GRAU'S ANSWERS TO TURF QUESTIONS

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Our Strongest Tools Are Soil Tests

In everything we do there is a compelling need to achieve an equitable distribution, a balance, among the various phases of our day-to-day life. We need to balance work and play, vocation and vacation, joy and sorrow for the complete life. Some supts have not had a vacation in years; others take them regularly. "All work and no play makes Jack . . ." but who wants a narrow, one-sided employee even if he's rich.

Balance is essential in producing high-quality turf. The soil must have a balance between air and water; the air balanced as to oxygen and carbon dioxide. Soil acids and alkalies must be balanced to avoid excesses of either. Traffic must be controlled in relation to soil compaction to avoid excesses and the death of grass.

Protective Mechanism

Soil microorganisms apparently automatically achieve balance with external factors when provided ample supplies of food and energy and chemical necessities which are identical to those required by grasses. Well-nourished organisms continue increasingly to produce colloids (glue-like) which bind tiny grains of sand, silt and clay together into large grape-like bunches called aggregates which then act like large coarse soil particles. Soils then can breathe, resist compaction, absorb traffic shocks, absorb water and stay alive.

Balanced nutrition, which feeds soil organisms first and grass second, consists of supplying all nutritive factors in proper proportions. When soil tests show excessive soil acidity we must apply calcium and magnesium to counteract the hydrogen ions, thus restoring balance. Nitrogen, of course, must be kept in constant ample supply so that soil organisms never, never go hungry.

Phosphorus, essential for root growth, is needed in moderate supply. When great excesses, detected by soil tests, accumulate, it can be eliminated from the diet until levels become moderate. Potash, essential for many things, needs to be present in adequate amounts. Excesses may be harmful, always are wasteful. Soil tests can be so useful. Iron, copper, boron, zinc, manganese and other trace elements may be needed occasionally to maintain growth and color.

The complex dynamic biological system of soil-plant relationships has the inherent ability to absorb many shocks and to achieve balance if provided with reasonably adequate mineral nutrition and water when needed. Chances for satisfactory growth improve as we provide nutrient elements balanced according to the supply in the soil and to the needs of the plant. Our strongest tools are soil tests, intelligently interpreted and meticulously heeded.

Turf Feeding Plan

Q. For years before I took over our course the main fertilizer used was a 1-1-1 inorganic mixture. At times, my predecessor used animal residues and occasionally a little muriate of potash. Recent soil tests show 1500+ pounds P_2O_5 to the acre on greens and tees, about 1,000 lbs./A on fairways. Potash varies from L to M. What do you suggest for a feeding plan? (North Carolina)

A. This is becoming a rather common thing over a large part of the U.S. and Canada. To some extent the high readings for P may be attributed to arsenic but hardly to the extremely high levels that show up in the tests. Many courses that are plagued by VH readings for P (and often plagued with poa annua, too) now are developing programs of feeding straight nitrogen materials (no phosphorus) and sulfate

Potassium or Potash

Symbol: *K* from German *Kalium*. Potassium is a major nutrient element essential for plant growth. The pure element potassium is a grey metal that reacts violently with water, spitting flame and smoke. Plants indulge in "luxury consumption" when more K is present than is needed. It can be lost by leaching.

K is supplied by potassium sulfate, potassium chloride (muriate of potash) and by sul-po-mag (sulfate of potash-magnesia). K-sulfate carries 50 per cent K_2O equivalent, compared to about 60 per cent K_2O in muriate of potash and 21 per cent in sul-po-mag. K-sulfate yields sulfur to plants, a nutrient.

In balance with N, P and other nutrients, potassium performs several essential functions, some not yet well understood. It is not known to enter into chemical combination and become a part of the plant. It helps plants resist drought and diseases. It builds cellulose and makes plants stiffer. Root growth is improved. Many enzyme actions are enhanced. Respiration is reduced. Photosynthesis and food formation are improved. It helps to keep conducting tissues clear for translocation of sugars and starch. Plants stay more plump with reduced wilting and lower water loss. Potassium helps roots to absorb nitrates.

Soil tests accurately indicate levels of available K. Low to medium levels are sufficient for most turf. Two to four split applications a season are considered better than one heavy treatment for maintaining moderate levels.

Potassium materials are inorganic and will burn foliage. Thorough watering usually eliminates possible damage. Hydraulic application of finely-powdered forms is becoming popular. Re-cycling of nutrients where clippings are returned reduces the need for applied K.

Most potash comes from Carlsbad, N.M., Searles Lake, Calif., and Wendover, Utah. There are large reserves in Canada, also in Germany, France, the Soviet Union and Spain.

Potassium deserves to be used intelligently, as needed, according to soil tests.

of potash. Some courses have been on this type of program for over five years and report excellent results. No sign of P-deficiency has occurred to date.

Hydraulic feeding (sprayer, proportioner or siphon) makes it easy to add soluble sulfate of potash to the tank holding the straight nitrogen so that no extra labor is involved. Dry applications on fairways can be made by having a custom mix prepared that is geared to the soil needs (which may be a 3-0-1, a 4-0-1, or even a 5-0-1). The other way, of course, is to make separate applications of the individual materials.

Sulfate of potash is preferred over muriate for the reason that the sulfur is a nutrient element (Chlorine is not) and often is deficient in turf soils.

Frequency of feeding N-O-K will vary with the type of N material selected. The important thing is to reduce or avoid P use until soil tests show more realistic levels for available P.

Zebra Grass

Q. We want information regarding Zebra grass. Would you tell us if you are familiar with this product. It is our understanding that this grass will grow almost anywhere, that it spreads rapidly, is very hardy and never needs to be cut. We would appreciate any information you might be able to give us. (Colorado)

A. We, too, have been searching for such a grass. To date we have not found it. Neither do we know of anyone who has seen this grass. If and when you locate it please call us COLLECT.

Response to Lime

Q. We draw soil samples once a year for tests which guide our liming and fertilizing program (except nitrogen). We use ground limestone to keep the pH range close to 7.0. Why is it we often see a response to lime that resembles a combination of nitrogen and fungicide? The grass has better color, and diseases seem to be noticeably less. What is the explanation? (Maryland)

A. The first effect (if, indeed, any reaction is first) is that of replacing hydrogen (acid) ions on clay minerals and soil organic matter with calcium and magnesium ions, thus pro-

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