

The Care of Golf Course Equipment

Much may be said about the care of tools and machinery in its relation to good greenkeeping. The greenkeeper finds use for all ordinary carpenter's tools as well as other small equipment such as weeders, hoes, spades, rakes, hole cutters, etc.

Dull tools do poor work, and it is a poor workman who will use them. A few minutes spent each day in putting an edge on weeders, spades, hoes, hole cutters and similar equipment having a cutting edge, means time and strength saved in the work of the coming day.

The average eighteen-hole golf course uses sufficient mechanical equipment to keep a good tractor driver and mechanic busy during the playing season and until the fall overhauling of all machinery is completed.

The mowing equipment probably gets the hardest treatment of any on a golf course. This includes lawn and putting green hand mowers, often one or two one-man power cutting units for mowing the approaches, tees and lawns, and gang tractor mowers for the fairways. Sometimes the rough is cut with a side cutter bar directly attached to the tractor, and some courses use gang mowers set high and drawn behind the tractor for this purpose. Occasionally a horse drawn hay mower is seen, but very seldom is a horse now used on an eighteen-hole course. Some nine hole courses that operate on a very narrow margin still use horse drawn equipment, but these are gradually being replaced with some of the tractor outfits.

It is the concensus of opinion among manufacturers as well as greenkeepers that fairway mowing outfits receive the greatest abuse of any equipment on a golf course. This is largely due to the speed at which the tractors are run. Occasionally the greenkeeper finds it necessary to cut his course in a hurry, in preparation for some tournament event, or for some other logical reason. In ordinary daily work on the course, speed above six miles an hour in mowing fairways is not to be desired. Both tractor and cutting units will last longer at a moderate speed. Due care in making turns and in starting and stopping the tractor slowly

should be impressed upon the operator. Fairway turf can easily be seriously damaged by starting and stopping the tractor outfit suddenly, causing wheel slippage. If turns are not carefully and slowly made, the turf may be gouged so severely that the expense of re-turfing becomes necessary.

If the greenkeeper is not himself a good mechanic, one of his first duties is to secure a man of mechanical ability to put in charge of all golf course equipment. It will pay any greenkeeper in the end to secure the services of such a man, as golf course equipment represents a large expenditure of money on the part of the club, and good machinery will not remain good unless it receives good care.

Evenly cut greens, tees and fairways are demanded by all golf club members, and when the rough work due to imperfect mowing equipment shows up, members who are paying for the privilege of playing over a good course have every right to protest such a condition vigorously.

The best advice on the care of equipment which can be given the greenkeeper may be summed up in ten lines:

- (1) If you are not a good mechanic, hire one.
- (2) Keep tools and machinery under cover. Inspect frequently.
- (3) Keep sharp all edged tools.
- (4) Rub and wash top dressing into greens before mowing.
- (5) If your motors knock, find out why.
- (6) Do not allow untrained men to repair and adjust machinery.
- (7) Do not operate your fairway mowing outfit above 6 miles an hour.
- (8) Do not set your cutting reels too close to bed knives.
- (9) Lubricate with only best quality oils and greases.
- (10) Overhaul and oil all equipment in fall and store under cover.

GREENKEEPERS, ATTENTION!

A committee of six has been appointed by Mr. John Morley, President of the National Association, to answer all questions relative to golf course maintenance which are mailed to the offices of THE NATIONAL GREENKEEPER.

This service is offered the greenkeepers of the United States and Canada, through the pages of this magazine, in order that problems of general interest may be printed with their solutions for the benefit of all members of the National Association.

Send in your questions on soil, turf diseases, drainage, care of trees, care of equipment, in fact on anything pertaining to the maintenance of a golf course and surrounding grounds.

Each member of this special committee is expert in his line, and ready and willing to give you the benefit of his knowledge.

No names will be published. All questions will be answered. This is the real "get-together" page of the magazine. Send in your questions for the February issue not later than January 5. Don't be backward!

The ABC of Turf Culture

By O. J. NOER

Fellow, Department of Soils, University of Wisconsin

TURF culture is affected by the same factors that control the growth of all plants. The excellent turf on fairways and greens of certain golf courses is not a matter of chance, but the result of intelligent management on the part of a painstaking greenkeeper, and the club possessing such a greenkeeper is indeed fortunate.

An understanding of the basic principles of plant growth, coupled with ability to apply these principles to local conditions, simplifies the problem of maintaining greens and fairways in good playing condition.

The growth of plants is dependent upon the following factors:

- 1—Suitable air temperatures.
- 2—Ample supply of water.
- 3—Sufficient light.
- 4—A fertile soil.
- 5—Protection of the turf from injury.

It is impossible to alter some of these factors, but others can be so modified as to improve the conditions for plant growth.

Air Temperatures Vary Greatly

The air temperatures at which different plants grow best vary greatly. Most of the best turf grasses prefer a moist cool climate, so it is generally difficult to maintain good turf where high average temperatures are the rule. In some sections the months of July and August are hot and dry, and under such conditions turf suffers badly.

While climate cannot be modified, varieties of grasses suited to local climatic conditions should be selected. Obviously, grasses adapted to cool climates are not generally suitable for use in warm climates, and modifying cultural and fertilizer practices does not adapt them to the new environment.

Water constituting from sixty to ninety per cent of the weight of growing plants, imparts rigidity to the plant structure and plays an important role in plant growth. The plant obtains its water from the soil, through its root system.

How Plants Evaporate Water

Most of the water taken into the plant is evaporated from the leaf surfaces, and as a result a stream of

water passes through the plant. The evaporation helps control the temperature of the plant, just as the evaporation of perspiration aids in controlling our body temperature. Naturally greatest evaporation occurs during hot weather, but even so the temperature of plant surfaces is often ten degrees higher than that of the surrounding atmosphere.

Plants often wilt during hot, dry weather, because water is evaporated from the leaf surfaces more rapidly than it can be taken up by the root system. The plants' demand for water is considerable, some varieties evaporating as much as five thousand barrels of water per acre during a single growing season.

Turf grasses are among the first plants to suffer during periods of scant rainfall. The root systems of plants are proportional to the amount of top growth, and since the turf is kept short by constant cutting the root system is confined to a relatively thin layer of surface soil. During periods of drought the water of this thin soil layer is quickly exhausted and the turf soon suffers. It is folly to expect good turf, particularly on soils of low water holding capacity, without providing the turf with water during periods of low rainfall.

Leaf Becomes Manufacturing Plant

In the presence of sufficient light, the leaf of a grass plant becomes a manufacturing establishment, and builds a class of substances called carbohydrates (starch, sugars, etc.) from the simple raw materials, water and carbon dioxide gas. Light makes this synthesis possible by supplying the needed energy, just as steam furnishes the energy that propels the locomotive.

Carbohydrates are required by all living parts of the plant, and since they are only manufactured in the green portion of the plant, it is essential that sufficient quantities are produced to supply other parts of the plant, notably the root system. When manufacture exceeds the demand, the excess of carbohydrate is stored to supply the plant in time of need. Since manufacture is largely confined to the leaf the importance of maintaining an adequate leaf surface is evident.



Author's Note: It has been my privilege to learn the theoretical side of turf culture, and after that to test that knowledge in practical field work on the farms and golf courses of the Middle West. The publishers of THE NATIONAL GREENKEEPER tell me that I can help the greenkeepers to a better understanding of their problems. I am willing to try, and if my readers are interested and want to ask questions about turf culture I shall be glad to answer them through the columns of the GREENKEEPER.

Close clipping of fairways and greens late in the fall seriously restricts the leaf surface, and may result in depleting the carbohydrate reserves. This leaves the turf in such a weakened condition that severe winter-killing on greens, and a slow initial growth of the turf in the spring often results. If turf is permitted to make a longer growth in the late fall, possibly carbohydrate reserves can be built up sufficiently to insure an adequate supply for use in the early spring. A more extensive root system also accompanies longer top growth, and this increases the storage capacity of the roots for carbohydrates.

In the case of new fairway seedings probably a more vigorous turf will be obtained by encouraging a good leaf growth to promote rapid carbohydrate production, thus supplying the young expanding roots with sufficient carbohydrate to establish an extensive root system. This does not mean that young turf should be allowed to grow too long before initial cutting, for long delayed cutting results in a coarse tufted turf. Frequent clipping is essential to the development of side shoots, a prerequisite to the formation of dense uniform turf.

Fertile vs. Infertile Soil

That soils differ in their capacity to produce plant growth is generally recognized, but some of the factors which distinguish a fertile from an infertile soil are often over-looked. The soil acts as a support to which the plant anchors itself by means of the root system. It contains sufficient air to satisfy the root system's demand for oxygen, and furnishes the plant with moisture and the mineral plant food elements.

A fertile soil contains about fifty per cent solid material, twenty-five per cent moisture, and twenty-five per cent air (pore space). The solid portion consists mainly of small particles of minerals derived from the disintegration of rocks, and some organic matter derived from the decay of plant and animal residues.

Of the ten chemical elements required by plants to make normal growth, seven are obtained from the soil. These plant food elements enter the plant through the roots, and are available only when present in the soil water in the form of soluble compounds. Practically all soils contain sufficient supplies of four of these elements, but are often deficient in one or more of the elements, nitrogen, phosphorus and potassium, sometimes referred to as ammonia, phosphoric acid and potash.

While the soil water does not, at any one time, contain sufficient plant food to satisfy the entire demand of the

plant, a fertile soil is one which contains these materials in a condition which enables rapid solution when the plant makes heavy demands.

Bacteria in the Soil

Fertile soils contain vast numbers of micro-organisms called bacteria. The numbers are so great that a thimbleful of soil contains millions of them. These micro-organisms are the scavengers of the soil, for they are responsible for the decay of plant and animal residues applied to the soil. During decay plant food materials are released in available form, and normal plant growth does not occur unless these organisms are present in the soil. When conditions are favorable they are tireless workers. These conditions are, an abundance of organic matter, proper temperatures for growth, and a sufficient supply of moisture and air in the soil, for the most beneficial bacteria require oxygen.

The soil is a manufacturing plant where the plant food elements it contains are converted into forms which the plant can utilize, and it is the business of the plant grower to make conditions favorable so the factory can produce sufficient food to satisfy the growing plant.

While the most important factors affecting plant growth have been discussed there are several others which deserve mention, although they are negative factors. Plants require protection from injury and on established turf this resolves itself into protection from mechanical injury and the ravages of insect pests and plant diseases such as brown patch, etc. The presence of toxic substance in the soil occasionally prevents plant growth.

It is evident that normal plant growth depends upon a variety of factors. This may be illustrated by the use of a barrel whose staves are of unequal length. Just as the capacity of the barrel to hold water is limited by the length of the shortest stave, so plant production may be limited or prevented by one deficient plant food element, or a single unfavorable condition. If the shortest stave of the barrel is lengthened, then the next shortest stave determines the capacity of the barrel to hold water. So with plant production, the elimination of one unfavorable factor increases plant production up to the point where another unfavorable factor may limit growth. It is only when all limiting factors are eliminated that maximum and normal plant growth results.

Since soil conditions and plant feeding are the factors most easily modified these will engage our attention in future articles.

My Experience With Bent Greens

By C. G. BARTON
Greenkeeper, Sylvania Golf Club, Toledo, Ohio

FOUR years ago my knowledge of bent greens should have had to be treated somewhat as the baby in the story was—they gave it garlic to find it in the dark! I had heard about them but hadn't seen any stolons except in Washington on one of my trips there.

But we decided to try one green. So in March or April of 1922 we sent down in Jersey for a few bags of the stolons. When they came through they seemed to me to be mostly mud, and we planted them in the green, only to be disappointed for the green was a rank failure. We didn't give up, though, and that spring we obtained some more stolons, known then as the Washington bent.

Running through the Sylvania course is quite a creek and in my wanderings along its banks I saw some grass that looked like bent, so sent some samples to Washington. The authorities there pronounced it good bent; then we proceeded to make a nursery bed, taking only the finest of specimens from the creek, and from this nursery we made our *first real bent green*.

Now in preparing for a bent green I simply make a good deep garden soil, but not too rich as I find this strain of bent does not require that. In fact my experience has taught me that too rich soil makes the bent grow coarse. You see this strain we use, now known as Sylvania Bent, is acclimated and grows just as well on poor blowy sand as it does on the heavier clay.

Two Kinds of Soil

The Sylvania course has two kinds of soil, the creek being the dividing line. On the one side is blowy sand that is here today and in the next township tomorrow if the wind is strong enough. It is 40 feet deep with no sub soil at all. While on the other side it is clay and the bent seems to do as well on the one side as the other; it shows no preference.

One of the factors in my experience, that enters into the making of a bent green good or good bent green, is the top dressing. In the spring of the year the first dressing they get is a rich one, two loads of good manure to one of sand, is about the proportion. And after that every four weeks as regular as clock work they get a top dressing of sand.

I have about six acres that I sow to rye to keep the sand from blowing away. And while this rye is plowed under, yet the soil won't raise a crop, but it

does make ideal dressing for greens after it has been properly worked.

Caring for a New Green

When the stolons begin to grow in a newly planted bent green, I let them go till there are about three joints above the ground, then roll them with a heavy roller after which the green is given a top dressing of fairly good sand. When the bent is high enough, the mowing machine is started and every four weeks it gets a top dressing the same as the older greens.

That leads up to still another factor in bent greens, and that is to keep the runners covered and keep the bent growing up straight. I believe that will prevent any nap.

The Sylvania bent greens have always been free from that defect and I think it is this method which has prevented it.

One point I'd like to emphasize is, that to be successful with bent greens it is necessary to be regular with your top dressing. By insisting that a certain day is for top dressing the Club members expect it and there will be no objections. Sylvania members are pretty well trained, now, thank you. *And use sand and then more sand.*

And another thing, while bent grows splendidly, it bears watching. I judge the condition of mine largely by the amount of clippings the grass catchers turn out. A day or two sometimes makes a great change. If the amount grows less and less, I know there is something wrong and get busy with the top dressing, giving them a good dose of Sulphate of Ammonia, followed by plenty of water, keeping the greens wet down to the depth of the cup. They respond quickly to this treatment.

While bent likes water, yet in a drouth it stands a lot of punishment. Owing to trouble with our water system and a signing off of showers from above, we were without water for thirteen days and at the end of that time the bent greens were still in good condition while the old grass greens looked pretty sick.

Bent Greens Free from Weeds

One feature in favor of bent greens that cheers the heart of the greenkeeper, is their freedom from weeds. I have two-year old bent greens which have not cost the club five dollars for weeding. And the seeded grass



C. G. Barton



Cutting 'em Close at Sylvania

greens, well we've spent plenty on them. Weeds simply can't get through that turf, it's too thick and matted.

But weedless as they practically are, yet the brown patch gets into them during the hot sultry weather, and this pest is not to be ignored but met and mastered at once, if at all. My experience has shown me that the only real remedy is a top dressing of sand and a good dose of sulphate of ammonia followed up with a lot of water. This treatment turns the trick the quickest and most effectually of anything I've ever tried.

Now don't mistake me, I don't claim to be an expert in bent greens. All I know about them is what I've dug out by observation, experiments and mistakes.

One instance in the mistake line: I prepared three greens for bent, thinking I had plenty in the nursery bed for all three. But my judgment was wrong, there was just enough for two. So I took my men, went down to the creek, gathered thirty two baskets of the stolons and planted what is known as No. 1 green. It came up fine but there are five different strains of bent in that one green.

But for greens, I'm sold on the bent. It's easier to plant, comes up quicker, is easier to care for, free from weeds, except a few summer ones that are a result of the top dressings, and best of all it gives what a green is built for—a *perfect putting surface*.

Why I Use Charcoal

Bp JOHN MORLEY, President
The National Association of Greenkeepers of America

For some years I have found fine granulated or pulverized charcoal an aid in the keeping of good putting greens. I have been asked many times why I use this material on my greens, and there are several good reasons.

Perhaps the most important mission of charcoal in the soil is its moisture absorbing quality. Charcoal acts like a sponge in the soil, absorbing and retaining water gases and solutions. It shrinks very much in bulk when dried, and expands similarly when it takes up water. When soil comprising the putting green contains charcoal, it prevents the surface from cracking open in hot dry weather, and also helps to keep the nitrogen in the soil. On the other hand, when rain falls, charcoal in the soil expands and allows more water to enter the subsoil which can later be drawn up by the energy of the sunrays to the tiny hair roots of the grass plants.

An application of approximately 150 pounds to the ordinary sized putting green, either in the fall or the spring, is what I use at the Youngstown Country Club. I find that it improves a sticky clay soil, and encourages a clean growth of grass on my greens. Although not an available plant food, it contains carbon-dioxid, a gas from which grass plants can assimilate carbon, and carbon enters more largely into plant tissue than any other element.

GOLF MAINTENANCE PROBLEMS

What puzzles you may be puzzling the other fellow. Send in your questions for the February issue of THE NATIONAL GREENKEEPER to 407 Caxton Building, Cleveland, Ohio.



Month by Month With the Trees

By C. M. SCHERER

Principal of The Davey Institute of Tree Surgery, Kent, Ohio



Editor's note: Almost every greenkeeper has trees to take care of and loses a certain number every year. That's why we have enlisted the aid of Mr. Scherer, a nationally noted tree doctor, to tell us what happens to the trees through all seasons of the year. It's a precious work, saving trees, and we believe the greenkeepers of America will appreciate Mr. Scherer's contribution to our worthy cause.

ORDINARILY one thinks very little of trees during the month of January, however, trees are just as interesting in the winter as they are in the summer. At the same time they have their troubles and are deserving of attention as much now as at any other time.

In winter a sturdy oak, a stately elm or a graceful beech has a beauty all its own. A beauty which etched against the gray sky gives a picture which is hard to forget. As one looks across the golf course from the cozy confines of the club house, the trees stand sentinel waiting for the coming of spring.

Fortunately few of the enemies of the trees are abroad in the winter. The insects are inclosed in their cocoons or eggs and have no chance to do any harm. It is too cold for the fungus enemies to do any damage and one would feel that the trees are safe for a while, at least. In spite of their seeming security trees oftentimes suffer materially in winter time.

Extreme Cold Causes Frost Cracks

One of the most serious troubles is the extreme cold. There are few, indeed, of my readers who have not at some time while riding through the woods on a cold winter night been startled by what at first seemed to be a gun shot. On second thought, however, they realized that it was only the report occasioned by the splitting of some tree because of the cold. All of us have seen the great seams and fissures in the trunks of trees and wondered what was the cause. These long narrow wounds in the trees are the result of having been split asunder during some preceding winter by the extreme cold. These wounds are ordinarily referred to as frost cracks.

Frost cracks commonly appear in trees when the temperature drops rapidly following a comparatively warm

period. The outer portions of the trunk of a tree cool quite rapidly; more rapidly in fact than do the inner portions. Naturally the rapid cooling on the outside causes a contraction of the wood which is more rapid than is the contraction of the interior portions of the tree. It does not take long to make the strain so great that the outer tissues split apart, and this splitting is accompanied by a loud report quite similar to a gun shot.

The following summer the tree tries to heal its wound and very often succeeds in completely covering it, but the damage has been done and the scar is so weak that only a slight strain is needed to split it open again the following winter. This succession of healing and splitting goes on over a period of years and frequently great ridges are built out on the sides of the tree trunks following the effort of the tree to heal its wounds.

Of course when the protective covering of bark has once been destroyed, an entry way is open for other enemies of the tree to gain admission. These enemies take advantage of every opportunity and it is not at all unusual to find the supporting wood of a tree being rapidly destroyed behind a frost crack by some wood-destroying fungus. It is only with the assistance of some one trained in the care of trees that the injured trunk can recover from its trouble.

How Freezing Affects Leaf Buds

Besides the splitting of the trunks, there are still other damages caused by the cold. Most of us probably were taught that the buds of the trees were nice and warm, wrapped up in their covering to pass through the winter. This teaching of course is not true, because the buds get extremely cold and in fact freeze solid during the winter time. The protection is not against cold, but against the loss of water. If the water which is within the buds can be kept there and the water without the bud kept out, then the flowers and leaves for the coming season will be reasonably safe.

Some of the devices used by Mother Nature to accomplish this purpose are quite interesting. For example, the buds of a horse chestnut have all the appearance of having been dipped in varnish and the remarkable fact is that this varnish stays sticky during the entire winter. This stickiness of the horse chestnut buds is about the best way of distinguishing the horse chestnut from a buckeye. Wax is also used in the buds of the poplars and one of this family, the balsam poplar, gets its name from its sticky buds.

In the case of the black locust the protective covering is a mass of fine hairs quite comparable to velvet. These hairs are so closely interwoven that it is next to impossible for water to get either in or out. Some trees, like the bitternut hickory and the witch hazel do not have any special covering of the tiny leaves, but the little leaves themselves are covered with so tough a skin that the water will neither go in or out. The willows have a water-tight cap over each bud. This cap is made without any seams and can be picked off the bud in its entirety.

In spite of these various methods of protection, they are sometimes not enough, for the buds are injured and oftentimes killed. This killing occurs most severely when the trees have grown late into the fall so that the buds are not fully developed before cold weather comes. Some trees such as the willows and black locust continue to grow normally late into the season and never make any special preparation for withstanding the cold. As a result of this, the ends of the willow and black locust twigs are always frozen and invariably you find them dead and breaking off in the spring time. This is one reason why these trees, especially the locusts, are so irregular in shape.

Evergreens Suffer from Cold

Among the evergreens, the damage by cold is often quite severe. This is largely because of the fact that the evergreens hold their leaves throughout the winter and continue to evaporate large quantities of water in spite of the fact that the ground is so cold that the roots cannot replenish the water of the trees from the soil. When evaporation goes on to dryness, death is a sure result. There is probably no tree which shows the effect of this more than does the *Arbor vitae*. During the summer of 1926 hundreds and thousands of *Arbor vitae* trees turned brown and died because of the damage which was done by the cold winter of 1925-26.

Some trees freeze to death much more easily than others. Probably one of the best examples of freezing to death can be illustrated by the peach. This tree cannot ordinarily survive temperatures colder than 10 degrees below zero and since 10 degrees below is not at all uncommon in many sections of the country, it is next to impossible to have peach orchards in these colder regions.

There is no such outstanding example of the susceptibility to cold among the more common shade trees but these often suffer because of extreme cold and oftentimes one is unable to explain why a tree dies in mid-summer without any apparent reason other than the fact that it suffered from the cold of the preceding winter. Scientists generally agree that the extreme cold of the winter of 1917 and 1918 killed thousands of trees which did not succumb until from six months to two or three years later.

Fall Watering Offers Protection

Unfortunately it is next to impossible to do anything to help the trees survive the rigors of winter. Sometimes it is possible to protect some of the more important trees and this is quite often done, especially in the case of valuable evergreens. When a dry autumn occurs, great benefit is rendered the trees by watering them thoroughly once a week during the latter part of September, October and early November, so that they will go into winter as full of water as possible. The excess of water will help carry them through the winter in good shape.

Trees in winter have a distinctive beauty and character in many respects that by far surpasses their summer attractiveness. They are deserving of all the attention that is possible for one to give them. In spite of the fact that most of their enemies give them a respite, the weather is a never ending source of trouble and the unfortunate part of the whole situation is, that we can do little to help the trees over this rough spot in their lives.

Mr. John Morley
Youngstown Country Club
Youngstown, Ohio

Dear John:

I have read most carefully the prospectus you have drawn up of the National Association of Greenkeepers of America. It will be a splendid thing for golf in general if such an Association can be organized on the lines you suggest; as I have said before and I again repeat that the greenkeepers as a whole are a very intelligent and honest class of men.

The wonderful development of golf in this country is largely due to their unselfish efforts and hard work in improving the golf courses and making it possible for players to enjoy the game to the fullest extent.

I congratulate you on your work as a greenkeeper of outstanding ability and with leaders of your type an association will unquestionably be a great success, not only from the standpoint of the members, but also from the Clubs who employ them.

With my cordial regards,

Yours very truly
Donald J. Ross

My Trail To Hillcrest

By WILLIAM STEWART
Greenkeeper, Hillcrest Country Club, Los Angeles, California

TO put detail into as brief a story as I wish to write will be impossible, so I will just endeavor to outline my career up to the present.

On starting to earn my own living I accepted work on the estate of a British Laird in Aberdeenshire, Scotland, where I served my apprenticeship as a gardener. In the course of my work there I found I had a leaning toward what was called "policy maintenance" which had to do mostly with the care of grasses and shrubs, and the first grass I knew was *Poa Trivialis* which grew luxuriantly in shaded parts of the lawns there.

Balmoral Castle in the Early Days

When my apprenticeship was served I went to the summer estate of the British King, Balmoral Castle, where there was a private golf course in which I was much interested. I requested to be transferred from the garden department to the golf course and in due time the superintendent, Mr. McLeod, granted this, and there I did my first real work on a course. Play was very light, resulting in an exceptionally well kept course, and all work was thoroughly done.

Mr. McLeod had a brother in the Park Department in the city of Leeds, England, where they were about to lay out two municipal courses. Owing to the interest I had shown in my work at Balmoral, he wrote his brother regarding a position for me on the links, and I was happy to learn I could be placed. I spent a few very profitable years on the construction and maintenance of those courses, but golf course work here is very different to

what I did then, both the architecture and construction methods were much in contrast to what we have today.

I left Leeds to enter the Royal Botanic Gardens, Kew, London, where for two years I studied botany, physics, chemistry, soils, manures and allied subjects.

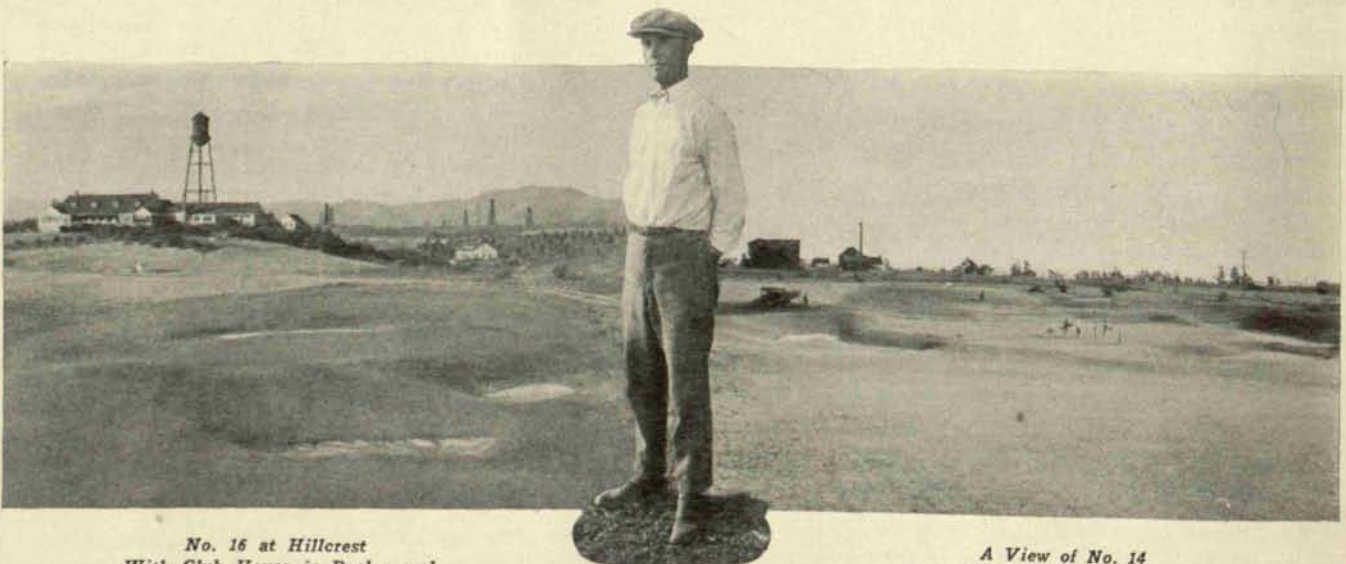
I was American born of Scotch parents, and when very young, went to Scotland with them. In 1915 I returned to the United States and went to work remodeling and maintaining one of the best sea-side courses in New Jersey.

Starts at the Bottom in America

In all my work I had been very fortunate in being supervised by men with a thorough knowledge of their business and who had no scruples about imparting their knowledge to one who showed an interest. In the few places I was employed, I went to work with the crew, but with extra effort I always got a worth while place in due time.

I went from New Jersey on to my first real job as Superintendent of construction on a course in Pennsylvania. The wide variety of ideas and experience with grasses under varying conditions I had gained, proved invaluable to me in that job. Such experience is invaluable to any man who hopes to have success. Local conditions are the ones a man has to acquaint himself with always, but a varied experience is valuable if a man can avail himself of it and be receptive.

I had a desire to come West and had been acquiring what knowledge I could of golf out here, so on arrival,



No. 16 at Hillcrest
With Club House in Background

A View of No. 14
Left, "Bill" Stewart, Greenkeeper

I called on Mr. William Watson, who had been brought prominently before me in my search for knowledge of these parts, and I may say here in compliment to Mr. Watson that the plans for the Hillcrest course, where I have now the good fortune to be greenkeeper, were so well prepared, and the care he exercised in supervising its construction was so thorough that no alteration has been made on the course since the day it opened.

Mr. Watson had several courses under development and he kindly placed me under his construction foreman on the Hillcrest course. Here I was right at the bottom again, and I consider every fellow entering unfamiliar country should start from that point. From there you can work up and learn along the way.

A greenkeeper coming out here from the East or vice versa, is doing his employer and himself an injury and an injustice if he takes charge of a course with no knowledge of local conditions. What may prove the right thing to do on a course in the East may be the wrong thing here.

Eastern Grasses in California

To get back to my present work. I came here a few weeks after construction was started in October, 1920, and with but one absence of a few months, have been here since. Though that is comparatively a few years ago, grasses with the exception of Bermuda grass, were considered almost impossible to grow successfully in California, where we have but little rain and a twelve month growing period. Our architect, Mr. William Watson, who has a thorough knowledge of all grasses and all things pertaining to them, persuaded our Green Committee to sow the fairways to eastern grasses. They were naturally very unwilling, as failure would have involved heavy additional expense, but consented. They were sown to Red Top, Chewings Fescue, Meadow Fescue and a small percentage of Clover, and today are considered the best in these parts for good golf and appearance. There have been places where it has been difficult to get a good stand, but by building up the soil and nursing along a thin weak stand to a strong vigorous turf, we now have splendid fairways. They have never been fertilized except on the weak spots and we feel proud that we haven't sown a seed in the past two and a half years.

The greens were all well worked over and put in good shape with fertilizer and peat humus before being sown to Red Top and Chewings Fescue. Due to the excessive amount of watering necessary here, it was important to get something to reduce the quantity applied, and thus

also retain the natural salts in our soil. The peat humus used for this purpose proved to be exactly what was needed.

Weeds in Water Supply

Our water supply comes a good many miles through open ditches and gathers weed seeds all the way, which we put on to our greens in the water. This gave us weedy greens in spite of our efforts to keep them down and they began to crowd out our good Fescue and Red Top. The greens grew varied in texture, although they putted extremely well and my Chairman thought we had better make preparations towards getting new greens. We sent to Washington, D. C., for a sample of Creeping Bent and from a very small piece of what has been identified as the latest and best Washington strain, we grew enough and have recently renewed all our greens to Bent. We had eight varieties growing here for over a year and none of them came up to our standard of a good putting green grass like the Washington. I prepared and planted from stolons an area equal to the combined areas of our putting greens and when it matured we cut and rolled the sod and moved it right on to our old putting surface.

Sodded Bent Greens

I first killed with Ammonia Sulphate the grass on the old putting surface and ten days from the time we started to lift the sod for a green we were able to open it again. It took seven weeks from the time we started to the time we opened the last green and no green was out of play for more than ten days. The job was completed and our members scarcely realized what was being done, play was interfered with so slightly.

We now have 18 putting greens and a large practice green of good Bent on an old course, and after three years' experience with it have found no objectionable features. The Bent loses color in the winter due partly to the fact that we give it a chance to rest for about two months.

Practically all grasses do equally well here as those I have seen in the East, but they require more care on account of perpetual growing, artificial irrigation and the native adobe soil.

I would advise any greenkeeper wishing to locate in California to work on a course for at least a couple of months to acquire some knowledge of local conditions. By so doing he will be better prepared to assume his duties as a greenkeeper.

What Golf Rules Affect the Greenkeepers

How the greenkeeper may help the player avoid penalties in his play.
Knowledge of certain rules and definitions necessary
to avoid complaint.

By ROBERT E. POWER

Vice President and Chairman Green Committee, Westwood Country Club, Cleveland

GREENKEEPERS as a rule are not golfers. One hears this fact deplored quite often by chairmen of the Green who claim that if a greenkeeper played the game he would know better how to keep his course in condition. I am one who disagrees with that opinion: turf culture is one thing and playing golf is another. The man who is concentrating on the condition of the turf while playing golf is not playing golf—conversely the man who plays golf cannot think about the course. Then, too, a greenkeeper's recreation like any other business or working man, must be away from the scene of his daily labors.

However, there are certain rules of golf that affect the greenkeeper's work which he should know and be mindful of as he makes his daily rounds. As I have never seen them set forth in any golf magazine or pamphlet I think an article about them at this time may be of help and benefit.

In the first place let me cite certain fundamental definitions as a basis for better understanding of the rules in which these terms occur:

Course

The "Course" is the whole area within which play is permitted; more particularly, it is the ground between the holes which is specially prepared for play.

The greenkeeper must remember always that the rough is just as much a part of the course as the fairway and must see to it that big stones and heavy logs are removed and holes filled up so that there are no unplayable or unfair lies. While the player must expect difficult lies and hard play in the rough he should not be expected to find his ball in a position where he cannot hit it in some direction.

Teeing-Ground

The "teeing-ground" is the starting place for a hole. The front of each teeing-ground shall be indicated by two marks placed in a line as nearly as possible at right angles to the line of play, and the teeing-ground shall include a rectangular space of the depth of two club lengths directly behind the line indicated by the two marks.

When placing their tee plates greenkeepers generally consider only the ground between the markers and therefore we generally find the entire width of the tee used for this purpose. As a matter of fact about six feet of the tee behind the line of the markers is "teeing-ground" and the use of this should be encouraged by placing the marks closer together or approximately half the width of the tee. This area might be mowed a trifle closer than the balance of the tee in order to emphasize and define its location.



Robert E. Power

Hazard

A "hazard" is any bunker, water (except casual water), ditch (unless excepted by Local Rule), bush, sand, path or road.

Sand blown on the grass or sprinkled on the course for its preservation, bare patches, sheep tracks, snow and ice are not hazards.

Heather is not a hazard, R. & A.

Bent is not a hazard. R. & A.

Long grass is not a hazard unless within the boundaries of a hazard. R. & A.

A "Bunker" is (that part of) a depression in the ground where the natural soil is exposed, and sometimes top dressed with softer soil or sand. It is the duty of the authorities in charge of the golf course to define its hazards by Local Rules. R. & A.

This definition brings sharply to mind the constant vigil necessary in keeping paths and roads in playable condition. How often the greenkeeper is "cussed out" when a player's ball lands in a wagon rut or washout, and how often the temptation to cheat a little is overpowering in these conditions. Any greenkeeper is subject to just criticism who permits any hazard on the course to get into or remain in an unplayable condition.

Casual Water

"Casual Water" is any temporary accumulation of water (whether caused by rainfall, flooding, or otherwise) which is not one of the ordinary and recognized hazards of the course.

The definition of "water" in the term "Casual water" is any water which interferes with the lie of the ball or the stance of the player. R. & A.