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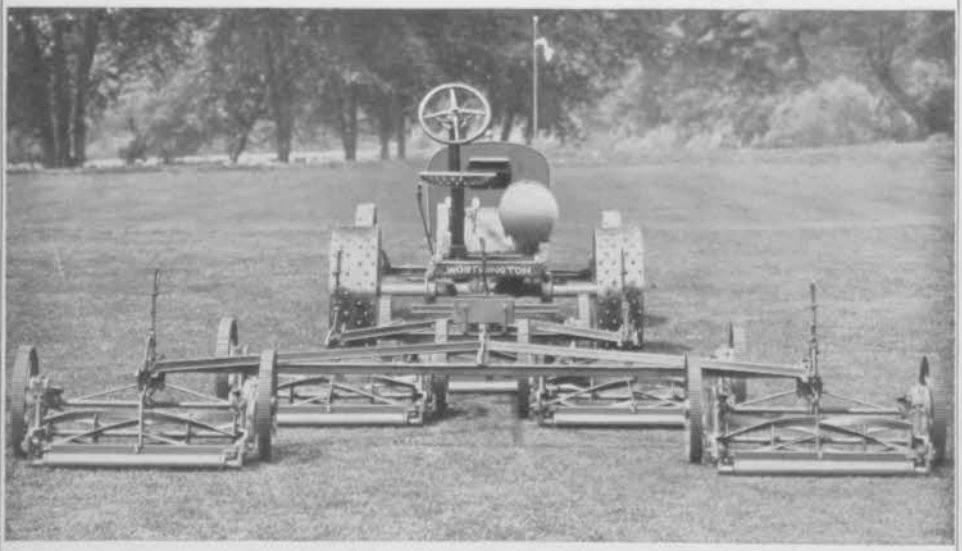

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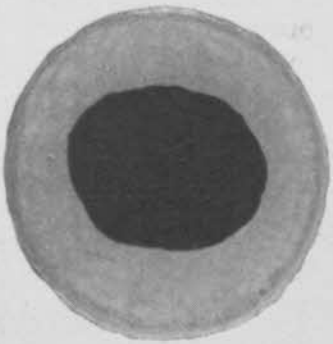

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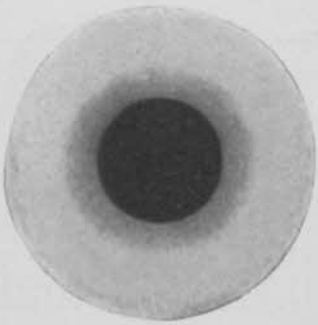

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JULY, 1927

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 roof 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.

Mid-Summer Pointers on Maintenance

By C. A. TREGILLUS

THE dog-days are upon us, the sun beating down with scorching impartiality upon protesting greens and the worried heads of perplexed and perspiring greenkeepers. With no relief from heat, blazing sun and high humidity, the care of highly nurtured and temperamental grass becomes a very exacting business. A slight mischance, a small neglect, and the greens may become, in short space of a few hours, a mere memory of their former excellence.

The mid-summer period, especially in those sections of the country where turf suffers from fungus disease and where the heat is intense, is very strenuous on our northern grasses. The indigenous species of this continent and those imported from other temperate countries, have the habit, when weather conditions are not conducive to growth and development, of going into a dormant or semi-dormant state and resting until suitable temperature and moisture returns, when they will again take up their activity. In this way they can withstand the extremes of climate and survive our cold winters and burning summers. This fact should be fully appreciated by greenkeepers and course managers, since, in earnest endeavor to keep the grass growing at top notch at all times, it is so easy, by a misstep—too much fertilizer at the wrong time, too little water at the right time—to throw the greens into a relapse from which there is slow recovery. The skilled greensman can do remarkable things with grass but there are limits it is well to keep within.

Grooming for Heat

For some years courses have suffered from poverty of soil underlying the greens with starvation of the greens thereon, and much preaching has been done to correct this glaring evil. The excuse has been, largely, that golf course fertilizers are expensive, and a mistaken idea that grass, nature's most generous provision for covering the earth, should not need much in the way of sustenance. However, to allay in part the cost of manures and to impress upon the green committees the importance of feeding the greens, clubs have been urged to experiment with ammonium sulphate and other chemicals carrying a large percentage of plant food elements. The results were so startling that, on the theory of a little being good, more must be better, the inclination of late has been to debauch the greens with high-powered nitrogenous compounds. Now, ammonium sulphate, one of the most excellent manures we can use, is, if one may be pardoned the expression, a 'lopsided' fertilizer, and must be handled with extreme care. A 'complete fertilizer' has in it some quantity of each of the three elements necessary to plant growth that ordinary soil may lack, namely: nitrogen, phosphorus (phosphoric acid) and potash. When supplying all three in logical proportion, we feed the plant a 'balanced ration'; by the inordinate use of one of these and neglecting the others, we have unbalanced the ration and, by forcing certain organs of plant structure beyond their powers of endurance, may reduce the whole plant to a low state of vitality even though it may appear large and flourishing. The test of constitutional vigor in turf is its ability to withstand abnormal weather, harsh treatment and disease, and this fact may be brought home forcibly when a fine appearing green suddenly goes sick. The discerning and careful greenkeeper, knowing that the turf will have a hard struggle over July and August, builds it up during the cooler months of spring and early summer and keeps it well in hand during the critical time, while the thoughtless one, seeing the grass decline when the hot weather approaches, may rush out with stimulating fertilizers in an effort to get his color back, and do far more harm than good.

Another factor of vital importance to the health of the greens during this trying time, is water, without which, in plentiful supply, the greenkeeper might just as well throw up his hands. Water and more water—though not in excess—is the only hope of keeping the grass green and growing. It is necessary in two ways, sup-

plies the plants with much needed drink and, through evaporation from the soil, moderates the temperature of the ground around the roots and so affords some protection from the heat. This is a point to be watched most carefully as a day's neglect may result in severe scorching of these roots which are soft and succulent, particularly so if they are used to liberal sprinkling. The quantity of water that is required is a matter of individuality of the green and also the habit formed from the quantity it expects daily. Thus a green heavily watered is more quickly affected when water is withheld than one that has to get along on a meager supply. Water must be used discriminately, with due regard to the soil underlying the turf, location exposure, weather, atmospheric humidity and so on. Over saturation of the ground will suffocate the roots; too much surface moisture over too long a period will promote algae, slime and fungus growth that will throttle or penetrate the living grass.

Mid-Summer Mowing

Further protection of the roots should be afforded by setting up the mowers. Scalping the greens at this time is courting trouble. Observing nature's scheme we find that at this time of year the grass roots are well safe-guarded from the sun and heat, by the stems and foliage. While not able to shade it as generously, still, the extra length that we can allow will be beneficial and will help in preserving the color of the green. The scantier the turf, the greater the danger from root exposure. This precaution does not apply only to the greens but all mowers may be set up a trifle. The grass on the fairways is not growing quickly at this time and the balls get tremendous runs because the ground is dry and hard; this may be checked a mite by the extra length allowed the turf.

All in all, the troubles that beset the greenkeeper during the mid season, come largely, as a logical sequence following the system of management prior and approaching this critical period. The hot weather will come just as certainly as the seed time and harvest and the right time to prepare for it commences at the opening of the season. In the spring we have favorable weeks in which to fatten up the greens and make them strong, vigorous and hardy. Then by using all reasonable methods of precaution, we may feel fairly sure that they will ride the crises easily. In the regions where fungus disease is rampant we will always have that demon lurking near at hand and can do no more than use whatever preventive measures we can afford and prepare to attack boldly whenever the spectre lifts its head, remembering that one ounce of prevention is worth a pound of cure.

Then, with the mind as much at ease as the cares of the greenkeepers position will allow, what better time is there than during dry, sunny days, to set about preparing the autumn supply of compost.

Mid-Summer Methods in Nebraska

By J. O. Campbell

Greenkeeper, Eastridge Country Club, Lincoln, Nebr.

KEEPING plenty of moisture in the ground is the first essential in correct mid-summer care of a golf course. Water well the aprons and approaches to protect your putting surfaces from drying in from the outside.

Compost every 24 to 28 days, with good rich compost mixture of 50 per cent sand, 35 per cent animal fertilizer (preferably horse manure) and 15 per cent of good top soil. Use treatment for brown patch as occasion requires. I have had good results with pure calomel. Apply sulphate of ammonium at the rate of 1½ pounds per 1,000 square feet of putting surface, once every 10 days. This should be applied late in the afternoon. Use plenty of water after each application.

Use ammonium phosphate every 30 days at the rate of 1¼ pounds per 1,000 square feet putting surface. Follow this application with plenty of water also.

Mow greens every day. Adjust the mower to the proper height and never change it during the mid-summer season. To change it will cause your turf to become very fluffy, making a bad putting surface. Greens should be watered at night during this season, using water from 7 p. m. to 6 a. m. Blue grass or clover tees may be watered any time, day or night, just so they are kept moist and in good growing condition. It is a good idea to give tees an application of ammonium phosphate every 30 days. We follow this plan and have no trouble with our tees.

Fairways should not be mowed too often