Golfdom
THE BUSINESS JOURNAL OF GOLF
JULY, 1927

Fertilization of New Fairway Seedings

By O. J. NOER
Service Bureau, Milwaukee Sewerage Commission

FAIRWAY seedings on new golf courses always are watched with apprehension. This disappointing turf often results from failure to provide sufficient plant food to encourage rapid growth of the young grass. It is easier and less expensive to provide plant food prior to seeding than to improve patchy turf after play begins.

Judicious fertilization prior to seeding in the fall produces a dense, hardy turf before growth ceases. In northern sections this prevents severe winter-killing and results in good turf early the next season.

Poor fairway turf creates discontent and makes it difficult to complete membership quotas. A club established four years ago still lacks fifty of completing its membership, largely as a result of poor fairway turf. A nearby club, with similar soil conditions and organized last fall, has a waiting list of thirty. Needed plant food was applied prior to seeding and a surprisingly good turf was obtained before growth ceased in the fall. This course was put into play early this spring.

Period Following Seeding Critical

The first few weeks following seeding are the most difficult and critical in the

Nitrogen and acid phosphate produce uniform strand of turf and dense, hardy growth. Plot received 80 lbs. nitrogen, 40 lbs. phosphoric acid per acre. Seeded in August. Photographed in October.

Unfertilized seedings often result in thin patchy turf. Seeded in August. Photographed in October.

development of fairway turf. The small grass seed contains only enough stored plant food to initiate growth. Additional food must be obtained from the soil almost immediately after growth begins, but the ability of the seedling to forage for food is restricted by a limited root development. Unless the soil contains an abundant supply many seedlings succumb. Only the most sturdy survive, and patchy turf results. On fertile soils many more seedlings survive and a uniform turf results.

Fertilizers often prove helpful even on supposedly fertile soils. Their use insures abundant available plant food and benefits result from the increased numbers of grass seedlings which survive and become established in the turf.

Soil Analysis of Little Value

The only trustworthy methods of soil analysis determine the total plant food contained in the soil. Most of this plant food exists in insoluble materials and is not available for plant use until dissolved in the soil water. The latter is never sufficiently charged with soluble plant food to supply the entire demand of the turf. Hence rate of solution distinguishes the fertile from the infertile soil. Until reliable methods for measuring rate of solution are available sufficient plant food should be added to the soil to encourage rapid early growth.

The character of the soil and previous cropping history of the land must be used as a guide in the selection of the fertilizer mixture, and determines the amounts to use. Sandy soils require more plant food than heavy soils. Larger applications must be made on heavy cropped soils than on soils which have been manured regularly.

Plant Food Elements Needed

Of the ten chemical elements needed to complete plant growth seven are obtained from the soil. Four of these are sufficiently abundant in all soils to meet the requirements of the turf. The soil may be deficient in one or more of the other three, namely nitrogen, phosphorics and potassium. These are generally referred to as ammonia, phosphoric acid and potash. Most soils contain sufficient potash, but its use on sands, peats and mucks in limited amounts may prove beneficial. Generally, nitrogen and phosphorus are the critical elements on new fairway seedings.

Phosphorus benefits new seedings mainly by stimulating rapid root development, and thus enables the weaker seedlings to compete with the strong, thrifty plants. This insures a uniform stand of turf.

Nitrogen is responsible for vegetative growth and dark green color. Its use hastens top growth and aids in quickly establishing dense turf.

Characteristics of Different Soils

The soil supply of nitrogen is stored in the dark colored humus. Dark colored soils always contain more nitrogen than the lighter colored soils. The stored nitrogen is not in forms directly available to the plant, but must be converted into available form by the action of soil bacteria. If the soil has been heavily cropped the humus may be so resistant that the bacteria cannot break it down and release available nitrogen. Response to applications of nitrogen often occur on dark colored soils

Fertilization prevents severe winter kill on new seedings. Dark strip in center is turf fertilized with nitrogen and phosphoric acid prior to seeding in fall. Sufficient growth obtained in fall so turf withstood severe winter weather. Unfertilized turf in foreground and background badly winter killed.

for this reason. Sandy soils are low in nitrogen because they contain very little humus, and are in especial need of additional nitrogen.

Phosphorus and potassium occur in the mineral soil particles and are most abundant in the smaller particles silt and clay. Hence loam and clay soils contain more of these elements than sands. Heavy soils contain thirty to forty times as much potassium as phosphorus, and, as already mentioned, rarely respond to additional applications of potash fertilizers. Because of its more limited occurrence in the soil and its beneficial effect on root development, phosphorus should be used on all new seedings.

Sources of Phosphoric Acid

The two main sources of phosphoric acid are bone meal and acid phosphate. Bone meal is more expensive and not satisfactory for new seedings. Its phosphorus is all insoluble and does not dissolve rapidly in the soil. Acid phosphates containing 16, 20 and 45 per cent phosphoric acid are obtainable. While the phosphoric acid is mostly water soluble, it is precipitated as insoluble compounds when applied to the soil. The extremely fine state of division of the precipitated compounds permits rapid solution in the soil water when the plant makes heavy demands, and insures an adequate supply to meet the demands of the rapidly expanding root system.

Acid phosphate must be applied prior to seeding and worked into the soil with a disc. This places it in the soil layer where root development takes place. Surface applications after seeding produce little benefit. The phosphoric acid is precipitated in the shallow surface layer of soil and does not move down into the root zone. Because the phosphoric acid is precipitated in the soil it is not subject to loss in the drainage water.

Acid phosphate can be used without danger of injuring or burning the young grass seedling.

Sources of Nitrogen

Nitrogen can be supplied from a variety of sources. This is the most expensive plant food element, and since it is subject to loss in the drainage waters due to leaching care must be exercised in the choice of material used. Some nitrogen carriers burn or kill the young grass when too heavy applications are made. There is more danger of injury on sandy soils than on heavy soils. The different sources of nitrogen can be grouped into three classes based on the form of nitrogen they contain.

Organic nitrogen is the form in animal and plant products. Some typical materials are manure, bone meal, dried poultry manure, tankage, cotton seed meal and milorganite. Bone meal contains only about 2½ per cent nitrogen and the others from 5 to 7 per cent. The nitrogen is not directly available to the plant, but is converted into available forms by the soil bacteria. This provides a gradual and continuous supply of nitrogen and minimizes the loss from leaching. The danger of in-

Acid phosphate stimulates root development and produces uniform stand of turf. Plot received 40 lbs. phosphoric acid per acre. Seeded in August. Photographed in October.

juring the young turf is less than with any other class of nitrogenous material.

Ammonia nitrogen is the form of nitrogen in ammonia sulphate and ammonia phosphate. The former contains 25 per cent ammonia and the latter 20 per cent. Both materials are water soluble and hence very quickly available. They must be used with discretion because both will kill the young seedling if excessive applications are made. The ammonia is rapidly converted into nitrate nitrogen in the soil and may be lost in the drainage water. The danger of loss is greatest in sandy soils. Nitrate nitrogen is the form of nitrogen in nitrate of soda. It contains approximately 20 per cent. This is the form of nitrogen preferred by most plants, but all other nitrogen is converted to nitrates in the soil by bacteria. Nitrate of soda is water soluble and immediately available to the plant. Unless taken up by the plant it is lost in the drainage water. Excessive applications will kill the sensitive young seedling. Ordinarily the use of nitrate of soda is discouraged because repeated applications encourage the growth of objectionable weeds.

Amounts of Fertilizer to Apply

In the past manure was extensively used. Applications of less than 10 tons per acre were rare. Failure to appreciate the amounts of plant food contained in such applications have often been responsible for poor results obtained with the fertilizer materials. Such applications supplied at least 90 lbs. nitrogen and 50 lbs. phosphoric acid per acre. Best results from other materials cannot be expected unless these amounts are approximated. Somewhat less nitrogen can be used because of the greater availability of the nitrogen in the commercial nitrogen fertilizers.

If organic nitrogenous materials are used heavy applications can be safely made at the time of seeding. With the soluble materials lighter applications should be made at the time of seeding to guard against injury to the seedling and danger of loss from leaching. Later applications should be made as needed. Where mixed fertilizers are used, a mixture high in nitrogen, with medium phosphoric acid and low potash should be selected.

Methods of Application

There is very little lateral movement of fertilizers in the soil. To obtain good results uniform distribution is absolutely essential. This is best obtained by the use of a good fertilizer distributor. Applications should be made prior to the last discing so the fertilizer can be worked into the soil.

Benefits Warrant Expense

Generous applications of fertilizer containing phosphoric acid and nitrogen invariably produce better turf in new seedings. The cost need not exceed $1,500 to $1,800 for an eighteen hole course. This is a small item of expense considering the difficulty and cost of improving poor turf later.