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Fertilizer Facts for Fairway Improvement

By O. J. NOER

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

During the past few years advances in fairway management have resulted in greatly improved turf. More general fertilization, sometimes supplemented with irrigation, have displaced the older, less certain methods of re-seeding alone, top-dressing with soil, and the use of bulky, weed-infested animal manures.

Re-seeding alone is an expensive procedure, and securing a satisfactory stand of grass is often a gamble, especially upon the heavier compact soils. Besides the actual seed cost, there is the expense of preparing a suitable seed bed. This necessitates thorough spiking or discing, an operation which can be performed on heavy soils only when soil moisture conditions are favorable. Occasionally seeding is followed by a light top-dressing to effectively cover the seed. When disc seeders are used, the seed is drilled in rows several inches apart. This necessitates cross seeding several times to obtain even reasonable coverage. Unless moisture conditions are favorable, the discs fail to



O. J. NOER

Whose nation-wide experience on turf maintenance has been keenly observant and whose advice is considered as final by those who know.

penetrate the compact soil, and if cuppy depressions in the turf are numerous, the discs often ride over the soil areas devoid of grass.

Failure to obtain a desired stand of grass may result from any one of several causes. On loam and heavier soils the small, light seed is often washed from the bare areas into adjacent tufts of heavy grass by downpouring rain. This is likely to occur when soil moisture is low, because dry soils do not absorb water readily and consequently surface run-off is greater.

Poor stands of turf are often the result of soil deficiencies in plant food. Under such conditions it is hardly reasonable to expect the struggling young seedling to compete with the existing grass on account of the limited supply of plant food. When seeding is necessary, adequate fertilization should obviously precede seeding. Where the grass is uniform but thin, feeding alone will produce desired turf. Only where the grass is unusually thin, and large bare spots are numerous should re-seeding accompany fertilization.

COMMON PRACTICE TO TOP-DRESS FAIRWAYS

AT ONE time it was common practice to top-dress fairways with soil. The limited benefits make it altogether too expensive practice. Top-dressing must be dismissed as a practical means of appreci-

ably increasing the soil supply of plant food. For this purpose fertilization is more effective and far less expensive. Essentially top-dressing can be justified only to level uneven surfaces or improve the water-holding capacity of sand soils. If uneven surfaces are due to tufted turf growth, topdressing is not the proper corrective treatment.

Systematic feeding will quickly encourage the existing grass to spread and thus obliterate the objectionable cuppy lies. On sand soils, an irrigation system may prove more effective and satisfactory than extensive topdressing. Their low waterholding capacity is not sufficiently increased to enable the grass to withstand even moderate mid-summer drought.

Confronted with the increased difficulty in obtaining adequate supplies of high quality manure, clubs reluctantly turned to supposedly more costly and less effective concentrated materials. The latter rapidly supplanted manure because of the startling results produced. Now they are preferred because of more rapid improvement in turf; they do not introduce objectionable weed and clover seed, nor do they leave any bulky debris following application to interfere with play. It is actually less expensive to use these superior manure substitutes because of the lower cost of applying the smaller quantities required.

ABOUT IRRIGATION SYSTEMS

SOME enthusiasts attempt turf improvement by installing elaborate irrigation systems. An adequate supply of water is advantageous because it eliminates moisture as a growth-retarding factor, but grasses also require essential plant food elements, and unless fertilization accompanies irrigation, disappointing results are inevitable.

In most cases water alone results in material increase in objectionable clover. This can be controlled by proper nitrogen feeding. Where the underlying soil is moderately fertile, clover infestation may not be immediately apparent, but will eventually result from the sole use of water.

The same nutrient requirements for essential plant food elements govern improvement of thin turf as are needed to maintain good fairways. The only difference is in the amount of fertilizer required and frequency of application. More general feeding at more frequent intervals is impor-

tant when the grass is thin. This encourages it to spread and form desired coverage.

While yearly applications often suffice on dense sod, spring and fall fertilization is advised on poor turf and, where the grass is unusually poor, quicker improvement will result from an early spring application, a lighter application in May, followed by a fall application. The principles underlying fertilizer usage are comparatively simple. The program must be built around nitrogen feeding, for this is the growth-producing element, with phosphoric acid and potash playing minor roles.

NITROGEN IS THE DOMINANT NEED

NITROGEN is the dominant need on established turf to produce green color, encourage existing grass to spread and thus form dense turf. Furthermore, it is the element responsible for clover and weed control.

The generous use of nitrogen is warranted until turf of desired texture is produced, provided *Poa annua* is not too prevalent in the fairways. Excessive use of water-soluble nitrogen fertilizers produces rapid lush growth following their application, but effects soon disappear because the immediately available nitrogen is either taken up and utilized to promote excessive leaf growth, or is leached from the soil. Organics tend to promote a more uniform and continuous growth, because the nitrogen is gradually converted into available forms by soil organisms.

The safest criteria for determining quantity of nitrogen needed are general turf vigor and kind of soil. Heavier rates are justified where turf is sparse with moss, clover, and weeds prevalent. Larger amounts are also needed on light-colored heavy soils and on sands.

DANGER OF BURNING IS ALWAYS PRESENT

THERE is always the danger of burning or injuring turf when soluble fertilizers are used. Heavy rates should be avoided and applications should not be made when the grass is wet or heavily laden with dew. During hot weather burning may occur even though the grass is dry; so if the weather suddenly turns hot, operations should be suspended until temperatures moderate. It is also well to attach a chain or mat device to the spreader so as to brush adhering fertilizer off the grass blades.

If organics are used as the sole source of nitrogen,

initial applications of 1000 to 2000 pounds per acre of a material containing six to eight per cent nitrogen are warranted. Succeeding spring and fall applications can be reduced to 800 to 1000 pounds per acre, and if May fertilization is included, 500 to 700 pounds is ample at that time.

When some water-soluble nitrogen is also desired to promote immediate growth, or as an additional aid in weed suppression, the indicated quantities of organic fertilizer can be reduced several hundred pounds and from 100 to 200 pounds per acre of sulphate of ammonia or ammonium phosphate substituted. Obviously, the ammonium phosphate should be used where tests indicate the need for phosphoric acid in addition to nitrogen.

Spring and fall are the logical seasons for applying nitrogenous fertilizers on established grass, especially if rainfall is the sole source of moisture. These are the seasons of greatest rainfall, and temperatures are more favorable for growth.

FALL FERTILIZING BEST IN SEPTEMBER AND OCTOBER

FALL applications are best made during September and October, and in the spring it is well to apply the fertilizer before active growth begins.

Marked response is rarely obtained on established turf from applications of phosphate fertilizers, probably because the soil supply of available phosphorus is constantly augmented by the decay of clippings. Fixation of added soluble phosphates in the soil very close to the surface may be an added reason.

There is reason to believe that in the north, fescue and bent succeed in soils too low in available phosphorus to support Kentucky blue grass, and in the south Bermuda appears to have a low phosphorus requirement. This means that on soils where phosphoric acid is needed, lower rates suffice for fescue, bent and Bermuda than are required for Kentucky blue grass.

Need for phosphate can be judged by using one of the soil phosphorus test kits now on the market, provided the turf has not been treated with lead arsenate. Samples for these tests are usually taken to a depth of four inches or more, but where phosphates have been used in the past, it is well to make supplementary determinations of surface samples, for applied phosphate is usually fixed in the surface inch of soil.

HOW PHOSPHATES SHOULD BE USED

SOIL texture, kind of grass, and amount of available soil phosphorus should determine rate at which phosphates are used. Less phosphate is needed on sandy soil than on heavy soil, and rates should be somewhat higher for Kentucky blue grass than for fescue and bent. Obviously, higher rates are warranted where the soil supply of available phosphorus is low. Based on these factors the accompanying table can be used as a rough guide for determining the approximate amount of phosphate to apply. The rates are based on 20-per cent grade of superphosphate. If other materials are substituted, they should supply the same amount of phosphoric acid.

Obviously, in each instance the heavier rates should be used where the available soil phosphorus approaches the lower limit, and the lesser rate where the available soil phosphorus approaches the upper limit indicated. Annual applications of phosphate are seldom needed. The rates suggested are sufficient for from two to four years.

Approximate Rates for Applying 20% Super Phosphate, for types of soil and grasses indicated, based on available soil phosphate by the Truog Method

Texture of Soil	Pounds Avail. Phos. per Acre Truog Method	Pounds per Acre 20% Super Phos.	
		Kentucky Blue Grass	Fescue and Bent
Sand and Sandy Loams	0-25	200-300	100-200
	25-50	100-200	0-100
	50-75	0-100	000
	75+	000	000
Loams, Silt Loams, Clay Loams and Clay	0-25	300-400	200-300
	25-50	200-300	100-200
	50-75	100-200	000
	75+	000	000

APPLICATION OF LIME

ON VERY acid soils where applications of lime are needed, the lime should be applied several months in advance of the phosphate, if possible. This tends to increase phosphate efficiency by reducing the possibility of its being converted into inavailable forms by the acid soil.

Potash may be regarded as being unessential where clippings are not removed, with the possible exception of fairways on sands, peats, and mucks. When used on these soils, rates should approximate 100 to 200 pounds of 50 per cent muriate or sulphate of potash.

(Concluded on page 18)

istry, soils, fertilizers, grasses and how to buy the various things for golf courses. Address inquiries to Box 5, The National Greenkeeper and Turf Culture, Caxton Bldg., Cleveland, Ohio.

Fertilizer Facts for Fairway Improvement

(Concluded from Page 7)

Because clover and weeds are more prevalent where turf receives lime regularly, it was said that lime should never be used on established turf. The belief is no longer tenable, and the judicious use of lime in conjunction with feeding is now recommended. The beneficial effects of lime are most noticeable with the approach of dry weather in mid-summer. Besides its direct effect on the well-being of the turf, lime tends to improve soil structure of acid clay soils by promoting granulation.

The following factors are important, and should be considered in deciding upon the amount of lime to apply, namely degree of soil acidity, kind of soil, and variety of grass. With the possible exception of lime-loving Kentucky blue grass, lime is needed on moderate to stronger acid soils. The coarser-textured sands and sandy loams require less lime than finer-textured loams, silt, and clay soils of equal acidity. Fescue and bent seemingly withstand acidity better than Kentucky blue grass, hence less lime is required, and its use should be confined to the more acid soils only.

Ground limestone of reasonable fineness is the safest and best form of lime to use. In some localities the use of a material derived from dolomitic limestone may be advisable to supply magnesium, and thus provide for its possible deficiency. Yearly applications of lime are unnecessary. It is better practice to make applications every two to four years. Effects are satisfactory, and there is less danger of unduly encouraging clover.

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Brown Patch Control

After nearly a year of intensive study, J. R. Ervine, formerly connected with the Davey Tree Institute and well-known student of Botany, has worked out what he believes would be an almost perfect method for the control of brown patch. To quote Mr. Ervine:

"Most authorities agree that brown patch is caused by Saprophyte fungi and to date there has been no fungicide introduced that will kill the adult plant without injuring the plant upon which they attack, but the spore of the fungi, like the germ of bacteria, can be killed during the germination period.

"I would suggest that with the last application of topdressing in the fall use approximately one pound of lime sulphur to 500 square feet of turf and in January repeat the application with a spray and repeat again with the first spring topdressing. In this method I believe it would be possible to catch the spores that germinate in the fall with the first application and those that would lay dormant

until along in February or March would be killed in the final application at the time of topdressing. I sincerely believe that if such a method is carefully applied to greens suffering severely from brown patch that within a period of two years the fungi disease will be completely and permanently destroyed.

"I would advise that a complete soil test of the greens be made late in the fall, one that will give the amount of nitrogen, phosphorus, potassium, calcium, magnesium, and sulphur available in the soil, then use the fertilizers necessary to make up the deficiency.

MERLE ZWEIFEL,
Catoosa, Oklahoma.

Look Out for Sod Webworm

It is said by the McClain Bros. Company, Canton, Ohio, that tests made by the Rhode Island State College rank Fungol as one of the two leading products for the control of sod webworm. The above company says they applied Fungol successfully at the rate of one-third of a pound in 20 gallons of water which was used as a spray.

Fungol controls many soil pests for the greenkeeper in addition to the sod webworm, so the makers claim. Sufficient applications to kill the webworm will also take care of brown patch and other vermin such as grubs, beetles, snails, earthworms, etc.

The Research department of McClain Brothers Company, which has made a complete study of lawn and greens maintenance, recommends most strongly that regular spray applications be made. Looking toward a control of these troubles rather than waiting until trouble develops before taking action, a systematic control chart has been worked out which can be had free by addressing McClain Brothers Company, Canton, Ohio.

Our Error

In the list of manufacturers and dealers published last month in the Buyers' Guide we inadvertently omitted the name of the Toro Mfg. Company, Minneapolis, Minn., and we take this occasion to call attention to this error and to apologize to the Toro Mfg. Company because of this unintentional oversight.



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