FERTILIZATION PROGRAM FOR renewing fairways

BALANCES MANY FACTORS

By O. J. NOER

STARTLING improvement effected by rational feeding of poor fairways is largely responsible for the increasing interest in fairway fertilization. The folly of attempting renovation with seed alone is now generally recognized, and the scarcity of good manure is compelling the substitution of more concentrated products.

The notion that results obtainable with manure cannot be approached or equalled with any other product, while widespread, is unduly emphasized. That manure materially increases the humus content of established fairways is debatable. Fresh manure often contains 70% moisture, in which case the actual organic matter does not exceed 600 pounds per ton, and during decay on the fairways added losses occur. Furthermore, surface applications on established fairways do not penetrate into and become incorporated with the underlying soil. Building up a surface layer highly charged with organic matter and plant food seems remote, but would prove detrimental by encouraging shallower root development. It is when applied and disced into the soil prior to seeding that manure exerts its greatest effect in modifying soil structure. Even then comparatively large applications are required on heavy soils. Unless manure is well rotted, applications prevent or seriously interfere with play, and may introduce objectionable weeds.

The belief that manure exerts effects over longer periods is true, but its importance often exaggerated. Prompt improvement of poor fairways can be obtained more readily with quicker acting fertilizers. Even the lasting effects of manure can be approached with other materials by a carefully designed program.

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Whether manure or a substitute is selected usually depends upon the quality of the manure and its cost, which must include the additional expense of hauling, spreading and harrowing to break down the lumps. To cover 50 acres with manure at the rate of 5 tons per acre necessitates handling a total of 250 tons. Even 1,000 pounds of concentrated fertilizer per acre involves handling only 25 tons, and does not interfere with play. Except in unusual places, the manure must be cheap and the haul short to warrant its use.

After a fairway fertilizer program is once decided upon, and the use of manure eliminated, those charged with course maintenance are usually perplexed with the following questions: what fertilizer to select? How much to use? When and how to apply? These are pertinent questions and may spell success or failure of any program.

The multiplicity of products available confuse even the experienced greenkeeper. It is doubtful if there is any "best" fertilizer. Each may have its advantages, and, also, disadvantages. Some give quicker results; others are superior on lighter soils, etc. Space prevents a detailed discussion of individual fertilizers. A thorough knowledge of the principles underlying fairway fertilization and the properties of the various classes of plant food products simplifies the selection of a suitable fertilizer.

Nitrogen Most Vital

While the future may modify some practices, the fundamental principles upon which fertilization depends seem clear. Modification in procedure will accentuate desirable effects. It seems possible and probable that a system may be formulated

Capuchino Golf and Country club, one of California's inviting establishments, has a natural topography that makes the going tough away from the straight and narrow

eventually which may either dispense with the necessity of fairway watering or at least greatly shorten the irrigation period in Northern humid sections, excepting sandy soils and very unusual seasons.

Of the three important fertilizer elements—nitrogen, phosphorus and potassium—the first is the most important and is usually the key to success. Nitrogen alone is subject to loss in the drainage water by leaching. It imparts dark green color and induces active vegetative growth. Consequently, need for nitrogen is easily detected. Brown color, lack of vigor and growth indicate nitrogen starvation; yet the startling effects produced by nitrogen have in some instances encouraged excessive use, producing succulent turf which cannot well withstand adversity. Correctly used, there is no plant food element which will compare with it.

Application of phosphorus, worked into the soil prior to seeding, promotes rapid root development and thus encourages more uniform coverage of turf. While soils are often low in phosphorus, surface applications on established turf unfortunately fail to effect marked improvement. Surprising as this may seem, there are two probable causes. Soluble phosphates, when applied to the soil, are precipitated or fixed as insoluble compounds. This fixation takes place rapidly and so near the surface that penetration into the soil layer where roots develop is prevented. When methods are found which will distribute phosphorus uniformly through the 3 or 4 inches of surface soil, more extensive use of phosphates may be warranted. The phosphorus contained in the older roots is liberated when they die and decay and is not lost by leaching. This also applies to potassium. Furthermore, clippings are not removed, and as they decay, phosphorus and potassium are again released.

Soils, excepting peats, mucks, and some sands, contain much larger quantities of potassium than phosphorus. Ordinarily it becomes available in quantities sufficient to satisfy the demands of fairway turf, especially when clippings are not removed. Abundant potassium favors and encourages clover; consequently, potassium, when needed, must be applied in limited amounts, thus satisfying the demands of the turf without unduly stimulating undesirable clover.

Unquestionably, on established fairways the main dependence must be placed on nitrogen, with phosphorus and potassium playing minor roles. Consequently, fertilizers relatively high in nitrogen, with medium to low phosphorus and potassium, should be most economical and effective.

Types of Fertilizers

Nitrogenous fertilizers can be grouped into three classes, depending upon the kind of nitrogen. These are organic nitrogen, ammonia and nitrate nitrogen. Each has specific effects.

Organic nitrogen fertilizers, as the name implies, are residues of animals or plants. Among typical products may be mentioned cotton seed meal, dry blood, milorganite, bone meal, tankage, fish scrap, poultry manure, etc. They vary widely in cost and nitrogen content. Some find favor as cattle food and consequently command higher price. Organic nitrogen cannot be assimilated by the plant roots directly. When applied to the soil, micro-organisms gradually convert the nitrogen, first to ammonia, and finally to nitrates, which is the form preferred by most plants.

The rate at which conversion takes place varies, blood and tankage breaking down very rapidly, while the action is slower with cotton seed meal, milorganite and bone. From the standpoint of "burning," these materials vary. Those which contain small amounts of water-soluble nitrogen and break down slowest are least apt to injure the turf.

Organic fertilizers usually provide for longer feeding because of the more gradual release of nitrogen, and are especially suited to sandy soils where the danger of loss of nitrogen from leaching is greatest. These materials have practically no direct effect upon soil reaction or weed control.

The two conspicuous ammonia-containing materials are sulphate of ammonia and ammo-phos. Both are water soluble, but ammonia, as such, does not leach out of the soil. The clay particles take up and hold the ammonia, but it is soon converted into nitrate by soil organisms and then may be lost. Both are extensively used on golf courses and are excellent for encouragement of rapid growth. They make the soil acid and help control clover and weeds.

Up to a few years ago sodium nitrate or Chili saltpeter was the sole nitrate nitrogen fertilizer. Now, due to rapid advance in the manufacture of synthetic nitrogen, others, such as calcium nitrate, are available. These water-soluble quick-acting materials tend to decrease soil acidity. Unless taken up by the plant, nitrates leach from the soil. Their general use on fine turf grasses has been discouraged, but they may be helpful, particularly during cooler weather.

The principle sources of phosphorus are acid phosphate, ammo-phos. and bone meal. Acid phosphates containing 16, 20 or 45% phosphoric acid are on the market. Ammo-phos. and acid phosphate are probably the best sources of phosphorus because they are most soluble. None of the phosphorus in bone is water soluble, which accounts for its slower action. As already pointed out, the big difficulty on established turf is to get the phosphorus deep enough in the soil before it precipitates.

Muriate of potash containing 50% potash is the commonly used potassium fertilizer and is a water-soluble material.

How Much Fertilizer?

The kind of soil, condition of turf, and source of nitrogen determine the rate of fertilizer application. If drainage is adequate, impoverished soil and thin turf are often synonymous. More fertilizer is usually required to induce thin turf to spread and cover bare spots than is required to maintain an existing good sod. After good fairways are once obtained, rates can be reduced. On sandy soils, where leaching may be serious, several lighter applications are often preferable to minimize the possibility of loss. It is possible to apply larger amounts of organic fertilizers than soluble materials, such as sulphate of ammonia, which may burn. Heavy applications of the latter also encourage too rapid initial growth. Here again it is better to make several light applications. A combination of organic and water soluble nitrogen is being used in many instances. The quick-acting nitrogen promotes rapid initial growth, and the slower-acting organic nitrogen subsequently feeds the turf.

When to Apply

Fertilizers are best applied in spring or fall, and should never be used on fairways in mid-summer, when limited rainfall prevents active turf growth. In sections where crab-grass is troublesome, heavy applications of nitrogen in the spring seem to encourage the crab-grass unduly. Possibly this can be avoided by fertilizing in the early fall just as the crab-grass begins to die. During the balance of the season, growth of the grasses will be encouraged, and the major effects of the fertilizer disappear before crab-grass germinates the next year. Even in Northern sections, fall fertilization has many ardent supporters.

The importance of uniform distribution of fertilizer cannot be over-emphasized, and is not generally appreciated. Fertilizers do not move laterally in the soil, consequently failure to obtain even distribution is apt to result in patchy turf. Localized areas, heavily fertilized, will be dark green, and corresponding unfertilized areas, thin and poor. This can be avoided by using a good fertilizer distributor. The hopper should be filled in the rough so, if fertilizer is spilled, fairway turf will not be injured or killed. Soluble fertilizer should never be applied when there is dew on the grass because injury is apt to occur, which cannot be avoided even with spreader chains.