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.

A BRIGHT sunshiny morning a few days ago, I was entering the city of Philadelphia over the Pennsylvania railroad. As I looked out the car window a crystal world greeted my vision. Instead of being "ridged inch deep with pearl" each tree and shrub was ridged with diamonds.

Fortunately, the Philadelphia ice storm was not severe enough to cause any appreciable damage and consequently the marvelous beauty of the landscape was not marred by the wrecks of broken trees. However, the scenes did serve to remind one of the great havoc sometimes wrought by the seeming demon ice. Trees of Massachusetts in the fall of 1921, those of Wisconsin and Michigan in the spring of 1922, and those of Missouri and western Illinois in the winter of 1925 did suffer terribly, and the sparkling beauty of a few days was bought at a price which defies comprehension.

At this time of year it is not at all uncommon to have ice storms of greater or less severity. Those which do no damage are welcome because they furnish beauty which is appreciated by the most prosaic. The heavy ice storms are among the worst enemies of our tree life.

Occasionally conditions of the atmosphere exist which are favorable for ice storms. The air near the surface of the earth is at a temperature a few degrees below freezing while the cloud laden air several hundred feet above the ground is at a temperature a few degrees warmer than freezing. The rain falls and as it strikes objects on the surface of the earth, it wets them and this water freezes into ice. If by good fortune the duration of the rain happens to be short a light ice storm is the result. If for any reason the rain continues for a considerable length of time, the ice storm becomes heavy with disastrous results.

Nature is almost profligate in building beyond the normal requirements of strength. However, during severe ice storms twigs and branches of trees increase their weight tremendously. Cases have been known where twigs increased their weight as much as one hundred twenty-five to one hundred fifty times.

Some trees break early and come down with a thundering crash, while others bend under the weight resting their heads upon the ground thereby gaining valuable support to save their bodies.

Soft Wood Trees Often Victims

With a few exceptions, the soft wooded trees are the ones which go first. Silver maples are not only soft wooded, but are so constructed that all their branches come out at, or near a common point and consequently are unable to withstand such severe conditions. They go early and it is not at all unusual when the ice has disappeared to see only stumps remaining. Whole tops are often destroyed. The limbs are broken and torn completely out of the trees leaving jagged stubs and hideous gaping wounds.

Basswoods are usually almost as hard hit as are the maples. The wonderfully beautiful round and oval headed trees are mutilated almost beyond recognition. In a like manner Lombardy poplars, those stately spire shaped trees, are reduced to little more than poles. Their giant relatives, the Cottonwoods, succumb to the same fate. The balsam poplars seems to have strength enough to ordinarily withstand the test. They neither bow their heads or drop their arms, but seemingly square their shoulders and stoicly bear their burdens.

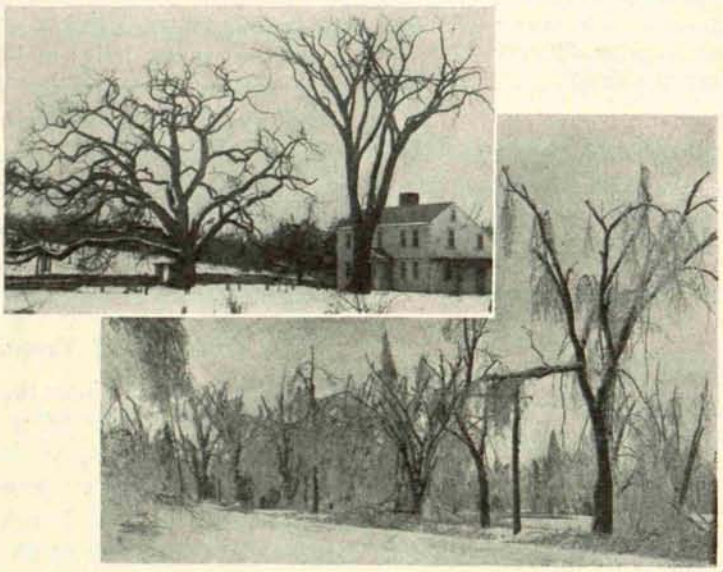
Ice Splits Many Elms

In spite of their reputed strength and toughness, the American elms suffer almost as badly as do their weaker neighbors. Unfortunately the American elm has the habit of growing in the shape of a gigantic vase. The

outer tips of the branches are broken up into thousands of small twigs which in the most beautiful specimens hang down for several feet. As the thousands of twigs gather their load of ice, the strain becomes too great and the trees are split asunder. The toughness of the wood prevents the branches from being torn from the trunk, but they rip down leaving tremendous gaping wounds.

Among the deciduous trees there are some which show marked ability to resist the depredation of ice. Strange as it may seem, the willows are very proficient. Their long slender, drooping branches bend until they rest upon the ground and thereby shift the burden before the breaking point is reached. The sturdy oak here makes good its reputation. It bears its load and seems to defy the elements to do their worst. The walnuts, the catalpas, the hawthorns and some others are able to pass through the ordeal almost unscathed.

We ordinarily think of the hickory as one of the strongest of trees, however, the test of the ice storm is too much for these. In a similar manner we think of the birches as possessing a resistance equal to or possibly superior to that of the willows, but the birches cannot stand the strain and give way long before the willows are materially injured.



Upper Left, Gates Elm at Framingham, Massachusetts, Protected by Proper Bracing, Still Perfect. Lower Right, Beauty of Ice Storm Leaves Destruction in its Wake.

Young Trees Are Resistant

Age appears to have a decided influence on the resistance of trees to ice storm damage. Many instances where large maples, elms and other trees are reduced to an almost unrecognizable mass of debris, young trees of the same variety in the immediate vicinity come through intact.

The size of the twigs also seem to have a direct bearing on the amount of suffering. The maples, the elms, the basswoods, the birches and others have small lacy twigs while the oaks, the walnuts, the catalpas and others have strong large twigs. Notable exceptions to this, are the willows among the small twig trees and the hickories among the larger twig trees. Those trees which usually have broad spreading or rounded tops suffer more than the trees with the more nearly conical sharp pointed tops.

Evergreens Bend When Others Break

When one considers the fact that the conifers have not only their branches and twigs, but also their leaves to collect loads of ice during the winter, one would expect tremendous damage among these most beautiful trees. The reverse of this logical conclusion is true. The conifers suffer less than any other trees from ice injury. This may be because of the fact that the natural home of the conifers is to a large extent in the cold ice and snow ridden sections of the country, and consequently they have developed this remarkable resistance in order to survive in their natural home.

Pines can become almost solidly incased in ice, with their branches bending to the ground under the weight, without any damage being done to the tree. This is largely due to the fact that the pine sends up one central shaft to the very top and from this central shaft slender willowy branches extend out to form a conical top. This character of the pines is equally applicable to the other evergreens. Their long lower branches bend down and rest on the ground, then the next branches above rest on the lower ones and so on until the entire top is supported by the ground.

In the case of the younger evergreens, their main trunk is flexible enough to bend to the ground without breaking and once they have become so bent, they remain until the ice has melted and then regain their upright position.

Strengthen Elms and Maples

Unfortunately it is impossible for lovers and owners of trees to prevent the occurrence of ice storms. They can, however, prepare their trees to resist the ice scourge when it comes. Since many of our most beautiful trees are elms and maples it is decidedly worth while to give them the consideration which they merit.

The trees which have a weak structure as is so excellently illustrated by the elm can be examined for their weaknesses and wherever these weaknesses are found mechanical braces can be installed which will relieve the strain at the weakened point.

One famous tree, the mammoth Gates elm near Framingham, Massachusetts, was so prepared to withstand not only ice storm depredation but also damage from other sources. This tree passed through the terrific ice storm of 1921 with the loss of only a few comparatively unimportant branches.

Here's "How" From Florida!

By SCOTT TUPPEN
Greenkeeper at Cleveland Heights Golf and Country Club, Lakeland, Florida.

Scott Tuppen

Editor's Note: It is not often that we find a greenkeeper, only 24 years old, who has already made a name for himself. Mr. Tuppen is the son of Frank Tuppen, veteran Florida greenkeeper, and is probably the youngest man in his profession in charge of a championship course in America.

SOMETIMES a young man chooses what he will do in life, and sometimes he is pushed into a line of endeavor he would never have chosen for himself. Luckily for me, my father's profession attracted me from the time I was going to school, and therefore I have had the benefit of his long experience in keeping golf greens in the South. Eighteen is not too young to start, if you know just what you want to do, and I did. I followed in his footsteps and took up greenkeeping, not because he had made a success of it, but because I wanted to.

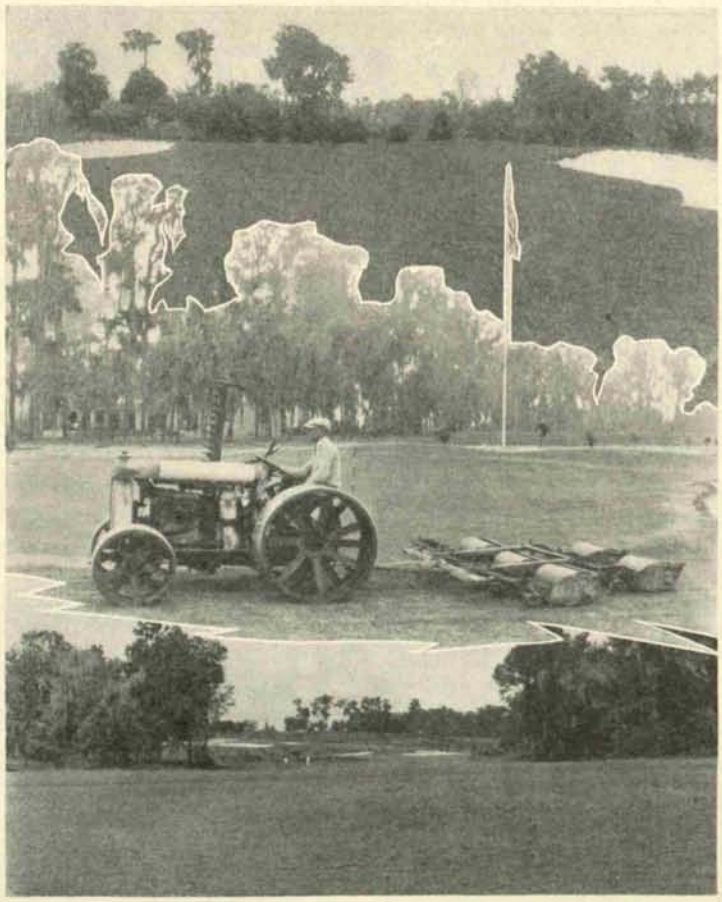
In 1924, when they were building the course at Cleveland Heights, I took the position as greenkeeper. This is what is known as a championship course, and hundreds of golfers from all parts of the country play over it during the winter season. In fact, it is an all year round course, busy during the summer, too.

Native Soil and Grasses

We have two different types of soil, depending upon the elevation of the land. On the lower levels the soil is dark sandy loam, and soil from these lower levels makes a fine top dressing for use during the winter season. On the high land the soil is a yellow sand, and this soil mixed with the dark loam from the low places we use for summer top dressing with excellent results, as it is almost entirely free from foreign vegetation.

Our greens were planted with the Atlanta strain of Bermuda, which is a much finer strain than common Bermuda, and gives a smooth texture of surface for summer play. In the winter season the greens are sown with Italian rye and red top, while the Bermuda is in its dormant stage.

The higher fairways are planted in common Bermuda, which seems to make more satisfactory growth on high dry fairways. On the lower fairways we planted carpet grass, and this is very well adapted to low ground. Our rough is all natural grasses, blanket corn, Bermuda, wire grass and Mexican clover.



Views at Cleveland Heights, Lakeland, Florida. Upper, Number Four Green. Center, Mowing Fairways on a Sunny Morning. Lower, Number Six Fairway and Green, Along 3-Shot 5-Par Hole

Keeping Bermuda Greens

We have a more equable climate than prevails in many sections here in Florida, our temperature in summer averaging 73°, and in winter 62°. We have no difficulty in keeping a proper degree of moisture in our greens, as our water supply is very good. We use lake water, pumped to a tank and distributed through the course with a 3-in. line. Our pressure is 45

pounds, and we use ¾ inch hose, as many courses in the North do.

Through the summer season, we have to water twice a day, early in the morning and again in afternoon, never watering while the sun is hot. In the winter the greens may be watered any time a day, night watering being preferable so as not to interfere with play.

Top dressing we apply to the greens approximately every three weeks to a month during the winter while they are under heavy play. During the summer rainy season, June, July and August, on account of washes they have to be top dressed oftener.

When ordinary soil is used, we mix with every two yards to a green, three pounds of sulphate of ammonia to every 1000 square feet of green to be covered, and this dressing must be thoroughly watered in and kept moist until sulphate shows results, to prevent burning the grass. Our compost mixture is 1/3 yard of well rotted stable manure to 2/3 yard of dark loam soil.

We have a plentiful supply of laborers, and keep twelve men all the year around, at from $3.50 to $4.50 a day.

Greenkeeping Asks for the Best You Can Give

One of the worst animal pests we have is the Salamander, a burrowing animal somewhat on the order of the northern gopher, and we find the easiest method of eradication to be traps placed in the burrows. Army worms, hybernating worms, grubs and Hessian flies keep us busy at times with copper lime in dry form or arsenate of lead in liquid form, and so far their depredations have been held pretty well in check.

While sometimes our winter grass, red top and Italian rye, is affected to a slight degree with Brown Patch, Bermuda grass is immune to this disease. From all I hear, we have no more drawbacks for the greenkeeper in this section of Florida than he finds in the Northern states, and I guess greenkeeping means about the same thing the country over, a good knowledge of individual soils, climatic conditions, and how to grow and maintain the kinds of grass that are suited to any one given locality. No job holds the interest of the man at the helm unless it holds difficulties to overcome, and if a man sticks to the game of greenkeeping and makes a success of it, there is only one answer to it,—he loves his work. There are many easier ways for a man to make a living, but the easy road, even though it leads to success, is seldom the one that gives the most satisfaction. I am only twenty-four years old, but down here in Florida, where thousands of dollars have been made over night by boys a lot younger than I am, I am not sorry that I have stuck to keeping greens.

The Permanent Beauty of Concrete

By JAMES E. FOSTER
Portland Cement Association Educational Bureau

IN order to cut the time they must devote to structural improvements (such as walks, bridges and fences) to a minimum, many greenkeepers are using concrete extensively on the courses under their supervision. Its permanent qualities, together with its resistance to climatic conditions make it easily adaptable to the needs of the greenkeeper.

James E. Foster
Portland Cement Association
Educational Bureau

Concrete Gives Service

Consider first of all the matter of steps and of sidewalks. They are constantly used and are exposed to changes in temperature. Naturally, they must have outstanding wearing qualities. The action of rain and of wind, of zero weather, and of the sun's unchecked rays on a hot summer day must not impair their quality. Concrete meets these requirements.

Artistic Possibilities

The broken down bridge crossing a stream is a relic of bye-gone days where this material is used in making bridges. The smallest structure can be as well built as a gigantic span weighing thousands of tons. Concrete can be colored; and since it can, in its plastic (or gluey) state, be put into any shaped forms, it is adaptable to numerous design schemes. Even rustic beauty, which harmonizes so well with the natural surroundings of a golf course can be successfully and permanently reproduced with this material.

Such garden ornaments as fountains, bird baths, sun dials, flower boxes and similar pieces, when made of concrete, demonstrate the artistic possibilities of this material. As with benches, these fixtures, because of their weight, should be set on very firm ground or on flat slag supports.

Extremely ornamental fixtures, such as bird baths, benches and sun dials are manufactured by several products plants, located in different parts of the country.

Preventing Washouts

By the use of dams, piers and abutments, erosion can be retarded and changes in the stream channel can be

prevented. Natural action often results in serious topographical changes, and while the process is slow, it is inevitable unless counteracted. By placing slabs at proper places, the greenkeeper can prevent much natural damage to the property under his care.

When piers and abutments are used, they should extend at least one foot below the water bed, so that the ground cannot be washed away from underneath them. The sides of dams and similar structures should extend a fair distance into the stream's banks as a safeguard against the water making a channel around the slab.

Permanent Fence Posts

Concrete fence posts have come into widespread use because they do not rot, they do not burn, they do not require replacing, and they always present an attractive appearance. As a rule, these posts are from seven to eight feet in height, with a rectangular cross section of 4 by 5 inches at the bottom, which tapers to 3 by 4 inches at the top. Other shapes and sizes, however, may be used. The post may be round, or oval, or triangular, or octagonal—in fact, it may conform to any shape within reason that is desired.

When fence posts are made, forms are required. There are a number of these on the market, which are made of steel, and which can be secured in a large variety of forms and sizes. While a skilful person can often make his own forms of wood, one who is not "handy with tools" should purchase these forms ready made. To insure strength bars of steel, called reinforcement, must be placed in the forms before the concrete is placed. These reinforcements run the entire length of the pole.

Expansion Joints in Sidewalks

When sidewalks are laid, joints should be made at regular intervals to allow for expansion. These may be construction joints, which are from four to six feet apart, or expansion joints, which are found every fifty feet. Construction joints, as their name implies, are those which are naturally made during the laying of the concrete. A batch is placed, and a sheet of steel is put against it to keep it from spreading. The next batch is then placed, and when the concrete has set sufficently to remain firm, the steel is removed. In making these joints, one thing should be remembered: have them perpendicular to the edge of the sidewalk.

Expansion joints are grooves between slabs of concrete. They are in sidewalks from one-half to three-quarters inch in width, and are filled with tar, asphalt or some other material of a plastic nature.

Both expansion and construction joints are separate distinct units. They are not mere surface indentations, *but go the entire depth of the slab.* Perhaps this point can be made clearer by saying that a sidewalk properly constructed is not a single strip of concrete, but a series of slabs, set end to end.

Be Careful of Your Mixture

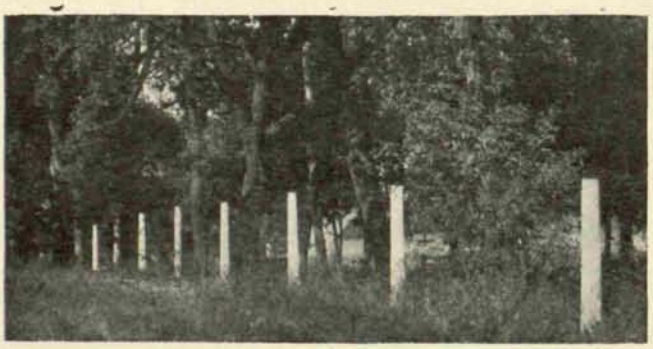
If you are making the concrete yourself, remember that the less mixing water used, the stronger will be the resulting concrete. Laboratory tests have proven conclusively that *too much water weakens concrete,* and inversely, that the less water used, the better. The old idea that concrete must resemble a thick soup is erroneous. Concrete must be plastic, but it must *not* be sloppy. Add enough water to your cement, sand and crushed stone to make a workable mix, but do not add any more.

Concrete May be Laid in Winter

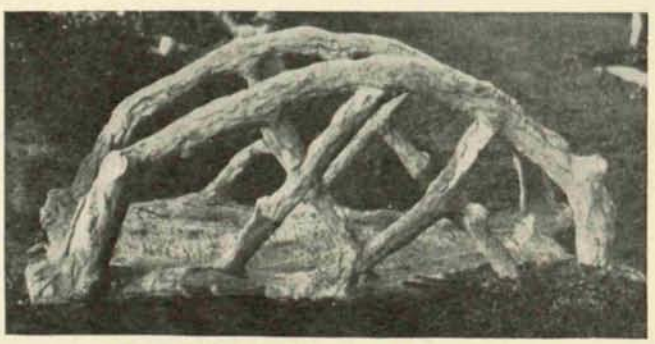
Work with concrete can be done as well in winter as in any other season, if proper precautions are taken. There is a false belief to the effect that warm weather is necessary for placing this material. Numerous skyscrapers, warehouses and other large structures erected when the temperature was below zero disprove this fallacy. If you wish to make some improvements with concrete this winter before your club opens in the spring, go to it.

When work is done in winter, the water and the aggregates (stone and sand) should be heated, and the concrete, after it is placed, should be kept from freezing for at least two weeks, so that the first stages of curing will not be hampered. A good plan with sidewalks is to cover the concrete with canvas, and then place a heavy coating of manure or straw over this. Unless the weather is extremely cold, this protection will suffice.

If you are planning to add any improvements to your course before the spring opening, now is the time to get busy. By starting now, you can, without crowding yourself, have your club in perfect order in plenty of time for an early opening.



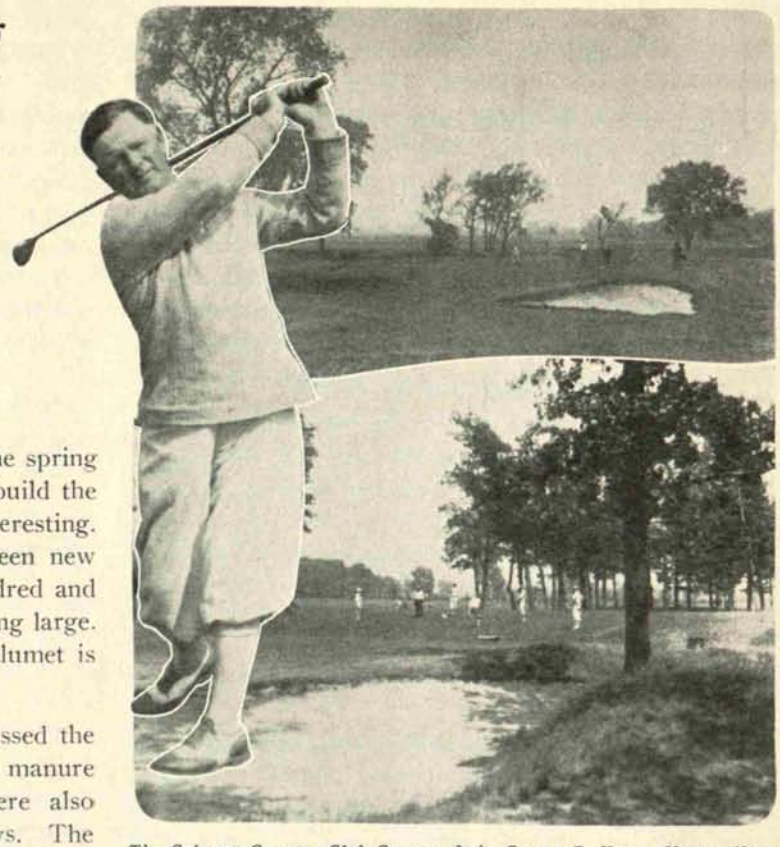
Concrete Posts Like These Make Even the "Rough" Seem Attractive



Who Would Guess that This Bridge is Made of Concrete?

Experimenting with Bent

By GEORGE P. KNOX
Calumet Country Club, Homewood, Illinois



The Calumet Country Club Course. Left, George P. Knox. Upper, Number 11 Green. Lower, Number 12 on a Busy Day

UPON my arrival at the Calumet C. C. in the spring of 1921, it was decided to remodel and rebuild the golf course which was at that time very uninteresting. To do this it was necessary to construct eighteen new greens and thirty new tees, as well as one hundred and thirty traps and bunkers, the greens and tees being large. The club has never regretted the change as Calumet is now rated among the best in the country.

In the fall of 1921, we fertilized and top-dressed the fairways the top-dressing being applied with a manure spreader and brushed in. The fairways were also seeded with a Kentucky drill, crossed three ways. The improvement was very noticeable.

Built Up Tiled Greens

With the exception of a few very natural holes and greens the greens are built up. They are all tiled with the Herring-bone pattern, as I believe every green should be tiled, irrespective of its conditions. The greens are undulating with this effect not carried to the extreme as the wave is slight. In designing a green, the eye effect is to be the most considered.

From Red Top and Fescue to Bent

The majority of the greens were seeded with Red-top and Fescue. When the club moved from its old location, it brought along two small bent greens out of which I was able to get one good green. This green has vegetated to such an extent that I now have two acres of bent nurseries, and by plugging and patching whereever I saw clover or chickweed the greens have become practically all bent, this being taken from the fringe and outskirts of the original bent green.

Believes in Sodding Bent

I can not see the practicability of the vegetative method. I am a firm believer in the sodding method to grow a bent green. I can take a rake to my greens and use it in any way; if you can do this you have a first class putting green. There is no sinking on my greens.

Experimental Planting

My experiment on my number eighteen green might be of interest to you. Late in the fall, the middle of September four years ago, I seeded this green with Fescue and Red-top. A month later I put grooves thru this green two feet apart in which I put some of my bent chopped up. I covered it and did not notice any signs of the bent until the following July. Today this green is one solid mass of healthy bent. I have been asked to send this strain to Washington for an analysis and a name but I consider this unnecessary as I call it the Calumet strain and the members the Knox strain. This bent is not susceptible to Brown Patch although I had a little that I quickly got rid of. I call it a good old fashioned Carpet Bent.

I have this Bent in some of my tees. I believe a tee should be large and irregular as I do not like a straight line on a golf course be it tee or putting green.

Mushroom soil is a good top-dress in the fall and sulphate or Ammo-phos in the summer. For the best results top-dress frequently.

Get a good strain of bent, the kind most suited to your particular location, and build a nursery. Take plugs from your nursery for the greens eradicating the weeds. In time you will notice, as I did, that it will run into your fairways and approaches.

"Greenkeeping Yesterday and Today"

Address By JOHN MORLEY, President N. A. G. A.

Annual Meeting, National Association Club Managers, Chicago, January 26

ABOUT fifteen years ago, there were scattered on God's green acres in various parts of the United States a few hundred golf courses. The word "greenkeeping" was not generally known. About seventy per cent of the courses then in existence were under the direct supervision of professionals, most of them having received their training from the British Isles. In most cases, the methods which they had been accustomed to, owing to the difference in climate and soils in this country, proved very unsuccessful. They were to a certain extent handicapped, because very little knowledge was to be obtained, even from Washington, as to what should be the best methods to pursue. There were not more than ten per cent that would qualify as greenkeepers as the greenkeeper is known today.

Old Methods and Equipment

In those days, while we were fortunate to import good grass seeds from foreign countries suitable for golf courses, we were lacking in our ability to know how to take proper care of turf and produce good results. It is true that we had turf experts in those early days of greenkeeping. One of the leading turfmen was the late Fred W. Taylor of Philadelphia, who thought he had discovered that, by mixing clay, bonemeal and cow manure in a cement mixer and placing them in layer formation in the making of a putting green, it would solve the problem of raising ideal turf. This method as we all know proved a failure. In those early days there were very few pieces of equipment suitable to keep a course in excellent condition. First, we had to cut the fairways with a one horse mower outfit. Then came the gasoline mower that weighed nearly a ton with one single cutting unit. On an eighteen hole course, if we wanted to cut the fairways once in nine days, we were compelled to use two mowers, for one or the other was out of commission most of the time. Then came the sulky mower with three cutting units drawn by a horse which had to wear iron or aluminum shoes. If the horses were not flat footed when the turf was soft, they would dig the toes of these shoes into the turf, leaving the fairways full of small holes.

Ten Years of Real Progress

About ten years ago, golf in this country began to take rapid strides, and with this progress came improvements. But new courses multiplied so fast that it was impossible to secure enough men well versed in the art of greenkeeping. To a large extent we were very fortunate to secure men who had at one time been well versed in farming and gardening. But they soon discovered that the methods applied to farming and gardening would not produce results for successful turf on golf courses. Each in his own way endeavored to find other methods, and with so many working along different channels we gradually commenced to get information that tended to create better and better working equipment. Since the World War golf courses have sprung up in leaps and bounds and from the few hundreds, fifteen years ago, they now number over four thousand. Out of the vast number of men selected to take charge of these courses, we have been enabled to produce a large number of successful men who are today well versed in greenkeeping. With the advent of the Green Section of the United States Golf Association, a few years ago, "greenkeeping" was placed in a position where it rightfully belongs, known as the Arts and Sciences. And instead of seventy-five percent of golf courses, which were formerly taken care of, fifteen years ago, by professionals, today over eighty percent of the courses are in charge of greenkeepers.

Science in Greenkeeping

It requires from three to five years to produce grasses that will stand the wear and tear of the players, and to a certain extent it also requires the same amount of time for a pupil to acquire sufficient knowledge to make him rightfully known as a greenkeeper. With this in view officials of new courses should take this under consideration. It also happens, during the early existence of a new course, that conditions are such that they often breed dissatisfaction among the members. No matter how hard the chairman of the green committee and the persons who have charge of the course try to correct conditions, they still fail to obtain results, owing to the fact that the soils especially used in the making of putting greens were selected and cultivated by golf architects to grow blue grass and clover instead of bents and fescues. For illustration, I can quote you two courses where this condition exists. Every method known has been tried with practically no effect. This fall both of these courses sent samples of their soils to one of the leading experiment stations conducted by the State of Ohio to have it analyzed. The answer they both received was to dig up several inches of soil and replace it with soil containing a certain amount of acidity, that the soils they had contained too much lime, or, in other words, they were too alkaline. But some will say "why don't they use an acid fertilizer and create the acidity needed?" Where phosphorous and potash predominate

in the soil caused by excessive lime formation, an acid fertilizer has very little effect, for the reason that when the temperature of the soil reaches a certain degree, the nitrogen from the contents of the acid fertilizer is almost immediately turned into ammonia—a volatile gas which escapes out of the soil.

Experimenting with Compost

Previous to the World War very little attention was paid to the creating or making of suitable compost, composed of soil, sand and manures. Most of us were using commercial humus, which proved to be very expensive. About this period I commenced to make compost of my own. But I found it difficult to secure suitable stable manure. In looking over the advertisements in one of our daily papers I had discovered that a certain livery stable wanted to contract their manure for one year. Upon investigation I found that the bedding was composed of oat straw. I signed the contract. About two weeks later the teamster brought to the club manure made from wood shavings insead of oat straw. I had signed the contract and knew that I would be compelled to haul it away from the stables, so I tried to dispose of it to farmers. However, when they were informed of its contents, they wouldn't take it. I knew that manure composed of wood shavings produced acidity, but did not know at that time that it would be suitable for golf grasses. I composted it, and after turning it over twice, and it had become one year old, I experimented with this compost upon one of the putting greens. In a reasonable time I noticed a slight improvement in the turf. About one month later I topdressed this same putting green again with the wood shaving compost. It did not take long before the chairman of the green committee and members of the club observed the wonderful improvement in the turf. I afterwards gave the rest of the putting greens the same treatment, and all of them responded the same as the first putting green. Then I began to realize that I had created an acid condition in the soil and that bent and fescue grasses thrived well in it. However, having failed to renew my contract for more shaving manure, and having used up all compost that was composed of it, I began to look around for an acid fertilizer.

Tries Sulphate of Ammonia

It was suggested to me to try sulphate of ammonia. I did, on my own lawn, and burnt nearly all the grass. After several attempts I finally discovered the proper amount to use. Having previously created an acid condition in the soil, I was able to get immediate results. I have been using ammonium sulphate for over eight years, and lately I was of the opinion that I was getting too much acidity into the soil. During the season just past, in order to keep the turf in good condition I was compelled to nurse it more than usual. The chairman of our Green committee suggested to have the soils of the putting greens analyzed, which I did—and I was surprised to learn that most of them were only slightly acid, and that two of them were neutral. This demonstrates that you can not by the continuous use of sulphate of ammonia get too much acidity in the soil. This also shows that when the soils obtain a certain degree of acidity, an acid reaction takes place, and gradually brings the soil back to neutral—its former condition.

We know that the bent grasses, whether they are raised from seeds or stolons, have very shallow roots and remain close to the surface, and we are informed that fertilizers, such as nitrate of soda, cotton seed meal, sheep manure, and several others, contain a large percent of nitrogen. After these have been applied to the turf and receive a heavy watering either by rain or sprinkling, the contents of these fertilizers are forced too deep into the soil, and very little of it is able to reach the roots of the bent grasses. We often wonder why foreign grasses thrive better in our putting greens than bent—one of the chief reasons is that they are getting the benefits of the above named fertilizers—which the bents are not getting. Sulphate of ammonia is a very light nitrifying gas and remains close to the surface. On this account it has a tendency to starve out a large number of foreign grasses and obnoxious weeds.

Worms Dislike Sulphate

For the past ten years I have never used any worm eradicators, although our course is fairly alive with angle worms. The first two weeks in the early spring and in the late fall we get quite a number of them. But as soon as the soils in the putting greens warm up, the angle worms disappear. They do not like to work in soils that throw off nitrogen gas from sulphate of ammonia. The first two weeks that the angle worms are throwing up worm casts prove to me that they are beneficial to our putting greens. They create numerous channels in the soil, so that later in the season water will penetrate quicker into the subsoil, and allow the energy from the sunrays to draw it up to the tiny hair-roots in the form of a vapor to the grass plant when it is needed, when conditions are such that the capillary movements go up and down in the soil freely. It is a good plan to water heavily and seldom; when we water often and lightly the grass roots come to the surface for water when they should be going deeper into the soil.

Encouraging Nitrifying Bacteria

If I were to be asked "why" I make compost, my answer would be that one of the principle reasons is to breed into the souls nitrofying bacteria. These bacteria take the organic material which the compost contains, help to decompose it, and release the various fertilizing elements, so that when they are applied to the soil intended to topdress they become immediately available as plant food for the grass. Another reason "why" we

make compost is to topdress the putting greens with a porous soil, in order to make the putting greens true.

A Probable Cause of Brown Patch

On most of our up-to-date courses I believe that we are getting our putting greens too rich; we are getting too much organic matter into the soil, and we are often using the compost before it has had time to decompose. I believe that this may be one of the chief reasons for the breeding of fungi, or what is known as the brown patch disease. When this organic matter from the compost, that has not had time for the bacteria to tear the various elements apart for available plant food, is placed on the putting greens, and later washed into the soil, it lies there as decaying material, which later produces a poisonous substance in the soil. When the humidity becomes heavy for several days it causes the surface of the soil to sweat and prevents an equal distribution of air entering and leaving the soil. But on several portions of the turf on the putting greens there are what we may call air pockets, which the humidity has failed to close up. The poisonous gases in the soil escape through these air pockets, causing the rapid growth of mycellium, which has the appearance of cobwebs on the grass. If these are not destroyed before the heat of the sun strikes them, the pollen from this mycellium spreads out and closes up the pores of the blades of grass, preventing the upper part of the blade containing pores to obtain oxygen, and the lower part of the blade, carbon. This causes the grass to wither and die. We may often check the fungus disease by observing at the commencement of heavy humidity that the putting green mowers are not cutting the usual amount of grass. It then becomes necessary to apply at once a slight application of a quick acting fertilizer. This has a tendency to strengthen the blades of the grass, and aids in helping to throw off this poisonous matter.

Charcoal Improves Putting Surface

There is another important item relative to greenkeeping, and that is to know the best methods to keep the putting greens in a good porous condition, so that when the player makes a good drive on the putting green, the golf ball will bite well and not bounce off the green. We often create this condition by the use of pulverized charcoal, especially where silt and clay loams predominate. It tends to make the surface firm and porous. During the playing season, especially should it be a dry one, it helps to prevent the surface of the soil from baking and cracking open, thus preventing the nitrogen gases from escaping out of the soil. After a heavy rain or watering charcoal expands, thus allowing more water to enter into the subsoil.

Golf Grasses

The most important grasses used on a golf course are the various bents, fescue, red top, bluegrass and poa annua. In the northern latitude the bents are the favorite grasses so far as putting greens are concerned. However, since the World War we have not been able to obtain a good variety of bent seed. This has caused a good many courses, which have been built since then, to plant their putting greens with red fescue. But owing to the fact that it will not stand close cutting, it has proved very unsatisfactory. Red top often makes a fine appearance the first season, but in the second season it has a tendency to die out. The best place for the bluegrass is on the fairway, although it does not do well in extreme dry weather. Poa annua will make, if properly taken care of, the finest turf for putting greens—however, it is very treacherous. It requires lots of water and feed, and must be cut very close when it is seeding heavily. I would recommend that poa annua be used only by competent greenkeepers.

Time will not allow me to enter into all the ramifications of greenkeeping. I am well aware of the fact that it is difficult, if not impossible, for any one at a distance to give advice of any real value, much less to dictate any hard or fast rule as to what may be right or wrong for others to do. Experience teaches us to appreciate the fact that what may be the right thing to do in one place may be the reverse in another. Therefore, I have tried to outline methods that have proved satisfactory to me on a number of courses which I have visited in an advisory capacity.

Nature Never Subjugated

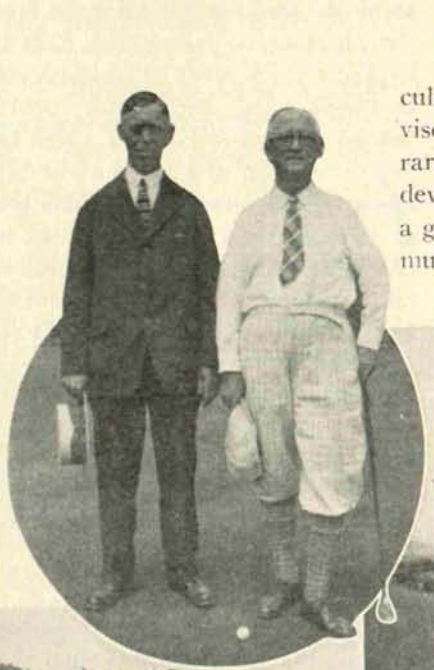
I have endeavored to lay before you our methods of the past and present regarding greenkeeping. What the future has in store for us, I do not know. But I am inclined to believe that with so many new courses being constructed with the intention of further progress, the greenkeeper, who is aiming to give the services that will be demanded, will be compelled to be well versed in botany and plant pathology. While we all realize that the best education he may get is from practical experience, yet I am of the opinion that knowledge along theoretical lines helps.

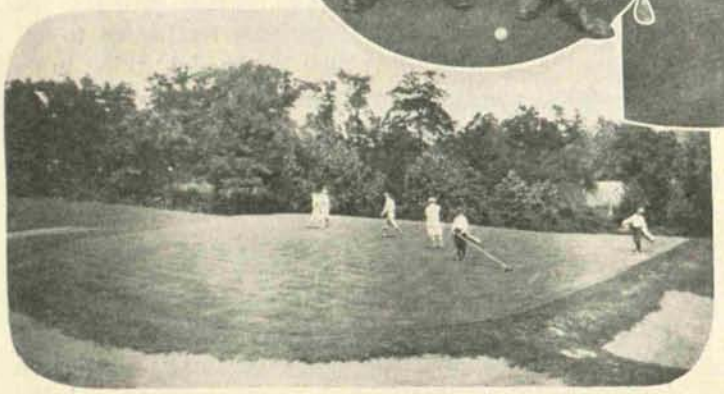
In the many callings of life there are many vocations where one can, by perseverance, industry and skill, reach the top of the ladder of fame, but greenkeeping is one of a few where it is impossible to reach it, for nature, Mother Earth, will not let him. She will only allow him to go so far and no farther. She is looking forward to the protection of future generations, and when we endeavor to try and get ahead of Nature, she penalizes us by producing insects, bugs and various fungus diseases, in order to check us. While it is true that we will eventually learn to eliminate these pests, yet we are apt later on to get diseases of the turf more disastrous. Greenkeeping really belongs to the Arts and Sciences—for Art creates and Science discovers.

Twenty-Five Years

By JOHN
Greenkeeper, Pittsburgh Field

While all my associations in twenty-five years of keeping greens in the Pittsburgh district are dear to me, "if I had my life to live over again," as many a man has said, I think I would distribute those years over a greater area before settling down to one course.



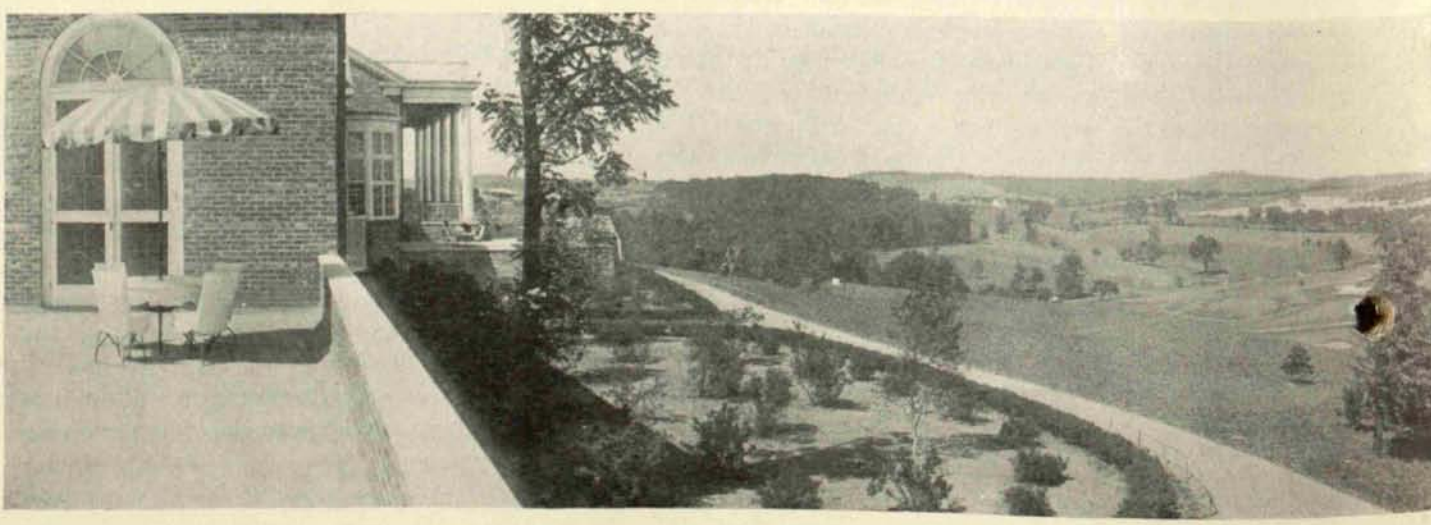


Views of the Pittsburgh Field Club, Pittsburgh, Pennsylvania

Upper left, to right: John McNamara, Greenkeeper, with John W. Carr, Chairman of Green Committee.
Upper right: Clubhouse.
Lower left: Eighteenth Green.

The young greenkeeper will do well to keep greens in several districts for a number of years, and bring to the golf course he finally settles upon, a variety of experience in soils and the culture of golf turf. I do not mean by this that I would advise a young man to become an irresponsible nomad, for this rarely pays in any line of work. However, ten years or so devoted to working on four or five golf courses, will develop a good knowledge of greenkeeping methods which will be of much value to a young greenkeeper who wishes to give dollar for dollar to the club engaging him for a permanent position.

As is well known, Pittsburgh is built upon a succession of hills, and perhaps it seemed in a measure homelike to me when I first arrived, as I was born at the foot of the Tipperary hills in the south of Ireland. There I worked on a farm until I was twenty, at which time I left for Eng-



The First Nine, Taken from the Club House Veranda.