Fall Is Year's Best Time to Fertilize Fairways

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TOTAL COST OF seed, fertilizer or other purchased material is not a matter of great moment on greens, for their entire area seldom exceeds 2½ to 3½ acres. But on fairways these items involve considerable expenditures, for an average 18-hole course contains from 45 to 60 acres of fairway turf. Hence it behooves those charged with the responsibility of fairway improvement and maintenance to weight every possibility before embarking upon a definite treatment program.

In recent years it has been customary to depend upon lead arsenate for the control of earthworms. On greens, at five pounds per 1,000 square feet, the entire cost for this chemical ranges from $75 to $150 per application, but to arsenate all fairways at the same rate necessitates the expenditure of $1,500, or more, for the chemical alone.

Several years ago fairways at an eastern club were sufficiently infested with worm casts to arouse officials. The orthodox lead arsenate treatment was prescribed, and no other procedure questioned until a controversy arose as to the most suitable carrier for its application. Careful inspection of the fairways disclosed these interesting facts, which completely changed the treatment program. Soil moisture condition and reasonably low organic matter content indicated a normal earthworm population, so the necessity of expending $30 to $40 per acre for arsenate was questioned. The suspicion became conviction when close inspection of the fairways disclosed limited areas of dense turf completely devoid of worm casts. For some years fairways had received no fertilizer. Attempts at turf improvement were confined to annual reseeding, with Kentucky bluegrass the principal component of the seed mixture. In spite of regular reseeding, Kentucky bluegrass was practically non-existent, for the turf consisted of a thin open stand of fescue, interspersed with numerous patches of bent. Obviously the soil was too acid, and possibly too low in available phosphorus, to permit successful growth of bluegrass.

Fairway Feeding Licks Worms

These facts were confirmed by chemical tests. Officials realized lead arsenate would control the earthworms, but they also recognized the need for a program of turf improvement. After considering all factors, it was decided to defer arsenate treatment in favor of a fertilizer program. It seemed logical to expect this procedure to remove player objection to worm casts, for fertilization alone should produce uniformly dense turf, the equal of the existing dense patches found in favored locations. Consequently, all fairways were tested for acidity and available phosphorus. Lime was applied to the strongly acid fairways at one ton per acre. This was followed by the moderate use of phosphate. Nitrogen was also applied at fairly heavy initial rates, and during the succeeding several years fertilization was confined to the use of nitrogenous fertilizers. This program produced turf of sufficient density to subjugate earthworms so casts ceased to become troublesome, and the club was saved the huge expense of arsenate treatment.

This example is not cited as a wholesale condemnation of lead arsenate treatment. Fertilization alone is usually effective on soils of normal moisture and organic matter content, but on dark-colored organic soils excessive earthworm population may necessitate their control with arsenate before proceeding with any attempts at turf improvement by fertilization.

In another instance a mid-western club suffered severe fairway turf injury following several successive years of unprecedented drought. The original course included only nine holes, but an additional nine was added during the affluent days of the boom. Curiously enough, injury was confined to the new nine. Officials were correct in their decision to re-seed the affected fairways. The seedsman consulted recommended the conventional Kentucky

bluegrass, red-top mixture without attempting to determine why turf loss was confined to the newer fairways. Investigation disclosed these facts. No essential major soil difference existed on the course, but turf on the old fairways was almost wholly fescue, whereas bluegrass was the only species on fairways of the new nine. These differences must have been due to differences in the original seed mixtures used. Phosphoric acid and nitrogen were applied before seeding, and the reseeding mixture was modified to include fescue. As a result, turf on the new nine is now the equal of that on the original fairways.

Fertilize if You Water

Deficiencies in rainfall during recent seasons is responsible for widespread interest in fairway irrigation. This is most noticeable in Metropolitan districts, and as a result, the use of water has increased enormously in these districts during the past three years. Most playing members, and many club officials, express the conviction that an adequate water system is the sole solution of the vexing fairway problem. They see the turf turn brown and wither for want of moisture, and to prove their contention cite the immediate startling response obtained from the use of water on limited trial areas. To maintain green fairway turf throughout the entire playing season, irrigation must supplement even normal rainfall, but to avoid objectionable clover and troublesome weeds, fertilization must supplement irrigation. This truth has been amply demonstrated to the sorrow of many clubs, and is one reason underlying prejudice against fairway irrigation on the part of some. Unless a club is prepared to inaugurate a regular fertilization program, it is folly to install costly and elaborate irrigation systems.

Selection of a suitable source of nitrogen narrows down to a choice between the water soluble inorganic materials and the true organics. Among the organics there are a number of materials from which to choose, but cottonseed meal, activated sludge, dried poultry manure and castor pomace are the principal organics used. In the North, cottonseed meal is usually too high priced, and castor pomace, unless properly refined, may contain an irritating poison which is annoying to the workmen. In one instance workmen were incapacitated for several weeks due to the ill-effects produced by this irritant. At one time bone meal was the favored fairway fertilizer. It is high in phosphoric acid, but low in nitrogen, and too expensive to deserve serious consideration as a source of nitrogen. In other words, it is primarily a source of phosphoric acid.

Where inorganic fertilizers are preferred, choice simmers down to sulphate of ammonia and one of the ammonium phosphates. On soils needing nitrogen only, sulphate of ammonia is the logical choice, but where phosphoric acid is needed in addition to soluble nitrogen, both can be supplied in a single material by selecting one of the ammonium phosphates.

Organic and inorganic sources of nitrogen both have their staunch advocates. The chief advantages claimed for organics are their tendency to release available nitrogen gradually over longer periods, and thus provide a more uniform and continuous rate of growth, together with the added fact that burning injury is less likely when heavy rates are applied. The champions of inorganics, such as sulphate of ammonia and ammonium phosphate, cite the startling immediate improvement in color and rapid rate of growth. They stress the marked decrease in clover and weeds effected by their continued use. But during dry seasons it has been observed that the turf fertilized continuously with sulphate usually suffers severest injury from drought. This observation has been confirmed by English investigators also. It is likely that the ill effects produced by sulphate can be overcome by the moderate use of lime. Rather than accept either extreme viewpoint, it would seem more sensible to recognize and take advantage of the virtues of both classes of nitrogen materials.

For fall use organics are increasing in favor, for loss of nitrogen during the winter is less likely. Then, too, generous rates can be applied in September with less danger of burning grass. The use of some sulphate of ammonia or ammonium phosphate with the organic is often advantageous, to stimulate quicker initial growth.

Nitrogen Controls Clover

The consistent use of nitrogen underlies clover control on fairways, but success depends upon rates which are sufficient to check its spread, and promote growth of the desired grass. Suppression of many weeds likewise depends primarily upon nitrogen feeding. This is especially true of dandelion, provided the infestation is not excessive, for they can be largely eliminated by a proper feeding program. Nitrogen feeding is ineffective on heavily

infested areas, because grasses have been crowded out by the broadleaved dandelions. In such cases, iron sulphate treatment to eradicate the offensive dandelion, followed by reseeding is the proper procedure.

In those districts where crab grass is a dangerous fairway pest the safe and wise procedure may be to apply most of the needed nitrogen in the fall, so major effects will disappear before crab grass starts growth during the following midsummer.

In the feeding program on established fairways, phosphoric acid is secondary to nitrogen in importance. There are soils in need of this element, and when benefits are obtained they usually show in the greater ability of the turf to withstand midsummer heat. Since phosphates tend to encourage clover, it would seem best to select rates which barely satisfy the turf's need for phosphoric acid. A determination of the soil supply of available phosphorus serves as an excellent guide in judging need for this element. Rate of application depends upon amount of available soil phosphorus, kind of grass, and type of soil. Obviously need for phosphate is greatest on soils containing only small amounts of available phosphorus, Kentucky bluegrass needs more phosphorus than fescue or bent, and heavier rates are warranted on silt and clay soils than on sands and sandy loams containing the same quantity of available phosphorus.

In order to obtain deeper penetration of soluble phosphates before fixation occurs, reasonably generous initial applications seem best, and since there is no danger of serious loss from leaching, two to four years can intervene between succeeding applications. During this period fairway fertilization becomes a simple matter of nitrogen feeding.

With the possible exception of sands, mucks and peats, potash is almost never a limiting factor on fairways. Where needed, it is probably best to follow the procedure recommended for phosphate, namely make applications every two to four years.

Many soils are too acid to permit successful development of bluegrass, and some may be too acid for best growth of fescue and bent. The safest procedure is to test the effect of lime by trial applications, but if time does not permit, need for lime can be judged by testing the soil for acidity. In order not to unduly encourage clover, minimum amounts of lime should be used. The basis for establishing rate of application should be degree of soil acidity, kind of grass, and type of soil. For fescue and bent, liming should be confined to soils of marked acidity, but with bluegrass the use of lime is warranted even on moderately acid soils. Less lime is needed on sandy soils than on heavy soils of the same degree of acidity. It should not be necessary to repeat applications oftener than every two to four years.

Outline of Fairway Program

Briefly, a fairway fertilizer program should be built around the following major factors:

To judge need for lime and phosphate, samples of the representative soil types should be collected for determination of acidity, and available phosphorus.

Where tests indicate need for either of these materials, excesses should be avoided so as not to encourage clover and weeds. Disappointing results are almost sure to follow the continuous use of lime, or fertilizers of high phosphoric acid and low nitrogen content.

On extremely acid soil lime and phosphate are both needed. Apply the lime first and if possible permit several months to elapse before using phosphate. This procedure minimizes the danger of the phosphate being converted into difficultly soluble compounds.

Annual applications of lime and phosphate are seldom needed. Intervals of two to four years can intervene between succeeding applications.

Potash is seldom a critical and limiting plant food element on fairway turf, but its use on sands, peats, and mucks may be necessary.

Nitrogen is the key to successful fairway management. On thin turf generous initial applications are needed to encourage existing turf to spread, and to discourage clover and weeds. Unlike lime, phosphate, and potash, nitrogen fertilizers should be used each year, and once turf of desired density is obtained, rates can be reduced to a minimum which will barely maintain the turf.

Those who prefer to use a complete mixed fertilizer should select one which is high in nitrogen, with moderate phosphoric acid and low potash content. If part of the nitrogen is derived from organic sources, it is obvious that longer lasting results will be obtained.