of sugar is made during the life of most plants, the ones that grow from youth to maturity, but not always for grasses and legumes. They are among the few plants that can survive constant defoliation. But for continual survival there must always be enough leaf surface left so that the manufacture of sugar can continue at a rate which will permit normal growth, provide a reserve for use in adversity, and initiate new growth after winter dormancy.

This is the reason erect growing grasses like bluegrass, fescue, ryegrass and colonial bent perform best when cut high — up to several inches. They suffer severely when mowers are set to cut below 3/4 inch. The prostrate growing grasses such as poa trivialis, creeping bent, Bermuda, zoysia and carpet grass can produce ample sugar even when cut close.

Where High Cutting Hurts

With all of them, high cutting favors thatch development. It is detrimental rather than beneficial. Only the top foliage stays green. Leaves below turn brown for want of exposure to sunlight. Then scalping occurs. As a consequence, the operator is prone to raise the bed knife. This only makes a bad situation worse. Creeping bent, Bermuda and zoysia turf should be kept tight by close cutting, never above 1/2 to 5/8 of an inch.

When clippings are not removed, only nitrogen is subject to loss, some by leaching and part by denitrification. The other mineral elements, including phosphorus, potash, calcium and magnesium, are stored in the soil exchange complex for future use after their release as the clippings undergo decay. The dominant role of nitrogen and the lesser need for phos-

phorus and potassium is exemplified on the fairways at one Milwaukee course. The bent turf has received nothing but a 6-3-1 fertilizer since 1933. There is no better fairway turf anywhere. These watered fairways receive about 3,000 pounds of fertilizer per acre each year.

Monthly Nutrient Loss

Based on studies of Bermudas and bentgrasses, the average monthly loss of nutrients in clippings is about one pound of nitrogen, not more than 1/2 pound of phosphoric acid and 3/4 pound of potash per 1,000 square feet of a golf green. At Memphis, the quantity of sulfur was about the same as phosphorus. These figures can be used as a rough guide in formulating a fertilizer program for greens and for tees where the clippings are removed. However, a more vigorous rate of growth is desirable on tees because of wear. That means somewhat more nitrogen, as well as phosphate and potash should be applied.

Kind of grass and type of soil have pronounced effects upon fertilizer practices. In the Mississippi and Ohio river valleys, bluegrass is the dominant grass. The soils are above average in fertility and seldom more than moderately acid. In New England and in the Pacific Northwest, fescue and bentgrasses, mostly of the Colonial type, are the common grass species. Soils are less fertile, usually low in phosphorus, and are moderately to strongly acid.

The fescues and bentgrass can survive under these conditions, but bluegrass can't. The only way to keep fescue in the Midwest, out in open areas, is to make conditions unfavorable for bluegrass. That means minimum amounts of lime, nitrogen and phosphate. On watered fairways in the North, bluegrass gives way to creeping bent under programs of plentiful fertilizer and heavy watering.

Southern Grasses

Bermudagrass is the dominant turf grass in the South, in well drained places which are devoid of excessive shade. Carpet grass occupies damper locations. St. Augustine in the deep South, and zoysia elsewhere are the best shade tolerant grasses. Bahia and centipede are called the poor man's grass because of their low fertility requirements. Centipede thrives in acid soil where it is able to assimilate needed iron. On neutral to alkaline soil centipede becomes chlorotic and dies unless sprayed repeatedly with ferrous sulphate or chelated iron. The solution is to use a different grass.

This article is condensed from a speech made by Noer at the Oklahoma turf conference in December.

Iowa State U's associate dean of agriculture, Louis M. Thompson (center), prepares to give GCSA scholarship checks to (l to r) Theodore B. Bailey, Jr., Washington, Ia., Joseph Burris, Willoughby, O., James E. Wieborg, Odebolt, Ia., and Flave E. Markland, Vinton, Ia. The checks range from $300 to $500. Markland is a graduate agronomy student; others are undergraduates in the horticulture college.

Bermudagrass tolerates considerable acid but grows best when soil is no more than slightly acid and well supplied with calcium. Lots of nitrogen is needed to produce a dense, tight turf. The use of several hundred pounds of actual nitrogen per acre of watered fairway is not uncommon on poorer soil where the growing season is a long one. A Nevada club used almost 400 pounds per acre in 1953. Yet the supt. thought it was not enough. The range in Oklahoma is much less, more like 150 to 250 pounds.

Zoysia requires less nitrogen than Bermudagrass. Where zoysia and Bermuda are intermixed, the Bermuda dominates under a heavy nitrogen feeding program. With lesser amounts, zoysia may take possession.

Soil Reaction

Soil reaction affects turf growth and the effective use of fertilizer. A desirable range is pH 6.0 to 6.5. It is a good one for growth and a desirable one for the availability of soil nutrients.

Lime usage is justified on moderately to slightly acid soil, and imperative on strong to very strongly acid soil. It may

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Miscellaneous Merchandise

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them from you if you take the trouble to sell them. If they'll eventually increase your profit by five, ten or twenty per cent, they are something you can't laugh off."

Below, in parentheses, is the percentage of shops that handle the Miscellaneous Items listed in the survey:

Neckties (25)	Sandals (10)
Tie pins/clasps (20)	Slippers (10)
Cuff Links (20)	
Belts (65)	Ash trays (10)
	Figurines (15)
Bracelets (10)	Sunglasses (20)
Necklaces (5)	Lighters (20)
Pins (25)	Cigaret cases (10)
Wallets (15)	Repellents (60)
Luggage (35)	Lotions (85)
Shaving Kits (10)	
	Instruction
Loafers (35)	books (40)
Tennis shoes (15)	Other books (20)

Items not mentioned in the survey but which pros say they stock are: Shoe bags, golf games, chapstick, ball retrievers, hand warmers, vitamins, records, drinking glasses, electric razors, purses, foot spray, waterproof spray, playing cards and hunting coats.

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be beneficial otherwise when the levels of available calcium are low. A dolomite should be applied when a soil test indicates a low level of available magnesium. Besides neutralizing acidity, dolomite furnishes magnesium and eliminates any possibility of a soil deficiency.

Spread It Out

It is not necessary to apply enough lime at one time to change a strongly acid soil to neutrality or very slight acidity. It may upset soil equilibrium. The better way is to use 1½ to 2 tons per acre annually until pH 6.0 is attained. Then an application every two to three years at a rate which will maintain this reaction range will suffice.

Type of soil plays a part in fertilizer procedure. It governs kind of fertilizer, rate and frequency of application. Sands are very low in all nutrients and are un-

able to fix and hold applied soluble nutrients. That means frequent applications at light rates or the use of slow release fertilizers. These types are feasible for all elements but nitrogen. In theory even this is practical, but not always in practice. Hot, moist summer weather may accelerate the release rate so grass can become succulent at a time when it should be sturdy and tough. The safe way is to use frequent light applications or build reserves of all nutrients except nitrogen and then use moderate rates of slow release forms of nitrogen. Larger amounts may be feasible in arid regions where there is no danger of overly wet periods.

Revolutionary Procedures

If the very sandy mixtures advocated by the USGA green section for greens are accepted generally, it will involve revolutionary changes in fertilizer procedures on greens. Then it may become necessary to use all seven of the major nutrient elements and apply trace elements also.

The exchange complex is the important feature of loam and clay soils. These soils will retain and release all soil nutrients, provided the soil is not too acid, or too alkaline. Then phosphate and potash can be used regularly along with nitrogen, or they can be applied once or twice a year. Interim feeding then becomes a matter of nitrogen, the big element in any fertilizer program.

Phosphate and Potash

From a practical standpoint, many successful superintendents provide for mineral needs on greens and then rely on regular applications of nitrogen. They use from one to two pounds of actual nitrogen per 1,000 square feet. Minimum amounts of potash are best in summertime in Bermudagrass greens in order to promote vegetativeness. Excessive potash then encourages formation of stemmy seed stalks. The time to use phosphate and potash liberally is in the fall just before the greens are overseeded for winter play.