Fairway Fertilization

By O. J. NOER

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GOLF clubs cannot afford to neglect fairway turf. Players demand good lies and will not support clubs which permit turf deterioration. It is also vastly more expensive to rejuvenate thin, weed infested turf than to maintain good fairways. In the interest of economy feeding should not be abandoned. To meet reduced income, programs should be designed to produce desired results at reasonable cost.

The argument favoring universal use of complete fertilizers is open to grave question. Admittedly this is the easier method, but it is more satisfying and certainly more economical to correct soil deficiencies whatever they may be.

O. J. NOER
who is acknowledged generally as the best informed turf expert in America.

Fairways are never cropped because clippings are constantly returned. In this respect they differ from greens and all farm practices. Upon decay, all the phosphoric acid and potash are released in forms which can be re-utilized by the grass. Furthermore these elements are not subject to loss by leaching. Growth-producing nitrogen is the elusive element. It may be leached away as nitrates in the drainage waters, or escape as elemental gaseous nitrogen resulting from so-called denitrification processes carried on by soil organisms.

NITROGEN IS DOMINANT ELEMENT

NITROGEN is conceded to be the dominant element for turf growth on established fairways. Not only is it responsible for deep green color and active vegetative growth, but it supplies the urge to induce grass to spread laterally; the first essential to production of satisfactory dense sod. Contrary to general belief nitrogen is not the sole cause of shallow root systems. As a matter of fact roots also require nitrogen and only when their requirements are fully satisfied is a dense root system possible. Too close cutting, superficial watering and exceedingly compact soil tend to restrict root systems.

The most effective way to control clover in fairways is to feed nitrogen. Grasses, unlike clover, depend upon the soil for needed nitrogen. If the soil supply is low, clovers flourish at the expense of the turf grasses. Nitrogen feeding encourages the grasses and clover thereby becomes less noticeable. The truth of this statement is demonstrated on many test plots.

Chemical methods fail to throw much light upon need for nitrogen. Yet there are unfailing signs which can be used to determine whether its use is necessary. The soil supply of nitrogen exists in the dark-colored humus and organic matter of the soil. Hence light-colored heavy soils and sands are low in this vital element. Even on dark-colored soils turf may show marked response to additions of nitrogen because the humus materials resist further break down and its nitrogen is not converted into forms which the roots can take up.

The turf itself plainly shows any need for nitrogen. Lack of color, failure to spread and grow vigorously, when moisture is plentiful and air temperatures favorable, are sure signs of nitrogen deficiency. Prevalence of moss and clover are further indications of need for nitrogen.

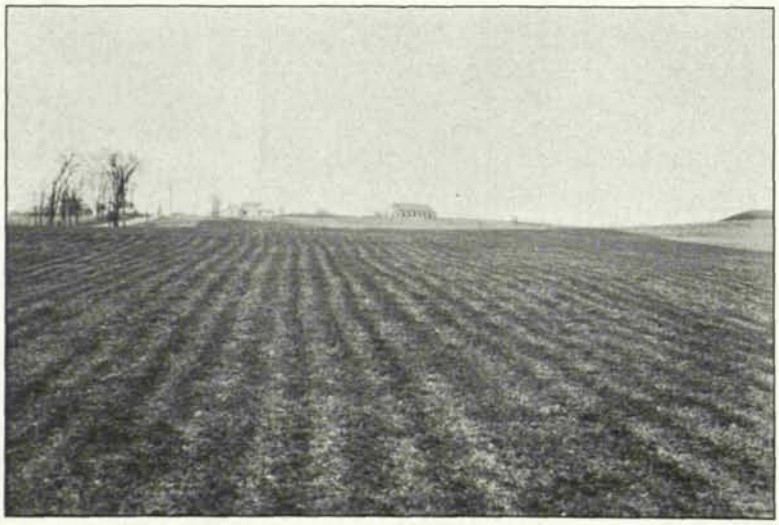
CHOICE OF NITROGEN MATERIAL IS IMPORTANT

THE choice of nitrogen material is important. Broadly, there are two distinct groups of materials depending upon the form in which nitrogen occurs. These are classed as organic or inorganic materials. The true organics are of vegetable or animal origin including such materials as manures, cotton seed

meal, activated sludge, bone meal, etc. Typical examples of inorganic materials are sulphate of ammonia, ammo phos, nitrate of soda, etc.

The inorganic materials are water soluble, consequently apt to burn the turf. They produce rapid growth immediately following their application but effects soon disappear. The more lasting effects of organics is due to the water insoluble nitrogen. This becomes available gradually as a result of the activity of soil organisms. Any water soluble nitrogen in the organics is similar in its action and effects to the soluble inorganic materials.

From the standpoint of fairways a slow but continuously growing turf is the ideal. This necessitates less frequent mowing. Since amount and rapidity of growth are roughly proportional to amount of available nitrogen the ideal condition would be to have a continuous and uniform supply of nitrogen at all times during the growing season. This can be accomplished by periodic applications of soluble nitrogen materials using moderate rates, or by single applications of the proper kind of organic nitrogen. Soil processes gradually liberate the nitrogen thus insuring a continuous supply. In some cases it is best to use both types of materials. This insures immediate effects from the water soluble nitrogen and as these wear off additional nitrogen, becomes available from the organics.



TELLTALE MARKS PRODUCED BY APPLYING FERTILIZER IN ROWS. SPREADER DID NOT HAVE SPREADER BOARD.

If the soil is impoverished and turf thin, more generous nitrogen feeding is necessary to urge dense turf formation than where feeding is simply a matter of maintaining good fairway turf.

PHOSPHORIC ACID AND WHAT IT DOES

Phosphoric acid, although the dominant element on new seedings, plays a less important role on established fairways. During a growing season constantly clipped grass requires only one-fourth to one-third as much phosphoric acid as nitrogen. There is some reason to suspect that fescue, Bermuda and bent either require less phosphoric acid or have a greater feeding power for this element than Kentucky blue grass.

When soluble phosphates are applied any phosphoric acid not taken up immediately by the grass roots is precipitated in the soil and does not leach away. Solution gradually takes place as required by the grass. On most soils requiring phosphate a reasonable application should last for several years. Leaching losses are negligible and the soil supply is constantly augmented by the decay of clippings.

Fortunately fairly simple methods have been devised for rapidly measuring the amount of available phosphoric acid in the soil. They deserve more general use. Heavy soils containing 75 pounds or more, and sandy soils containing 50 pounds or more of available phosphorus per acre as measured by the Truog method almost never respond to additions of phosphate, and only when the amount in the soil falls below these figures it is necessary to apply phosphate fertilizers.

POTASH IS RARELY NEEDED

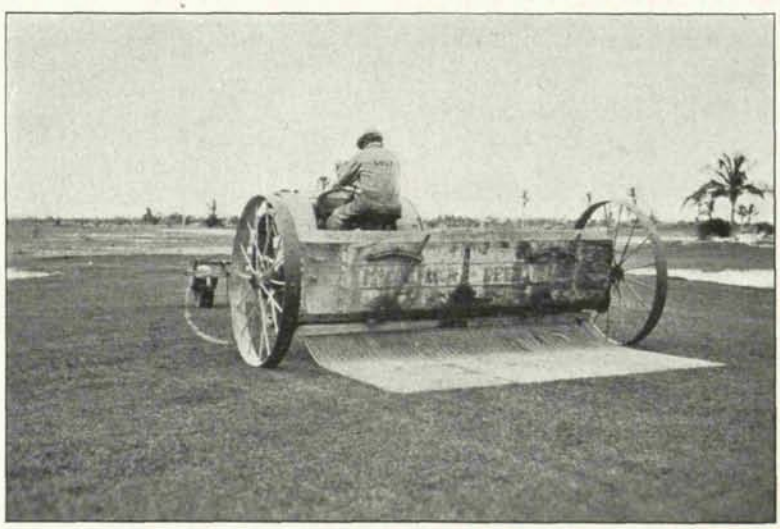
Potash, although almost as plentiful in clippings as nitrogen, is rarely needed on fairways. Excepting sands, peats and mucks, the surface soil contains from 20,000 to 40,000 pounds of potash per acre, or from 10 to 20 times the amount of nitrogen.

Unlike nitrogen, this element does not leach from the soil, so the large initial supply constantly augmented by that released during decay of the clippings satisfies turf requirements. As yet there are no trustworthy chemical methods for determining

need for potash. The only sure method is actual trial on limited areas. Ordinarily this is only worthwhile on sands, peats and mucks. Even some of these soils do not respond to additions of potash.

The first logical step preceding inauguration of a fertilizer program is to determine soil reaction and available phosphorus. Samples for these determinations should be representative of the major types of soil occurring on the grounds.

If the soils are very acid the use of some ground limestone is justified, particularly if Kentucky blue grass is the dominant grass. There is reason to believe that both fescue and bent will thrive and withstand more acidity than blue grass. If soils are very acid, applied phosphates are sometimes precipitated in forms which do not go back into solution with sufficient rapidity to satisfy turf requirements. Consequently applications of lime should precede the use of phosphates to reduce the possibility of its fixation in unavailable forms. Applications of 1 to 2 tons of ground limestone should suffice for several years. Overliming should be avoided because of its tendency to encourage clover.



UNIQUE ARRANGEMENT USED BY O. E. BAKER AT BOCA RATON

The mat insures uniform distribution and prevents burn of soluble fertilizers by knocking particles off blades of grass.

Where the available phosphorus is below the limits mentioned above, an application of phosphate may prove beneficial. From 20 to 500 pounds per acre of high-grade super phosphate will suffice for several years. Use the heavier rate when the available phosphorus is negligible, and the light rate when the soil supply approximates the limits mentioned. Where some immediately available nitrogen is desired one of the ammonium phosphates can be substituted for the super. If bone meal is preferred it may be wise to use 500 pounds or more per acre because of its lower availability.

The phosphate can be applied separately or mixed with the nitrogen fertilizer. If an organic is used, preliminary mixing is not necessary, for they can be mixed right in the hopper of the distributor.

CHOOSING THE SOURCE OF NITROGEN

THE choice of source of nitrogen depends upon several factors. If soil is poor and turf thin, generous use of nitrogen is warranted. It is seldom advisable to apply soluble materials at rates of more than 300 pounds per acre due to the danger of scorching the grass. When larger quantities are needed it is safer to divide the applications and apply at intervals of 4 to 6 weeks. Such materials should not be applied while there is dew on the grass, or during hot weather, because of the danger of burning.

Organics can be used more liberally without danger. Rates of 1000 to 1500 pounds per acre are justified where turf is poor. Some prefer to use a combination consisting of 700 to 1000 pounds organic and 100 to 200 pounds per acre of sulphate of ammonia or ammo phos. They can be mixed right in the hopper. Such combinations are ideal, for immediate results are obtained from the water soluble nitrogen, and growth is continued by the organic nitrogen as it gradually becomes available.

Opinions differ somewhat as to when fairways should be fertilized, but there is general agreement that spring and fall are the logical seasons. It is during these periods that turf makes its most active growth. When turf is poor more rapid improvement results from feeding in spring and again in the fall. This is also good practice on sandy soils to reduce leaching losses.

Organics are certainly the ideal materials to use for fall feeding. They will not burn the turf, and temperatures are such that nitrogen is released in

amounts sufficient to promote fall growth. The remaining nitrogen does not leach away during the winter because soil organisms are not active due to low temperatures. Beneficial effects extend into the following season.

UNIFORM DISTRIBUTION IS IMPORTANT

Fertilizers do not move laterally in the soil, so uniform distribution is exceedingly important. Best results are obtained by using the two-wheel hopper type lime and fertilizer spreader. The better machines cover a strip 8 to 10 feet wide, and have a hopper capacity of at least 500 pounds. On most machines a slanting spreader board is attached directly below the outlet spouts to facilitate uniform distribution.

If the outlet spouts are spaced four inches or more apart even with the spreader board, the fertilizer is apt to be applied in rows. This can be overcome by attaching grain seeder chains to the outside top edge of the spreader board and directly under each outlet spout. These chains can be obtained from any implement dealer.

Another effective method is to remove the spreader board, and replace it with a steel mat which is the exact width of the hopper and 5 or 6 feet long so it drags along the ground behind the spreader. Besides insuring uniform distribution, the chains, or mat, reduce the danger of turf scorching by preventing soluble material from adhering to the grass blades.

The factory calibration of fertilizer distributors is only approximately correct. Further, there is a wide difference in the flowing qualities of different fertilizers. Hence rates of application should be carefully checked.

CAREFUL APPLICATION OF FERTILIZER IS NECESSARY

Carelessness leaves telltale marks. Failure to overlap leaves disappointing turf in the unfertilized strips or skipped areas. It is best to fill the hopper in the rough to avoid burns resulting from spilled fertilizer.

Whenever it becomes necessary to stop the machine on fairways the outlet spouts should be closed, for unless the flow of fertilizer is stopped burned strips may result. This usually necessitates placing a man on the spreader to perform this operation. These details may seem trivial yet it is folly to invest funds in fertilizer only to obtain disappointing results because of carelessness in its application.

On hillsides where turf is thin, it is often well to spike or disc fairways before fertilizers are applied. This reduces the danger of mechanical loss during heavy rains. Following prolonged summer drought it is unwise to fertilize until after the first good rain. Dry soil sheds water and surface runoff is usually greatest with the first rain. After the soil becomes moist, water is more effectively absorbed.