CHAPTER XV

Personal Experiences

Among the golfers of the country are many who have devoted much of their time and energy to a study of the problems involved in growing good turf. The experience of every one of these men contains much of interest and value to all who are concerned with similar work. Some golf clubs have been so remarkably successful in securing and maintaining good turf that they have attracted visits from many greenkeepers and others confronted with a like task. It is usually good economy for a club to send its greenkeeper or the committee in charge of the course to make such visits, as much valuable information is thus secured and many costly errors may be avoided. The experiences of three ardent golfers who have had much success in growing turf are presented here in their own words. It will be noted that in some details these gentlemen reach variant conclusions, but in the main their results are in close concord with the body of this book.

PRACTICAL EXPERIENCE IN GROWING TURF ON GOLF COURSES NEAR PHILADELPHIA

Hugh I. Wilson

The Merion Cricket Club, of Philadelphia, played golf on leased property for nearly twenty years and, as is usual in this country, the land became so valuable that the club was forced to move. This experience showed the advantage of permanency, so early in 1911 the Club appointed a committee consisting of Messrs. Lloyd, Griscom, Francis, Toulmin, and Wilson to construct a new course on the 125 acres of land which had been purchased. The members of the committee had played golf for many years, but the experience of each in construction and greenkeeping was only that of the average club member. Looking back on the work, I feel certain that we would never have attempted to carry it out, if we had realized one-half the things we did not know. Our ideals were high and fortunately we did get a good start in the correct principles of laying out the holes, through the kindness of Messrs. C. B. Macdonald and H. J. Whigham. We spent two days with Mr. Macdonald at his bungalow near the National Course and in one

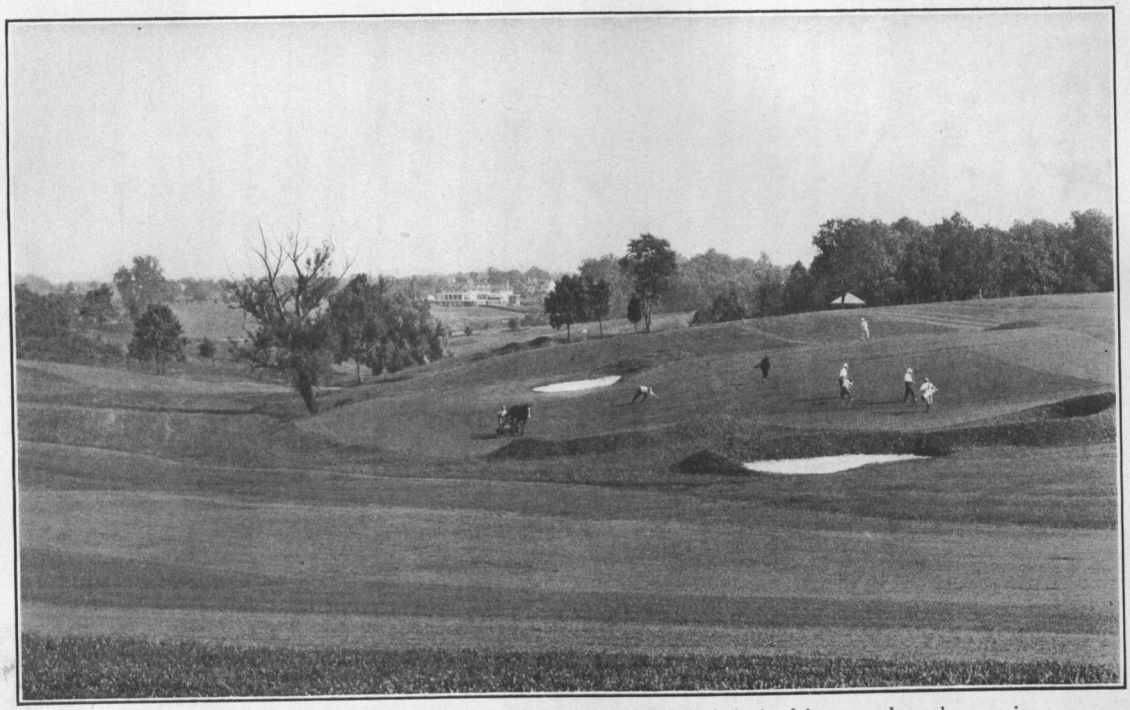

PLATE XX. — View of a golf course showing the closely clipped turf on the fairway and on the margins the taller grass of the "rough."

night absorbed more ideas on golf course construction than we had learned in all the years we had played. Through sketches and explanations of the correct principles of the holes that form the famous courses abroad and had stood the test of time, we learned what was right and what we should try to accomplish with our natural conditions. The next day we spent going over the course and studying the different holes. Every good course that I saw later in England and Scotland confirmed Mr. Macdonald's teachings. May I suggest to any committee about to build a new course, or to alter their old one, that they spend as much time as possible on courses such as the National and Pine Valley, where they may see the finest types of holes and, while they cannot hope to reproduce them in entirety, they can learn the correct principles and adapt them to their own courses.

Our problem was to lay out the course, build, and seed eighteen greens and fifteen fairways. Three fairways were in old pasture turf. These will be mentioned later. We collected all the information we could from local committees and greenkeepers, and started in the spring of 1911 to construct the course on ground which had largely been

farm land. We used an average of fifteen tons of horse manure to the acre on the fairways and eight tons of various kinds of manure to a green, the greens averaging about 10,000 square feet in area. At time of seeding, we added 300 pounds of bone-meal to the acre and 100 pounds to a green. After completing the construction of the greens, and thoroughly harrowing and breaking up the soil on both fairways and greens, we allowed the weeds to germinate and harrowed them in about every three weeks. We sowed from September 1 to 15 and made a remarkably good catch, due to two things — good weather conditions and a thorough preparation of the soil. We opened the course September 14, 1912, just a year after seeding, and it was in good playing condition. Naturally, the greens had not a finished surface. We found that it was very easy to get grass started, if weather conditions were normal, but experience has shown us how difficult it is to keep it in good shape. After we had one season's growth, one of the grass experts of the United States Department of Agriculture, when looking over the course, remarked that the writer should publish a book on the growing of grass. Being modest, I asked him for his reasons

and he replied, "Now you have definite fixed ideas as to what seed, fertilizers, and the like caused certain results, but each year your opinion will become less certain on account of the great number of factors which enter into the results." He was right, and it is truly difficult to give definite answers to many of the questions which bother those who are trying to grow turf. As one greenkeeper puts it, it is easy to grow grass but very difficult to get turf. Two months after opening our course, we were forced, on account of the increased interest in golf, to buy 125 acres more for another eighteen-hole course, which we started to build in March, 1912, and seeded in May. We were unfortunate in having a drought that summer, which burned out the fairways and by the end of August it looked as if we would have to reseed them all. Luckily, plenty of rain in September brought them back and they were in fair condition by May, 1913, when the course was opened. Naturally, this experience makes us prefer autumn seeding, and further experience has shown that in this section of the country it is the safer time. It may simplify this account if the experience is placed under headings.

Soil.

Ours is a clay loam, which would be called in this section a good farming soil. It is a fair lawn soil. Our fairways have grown well and have withstood drought with little damage. Our error in building the greens was a failure to open up the soil sufficiently and take care of the drainage. When we built them, they were all raised above the surrounding ground level so as to get good surface drainage and freedom from wash. We also forked in about eight tons of manure to a green and added about five tons of sand (not nearly enough) with a layer of leaf-mold, sand, and soil mixed in about equal proportions for the seed-bed. As was stated before, the results were good the first year, and it was not until the end of the second year that we noticed much deterioration in certain of the low-lying greens. In the fall of 1913, two years after seeding, the grass started to die in these greens and although we nursed them carefully, having noticed early in the summer that they were weak, all our efforts with fertilizer, water, and care were of no avail. Opinions differed as to the cause and treatment. Finally, we determined that as we could obtain a quantity of good turf from our old course, we

would dig them up and resod them. We started November 1 and our first decision, after a thorough investigation of the soil conditions, was to add a lot of sand and gravel, and also to under-drain them with tile. In order to lessen the cost, we dug the gravel out of the stream near the greens and covered the present soil to a depth of four inches. To this we added ten tons of manure; this was thoroughly worked so that it was a complete mixture of soil, gravel, and manure, and at this point may I strongly emphasize one thing — that experience has taught us that, whenever manure, sand, or any such substance is added to the soil, the mixture must be made as thorough as possible in order to obtain really good results. We then put in drains of three-inch tile, eighteen inches deep and twelve feet apart, with as big a fall as possible. On two greens it was possible to keep both ends of the drains open and these were protected by a fine wire netting. After this we tested our soil by flooding the green so as to see if it would take care of the excess of moisture. It is very difficult to say just how much sand or gravel should be added to a soil to make it right. The gravel should only be used for the lower stratum of your green, and

sand for the upper three inches, as gravel will spoil the putting as well as the mowers. Naturally, the depth depends on the size of the gravel. The ideal is a soil that will absorb enough moisture to take care of the grass roots in dry weather, that will raise the moisture in time of drought from the lower levels, and that will dispose of the excess. The latter can be tested out by flooding. Care must be taken, however, not to add so much sand that the soil will not retain enough moisture. Probably the simplest test is to squeeze the soil, when damp, in your hand and if it falls apart it is too sandy, but just previous to this stage it is about right. This I appreciate is a crude way of explaining soil structure, but is used because of the absence of a better one. The tremendous importance of soil structure cannot be over-emphasized. If it is bad, it does not make any difference how much you may fertilize or what you may do, you cannot have satisfactory greens. By satisfactory greens are meant greens that are in good shape most of the year and will stand a lot of wear. From our experience, soil structure is the foundation of green-keeping, and it is a simple matter, and relatively inexpensive, to make proper soil conditions when

constructing greens. It must be remembered that our experience has been with soils near Philadelphia. Surface drainage we found necessary, owing to the fact that wherever there was a hollow the grass died out. It was not due to winter kill only, but also to excess moisture at other times.

Seed.

Our putting-green mixture consisted of equal parts by weight of Creeping Bent, Rhode Island Bent, and Red Fescue (Chewings' Fescue), which made a very large percentage of bents on account of the smallness of the seed as compared to Fescue, about ten to one. When reseeding our greens, which we have done either once or twice a year, we have used nothing but Creeping Bent, as the Red Fescue did not grow well in our greens. Last year we used Rhode Island Bent[1] on account of the scarcity of Creeping Bent, due to the war. The fairway mixture on the first course consisted of equal parts by weight of Sheep's Fescue, Red Fescue (Chewings' Fescue), Slender Fescue, Creeping Bent, and Rhode Island Bent. Here again the bents

[1] Recent investigations have disclosed the fact that probably no genuine seed of Rhode Island Bent has been gathered in the last ten years. All of numerous samples examined prove to be either Creeping Bent or Redtop, mostly the latter.

predominated, but we obtained much better results in the fairways from the fescues, due, we believe, to the fact that the grass is not cut so closely. On our second course we omitted the Slender Fescue, which was of little value to us. The turf on the fairways is very similar to that on the putting-greens, and has given excellent results. It withstands drought, forms a fine mat, and makes little variation in the run of the ball from the fair-green to the putting-green. Our conclusion has been that it pays to buy good, clean seed from a reliable firm, and unless you are given the exact proportions not to buy mixtures. There is a lot of nonsense talked about secret mixtures. There are but few grasses that will form a first-class putting-green, and of the two main varieties, fescues and bents, one or the other will probably grow in your soil.

Grass.

The one important feature which has apparently been overlooked in the books on this subject, is the question of the length of grass. We have found that the fescues will grow splendidly in the rough or in the fairway, if they are not kept closely cut. We have also found that they would scarcely grow

at all in the greens where closely cut. Experience has taught us that the cutting of grass should be very carefully studied, and that if left at a good length, such as it is in the short rough way, say two or three inches, grass will grow and thrive under pretty nearly any conditions in our soil, whereas if it is cut down to our fairway length, that is, close cutting for fairways, it will not stand so much wear. When we get to the extreme of putting-greens, where the tendency to cut closer and make greens faster has steadily increased, we find it indeed difficult to keep the grass in good shape during the whole year. From a greenkeeping standpoint, it would save a great deal of money and a great deal of worry if the grass were left longer, and it were not necessary to keep greens as fast as billiard tables in order to have them rated first class. A careful study of mowing in the hot months of summer has led us to adopt the practice of clipping the putting-greens frequently but not as closely as is possible. We also allow the grass both on the greens and fairways to go into winter a bit long, thus providing a thicker mat during the season when there is no growth. These methods we believe have greatly assisted the turf.

Sodding.

The general impression seems to be that seeding is preferable to sodding, but we are led to believe that the sodding is more satisfactory, if you have a supply of really good sod, on account of the saving of time and the guarantee, if the work is well done, of certain results. In the fall of 1915 three of the fairways left in the old pasture turf became so weak that we decided to try sodding them instead of seeding. This was done to save time and keep the course in play. We had a great deal of fine sod in the rough, which was of no value there, so we started at 160 yards and sodded to 230 yards, with a width of 45 yards, and were surprised, not to say gratified, to find that it cost us less than one hundred dollars a fairway to do this work. This included not only the sodding but the plowing and fining of the ground, and the manure and fertilizer which were added. In the case of tees, it takes so long for grass, if seeded, to become strongly enough established to stand any wear, that we are thorough believers in sodding. To obtain good results in sodding tees and greens, we have found that the sod must be trimmed by putting in a box shaped like a picture-frame, about one

inch deep, and then trimmed with a draw-knife to an even thickness. Prior to this, all the sod is cut in pieces about a foot square, by marking off the green with a plank one foot wide and cutting along both sides of the plank. This makes each sod exactly the same length and breadth, and saves much time in fitting. It is then lifted and trimmed to even thickness before laying. The tee or green is carefully prepared before laying the sod, and then the sodding is started from the near side of the green and as the sod is laid on, planks are laid on top of the sod and the men work while standing on the planks. This prevents them from walking over the green and making impressions with their feet before the sod is laid. After this, the sod is allowed to settle three or four days before rolling, a heavy coating of sand being spread over, which will work into the cracks and level it off, then the sod is lightly rolled. After a few days longer, a heavy roller is put on and then the work is allowed to settle for as long a time as possible before using. Our best success has been with sodding late in the fall so that it can settle during the winter, and we have thus obtained an excellent playing surface by early spring.

Greenkeepers.

We have found that a greenkeeper should be a man who can diagnose any trouble quickly, and who will nurse the grass with infinite care. He must watch the course every day and practically all day, as changes come so very rapidly in turf. One of the great failings of greenkeepers is due to the lack of thought on the part of the committees. They have never taught them thoroughly the question of cost. After careful study, one of our members has worked out a budget which shows the detailed cost of the work month by month for the whole year. Of course, this cannot be adhered to in every detail, but the main object is to put the plan before the greenkeeper so that he can see just what he has to do and how much money he has to do it with. He then begins to figure a job not by the size but by the cost. It is most important to try to make the greenkeeper think in dollars and cents. The usual answer to a question of, "Do you think you can do this," will be, "Oh! yes, it is not a very big job," but if you ask the same man what it would cost, it would be hard for him to give an estimate. The cost of mowing the fairways and greens, in addition to all the general cost, becomes

an interesting and most profitable study. It is a very simple matter for the greenkeeper to keep track of the cost of a new bunker or the sodding of a green, and each time he does it he learns a little more about the cost question and why it is such an important factor in all work. It also gives him a new interest in the work, and a basis for competition with his former work, and we believe you will find that your greenkeeper is keener for knowing that the last bunker cost $20.80 to build and that the next one he is going to build will cost a little bit less because he has figured a way of doing it more cheaply. We have obtained splendid results by sending our greenkeeper to as many courses as possible in order that he may see what other persons are doing and profit by their good results, as well as by their errors.

Labor.

The organization of labor has played a big part in making savings for us. For instance, one man has entire charge of all the machines. If for any reason a machine, either a horse machine or a putting-green machine, will not cut, it is brought back at once to the stable and a new machine taken out. The man who has charge of it then puts it in repair.

He adjusts all the machines, and the men who do the cuttings are not allowed to alter a machine in any way. In this way one man is responsible and attains a thorough knowledge of the machines. Surprisingly good results have been accomplished by this method of handling. The labor we have used has been Italian, and during four years' experience on the two courses, we have had absolutely no trouble with them and found them faithful, willing, and exceptionally well fitted to this class of work.

Rolling.

The question of rolling seems to be fairly well understood at present and all seem to be following the same line, that is, to use light rollers rather than heavy. We find that the heavy one can only be used safely in the spring and the fall. In the first period to put the ground down after the frost has gone out, and in the second period when the danger of packing is small, as the frost will come into the ground in a month or so. We use a heavy motor mower on the course only a very few times in a year. For fair-green mowers, the three pony machines yoked together are the most satisfactory. This lawn mower will do a tremendous amount of work

in a very short time, and at present seems to be so well constructed that it is not always breaking down. They do not pack the ground, as the weight is small compared with the ordinary horse machine, and trivial as compared to a motor mower. For the greens we use the light wooden rollers and try to see that the greens are not rolled when they are wet, either by rain or the dew. On our soil a crust will form if care is not taken in this regard.

Weeds.

The only weed that has given us really much trouble is Crab-grass, and so far we have found nothing that will have any effect on it except the actual plucking out of the plant. This is done as soon as it appears in our greens, and a careful watch is made to find the very first plants. As many extra men as we can afford are employed to pluck it out at once, and strings are put across the green and the spaces marked off so that the men will not miss any in the operation. As soon as one green is finished they go to the next and may have to return to the first inside of a week, if the growth is heavy, and weed it all over again. This we believe is the most economical way of handling the problem. While the first cost is heavy if you do it thoroughly,

the result, if you do not, is the loss of a great deal of turf, and a great deal of trouble and expense is stored up for the future. The other weeds, such as plantain, dandelions, and the like, we have found can be most easily destroyed by using an acid such as sulfuric. The simplest method is to use a pickle jar half full of sulfuric acid and with an instrument like a sharpened ice pick, or any sharp steel instrument with a wooden handle, put a drop of acid in the center of the weed. That is, simply dip the instrument into the jar and then stick it deeply into the crown of the weed. In a few days the weed dries up and disappears, and the green is not disturbed and torn up as it is when the weeds are dug out. We believe a man can cover at least twice as much ground in this way as he can by taking out the weeds with a knife or any other implement. As far as our experience shows, no harm has come to the ground from the use of the acid.

Grubs and worms.

The one insect that has bothered us most is the grub, *Cotinis nitida.* This has affected the greens chiefly, although at times the fairways also. While the use of a heavy roller has helped somewhat, and solutions, such as kerosene emulsion, may

slightly check the insect, they do not really eradicate the grub. The use of a straight piece of iron about the size of a lead pencil which is forced down the hole, followed by squirting into each hole kerosene emulsion, or any other solution that is deadly to the grub, has so far proved to be the only sure cure. This seems like a lot of work, and it is, but we have not found any way which is easier or less expensive.

As to worming the greens, we have tried bichloride of mercury and several of the different powders which are advertised by seedsmen. The powders seem to be the best method of applying the cure on account of the labor cost being much less. One of the great difficulties is, that the time of worming comes at the time of reseeding the greens and it is always a grave problem whether to seed first and worm afterwards, or to worm first and seed afterwards. We must admit we have not definitely settled in our own minds which is the better plan.

Fertilizers.

Nitrate of soda has been our mainstay on the greens. Our plan has been frequent applications in small quantities. On a green of 10,000 square feet we may use only ten pounds at a time, but we may use it every two weeks for a while. It is

mixed with sand and carefully watered in at once. On our fairways, bone-meal, 300 pounds to an acre, once a year, has been the regular ration, and results have been good. Ground limestone, 1000 pounds to the acre, has also been added with good results. We believe that if we were forced to use for all purposes only one form of fertilizer, we would take compost. Nothing that we have done has given as good results as top-dressing with compost; apparently it can be used with good results at almost any time of the year. Piles of compost on different parts of a course are real safeguards against many of the dangers that may arise, and the truly remarkable results that a light top-dressing will accomplish are astounding. One of the main faults of greenkeeping is to put all the attention and fertilizer on the greens and none on the fairways. There have been many examples of good fairways going to pieces because they were allowed to go year after year with little care and practically no fertilizer. We have found it very necessary to see that our fairways receive a considerable amount of fertilizer each year.

In conclusion, our experience has taught us the real importance of good soil structure for putting-

greens, the splendid result from the use of plenty of top-dressing, and the great advantage of intelligent cutting.

EXPERIENCE IN GROWING TURF ON THE COURSE OF THE COLUMBIA GOLF CLUB NEAR WASHINGTON, D.C.

Dr. Walter S. Harban

The course of the Columbia Golf Club is of particular interest on account of the excellent results secured by top-dressing methods on a turf originally very poor, and on soil of low fertility. When the course was originally laid out in 1909 the whole area was plowed in fall, harrowed, and seeded the following spring, but the resulting fairways were very unsatisfactory. On the putting-greens a year or two later there was used unfortunately a large amount of Perennial Rye-grass in the mixture, and on many of the greens this still persists, but is gradually being crowded out by finer grasses. Since 1913 the welfare of the course has been under the care of the writer. The success in improving the turf to a high degree of perfection without at all interrupting play is an example of what may be accomplished by such methods.

When the course was built in 1910 there was very

little known of greenkeeping and men of even limited experience were not obtainable to give direction. Consequently faulty construction, inadequate preparation, meaningless endeavor, marked its development for several years, or until it seemed a hopeless task to do anything but start afresh. Under such conditions by the methods here related most satisfactory results have been obtained. Commencing in the summer of 1913, necessary materials of all sorts, such as soils, compost, tools, machinery, and the like, were secured for early active fall work.

Putting-greens.

The putting-greens received attention the first of September, when active work was started. They were raked thoroughly, removing very much undesirable grass. Many of them were forked and loosened up, others disked with the velvet lawn seeder. From 100 to 200 pounds of raw bone was broadcast and raked into the ground. A compost made of two parts of screened mushroom soil, one part of loam, and one part of sand, one-half inch deep, was applied and raked, smoothed, and rolled. The seeds were then broadcast and raked in, followed by rolling.

Every spring and fall as early as possible, the

putting-greens are reseeded where necessary, and always given a light dressing of the mushroom compost. In winter from one to two yards of sharp sand is applied at frequent intervals, at the rate of four to six wheelbarrow loads at a time to a green.

While the putting-greens in 1913 were poor, they have been improved under this treatment so that most of them may be classed as very excellent. Some of the Perennial Rye-grass which was originally seeded in them still persists, but is less evident each succeeding season. All new reseeding of the putting-greens is with a mixture of Creeping Bent and Red (Chewings') Fescue.

Fairways.

The fairways for the most part were rough, pitted, and broken. They were harrowed with a straight-tooth harrow, as well as the two-horse scratcher. Nearly an inch of good loam was spread on all thin places, and raw bone and a light dressing of mushroom soil applied. This was hand-raked, rolled with the heavy roller, and seeded, after which it was again raked and rolled. The results from this simple treatment were quick and have been lasting.

All of the fairways are dressed in early winter with a light application of mushroom soil. It will

be seen that the principal fertilization has been with mushroom soil, which is nothing less than horse manure which has been used in mushroom beds and removed after it has ceased to be productive for that purpose. The only effect of its use in the mushroom beds is to destroy all seeds and so completely rot it that it may readily be screened with a quarter-inch screen. It not only contains humus of excellent quality, but in a form readily available for grass purposes.

Care of putting-greens.

For years it was impossible to get a greenkeeper to cut the greens close in summer. After much insistence and finally absolute demand, two summers ago the greens were not only cut every day, but very close. The improvement was so marked in quality, texture, and strength of grass after the hot weather was over, that the greenkeeper now resents a suggestion even to let them go over a day. Get the surface of your greens true by very heavy rolling in early spring; afterwards use a light wooden roller frequently.

Watering.

There is no treatment in the care of a green requiring more painstaking than that of water-

ing. Careless watering does harm. The greens are watered in the daytime when a man can see what he is doing. Cool or overcast days they are watered in the mornings; on bright hot days, any time after two or three o'clock in the afternoon.

During dry weather, six greens are watered each day, or all once in three days. At first the sprinkler is allowed to play about ten minutes and then moved to another point. By the time the entire green has been covered the first watering has opened up the pores of the ground and started capillary action, when it is ready to receive more water. Each green is gone over four or five times, leaving the sprinkler longer each time but never to flood the surface or to the point of water-logging. By this method a green can be watered more easily and more quickly with less water and less injury. The lesson from nature of the benefits following an all day or night gentle rain, or of the disastrous results of a heavy downpour, will appeal to greenkeepers. The nearer one keeps to nature in all green work, the greater will be the success achieved.

The heavy gasoline machine for cutting our fairways is used almost exclusively. Notwithstanding the fact that the course is hilly and the

soil a clay loam, yet each year the turf has improved greatly and to-day is probably not inferior to that of any other course in the country. May it not be the neglect to feed the soil that has caused such general condemnation of heavy rolling?

Grubs.

A most interesting discovery was noted last season through the medium of heavy rolling. The approaches to all the greens have been cut either by hand or horse-cutters. From the point where the heavy rolling left off up to the greens, the grub worm commonly known as the June-beetle completely destroyed all the grass. Other points on the course where heavy rolling was impossible were affected in like manner. This strongly indicates a means of combating the ravages of the pest that has done so much injury to many golf courses and thus far has defied all safe means of control.

Ants.

Two or three drops of carbon bisulfide dropped in an ant burrow and immediately covered with a wet bag or blanket will completely destroy ants. A small oil can with a long spout is the best way to apply the liquid. A few drops are sufficient, as much will burn the grass but not injure it seriously.

THE GROWING OF FINE TURF ON THE SANDY LOAM SOIL OF LONG ISLAND FOR GOLFING PURPOSES

Charles B. Macdonald, National Golf Links

Links proper in Scotland, on which the famous golf courses such as St. Andrews, North Berwick, Prestwick, and Machrihanish, are laid out, is sandy ground, usually undulating, on the seashore. The sand having ceased to drift, the links are usually covered with bent-grass, furze, heather, whins, and the like. The term links in Scotland is synonymous with dunes as used in England and on which the best English golf courses have been laid out, such as Sandwich, Westward Ho, and Hoylake.

Confining myself to the links and dunes of the extreme eastern portion of Long Island, it may be stated that the sandy loam areas are far more bare of humus than similarly situated areas in Scotland and England, so that the seed-bed must be built to establish a good golfing turf. The National Golf Links of America, at Shinnecock Hills, is built on land much like that of the seaside courses in Great Britain as above described, but under American climatic conditions which present problems on which little successful experience is available.

While the light sandy loam is ideal for playing the game (and no course can be really perfect without it), the matter of securing good turf is far more difficult than on heavier soils. Grasses once established on a sandy loam soil give a character of turf which cannot be equaled for golfing purposes on a heavier soil such as is usually found on inland courses. The methods used and the results obtained on the National Links should therefore be of value to others who have a similar problem.

The two most important factors are: First, to procure pure seed of the grasses best suited to the conditions. Second, to prepare the soil so as to obtain the best results.

Grasses.

The natural grass of Long Island is Rhode Island Bent. It is evident everywhere, where the land is not too densely covered with dwarf shrubs and various kinds of sedge grass. This is the only fine grass to be found in quantity on the sandy loam soils on the eastern portion of Long Island. The difficulty is to get pure seed. Only on a small scale is it harvested commercially for seeding purposes in this country, and it takes an expert to tell by looking at the seed whether it is Rhode Island

Bent or Creeping Bent or Redtop. The difference in price is 25 cents a pound for the Bent against 10 cents a pound for Redtop, roughly speaking, hence the temptation to substitute a certain quantity of other seed which is sold as Rhode Island Bent.

Rhode Island Bent has a tendency to creep, and is similar to Creeping Bent, but it is not so vigorous a creeper as Creeping Bent from South Germany. Creeping Bent is excellent to mix with Rhode Island Bent for putting-greens. The blades of both grasses are fine and soft. Creeping Bent, however, does not resist drought quite as well as Rhode Island Bent.

New Zealand Chewings' Fescue is undoubtedly Red Fescue acclimatized and established in New Zealand, whence all the commercial seed is secured. It has been a source of great satisfaction to us to discover how well adapted this grass is to Long Island conditions. The grass is creeping in character and makes a hardy, excellent turf, and once matted it is difficult for weeds to find a foothold.

A mixture of Rhode Island Bent and New Zealand Chewings' Fescue makes a perfect "fair green."

Chewings' Fescue also makes an excellent putting-green, the only objection to it being that it does not keep as green as the bent grasses. It greens up later in the spring and in the summer months during the heat it becomes brown sooner than the bents, but it is far more hardy than the bents and will stand any kind of drought and such punishment as is inflicted on teeing grounds.

There is one peculiarity of Chewings' Fescue, and that is the loss of germinating power with age. The seed is harvested in New Zealand in February, and one should not fail to use it by the fall of the same year it is harvested, for it will lose 40 to 50 per cent of its germinating power if kept for another season.

One should also bear in mind that there is a far greater number of seeds in a pound of bent than in a pound of fescue, and in seeding this should be considered.

To my mind, there are no other seeds worth mentioning for the sandy loam soils of Long Island. All the fescues do well, but the other fescues are bunch grasses, and undesirable for golf courses, except they be used for the "rough" at the side of the "fair green."

Fair green.

The following is the manner in which we treated the soil for the "fair green" on Shinnecock Hills:

We did not plow, but cut the brush off throughout the summer while we were making our compost for the seed-bed. Cutting the brush left the roots in the ground to bind it, and these rotted into excellent humus in a few years. It requires nearly 140 tons of compost to top-dress one acre one inch in thickness for the fair green seed-bed. One inch is scant, two is better. Constant watching is necessary to avoid killing by drought, and the seeded fair green should be covered by light horse manure in winter to prevent winter-killing while the grass is young and tender. The 140 tons of compost is made up as follows:

1. Finely ground limestone . .	10 tons
2. Clay sandy loam	20 tons
3. Sandy peat muck	75 tons
4. Manure	35 tons

Compost Nos. 3 and 4 after thoroughly mixing, four months. Then mix Nos. 1 and 2 with it. Turn it over and let it stand through the winter.

Screen sufficient of the compost to mix the seed

in, distribute it on the ground evenly, rake lightly and then roll the ground firmly. Water when necessary.

A light dressing of nitrate of soda, 100 pounds to the acre, mixed with ground bone, 200 pounds to the acre, will help the grass after its germination. Put this dressing on immediately before a rain. Scatter the seed evenly, ten to twelve bushels to the acre.

Putting-greens.

The best putting-greens we have on Shinnecock Hills were built as follows: In order to conserve moisture, blocks of salt meadow sod, eight to twelve inches in depth, were first placed in the sand, disk-harrowed and cross-harrowed, until the surface was evened up; a heavy coating of crushed limestone was then placed on this frayed meadow sod; then a quantity of the best sandy loam obtained in the hollows between the hills was mixed with an equal quantity of our compost sufficient to make a six- to eight-inch bed for seeding. Some greens were seeded entirely with Rhode Island Bent, others with Creeping Bent, sometimes sold in England as "South German Agrostis," while others with New Zealand Fescue, but the larger number of the greens

were seeded with various mixtures of these seeds. Seed was used at the rate of three pints to nine square yards.

A good catch of grass does not imply that you have a good putting-green. It takes three years at least for these creeping grasses to mat. During the process of their matting they require eternal vigilance to destroy the weeds, injurious insects, and grubs. The whole green must be carefully nursed, with proper cutting, watering, and top-dressing when necessary. Always roll with light wooden rollers and not too much of that.

It is always best to water between sundown and sunrise. A thorough soaking every week or ten days is better than frequent superficial sprinklings.

The weeds hardest to eradicate are chickweed and pearlwort. My experience has been "get busy early and eradicate both by cutting them out." You will have no pearlwort if you do not roll too heavily and water too superficially.

I am in favor of putting both Yarrow and White Clover in the fair green mixture of seeds where the soil is particularly sandy, but never any clover in the putting-green. Yarrow grows strongly, creeps, binds the turf, stands the droughts better than any-

thing else I know of, and is always green. Yarrow must be closely cut.

White Clover also does well on Shinnecock Hills and helps the soil while the finer grasses are making a stand. In time the bents and fescues will, under heavy seeding, choke the clover out. In the meantime the clover is good for the soil as a fertilizer and binder.