Golf Course Construction
from the
Greenkeeper's Standpoint

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CHAPTER VI—*Conditioning the Golf Course*

BEAUTIFUL turf, which is essential to an attractive golf course, is the result of painstaking attention to the details which favor its growth. Few realize the quantity of seed wasted on an improperly prepared seed bed with large unbroken clods that bury the seed and retard its growth.

Proper cultivation of the soil, prior to seeding, assists materially in producing a fine initial growth. Without such cultivation a similar stand of grass might not be obtained in years. With poor preparation of the soil or poor treatment after seeding no rate of seeding however great will make much difference. Proper conditioning of the seed bed is the foundation of successful turf growth.

The secret of a good stand of grass is in preparing the proper home for the seed. That is, work the soil and surface until it is friable, well pulverized and in suitable condition. This is the one chance in the life of the course to make a proper foundation at a minimum of expense.

Too many look upon conditioning the soil as relatively unimportant and believe that grass seed manages to grow in some mysterious, incomprehensible manner. This attitude should be changed. A knowledge of the mechanism of the soil and the biology of germination is very desirable. Long famili-

Photo by F. W. Smith

NUMBER 9 GREEN AT THE NEW COUNTRY CLUB, CLEVELAND
This is a one-shot hole of 148 *yards. The bunkering is typical of the splendid work of the architect. Wm. S. Flynn, of Ardmore, Pa.*

arity in some cases breeds contempt and this knowledge of soil physics is often neglected. The soil and its problems is a most profitable study.

After the preliminary construction work on the new course has been completed, the entire property should be plowed and the top soil turned over thoroughly. Usually a depth of from six to eight inches is sufficient but in some cases it is necessary to plow deeper in order to turn over good top soil. If the ground is very hard and there are many rocks just below the surface, it is wise to use heavy railroad plows which will dig into the hardest ground. Ordinarily No. 12 plows are heavy enough. Naturally, the lighter plows are easier to handle and can cover more ground per day.

Plow Before Weeds go to Seed

THE first plowing has two purposes; both of which are very important; First, it loosens the soil and conditions it; second, it turns under any green crop or weeds on the surface. It is very desirable that this plowing should be done early enough in the season before the weeds go to seed. While green matter is not wanted on the surface, it is very helpful underground for it will decay and build up the humus of the soil, without which plant life is impossible. Sometimes it is possible to plow under a legume crop such as clover, cow peas or vetch.

Grass in its early stages requires more than the usual amount of humus in the soil. The process of the formation of this humus takes some time but may be hastened by the addition of about one ton of lime to the acre. In order to allow as much time for the making of humus as possible it is advisable to complete the first plowing as soon as possible.

Discing and harrowing should follow the plowing. A double disc and a three-section spike harrow will be found most efficient. The discing will break up the plowing furrows and the harrowing will pull up roots and stones and tend to level the surface. The leveling may be completed through the use of a plank-float, made of 2"x12"x12' boards nailed to runners, or a steel rail about 18 feet long dragged by a chain. The weight of the

man who rides upon the plank float ordinarily is sufficient. The dirt is pulled from the high spots into the low places.

The condition of the soil is an important factor affecting the speed with which this work may be accomplished. Tractors will be found very efficient for supplying motive power. The number of them will depend upon the speed with which it is desired to condition the course. A tractor operator can control two ordinary plows and cover about two-thirds of an acre per hour. The discing and harrowing and leveling may be done much faster. With a tractor it is possible to disc about an acre and a half per hour and to harrow almost three acres per hour without difficulty. About two acres per hour may be leveled.

Continuously dry weather is essential during the period just before and just after the work of conditioning the course. If rain has fallen just before the work is commenced, the ground is likely to be muddy and impossible to cultivate; if rain falls right after the plowing, the clods of dirt will cake and make the discing and harrowing doubly difficult. So avoid changeable weather and try to select a season of the year for the conditioning the course when the soil is dry and workable.

Fertilization is Necessary

NEARLY every piece of property being converted into a golf course requires quite a bit of fertilization. In many cases the land has been neglected or uncultivated previously and the organic elements of the soil have become exhausted. The quantity of these chemical elements needed by growing grass, especially in its early stages, is almost beyond belief. Soil, which is deficient in them, cannot be expected to produce satisfactory turf.

The exact condition of the soil can only be determined by study. Samples of all of the various types of soil on the property should be taken and submitted to a soil technologist for analyses. Often this work will be done without cost by the state department of agriculture or the state college of agriculture.

From the information obtained an accurate soil chart should be made of the property

which will not only aid in the conditioning but also in the maintenance of the course. Unfortunately analysis of the soil usually explains only its composition so that greenkeeping experience is necessary to interpret this composition in terms of necessary fertilization.

There is a tendency today toward the more concentrated fertilizers which may be rapidly applied at almost any time without interfering with play. However, it must not be forgotten that there are two entirely different kinds of fertilizers, organic and inorganic, which are different in their actions. The first is used to change the physical structure of the soil and to supply it with additional bacteria and humus for plant growth. This condition cannot be obtained alone by concentrated chemicals. The second type of fertilizer endeavors to stimulate plant growth.

Organic fertilizers are the best for conditioning the course. The kind and quantity to use depends upon price and the requirements of the soil. Manures or legumous crops, well rotted, are very efficient. Usually it is difficult to obtain this material in the proper condition for immediate application. Tankage, guano and similar fertilizers are satisfactory if applied in sufficient quantities. For permanent results cotton seed meal and bone meal are very helpful. This material may be obtained in sacks and is easily applied.

The purchase price of fertilizer should be according to value and not according to bulk. The nitrogen unit for ascertaining value has been standardized. The substance must be rich in nitrogen in an available form. Ammonium-phosphate and sulphate of ammonia are high in nitrogen in such condition and are proven fertilizers. However, it must not be forgotten that desirable fertilizer should contain phosphoric acid and potash, both of which are very necessary for plant growth.

Sometimes a fertilizer may be high in nitrogen and lacking in these other important elements. Unless the soil is peculiar in some respect or deficient in cerain elements usually it is best to apply a well balanced fertilizer, such as one having six units of nitrogen, eight units of phosphoric acid and four units of potash. Before buying fertilizer it is well to insist upon

a chemical analysis and a report as to its exact chemical content. It is foolish to pay for worthless fillers.

There are several efficient methods of applying fertilizer quickly and economically. The apparatus to be used depends to some extent upon the type of fertilizer. Regular fertilizer spreaders and lime sowers are both used for this work. As the equipment will be useful for maintenance it is economical to buy the best. With the proper equipment about four acres per hour may be fertilized As the fairways of the average golf course comprise about 55 acres, the entire fertilizing may be done in much less than a week.

The Cost of Fertilizers

THE cost of the initial fertilization of golf course property varies greatly. If the soil is in the worst possible condition, the expense may be as high as $60 an acre. The average cost is not over $15 an acre. The probable cost of this fertilization should have been considered when purchasing the site. Sometimes "cheap" land is not always so cheap.

Fertilizing should be completed at least a week before planting the grass. The soil should have an opportunity to throw off the immediate caustic effect and the chemical reactions should be well established before the seed is sown.

"Nature's time" is the time for sowing grass seed or planting stolons. This is just before the fall rains so that full advantage may be obtained from them. The days then are getting shorter and the nights longer. Grass grows best in the long, cool nights of autumn. If planted early enough, the grass should be strong enough by the time frost comes to withstand the rigors of winter.

Spring sowing of grass seed is not to be recommended. The days are getting longer then and the nights shorter. Warm weather is coming on which is much harder on young grass than cold weather. Spring sowing usually means wasted seed and labor. Grass planted in the spring is almost never strong enough to be trodden upon that year. If the turf is abused, reseeding generally is necessary.

The latitude of the course determines to a large extent the type of grass to be planted.

Grass is susceptible to both heat and cold and it is foolish to plant a type which cannot survive the climate. Strains of grass are being improved continuously and it is possible to obtain very dependable grass now.

In the southern half of the United States, Bermuda or carpet grass during the summer is supplemented with a crop of blue grass and red top during the winter. While Bermuda grass is somewhat coarse in texture, it has many fine qualities. About three pounds per 1000 square feet are sufficient.

The Type of Grass to Plant

THE type of grass to plant upon the greens in the northern half of United States has been the subject of considerable controversy between greenkeepers as it is essential that these surfaces should be perfect. The conclusion has finally been reached that the best grass for the purpose is creeping bent which is very hardy and very beautiful and uniform in appearance. Until recently there was no satisfactory bent seed on the market as South German bent is composed of a mixture of European strains, some of which are not adapted to the climate of this continent. However, a strain of bent has been developed in the northwest which is proving very satisfactory. This bears the generic name of agrostis stolonifera. It comes up very quickly and has a fine texture. It makes very fine tees and greens in the Middle West and on the Pacific Coast.

Bent stolons have been recommended for greens for several decades. Washington and Metropolitan strains were standard until the development of Velvet bent which is now regarded as the finest. As sod is usually obtained with the stolons, planting is simplified and produces quick growth.

For fairways in the northern half of United States Kentucky blue grass provides the most permanent growth. This should be planted between the middle of August and the middle of September. It matures fully about the third year and will live indefinitely under proper care. Canada blue grass is cheaper but its coarseness makes it suitable only for the rough.

Because blue grass takes so long to mature a nurse crop is usually planted with it. The faster growing grass protects the slower growing grass from the severity of the winter. Rye grass is the cheapest of these nurse crops but its life is somewhat uncertain but red top, which is only fifty per cent more expensive, will live thru two seasons. The best combination is a mixture of 120 pounds of Kentucky blue grass and 30 pounds of red top per acre. If possible, a small amount of bent should be sown in the fairway in the middle western and eastern sections of United States.

For very poor or sandy soil the planting of New Zealand fescue will be found most satisfactory. If sown straight, the quantity needed is about 10 pounds per 1000 square feet. For the bunkers, traps and rough, sheeps' fescue is recommended. This does not grow very fast but it is quite suitable for the purpose.

In purchasing seed attention should be concentrated upon purity rather than price. All grass seed contains some weed seed but it is desirable that this percentage should be as low as possible. Old seed often loses its vitality. Therefore, it is best to obtain fresh seed with as high purity and germination as possible. To ascertain these important facts samples of the seed under consideration should be sent to a competent seed analyst for a report. Often seed houses are not thoroughly familiar with the exact qualities of their seeds. Delivery is made without any warranty, either expressed or implied, and the purchaser of inferior seed has no redress.

Sow Seed by Broadcasting

IN sowing seed best results will be obtained by broadcasting it. Planting it with a seed drill will cause the grass to grow in ridges which is very undesirable. There are several efficient broadcast sowers on the market, especially designed for grass seed and which will scatter it very evenly. However, the sower must be careful in operating them and should not only sow lengthwise of the field but crosswise also. The average green contains from 6,000 to 12,000 square feet and may be sown in about twelve minutes. To plant stolons and to top-dress a green takes a crew of six men about two hours.

A depth of only a quarter of an inch is sufficient for grass seed because, if it is planted deeper, it must fight its way to the surface. At such a shallow depth the seed has no protection from the rain and the sowing should always be done when there is a likelihood of several days of fair weather. Many a club has been obliged to make its initial sowing twice because of contempt for the Weather Man.

After the sowing, the ground should be thoroughly rolled to iron out the surface. Triplex rollers weighing about 500 pounds each may be drawn by a light tractor over a fairway in about an hour. Handpulled water ballast rollers, weighing about 500 pounds, will roll a green satisfactorily in about half an hour.

Nature is now called upon to ripen the seed and to nurse the tiny blades of grass into mature growth. Her work can be assisted by spraying a fine mist over the seed bed of the greens and tees for several days in succession right after the sowing.

Too much stress cannot be placed upon proper conditioning of the course and careful selection of the seed to minimize later reseedings and top dressings, which are both inconvenient and expensive. Upon the condition of the seed bed and the quality of the seed depends the attractive and inviting appearance of the links. Don't forget cheap work and cheap seed is expensive.

NEXT MONTH

Landscaping the Golf Course