Bulletin *of the* Green Section *of the* U. S. Golf Association

Vol. I Washington, D. C., July 20, 1921 No. 7

A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

ISSUED BY THE GREEN COMMITTEE OF THE UNITED STATES GOLF ASSOCIATION

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Announcements

Subscription Price of The Bulletin

Up to the present issue subscribers to THE BULLETIN have been limited to golf clubs. The price, including the help of the service bureau, is $15 per year to clubs that are members of the U. S. Golf Association and $20 per year to clubs that are not members of the U. S. Golf Association. This difference is based on the fact that the Green Section is financed in part by the U. S. Golf Association, all of whose funds are contributed to it by member-clubs. Therefore it is simple equity that such clubs should secure the publication and service of the Green Section at a smaller subscription price.

Each golf club that is a member of the Green Section is entitled to receive two copies of THE BULLETIN, one intended for the chairman of the green committee and the other copy for the greenkeeper.

It is manifestly to the good of golf that THE BULLETIN have as wide a circulation as possible among golfers. In addition it is desired by many libraries who have learned of the publication. The Green Committee has therefore decided to fix other subscription rates as follows:

Additional copies to member-clubs for individual members thereof, $2 per year, the applications to be forwarded by the secretary of the club. It is hoped that each member-club will forward a goodly list of such individual subscriptions.

To libraries, $4.00 per year.

Meeting of the Green Section of the United States Golf Association

An informal meeting of the Green Section will be held in Washington, D. C., Thursday, July 21, 1921, at the Wardman Park Hotel, at 8 o'clock in the evening. Besides the regularly appointed delegates, the meeting will be open to all interested in golf turf problems.

The program will consist of brief addresses on the progress thus far made by the Green Section and the future ambitions, to be followed by open discussion of any matters of interest.

The great prevalence this season of the "brown-patch" fungus, the most serious of all turf problems at present, makes this a very timely subject to discuss.

Visitors should embrace the opportunity to visit the turf experimental garden at Arlington and the different golf courses about Washington.

Decay of Leaves

Some investigations have been conducted on the decay of leaves in the making of what is commonly called leaf mold. The acidity of freshly fallen leaves is found to be so high that it frequently takes as much as 25 tons of pulverized limestone to neutralize a compact layer six inches in depth and of an acre area. In specific tests made, red oak leaves required 16 tons, maple leaves 22 tons, and white oak leaves 25 tons. As decay progresses, the reaction changes from acid to alkaline owing to the lime the leaves contain. Only leaves so thoroughly decayed that they have lost their texture should be used as a humus-supplying material for top-dressing putting greens.

ADVERTISEMENTS

The receipt of many requests from manufacturers of equipment, purveyors of materials, and the like, for advertising space, necessitates a statement of the policy of the Committee in respect to advertising. The Committee is not unappreciative of the compliment implied by these offers, but the acceptance of compensation from advertisers will involve on the Committee obligations which it can not and must not assume.

THE BULLETIN is maintained by the subscriptions of member-clubs and by the United States Golf Association, and its only interest is the interest of the golf clubs of the United States. If it serves its purpose, the cost to the member-clubs, especially after this year, will be so little in comparison with possible benefits that there will be no occasion to accept the financial aid of advertisers. The established golf journals furnish a most satisfactory medium through which advertisers can reach the buyers, and we have no wish to encroach upon their field. We wish to maintain independence of thought and action which will be impossible if we incur even an indirect obligation of loyalty to advertisers. We have nothing to sell, and only information and advice to give for what it may be worth. Occasionally references to advertised articles or services may be made, but it will always be found that it is for some purpose other than the promotion of the interest of the maker of the article or the person having services to sell. The members of the Committee recognize the merit of the wares and services offered by many advertisers, and will welcome their aid in the promotion of the aims of the Green Section when it comes in the way of useful and sound information free from self-interest. If the manufacturer of equipment can give us information as to its use and care without advertising his own particular goods, we shall be pleased. And so, in other lines, the information useful to our readers is eagerly sought. But we have nothing to sell, and we can not permit others to offer anything for sale through THE BULLETIN.

There is no claim or pretense that the members of the Committee or the Committee's scientific advisers are omniscent. They distinctly are not "experts." Though readers may not accept the views expressed in THE BULLETIN, they will not be permitted even to suspect that our views arise from or are colored by self interests.

For these reasons nothing in the nature of an advertisement will appear in THE BULLETIN.

An Appreciation

"The Green Section is the greatest imaginable comfort. Its value to those who will take advantage of it is beyond computation. Each bulletin is fully worth the annual dues of $20. No golf club can afford to fail to join the Green Section and take advantage of what it offers, even if the dues were ten times $20."—Mr. W. E. BARRET, *Chairman of the Green Committee, Hermitage Country Club, Richmond, Va., June 21, 1921.*

Hawaii Joins the Green Section

The Oahu Country Club, Honolulu, is one of the recent additions to the Green Section. Surely there is a wide field of usefulness open to us.

Vegetative Propagation of Putting Green Grasses

C. V. Piper and R. A. Oakley

Any grass can be propagated in at least two ways, one by seed, the other by a portion of the parent plant. In bunch grasses a tuft can be subdivided into many portions each of which will grow readily. In creeping grasses a new plant can be produced easily from a single joint of a rootstock or runner. This can indeed be done with nearly any grass, but it is particularly easy with creeping grasses. Indeed, it has long been employed by farmers in planting fields to such grasses as Bermuda and Para. This method of planting is called *vegetative propagation.*

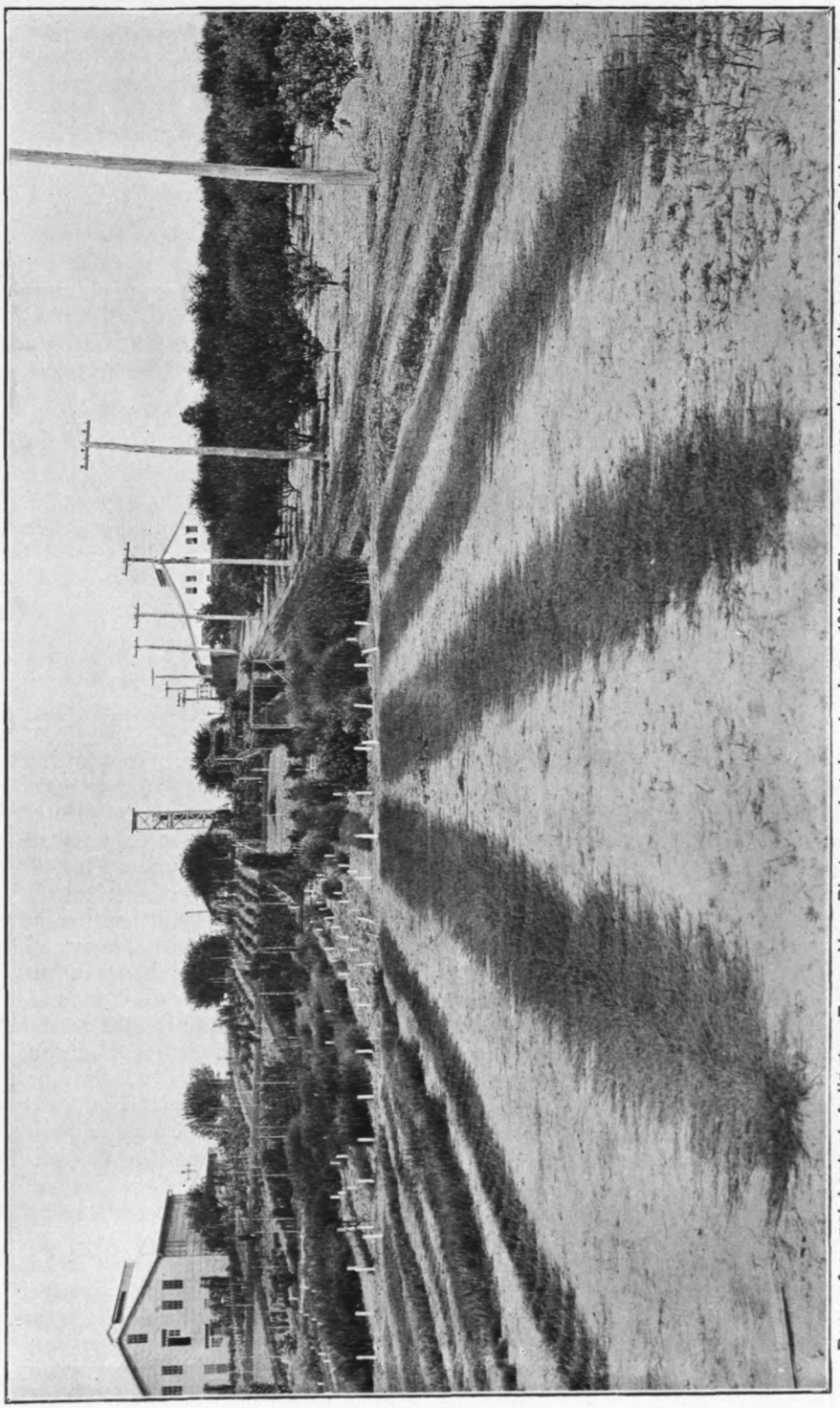
Some years ago, in studying the behavior of creeping bent—all in all, the best of putting green grasses—we discovered that a single plant, under favorable condition, would make a mass of turf six feet in diameter in a single year. The turf really consisted of innumerable runners, or stolons, radiating from the start at the center and rooting at each joint. It was at once evident that this grass could easily be propagated vegetatively. The runners were lifted, chopped into joints about two or three inches long, scattered over well-prepared soil, rolled in, and then covered lightly with soil. The quickness of growth of the joints thus planted is truly astonishing. At first only small plots of turf 8 by 8 feet were thus produced, the turf from each parent plant being perfectly uniform in color and texture. The finest of these were selected for further investigations.

To propagate the selected strains in quantity, runners placed end to end were planted in rows 6 feet apart, about the middle of September. As each runner is about 3 feet long, it takes only about 35 to plant a row 100 feet long. A year later each of these rows had developed into a broad band of grass 6 feet in width (see illustration). This amount of runners is sufficient to plant a large putting green by the vegetative method—that is, simply by cutting the runners into lengths of 2 or 3 inches, scattering over the prepared ground, pressing them in with a light roller and then covered with a thin layer of good soil.

The whole thing is extremely simple. Perhaps the only surprising thing is the ability of creeping bent to form runners. On an old putting green seeded with German mixed bent, the individual plants of creeping bent are seen as circular patches a foot or more in diameter and varying in color from green to decidedly bluish green. In reality the circular patch was made by radiating runners; but these grew comparatively slowly in the dense sod. Plant a small piece of this turf an inch square in open growth, and it is really surprising how rapidly it produces long creeping runners.

While any grass can be propagated vegetatively, it is only with the creeping grasses that it can be done cheaply on a large scale. Grass thus propagated is perfectly uniform, and of like color and texture to the parent plant. Therefore by this method the quality of turf made by any single plant can be increased without limit.

Already a considerable number of putting greens have been planted by the vegetative method. It can safely be said that some of these greens, notably No. 9 at the Columbia Country Club, and No. 9-A at the Potomac



Rows of carpet bent at Arlington Farm, Va. Photograph taken in June, 1918. The rows were planted the previous October and when planted each consisted of a single row of runners; the following June these rows were 3 feet wide, and by the first of October 6 feet wide

Golf course, both in Washington, are covered with the finest turf ever grown anywhere at any time.

But there is the inevitable fly in the ointment. The bents are greatly subject to the "brown-patch" disease which so greatly injures putting greens in July and August and which, indeed, is the most serious menace to fine turf that we have to confront. The vegetative greens suffer no worse than seeded greens, but fully as much. Many selections of creeping bent have been made in the hope of finding strains immune to the disease. Thus far strains more resistant to the disease have been found, but none truly immune. If such a one can be found, the vegetative method for creeping bent could be recommended without stint. Even as it is, the beauty and perfection of vegetative greens are far superior to seeded greens, and the cost of making them not much greater. Indeed, after a turf garden is once established, the vegetative method is quite as cheap as seeding. If a turf nursery such as above described is left undisturbed two years, the turf will be perfectly solid and can be lifted as sod.

Many member-clubs will doubtless wish to try out the vegetative method. To a limited number of such a supply of one of the best selected strains of creeping bent sufficient to start a turf garden can be supplied. These runners should be planted in well prepared ground, in rows 6 feet apart, in September. A 100-foot row will in one year give enough material to plant one putting green.

Killing Chickweed with Arsenite of Soda

ALAN D. WILSON

Some years ago my lawn was infested with chickweed. In turning to that ever-present help in all grass troubles "Turf for Golf Courses," I found that the annual variety could be killed with a spray of arsenite of soda in solution but that the perennial kind could only be gotten rid of by cutting out. The difficulty was that I was too ignorant to know whether my chickweed was annual or perennial. Some time later two of my friends who were in the neighborhood looked over the lawn and told me that as far as chickweed went I was entirely catholic, as I had both varieties. I knew it would be quite impossible to explain the difference between the two to the gardener, especially as I was not at all clear about it myself, and so I bought him the arsenite, told him the proper amount to use, and instructed him to spray every patch of chickweed he could find on the lawn, thinking that in this way we would at least kill the annual variety.

The results went beyond all expectations, as the solution not only killed the annual but also the perennial, and without at all injuring the grass. This was reported to my friends with the statement that their medicine cured more than they claimed for it, and while they did not frankly disbelieve me I suspect they thought the result of the experiment was a pure freak.

This year the third fairway on the west course of the Merion Cricket Club was in rather bad condition and was literally filled with chickweed, patches from 6 to 18 inches in diameter, some of the common kind (the annual), but nearly all, certainly 98 per cent, of the perennial or mouse-ear chickweed, the fellow with the deep green color and the hairy leaves (*Cerastium vulgatum*), also called "Creeping Charley."

Encouraged by my success at home, we determined to try to eradicate it with the arsenite solution, using 8 pounds to 50 gallons of water and applying with a spray-pump. We made the application about April 10, one man pushing the barrel, which was on wheels, and working the pump, and the other man locating the patches and directing the spray. It took them 8 hours to cover the entire fairway and they used 2 barrels of water and 16 pounds of arsenite. A few days later the chickweed turned brown, and 10 days later it was dead, and the small amount of grass and yarrow which was in the chickweed patches was entirely uninjured. The fairway was reseeded and topdressed and now, 7 weeks after the application, the young grass is growing nicely. In a few instances there are signs that the chickweed is growing again from the old roots, but these are very few—certainly less than one per cent, and on the 99 per cent, we seem to have gotten complete destruction.

We had thought that the early spring was the best time to do this work, as it would kill the chickweed before it had gone to seed, and that we would get a better germination of the new grass seed. The only objection we have discovered is that crab grass is beginning to grow in the bare patches, as it naturally would, we having prepared for it what is really a perfect seed bed. This makes us wonder whether it would not be better to do the work late in August, when the germination of the crab grass seed would be over, and then plant the grass seed and topdress by the first of September. We have two other fairways which are quite badly affected and intend to treat them in this way late in August.

This method is so simple, its action so prompt, and its expense so small, that we thought it might be of use to other people. The cost for one fairway was as follows:

16 pounds arsenite of soda at 32 cents.....	$5.12
Wages, 2 men, 8 hours, at 35 cents.....	5.60
	$10.72

I have not included the cost of reseeding and topdressing, as we would have been doing that in any event.

Of course, this treatment is still largely experimental; it may well be that our results here can only be obtained in this or a few other localities, but we would be glad to have other people try it elsewhere, in a small way at first, and see if they get the same result.

We would not recommend this treatment for the greens, as it would leave unsightly brown spots which could not be covered for 3 or 4 weeks. There, the best cure is to cut out the chickweed with a hole cutter and replace with good grass. If, however, you have a green that is so full of chickweed that it would be impossible or impracticable to cut it out and you do not wish to go to the large expense of resodding the entire green, it might be well to try this method on one green, or part of one, as an experiment, and if the new seed was planted by the first of September you ought to be rid of your chickweed at a very small cost and be able to play the green 6 weeks later.

One word of caution.—Apply the solution with a spray and not with a watering pot. My gardener tried the latter method the second year, because he knew better than to do as he was told, and while he succeeded admirably in killing the chickweed he also killed the grass. The theory

of this is that when applied with a spray, the broad pulpy leaves of the chickweed absorb a large quantity of the solution, while the narrow, hard leaves of the grass absorb very little; when applied with a watering pot the solution goes to the roots and kills the grass.

The Use of Chemical Weed Killers on Golf Courses

ALBERT A. HANSEN

The use of chemical plant poisons as a means of eradicating and controlling weeds originated about 1895; hence the method is comparatively new. Although the use of chemicals offered great promise, further experimentation has demonstrated that the method has but limited practical use. There are situations, however, in which chemicals are helpful. There is a great deal of popular interest in the subject; but public knowledge concerning chemical weed killers is very scant. It is the purpose of this article to show where chemicals are useful in dealing with weeds on golf courses and to point out the limitations of the method.

In general, weeds on golf courses are troublesome mainly on putting greens, except in the cases of perennials, especially those possessing wind-distributed seeds, as the dandelion, growing in the rough and on the fairway. Weeds of this type should be eliminated whenever practicable in order to prevent the possibility of infesting nearby greens.

Chemical Control of Annual Weeds

In general, such annual weeds as crab-grass, shepherd's purse, and pigeon-grass can not be controlled economically on golf courses by chemical means. These plants must be controlled by (1) improving the turf so the grass will be vigorous, thus tending to crowd the weeds out, or (2) by hand weeding.

With one species, common chickweed, successful results have been obtained by spraying with a solution of sodium arsenite prepared at the rate of 6 pounds of the chemical in 50 gallons of water. To be successful, the work must be commenced early in April, before the chickweed has made a heavy growth. Iron sulphate* has also been quite effective against chickweed. For this purpose the solution should be prepared at the rate of 100 pounds of the sugar form of iron sulphate dissolved in 50 gallons of water and applied as a fine, driving mist. Compressed-air hand-sprayers suitable for this work can be purchased for about $8. Neither the arsenite nor the iron sulphate spray will cause permanent injury to the turf, but the arsenite is a potent internal poison and grazing animals should not have access to the sprayed vegetation.

Chemical Control of Perennial Weeds

Perennial weeds as they occur on golf courses are of two general types, those that reproduce from running underground parts, such as

*The names of dealers in iron sulphate and other chemical weed killers and of distributing agents for weed-killing devices can be obtained on application to the secretary.

Applying chemical weed killer by means of a bucket pump, a method adapted to small areas.

speedwell, creeping thyme, and ground ivy, and those that reproduce by means of heavy crowns, the most conspicuous examples of which are the dandelion and plantain (rib-grass).

Chemical plant poisons have little use where it is desired to kill the creeping type of perennials, since if the above ground growth is killed by this means new shoots will soon arise from the underground structures. If the soil is sufficiently saturated to kill the underground parts, it will at the same time be sterilized against the growth of good turf plants. The only practical means of dealing with this class of weeds is to cut out the patches of weedy turf and resod.

Chemicals are useful, however, in eradicating weeds of the dandelion type. Where they do not occur in great abundance, dandelions may be killed by the application of gasoline, kerosene or carbon bisulphide to the individual plants. A very useful and inexpensive device for this purpose is now on the market. It consists of a tube with a valve on one end and a handle on the other. The tube is filled with gasoline and as each plant is stabbed with the valve end, a small amount of gasoline is deposited. The method is too laborious to advocate except where the weeds are few in number and scattered over the turf. Plantains have also been successfully controlled with crude carbolic acid used full strength and applied to the individual plants by means of a spring-bottom oil can or with the device above mentioned. The method is useful only when the plantains do not occur in large numbers.

A method of controlling dandelions by spraying with iron sulphate

has recently been developed. The spray solution is prepared by dissolving iron sulphate at the rate of 1 to 1½ pounds per gallon of water and spraying five times during the season, the first time just as the blossoms unfold during the early spring, and at intervals of a month thereafter. The method is useful on large, heavily infested areas where the grass is vigorous, particularly on bluegrass turf. On Bermuda grass, redtop, and bent grass turf the method is not to be recommended. Spraying will not eradicate the dandelions entirely, but will so diminish the number that the turf can be kept practically free of the weed for several years afterward with comparatively little effort. The spray kills the white clover and gives the grass a darkened appearance for a few days. Before investing in expensive spraying machinery, the method should first be tried out on a small scale with a hand-spraying outfit to determine its practicability under the conditions presented.

The results of European experiments indicate that weedy mosses growing on the turf can be controlled by spraying with a 5 per cent solution of iron sulphate followed by sprinkling several times with a 3 per cent solution of nitrate of soda. The method has not been tried extensively in America. The little experimental work that has been done along this line indicates that iron sulphate will kill the weak annual mosses, but when used against the more vigorous perennial mosses, defoliation results, followed by renewed growth of the treated plants. The moss problem is usually dealt with by drainage or by the application of lime.

Chemical Methods for Destroying All Vegetation

For situations where the permanent destruction of all vegetation is desired, as on sand greens, edges of clay tees, and in bunkers, chemical weed killers will probably find their greatest usefulness. In addition, they can be used to advantage on gravel walks and driveways, in gutters around the clubhouse and on tennis courts.

The most effective and economical chemical for destroying all vegetation is sodium arsenite in solution. It is the basis of practically all commercial weed killers. On small areas, or for test purposes, it is most economical to purchase such solutions already prepared. Most large dealers in garden supplies sell commercial chemical "weed killers."

Where the area to be treated is large, as on sand greens, home-made solutions are most economical. The following formula has the advantages of generating its own heat and yielding a high-grade product, but has the disadvantage of needing extremely exact procedure in order to obtain good results, and in addition the sodium hydroxide or the high-grade lye necessary are not always readily obtainable.

Granulated caustic soda (sodium hydroxide)	2 pounds
or	
High grade concentrated lye	3 pounds
White arsenic (arsenic trioxide)	4 pounds
Water, to make	1 gallon

The solid ingredients should be mixed in a wooden, granite, or earthern vessel, and the water added slowly, stirring vigorously in the meantime. The chemical action develops much heat so that the preparation is self-boiled, but if some of the arsenic is undissolved, the mixture must be reboiled until all of it enters in solution. After cooling (never before cooling), sufficient water should be added to replace the amount lost in

boiling. The solution should be used within a week after preparing, or else stored in air-tight receptacles. Apply in diluted form, using 1 gallon to 50 gallons of water.

Where the preceding formula is inconvenient, another may be used which has the advantage that the ingredients are more readily obtainable. Its principal disadvantage is the necessity of boiling by means of fire. Furthermore, the product is not quite as effective as the product of the preceding formula.

Washing soda (sal-soda, sodium carbonate)	8 pounds
or	
Soda-ash (anhydrous sodium carbonate)	4 pounds
White arsenic	4 pounds
Water, to make	1 gallon

Boil the mixture until a complete solution is obtained. The result is a stock solution, a gallon of which should be added to 50 gallons of water when ready to use.

In addition to the home-made products another choice is offered. Arsenite of soda may sometimes be obtained already prepared, ready to dissolve in water. The formula in this case is 1 pound of sodium arsenite (arsenite of soda) dissolved in 10 gallons of water and used direct.

The solutions should be applied at the rate of approximately 600 gallons per acre by means of a sprinkling can, watering cart, or hose equipped with a nozzle. The best time to apply the poisons is on cloudy days, since they evaporate too rapidly during dry, hot weather. In case a dense growth of vegetation exists, it is best to mow before spraying. Several sprayings may be necessary in order entirely to kill the perennial weeds.

A word of caution is necessary in handling arsenical compounds. Arsenic is a dangerous internal poison, and grazing animals should be kept away from the sprayed areas. Furthermore, arsenical dust should not be inhaled while preparing the weed-killing solutions. Caustic soda is also dangerous to handle, since it burns the skin readily; hence bare hands should never be allowed to touch it.

Another chemical that may find use where the complete destruction of vegetation is desired, is common salt applied dry every three or four years at the rate of 1 to 2 pounds per square foot of area treated. Most vegetation succumbs to the effects of salt, but several grasses are immune, particularly Johnson grass and Bermuda grass. For weed-killing purposes, the cheapest grade of salt obtainable is most economical. The grade called agricultural salt, consisting of dirty and off-color salt, is usually cheapest. Ice cream factories use a cheap grade of salt useful for killing weeds. Salt may also be sprayed in saturated solution (about 3 pounds for each gallon of water) at the rate of 400 gallons per acre.

Fertilizer

Modern commercial fertilizers are called "complete" when they contain nitrogen, potash and phosphorus. These three elements have been found to be the most generally useful to stimulate the growth of plants. For grasses, at least, nitrogen is as a rule far more effective than are potash or phosphorus or both. Nitrogenous fertilizers may be *inorganic* or *chemical*, as for example nitrate of soda and sulphate of ammonia; or *organic*, as bone meal, cottonseed meal, tankage, fish scrap, etc. Barnyard manure is a complete fertilizer but rich in nitrogen.

Sodding at Inverness

W. J. ROCKEFELLER

The method of cutting, handling and laying sod at Inverness differs so radically from that followed by Dr. Harban at Columbia as described in the March number of THE BULLETIN that it may be of interest to describe our method and to mention some of the points of difference. We do not claim ours is the better method, or that we get better results, because there is little room for improvement on anything passed as acceptable at Columbia.

It should be mentioned first that ours is a sandy loam soil, with no stones, and it is naturally easier to handle our sod than if the soil were of clay. Since our course was started, every green has been moved two or three times, and in every case the method of resodding used was the same.

If we were to move a green, we should use no particularly fancy system or specification, but would see that the new green was so located as to have good drainage, and, if necessary, we should put in enough soft tile to give drainage. We should then build up the green with at least 12 inches of good top soil, enriched by mixing in some fertilizer—mushroom soil or good compost. When the green was laid up, we should prefer to let it settle as long as possible—certainly not less than a week. Our next step would be to rake it over and bring it to the desired grade and contour, which would be followed by rolling with a heavy hand roller. When it was ready for the turf, we should go over it again with the rakes to remove any depressions and to get the grade and contours exact. This would be done at the last moment while the turf was being cut.

We wish to describe our method so exactly that it can be tried out by anyone who is interested, but we fear our description will be tedious and more or less like what might be expected from a patent lawyer.

The first step in taking up turf is to block out the job and decide which way the turf had best be cut, and this depends on the best place to work the team. Let us assume we decide that our team can be handled best on a line running north and south. We then cut lines across our green, three feet apart, from north to south. This is done by laying boards across the green end to end, and cutting along the edges, and by using an ordinary edger. We now have our green sliced, so to speak, into strips three feet wide running north and south.

The next step is to set up the rig for cutting. This consists of an ordinary horse-drawn sod cutter, a woven wire cable or rope about 100 feet long, a block (pulley) through which the cable or rope may pass, a clevis to fasten the block to the plank next mentioned, a plank 2 by 10 inches, into the back of which notches 12 inches between centers are cut to hold the clevis, and finally a couple of stakes or pieces of iron pipe, or something of the sort, to drive into the ground to hold the plank in place.

We have sliced our green into three-foot strips running north and south, so we must cut our sod from east to west. The next thing we do is to fix the plank—say, 6 to 8 feet off our green to the west, laying the plank on a north and south line. The pieces of iron pipe or stakes are driven into the ground through two notches, one in each end of the plank.

The clevis is now put on in say the last notch on the north end of the plank, the block is fastened on, the rope or cable is rove through the block,

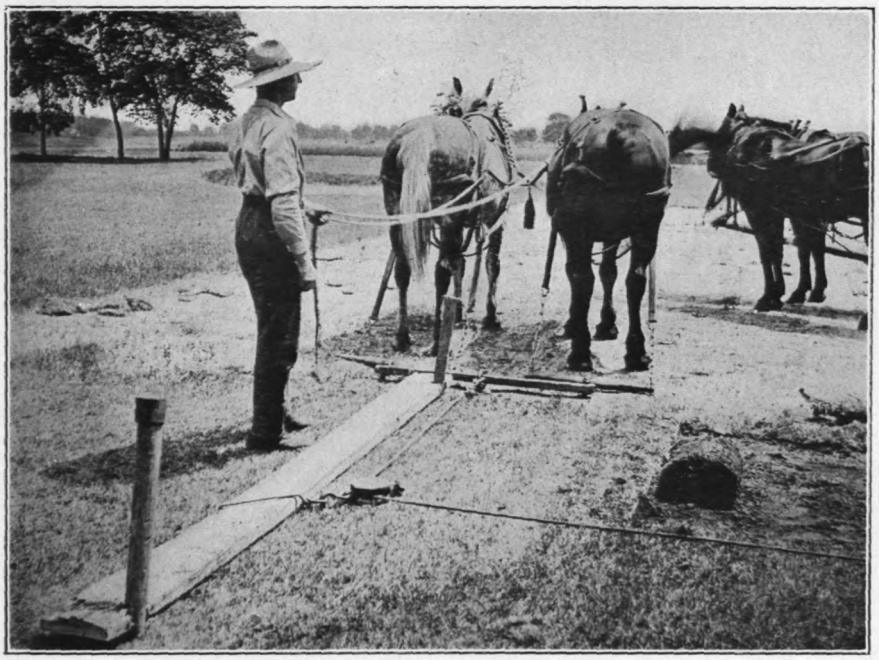


Fig. 1. Showing the method of attaching the cable to the plank, the team pulling at a right angle to the line of cutting.

one end is fastened to the sod cutter, and the other to the team, and we are ready for business.

The long cable lets us work our team off the green. The plank is set 6 to 8 feet off the green to give room to work and room for the sod cutter to run off the green. The long cable also gives a low, flat, even pull on the sod cutter; and inasmuch as the notches in the board are at fixed distances apart, it follows that the strips of sod will be of even width. If bunkers or traps are in the way, the cable can be as long as is necessary to get a good place where the team can work without damage.

We go to all this preliminary trouble to be sure our sod cutter will work on a perfectly straight line, and so our pieces of sod will be exactly the same width and all three feet long, and so all lines will be true and angles square. Some little sense and practice is required to handle the team, and some one must ride the sod cutter to weight it down.

As soon as the first strip is cut, the sods are rolled compactly and slid say 6 inches off the line on which they were cut so they will be out of the way of the next cut. This operation is followed until we have the whole green cut and the sod piled in rows.

The photographs which accompany this article were taken when the Green Committee of Detroit District Golf Association visited Inverness with the Detroit greenkeepers.

One photograph shows how the team is attached to the plank at right angles to the line of cutting. Another shows the sod cutter hitched to the cable. The rows of cut and rolled sod were removed before this picture was taken. Another photograph shows the plank, clevis, etc. The notches

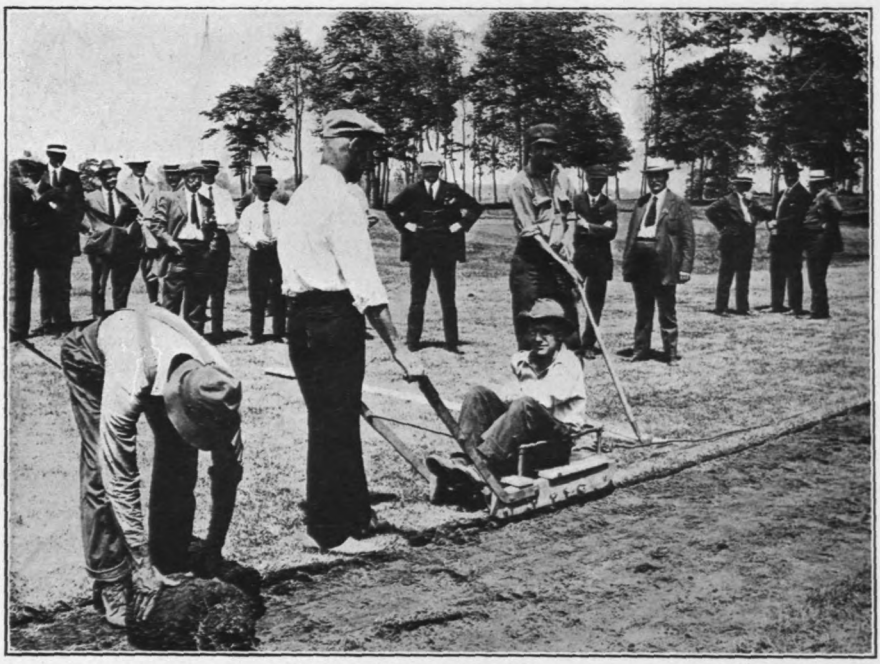


Fig. 2. Cutting the sod.

in the back edge of the plank which engage the clevis are one foot apart. It will be noticed the team is working at a right angle to the line of cutting.

A third photograph shows how each turf is rolled as soon as cut. There is nothing of any consequence to our method except, we believe, the notched plank and the long, flat cable pull, which let us do the work accurately and avoid trimming.

We are now ready to lay the sod on our new green, and the first step is to lay boards end to end in a true line across the green—it is not yet green, but soon will be. The first line of sod is laid clear across the green against an edge of the boards, using care that the line of the edge of the sod is true and always against the boards. As soon as one line or strip of sod is down, lay a line of boards on it so the men can work without damage to the sod or the prepared surface of the green.

We always carry our sods by hand, as we believe the weight of a barrow load even on the board is not good, and we thus avoid damage from careless handling. There have been times when we felt spry enough to wheel a barrow along a slack wire, but our gray hairs have made us cautious, and we will not trust anyone on a green in process of making. We lay the sod down and unroll and fit the ends together carefully. This is not very difficult, as we were careful to slice our turf at a right angle to line of cutting.

The sod stretches more or less in cutting and rolling, so we take out all the stretch or slack by compressing the edges together; that is, by taking hold of the strip being laid about the middle and pulling or compressing it against the end of the strip already laid. This takes the stretch or lengthwise slack out, and we compress the strips by pulling on

Fig. 3. Rolling each turf separately for safe moving.

them sidewise against sod already laid to take out any such stretch. That operation is just a little difficult to explain in words, but we aim to compact the turf to as near its original state as possible.

We are careful to get all edges flush and even and the surface must also be even. The edges are naturally even and the sod is pretty uniform in thickness. The surface of edges must be kept even. This is done by fitting them so and pushing both edges into place and to the same surface at once. It will not do to attempt to fit the surface of one strip of sod to that of one already in place, as they will never get true. Thus it can be seen we work always to true the outside edge of the strip in place and the inside edge of the strip being laid. The men always work on boards to avoid injury to the surface.

Next we tamp lightly to compace the sods and get to a smooth surface, and sometimes we follow this by rolling. We then topdress and work in the dressing carefully with brooms, mats, or poles, and our green is ready to use. Of course, we should prefer to let the job rest a week or two to give it a chance to knit, but many and many times the play has started on the newly laid turf before the green was completed. Our players have dispositions that are none too sweet, and they do not think loving thoughts when they miss puts on account of the condition of a green, so when we say the greens are ready for play, we mean they afford pretty fair putting—lots worse in the world.

Our No. 9 was built and sodded between July 4 and July 15, 1919, and was in fine shape for the Ohio State Open Tournament in September. Our No. 18 was finished June 29, 1920, and went into the National Open Tournament August 10. If it was not good, at least no complaint was heard from those whose last putts left them outside the money.

We think we can move turf as well in July or August as any other time, but naturally it requires more care. If it is very dry, the turf must be prepared for removal by being soaked with water two or three days and then being allowed to dry out till it can be handled nicely. The ideal time, however, in our experience at this place is May or June.

We do not feel that good results can be obtained in this climate by moving turf late in the fall, as it seems to be "set back" and does not recover so quickly as turf moved in the spring or summer, and though we do not duobt that good results were obtained by winter turfing at Columbia, we should be fearful of results from even late fall turfing on our course, but still the winter is much more severe near Toledo than at Washington, and we have frequent freezing and thawing, which of course is hard on all plant life.

We would not think of chopping our strips of turf into chunks—say a foot square—as we can cut them into even strips 12 by 36 inches. By using an edger and care, we get all edges even and ready to lay. By so cutting the strips, it is not necessary to lay the turves in the order in which they are lifted—ours are interchangeable, all alike.

We do not leave spaces between the strips, and we should be horrified if a space one-eighth to one-quarter of an inch was left any place. We never saw sod buckle, though we have seen it shrink.

We believe it pays in results and saves time and expense to prepare for the job and to work carefully to a surface, and that it is much easier than fussing around later trying to accomplish what might have been done in the first place.

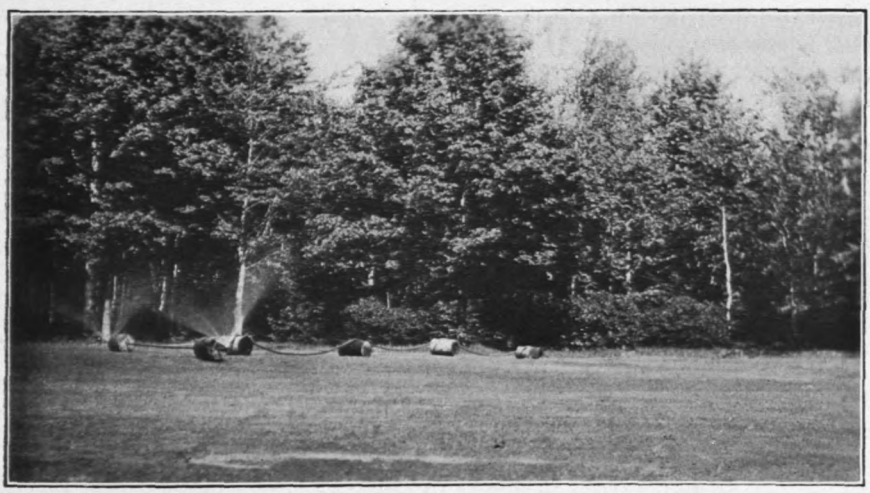
We want to make it plain we do not contend that our method is as good or better than any other. We offer it primarily for comparison.

A Novel Sprinkling Device

We are indebted to Mr. C. H. Moss, chairman of the green committee of the Wawonowin Golf Club, Ishpeming, Mich., for a description of a sprinkling device which he has designed and used with excellent results at Ishpeming. We quote Mr. Moss' letter:

"In the last number of THE BULLETIN we noticed several inquiries as to the best make of sprinkler. I shall endeavor to describe a device made under my direction with which almost any simple sprinkler can be used.

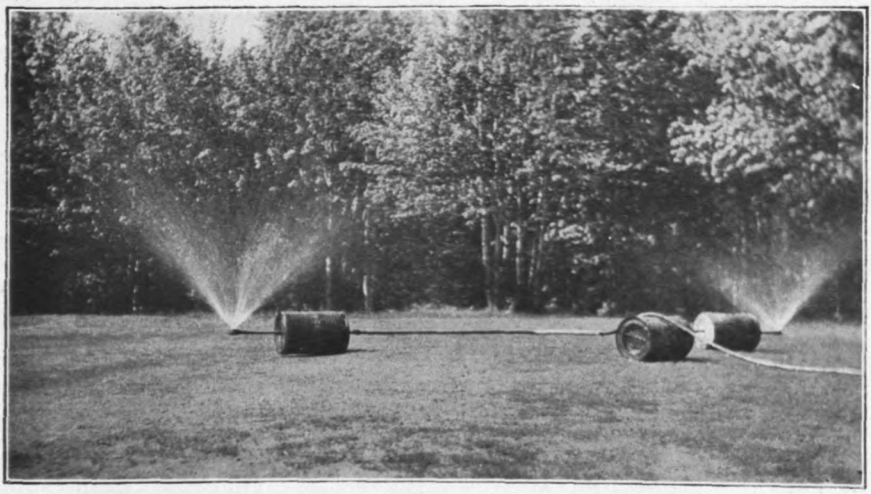
In the making of new greens a real problem is the shifting of the sprinkler; if you get near enough to lift it there remain footprints, and if you drag it even the hose itself will injure the new grass. To solve this problem of shifting we have resorted to the use of carbide cans. Any large round can should answer the purpose, but the carbide can possesses the advantage of being less susceptible to denting on account of its surface being corrugated. The accompanying photographs illustrate the arrangement. Carbide cans are a gift here when empty, and with wooden ends placed in them and centered with a hole that will admit a ¾-inch pipe they can be made into light rollers. Using a simple type of sprinkler, which never clogs or gets out of order, we place a sprinkler each end of a length of pipe, the distance to be determined by the water pressure at the given locality, and by connecting the hose at the middle, we have a double sprinkler supported on rollers 12 inches in diameter. We have a pressure at the golf grounds permitting the sprinklers to be placed 26 feet apart, and thus they



A novel sprinkling device in action—Wawonowin Golf Club.

sprinkle a zone 52 feet in width. We use hose 75 feet in length, serving any green not more than 150 feet in width, from faucets on each side. Starting the sprinkler as far away as the length of hose in use will permit, when the green is sufficiently wet in one place the apparatus is pulled toward you and gently rolled over the new grass. The extra carbide can nearest where the hose is attached to the pipe has to be removed after a revolution or two, but the can has then reached dry ground. The other cans, serving as idlers, support the line of hose. A few extra carbide cans, not attached, at intervals under the hose, would be helpful if the ground is powdery. The illustration showing the hose supported by the extra cans is No. 2 on the Wawonowin course.

"Any competent workman can construct one of these sprinklers in three hours' time. There is nothing about the sprinkler used to clog or get



Showing hose supported by a row of carbide cans.

out of order. Any sprinkler that revolves begins to wear out with the first turn, and no matter how carefully made will soon give an uneven distribution of water. Our sprinkler can be carried in one hand when occasion requires the following of a footpath through the woods. They cost so little that we are making more of them, and the hose is therefore all that we carry any great distance. The past month (June) has been hot and dry and we have found the device particularly valuable in watering at night, when the workman can not so easily watch his step. We have yet to find a footprint on any of our new greens. Even on greens that are well established it is not unusual to find evidence of thoughtlessness in changing the location of a sprinkler, requiring heavy rolling to correct. Rolling is necessary at times, but it is the antithesis of cultivation, and many a new green has been rolled to death, the only plants surviving being dandelion, plantain and crab-grass."

Turf Nursery

E. J. MARSHALL

Pictures of turf gardens may lead to the thought that a turf nursery is an extravagance not to be indulged in even by the more prosperous clubs; but it is not so. Every well-maintained course should have its turf nursery, in which turf for repairs should be grown and experiments should be made. Tees and greens can not be kept in first-rate condition unless good turf is available for replacement. Certain types of weeds, such as chickweeds and pearlwort, should be cut out as soon as discovered, when it can be done with an ordinary hole cutter. It is much easier and cheaper to maintain a moderate-sized turf nursery and use it to replace turf cut out to remove weeds, than to let the weeds get beyond control. There is always risk of losing a green or part of a green by disease, misuse, weeds or what not, and it is only a reasonable precaution to have spare turf in good condition for replacement purposes. The conditions and soils at two clubs are seldom alike and it is not an extravagance to maintain a little nursery in which three or four kinds of grass are grown and kept under observation. It is not necessary to keep the nursery in the pink of condition all the time as a green would be kept, but it should be kept healthy and vigorous. The great likelihood that vegetative propagation will supplant seeding as the means of producing fine, uniform turf, makes it clearly reasonable to keep a nursery to grow what might be called the breeding stock. A few rows of bent fairly well taken care of will furnish enough stolons to plant a large area by the vegetative method. A turf nursery, say one hundred or two hundred feet square, is a real necessity and in no respect an extravagance.

Starting Bermuda Grass Turf by the Vegetative Method

The following interesting note on the starting of Bermuda grass turf by the vegetative method is contributed under date of June 3, 1921, by Mr. Leonard Tufts, president of the Pinehurst Country Club, Pinehurst, N. C.: "There is another thing we have learned down there in the sand hills in connection with Bermuda which might be of benefit to the people where conditions are similar. After planting the roots of Bermuda we put on an ordinary spike-tooth harrow and keep the ground harrowed until we have a complete mat of Bermuda. It seems as if the harrow tears

up every root that is planted, but it keeps down the weeds, and we find that we get a good mat of Bermuda the first year; whereas if we do not harrow we have a crop of weeds that gets started ahead of the Bermuda and checks its growth, and it takes several years to get as good an effect as you can in one year by harrowing."

Dear Bill Letter III

Richland Center, N. Y., July 4, 1921.

DEAR BILL:

Instead of sobbing on my shoulder why don't you write to Cynthia Grey or Dorothy Dean and tell how your young life has been blasted? You certainly have less sense than Thompson's colt; and I believe it is an historical fact that it had none.

After all I've said you've listened to the *experts* again, because it was easier than working out your own problems. It you haven't enough interest to study and find out for yourself, don't expect me to waste perfectly good paper writing to you.

Of course, your expert was "johnny on the spot" with a satisfactory answer to all your questions and a complete solution of your troubles. Did you ever hear of the infant prodigy who could mystify audiences by multiplying 46,473.47 by 732,427,222 and give the answer as soon as the last figure passed the lips of his questioner? Expressions of wonder and great applause attended every exhibition until some person of less than ordinary intelligence inquired if it would be a good idea to take down the figures to see if the boy's answer had any relation to the figures given.

Do just as you like—either find out for yourself or listen to the expert.

Don't understand that there are no highly qualified men in the greenkeeping business, because there are lots of them; but the best are never afraid to say they don't know, if they don't. The "expert," however, always knows. His fountain of knowledge never runs dry. He'll sell you enough stuff to keep you busy a couple of years getting rid of it, and then, just like the little red rooster, he won't "come around as often as he useter."

You are a shining example of the green-committeeman who can wear a pretty golf suit and just get in the way. The average greenkeeper looks upon the chairman and committee as something which must be endured, and, with more or less tact, depending on the man, the fool suggestions and orders of the committee are ignored or put on the shelf until they are either forgotten by the committee or superseded by something new but equally fatuous and futile.

You positively may not hope (as our ex-President might put it) to be entitled to the respect of your greenkeeper and the men unless you get down to brass tacks and learn something about the business and how it should be done. If you are in earnest you'll find out, in a general way, of course, how to adjust a lawn mower. You'll find out whether it is run by gears or clockworks. You'll find out what each job on the course really is and how it is done and how long it should take. When you know something about the practical end of the work, you'll use a little more sense in making suggestions or giving orders and you'll commence to have some notion about where your money goes.

If you contemplate taking all the degrees and possibly being a Past

Master some day, you must serve your novitiate. You must work. It's the old choice 'twixt love and duty—your game or the grass. I know I'm a "nut," but there are lots of them just like me who are finding it real fun to learn this work and by their efforts to get better results and enhance the pleasure of their friends.

My real business isn't rotten—it just isn't. I don't know where the Wheatena is coming from for breakfast; but perhaps my family can learn to eat grass, if they try. Yours,

CHAUNCEY.

The Golf Club and the Golf Course Architect

ROBERT WHITE, *Wykagyl Country Club*

Just what are the functions of the golf course architect? My own experience has been perhaps an unusual one, because of the opportunity a number of times to represent a club in its dealings with the architect. At frequent intervals I have been on the other side of the fence—designing courses myself, and advising as to methods of construction. As a rule, the average director of a golf club has only the faintest idea of what the club should expect when it engages the architect's services. The character of the service rendered is different in the case of each particular architect.

In engaging an architect I should say that the club has the right to expect the following: (1) That he has the type of imagination that is able after he studies the land in the rough to visualize the finished course. (2) That he has sufficient knowledge of soils and soil structure to be able not only to plan good golf holes, but to suggest methods of treatment that will produce good turf in the shortest possible time and at the minimum of expense. (3) That he knows the various grass seeds suitable to various conditions of soil and climate and can advise the club as to where they may be procured of the best quality at the least cost. (I am always suspicious of anyone who recommends a fairway or putting green mixture. Except for the bents and redtop, all seeds should be sown separately.) (4) That he is able to advise as to methods of construction that will produce the maximum results with the minimum expense.

The commission that delights the architect is the one where the land is turned over to him with instructions to produce a first-class golf course with *carte blanche* as to the matter of expense. Then if the results are not of the best the club has indeed been unfortunate in its selection. Where money is available only in a limited amount, the proposition submitted to the architect should be about as follows: The club has a certain amount of money available to be spent in building (or, in the case of an established course, a certain number of holes). How can we spend this amount to the best advantage, and what should we have when it has been spent?

The possibilities in fitting the cost to the purse are almost unlimited. There is an 18-hole course on Long Island which cost over $750,000. On a 9-hole course in New Jersey, built in 1917, the greens were shaped, trapped, and seeded, and the fairways plowed, harrowed, and seeded, all at an expense of less than $2,000. The same club built three tennis courts at the same time which cost more than the golf course. Of course, an elaborate

scheme of hazards was out of the question; but most of the holes being more or less of the dog-leg variety, the rough made sufficient hazard to make the course quite interesting. The tract was a farm which had been in corn and potatoes. On sixty or seventy acres of pasture that is not too hilly a 9-hole course can be opened for play at even smaller expense.

No matter how small the amount of money available, it is poor policy for the club to attempt the design or improvement of its course without the services of a competent architect. An excellent idea is to have complete plans made in the beginning and let the carrying out be a matter of time and the growth of the club's resources.

Cornell University Establishes a Course to Train Men to Superintend Parks and Golf Courses

Realizing the necessity of securing better trained men to superintend golf courses, especially in relation to turf matters, the Green Committee authorized its chairman to take up the matter with various agricultural colleges. The original idea was that a two-year course to high school graduates should suffice, but on further thought it was realized that to secure men skilled in such matters as soils, drainage, landscape architecture, turf growing, the use of machinery, the control of pests, etc., a more thorough training was necessary.

The idea has been adopted by Cornell University. Dean A. R. Mann, of the College of Agriculture, informs us that the course will be offered beginning the next college year.

This we regard as a great step in advance and enables us to look forward to a supply of competent men for such duties as park superintendents and managers of golf courses and country estates and for similar important functions. It is a realization of the idea that agriculture has public duties in connection with such esthetic matters as parks and with such amusements as golf, as well as with the raising of crops and livestock. There is reason to believe that other institutions will follow the splendid enterprise of Cornell.

Questions and Answers

All questions sent to the Green Committee will be answered as promptly as possible in a letter to the writer. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Committee.

1. *Our supervisor subscribes to the idea of an acid soil, but contends that we need to sweeten up the soil to give the young grass a start, and has roughly estimated 200 tons of lime. That figures at least 3 tons per acre, which is as much as is recommended for alfalfa or clover. It seems to me that this would give us a considerable crop of white clover, and a liberal use of lime at a neighboring club less than a mile away has done just that. An agriculturist friend of mine thinks we should use about 200 pounds of sulphate and 400 pounds of acid phosphate, but is of the opinion that 3 tons of lime per acre would offset the acidity of this fertilizer and absolutely guarantee the white clover nuisance. My specific question is, Do we need a sweet soil to start the grasses which thrive best later on in an acid soil? As we are now buying materials I should like your comment.*

Our soil is a fairly heavy clay loam, and we are using a lot of cinders and horse manure to increase the porosity of it. Do you think we are apt to need potash under those conditions? L. W. E., Ohio.

We must disagree with your supervisor with regard to the rate of application of lime. In fact, we are not at all sure that you need lime; but assuming that a normal application will do no harm, we would say put on about one ton to the acre. Presumbably you have tested your soil to see whether it gives an acid reaction. Practical farm experience indicates that a ton of lime to the acre ordinarily is enough for all practical purposes. This, of course, applies only to your fairways. You will not need any lime in the rough, and we would not advise using it on your greens. As for applying sulphate of ammonia and acid phosphate, we think this might be done later to advantage. If you use well rotted manure in the soil of your greens, very little commercial fertilizer will be needed. Sulphate of ammonia can best be used as a top-dressing, unless possibly there is a chance of creating an acid condition in the soil by heavy application before the seed is sown. There is no doubt in our mind that the bents and fescues thrive on an acid soil, and that on acid soils they are better able to combat the weeds than on neutral or alkaline soils.

You ask whether it is necessary to have an alkaline soil for grass seedings. We are not prepared to state. We doubt very much that it is necessary, for since your soil is a fairly heavy clay loam a little lime will probably improve it by flocculating somewhat.

We should say, offhand, that you need no potash.

2. *I am enclosing two samples of seed on which I wish you would report. H. K. G., New York.*

The sample labeled "fancy recleaned redtop" contains 95 per cent of pure seed of redtop, some timothy, and a considerable amount of yarrow. We would consider it a very good sample of redtop, but with an unusual quantity of yarrow, which, however, is not objectionable for golf purposes. The other sample, labeled "red fescue," is apparently of New Zealand origin, and contains 95.82 per cent of pure seed with a very small quantity of redtop and rye-grass mixed. We would consider it a very good sample.

3. *Our greens were well constructed under the supervision of ———, using the proper amount of humus, etc. At the time we purchased our seed last summer it was practically impossible for us to secure bent seed, so we purchased a mixture from ———, a sample of which we are sending you under separate cover. The grass seems to be coming rather coarse, but probably will fine down some when we can roll and cut it closer and more regularly. If it develops that the seed we are using is not as fine a grade as we should use, can we incorporate finer grasses into our greens by topdressing heavily and reseeding with the better grasses? R. A. Y., Indiana.*

The seed sample consists mainly of chaff redtop—that is, the cheapest grade of redtop with considerable red fescue mixed. To speak frankly, you were swindled in this purchase of seed. The red fescue is all right, but chaff redtop is very cheap seed and, generally speaking, very undesirable for putting greens. This should illustrate to you very clearly the desirability of having the seed sample examined before you purchase, as unfortunately the statements or guarantees that many seed companies make

are not to be relied upon. There is one rather fortunate thing about the undesirable grass being redtop, namely that under putting green conditions nearly all of the redtop will disappear in one year and practically all of it in two years. Therefore by incorporating seeds of the fine bents into your greens, topdressing them at the same time, you will within a year or so be rid of the redtop and have greens composed of the fine bents.

4. *Three of our greens were completely winterkilled last winter. We must have new turf in readiness for play by July 1st, and we have no turf bed from which we can procure this. Our soil is medium heavy loam with clay sub-soil; rather acid. We would like to know whether to use Rhode Island or German Creeping Bent to re-seed; also whether nitrate of soda and acid phosphate would be the best fertilizer. E. B. P., New Hampshire.*

We are at a loss to account for the winterkilling on three of your greens unless it is due to poor drainage. It is rare, indeed, that cold alone will destroy any of our northern turf grasses. To plant seed now and secure a good putting green by July 1 is by no means easy. The best that we can recommend is that you prepare the ground immediately and seed to recleaned redtop seed, seeding heavily, using 5 pounds to 1000 square feet. Redtop grows more rapidly than any of the other turf grasses and young redtop makes admirable putting greens. Later it becomes rather too coarse; but it has this advantage, that most of it will die out from your putting greens at the end of the year, and practically all of it in two years. It is for this reason that we recommend the use of redtop. About September 1 you should seed South German mixed bent on top of the redtop. You understand, we are recommending redtop only because of the fact that you can get results from that more rapidly than you can from any other grass and secure satisfactory putting greens. Nitrate of soda and acid phosphate are good fertilizers for putting greens, but barnyard manure is better. Inasmuch as you have to prepare the ground, we would suggest that you have these fertilizers mixed with the soil at the time you prepare the seed bed.

5. *When I was out in California I found they were killing the Argentine ants by putting some kind of dope in a little tin can and hanging the can on the side of the tree, it being supposed that the curiosity of the ants led them to crawl around in the material, which killed them. Would a similar scheme be effective on a golf course? D. O. C., Ohio.*

The habits of the Argentine ant are entirely different from those of the ants which inhabit the northeastern portions of the United States, and for this reason the ants inhabiting lawns and golf courses in your particular region present an entirely different problem from the relations of the Argentine ant to the citrus fruit culture. The poisoning process moreover is a very slow one and is not recommended as one of the best methods of controlling the pest. The matter of poisoning our common lawn and field ants has not been very thoroughly investigated, principally because until recently they have been considered of comparatively minor importance. In point of fact, the chief objection to their presence is their habit of colonization of plant lice or aphids on various cultivated plants, including grasses. We are inclined to believe that soil fumigation presents a more promising field for investigation than the possible use of poisons to be ingested by the ants. Farmers' Bulletin No. 928, of the U. S. Depart-

ment of Agriculture, contains a popular account of the Argentine ant and methods for controlling this pest, and it would be interesting to try some of the methods of poisoning described in that bulletin.

6. *We are buying a small-power spraying machine to spray our greens whenever any work of that sort is required. Of course, the machine and the tank should be carefully washed out after each use, and if that is done can you see how any harm can arise from using the same machine to apply the different things, such as Bordeaux, sulphate of ammonia, nitrate of soda, worm destroyer, and the like? C. E. B., Ohio.*

There should be no danger whatever if the machine is thoroughly washed out immediately after using, each time it has been in operation. This should be done anyway, as it tends to prolong the life of the machine.

7. *We have several golf courses on the east coast of Florida on the greens of which courses they use northern grasses for the winter season's play only. These grasses are put in by seeding the greens in October and by January 1 they produce a pretty good turf which dies out about April 15, as at that time they are longer watered, the season for the use of the golf links being about over. These greens therefore lie idle for about seven months in the year. During this time many weed seeds naturally come in and weeds spring up which are hard to keep out of the greens during the playing season. We would like to inquire whether it would not be a good thing to put a cover-crop of some legume on these greens during the seven months when they are not in use. We would like, if possible, to obtain full information as to just what the benefits might be from such cover-crops. In this connection, it would be advisable, if the cover-crop is to be turned into the soil, to have one which would rot very thoroughly so as not to produce a lot of coarse trash which would have to be removed from the green before seeding in October. J. R. B., Florida.*

We regard the matter of plowing up these greens and planting them to legumes in the summertime as all to the good and we see no reason why it should not be entirely practicable. Probably your best legume for the purpose would be the bush velvet bean, although any of the velvet beans could be used, but will not make the mass of material, although they the whole summer season and make a great mass of material. Cowpeas could be used. The advantage of using these is that they grow through should prove very helpful. If you use velvet beans we would suggest that before they are plowed up they be practically cut to pieces with a disk and then plowed under. After plowing under the ground should be thoroughly disked so that there are not large loose places in the soil caused by the abundance of green matter plowed under. This matter really should be plowed under at least two weeks before the ground is seeded so that it becomes pretty well rotted and the soil compacted. If you do not have considerable rain, rolling will be necessary; and at any rate on the sandy loam soils rolling will do no harm. The cheapest and, under your conditions, the best seed to use for sowing on your putting greens is redtop. Bear in mind you use your greens only during the winter, and during the winter you would be putting on seedling redtop, which makes a beautiful fine turf. It is a waste of money to buy the more expensive seeds like Rhode Island bent or South German mixed bent under your conditions.