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of the

UNITED STATES GOLF ASSOCIATION GREEN SECTION

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Contents

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Some Observations on Construction and Maintenance Problems

By H. Kendall Read

The article written by me in the October BULLETIN on the reconstruction of an old course brought so many interesting letters and comments that I thought a further discussion along this line might be of some interest.

The first observation I want to make on construction and maintenance is the close relationship which exists between them. You notice "construction" is put first. Have you ever thought that the architect, in making his paper plans and the character of the construction employed in carrying them out, largely determines for all time whether your maintenance expense will be large or small? Each trap and hazard of every description represents a certain annual expense. If our records and accounting systems were accurate enough, we could number each hazard on our course and set opposite each number the annual cost of upkeep. With such a record in our hand, we could then have the questionable pleasure of strolling over our links some day, probably accompanied by our Board of Directors, and pointing to, say hazard No. 23 and consulting our list, be able to state that the thing costs $100 a year to maintain. In a similar way, we might point to hazard No. 223, large and terrible, but a little expensive we admit; $250 a year for this one. In each case, would not the questions be raised, "Is it necessary and is it worth the cost?" After such an excursion, I venture to say some reconstruction and elimination would take place.

But why can't these things be given proper consideration in the beginning? I know that by some architects they are. No hazard should ever be created when there is the slightest doubt as to its real necessity. Personally, I know courses where a majority of the artificial hazards are uncalled for, are an unjustifiable expense and a downright disfigurement. I want to repeat here a statement made in my previous article in THE BULLETIN: "It is fortunate that in the elimination of many unnecessary and useless hazards, a most desirable improvement in appearance is obtained. This is true because most of the things which I have in mind are wholly artificial and unnatural and when you take them away, you are taking a long step in the right direction."

However, a reasonable number of artificial hazards may be required to create a proper test of play. But if the future perpetual maintenance cost is constantly kept in mind much can be done in the construction to keep down upkeep expense, especially the hand labor portion. And don't forget that anything you can do to reduce

hand labor is cutting down your largest single expense item. How often do we see a group of small traps where a tractor or horse can not possibly be used. In most cases, they could be combined into one large hazard without loss of value, an improvement in appearance and a big saving in upkeep.

In going over a course, just notice particularly the things that demand the most hand labor. I mean the artificial hazards. You will find that in practically every case, they are the most unnatural, the ugliest, the most intrusive things that spoil what might otherwise be an attractive picture.

It is also sad but true that by far the largest portion of fairway bunkering hits the average player and not the star. I often wonder why. It is a silly mistake. Ask any first-class player after a round on an average course how many fairway traps he was in. Then ask him how many traps at the greens he found. Try this experiment. I am personally convinced that most fairway hazards are constructed and maintained at considerable cost for the benefit of the poor dub who pays the bulk of the cost of his own discomfiture.

Furthermore, I believe that a course of average length and with average sized greens could be constructed without a single fairway hazard, where par could be almost as difficult as you cared to make it. All you would have to do would be to tighten up your greens after properly setting them and provide reasonable rough. In this connection, I want to call attention to the so-called Cape type of hole. To me they hold great value and interest. But the same principle of construction can be used where the hole is straight away, and with an almost infinite variety. By simply twisting the green at different angles and trapping close to the green accordingly, many different problems can be developed. Moreover, this type of hole lends itself beautifully to differences in terrain and makes it possible to take advantage of slopes and levels. Two-shot holes of this character rarely call for more than one fairway bunker and frequently not any.

Assuming that proper ground has been selected, the man who can build a golf course and get his results with the least number of artificial hazards and with a minimum of interference with the natural topography and atmosphere of the land, is on safe ground and his work will stand the test of time. Moreover to maintain such a course properly will not break the club's financial back.

I have used the expression "artificial hazard" a number of times. This is simply to distinguish them from the natural ones that are not man made. But a hazard is poorly constructed in proportion to its artificial appearance. Besides, the things that make it look artificial are almost always the same things that make it expensive to keep up. In a great many places, a grassy hollow or good sheep's fescue rough would be better than a trap. It provides the problem equally well, looks better, and of course costs practically nothing to keep up.

I believe that in the future the interrupted playing areas will be used much more than they have been. You probably all know what I mean by this term. Take a hole of 400 yards in length. The first fairway area might start 100 or 125 yards from the tee and continue to the 300-yard point. The next area might cover the 50 yards in front of the green. These areas should be irregular in shape and

when skilfully formed, can be made to add much to the golf picture. I do not believe that the spaces between should be like the rough, but simply not fertilized or watered like the playing areas. Another chance to save money. This type of fairway also helps to supply an excellent objective for each shot.

Wherever it is at all possible, no tee should ever be built that will not permit cutting with a triplex. This means keep them at ground level, or when necessary to raise be sure the side slopes are drawn out well. The slopes around greens should also be gentle and if they are to be of grass why not see to it that they can be mowed by a triplex and thus economically maintained.

If trees are to be planted insist that varieties are chosen that will keep to a minimum the nuisance and expense of cluttered fairways in the fall.

If traps are built shallow with the sides toward the green rivetted, they are not only better looking, keep dryer and give better visibility, but you can use a chain harrow to keep them in shape and save some more upkeep.

It is amazing to find that on courses built within recent years, some of the faster and thicker growing grasses are used in the rough and on mounds and in hollows. This is not such a common error since the existence of the Green Section. It is now pretty generally understood that sheep's fescue makes an ideal grass for such purposes. It provides a fine contrast to the fairways and greens, is a fair penalty for a wayward shot, balls are not hard to find in it and mowing is not required more than twice a season.

I have endeavored to point out to you the close relationship between construction and maintenance and show at least some ways in which savings may be effected. But I would not have you understand that I am making any sweeping condemnation of all courses. We all know that there are a goodly number of first-class courses which show fine architecture and excellent construction. On the other hand, I believe that most courses have entirely too many traps that are badly placed and poorly constructed; that cost too much money to maintain and that their removal would help the average player, improve appearances, reduce upkeep and practically leave your star players unaffected.

In conclusion, I want to make a plea for greater simplicity both in construction and maintenance. In the effort to meet the demand for perfection, are we not guilty of over-refinement, and is there not danger of the grand old game losing some of the ruggedness that has always been associated with it in the past? Hazards and rough should never be unplayable, but neither should they be so groomed and manicured that a visit constitutes a mere incident instead of an adventure. In an effort to gild the lily, take care lest we kill the plant.

Every individual who has grown crops knows that a soil must contain air as well as water, and the amount of one will vary with that of the other. In other words, the air of a soil occupies that space not occupied by water, and when the proportion of the two is about equal optimum conditions prevail.

Observations on Turf Experiments at Gainesville, Fla.

By H. L. Westover

For some time the office of Forage Crops of the United States Department of Agriculture has been cooperating with the Florida State Experiment Station at Gainesville, Fla., in conducting experiments to improve the pasture, lawn, and turf grasses. More recently the United States Golf Association Green Section entered into the cooperation, in so far as the improvement of turf grasses is concerned, by appropriating funds to assist in supporting the investigations. During the latter part of December, I had the opportunity of going over these experiments in detail, and I want to say that if any of you are interested in southern turf grasses a visit to these experimental plots will be well worth while. You will find Prof. W. E. Stokes, who is in charge of the experiments, very agreeable and very approachable, and he will, I am sure, be glad to go over the work with you and give you the benefit of such information as he has acquired through his several years of experience.

The experiments in question are located on a soil type designated by the Bureau of Soils as Norfolk sand and consists of a grayish-brown-rather-porous sand which extends to a depth of several feet. There is a considerable area of the type of soil in the Coastal Plains area of the southeastern states. The soil is naturally rather low in fertility and generally deficient in humus. Relatively heavy applications of commercial fertilizer are essential to the vigorous growth of most turf grasses and many other crops.

There are at present under observation approximately 100 plots including plots of all sizes and subdivisions of certain of the larger plots. These plots include tests with several promising grasses, tests with different fertilizers, topdressing experiments, investigations of the value of various methods of planting, etc.

The turf experiments in cooperation with the office of Forage Crops began at Gainesville in 1922. The test included plots of Bahia grass (*Paspalum notatum*); broad leaved carpet grass (*Axonopus compressus*); centipede grass (*Eremochloa ophiuroides*); St. Augustine grass (*Stenotaphrum secundatum*); ordinary Bermuda, Giant Bermuda, ordinary carpet grass, blue couch (*Digitaria didactyla*); "lovey lovey" grass (*Andropogon aciculatus*); Dallas grass (*Paspalum dilatatum*); Manila grass (*Osterdamia matrella*); Japanese lawn grass (*Osterdamia japonica*); and *Osterdamia tenuifolia*. An effort has been made to give these plots treatment similar to that received by the average city lawn. They have been cut every week or ten days and watered as needed. Under such treatment most of the plots have developed fairly satisfactory turf, the most unsatisfactory grass being broad leaved carpet, which is very susceptible to the attacks of an unidentified disease.

Two years ago, the plots having then been established two years, were divided lengthwise into three strips. Since that time the strip on one side of each plot has been fertilized regularly with ammonium sulfate, the strip on the other side with nitrate of soda, while the center strip in each case has been left unfertilized as a check. The soil has been tested at regular intervals to determine the effect of the fertilizer on the degree of acidity. In the beginning the soil was slightly acid. The plots treated with ammonimum sulfate are slowly

increasing in acidity, and those treated with nitrate of soda are gradually becoming less acid. At present there is no apparent difference in the growth of the various grasses under the two fertilizer treatments, though each has resulted in marked improvement over the untreated plots. So far the character and amount of weed growth seems to have been affected very little by the two fertilizers, the one with acid and the other with alkaline reaction. In the Bermuda plots the portion receiving nitrate of soda seems to have considerably more crab grass, though this may be merely a coincidence. It is apparent that more time will be required to change the soil reaction sufficiently to affect the weed growth to any perceptible degree.

The early turf experiments carried under lawn conditions served to indicate the grasses that might be expected to make successful lawns in the South. They also indicated that certain grasses, particularly the finer textured ones, have considerable promise for putting greens, while others which were too coarse for this purpose might be of value on fairways.

While the cooperation between the United States Golf Association Green Section and the Florida Experiment Station really began in 1923, the first year was devoted largely to preliminary investigations and preparation for future tests It was not until the spring of 1925 that plots were established for the purpose of determining the reaction of the most promising grasses to putting green conditions. For the purpose of making these necessary observations the following plots were established:

Atlanta strain of Bermuda, which is the finest strain of Bermuda at present available, and therefore most desirable for putting greens.

Arizona Bermuda, the seed of which comes from Arizona and which contains a considerable proportion of the finer strain similar to Atlanta.

St. Lucie grass, a fine strain of Bermuda without root stocks.

Blue couch grass (*Digitaria didactyla*), an Australian grass much like Bermuda, but with no rhizomes and having a decidedly bluish green color.

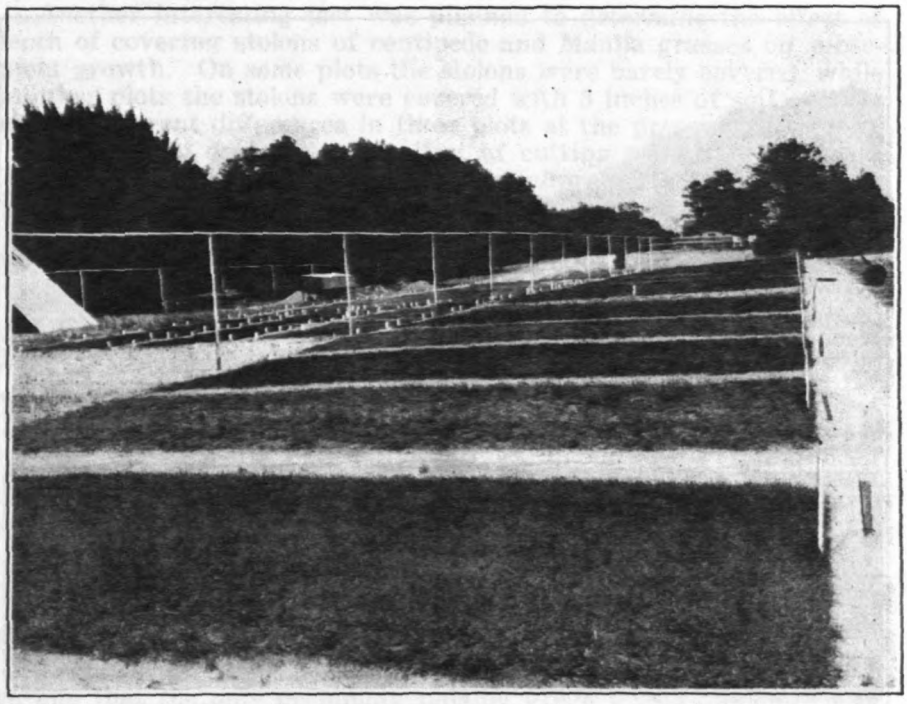
Centipede grass (*Eremochloa ophiuroides*), a native of China, with surface creeping runners much like carpet grass.

Manila grass (*Osterdamia matrella*), a Japanese grass, which makes a fine, but tough, beautiful green turf and is closely related to the Japanese lawn grass.

All plots were started vegetatively with the exception of Arizona Bermuda and centipede grass. Before planting, the west half of each plot was topdressed with about two inches of Gainesville sandy loam, which is a black soil containing some clay and more humus than the Norfolk. Soon after the plots were started they were divided lengthwise with three strips. Since the first month, one side has been fertilized every two weeks throughout the year with ammonium sulfate, the other side with ammonium phosphate, while the center has been left untreated as a check. The fertilizer has been applied at a rate equivalent to 1,000 pounds per acre per year. The plots have been topdressed frequently with soil similar to that on which it is planted, the east half with Norfolk sand, and the west half with Gainesville sandy loam. During the summer they are cut every day, and during the winter every other day. An effort is made to keep

the growth down to 3/16 of an inch. The frequency of watering varies with the amount of rainfall.

Up to the present time the fertilizers have exerted no influence on the weed growth, though they have improved the turf materially over the untreated checks. More time must elapse before the soil reaction will be changed sufficiently to affect the character or amount of weed growth to any extent. The portion of the plots planted on Gainesville sandy loam made somewhat more rapid growth from the first and covered the ground more quickly. At the present time, however, as a result of frequent applications of fertilizer the part planted on Norfolk sand is nearly equal to that planted on Gainesville sandy loam, with the exception of the Manila grass, which is

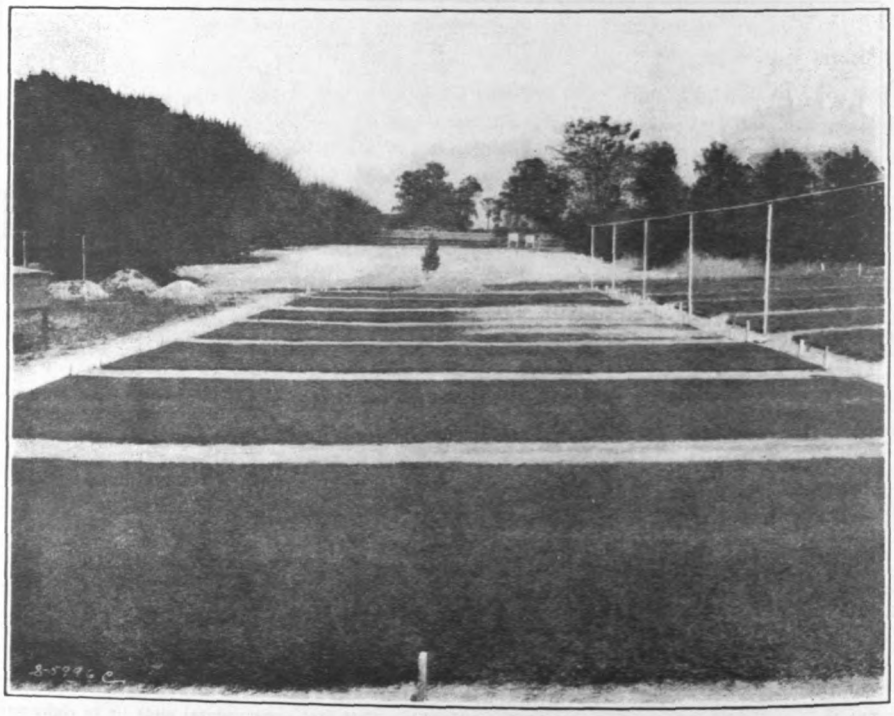


The lawn grass experimental plots at Gainesville, Fla. Golf turf experimental plots lie to right and left of this area.

appreciably better on the end of the plot that received a topdressing of Gainesville soil. The outstanding plot so far as present appearance is concerned is blue couch grass, which seems especially suited to sandy soils. It has a uniform texture and pleasing bluish-green color. Some golfers who have visited the plots voiced objection to this grass on the ground that it is too soft, but it is believed that this condition can be remedied by closer clipping. The Atlanta strain of Bermuda developed a satisfactory turf. It is perhaps a little finer than the plot of Arizona Bermuda established from seed, though the difference is very slight. St. Lucie grass is very similar to the other Bermuda plots. Indeed, at the present time the plots of these three strains of Bermuda are very similar, and so far as a putting surface is concerned all could be improved by closer cutting. The Manila

has been rather slow to cover the ground, and while it makes a dense fine turf, the stiffness of the leaves renders it somewhat objectionable for putting greens. It should be well suited for use on tees.

Centipede grass proved the least satisfactory of all those tried under putting green conditions. It is coarse and when kept cut close it becomes thin, exposing the runners and resulting in a very unsatisfactory putting surface. Furthermore, the open turf gives abundant opportunity for weeds to develop. Everything considered, the blue couch and the three strains of Bermuda are the only grasses in the test that offer much promise for putting greens, though centipede grass may be of value on fairways. While it starts rather slowly, it crowds out almost any other grass that it comes in com-



Some of the golf turf experimental plots at Gainesville, Fla.

petition with, not excluding Bermuda and carpet grass. It is very similar to carpet grass in its habits and should be just as satisfactory for fairways.

In June, 1926, an experiment was started to determine the most economical method of planting Bermuda greens. On two plots the plants were set by hand as closely as possible, and on two others the stolons were spread over the surface and covered with a thin layer of soil similar to the method employed in planting creeping bent vegetatively. The two methods resulted in satisfactory putting surfaces in about the same length of time but the former required all day for a man to plant one plot 10 x 25 feet, while under the latter method an equal area was planted in one hour, resulting in a great saving in labor.

In a fertilizer experiment started in 1926 on Atlanta Bermuda, ammonium sulfate was applied at rates of 2,000, 3,000 and 5,000 pounds per acre per year, and unfertilized checks. The plot receiving an application equivalent to 5,000 pounds per acre per year is at present the most beautiful plot in the entire series. While such heavy applications are not considered practicable they will be continued to determine the effect on the grass and weeds of such large quantities of ammonium sulfate. It is evident that considerable money can profitably be spent for fertilizers that will save hand labor in weeding. While a fair turf had been established on the unfertilized plot by merely keeping the soil well watered the grass had a brown, lifeless appearance and could not be regarded as a satisfactory putting surface.

Another interesting test was planned to determine the effect of depth of covering stolons of centipede and Manila grasses on subsequent growth. On some plots the stolons were barely covered, while on other plots the stolons were covered with 3 inches of soil. There are no apparent differences in these plots at the present time.

In a test to determine the effect of cutting newly planted plots it was found that those plots which were clipped as soon as the grass had made any appreciable growth came on more rapidly than those that were permitted to make considerable growth before they were cut. In other words, early and frequent clippings had a tendency to hasten the formation of a satisfactory turf.

In another test with Atlanta Bermuda, blue couch, and Arizona Bermuda, part of the plots had a topdressing of compost and part were planted on Norfolk sand with no compost. As might be expected, the plots treated with compost started off more rapidly.

Some interesting studies have been made to determine the character of the root systems of the various turf grasses. It has been found that practically all of the grasses develop quite a mass of roots to a depth of 3½ or 4 feet. Below this the roots are not abundant, although some have been traced to a depth of 7 feet. It should be remembered that, as stated at the beginning, the soil on which these grasses are growing is very sandy. It has been shown in previous investigations that grass roots do not penetrate to any such depth on heavy compact soils.

In summarizing the outstanding features in these various tests we find that the only promising putting green grasses among those tested are the various strains of Bermuda and the blue couch grass. It is reported that blue couch grass is being used on some of the putting greens around Palm Beach and Miami, usually in mixture with Bermuda.

For fairways, particularly in the flat woods area, carpet grass is apparently the outstanding grass. There is some indication that centipede grass may be fully as good and while somewhat slower to start is apparently more aggressive than either carpet or Bermuda. In the pasture experiments at Gainesville, carpet grass has done better than Bermuda, even on the higher well-drained areas, conditions for which Bermuda has been generally recommended. These three grasses should be tested further under varying soil and climatic conditions, to determine definitely their relative value.

Some of the *Zoysias* or *Osterdamias*, such as Manila grass and Japanese lawn grass, appear to have some promise for use on tees.

They are especially tough but unfortunately are rather slow to cover the ground. *Osterdamia tenuifolia* would be especially desirable for this purpose were it not for the fact that it grows very slowly. It forms a tough turf and is so dwarfed in its habit of growth that it seldom, if ever, requires cutting.

It has been shown that it is possible to start turf grasses on the Norfolk sand without manure or compost, depending on subsequent watering and fertilizer treatment to produce good turf. It is true that compost applied to the soil speeds up the early growth of the grass, but after a few months have elapsed little difference is apparent.

The value of frequent and liberal applications of fertilizer on porous soils that leach rapidly has been amply demonstrated. It also appears advisable to continue applications throughout the year at intervals of two weeks. By doing this last winter, which was about as cold as normal, the Bermuda grass was maintained in a green condition throughout the winter. After the cold spells the grass sometimes was brown for a few days, but the frequent fertilizer applications stimulated new growth and the clippings every other day soon disposed of the leaves that had been brown by the frost.

So far there has been no apparent difference from the use of ammonium sulfate, nitrate of soda, or ammonium phosphate. The ammonium sulfate is equal to any, but seemingly no better. However, more time will be required to change the acid reaction of the soil sufficiently to show any appreciable effect on the grass.

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Testing New Chemicals on Greens

By John Monteith, Jr.

During the summer many greenkeepers will be interested in trying a new chemical, calomel, for the control of brown-patch. This raises the question as to the best desirable methods available to a greenkeeper for testing a new chemical on his greens; whether it be a fertilizer, fungicide or insecticide. Practically all of those which are used on golf courses are likely to be injurious if applied unevenly or in excess. Therefore although a chemical may be regarded as perfectly safe for general use, it may produce disastrous results under certain conditions. An example of this is the common ammonium sulphate which is used on golf greens throughout the country in spite of the fact that hundreds of greens have been badly burned by careless application or unfamiliarity with its use. It seems to be a human failing to believe that if a small amount will produce beneficial results it must necessarily follow that a little more of the material will be more beneficial. It is wise to gain experience with a new chemical on a small scale, for if any mistakes are made the injury is not extensive. If the test is satisfactory, there will be plenty of time later for more general use.

So many times we hear a greenkeeper decide, "Well, I shall give it a trial on number so-and-so." He then proceeds to treat that entire green and to compare results with other greens on the course which have not been so treated. This method gives some information, it is true, but when one considers how much variation there may be between two greens within a hundred feet of each other, this system is obviously not as fair a test as might be desired. If the trial is made so that the treated and untreated turf is on the same green, the results are much more striking and convincing.

One of the best methods for testing a new chemical is that of using only a small square at one side of the green, as is illustrated in Figure 1. Especially for fertilizers or chemicals used against brown-patch this method has several distinct advantages. It takes very little time to mark off such an area and to apply the chemical. If injury results, due to error or other causes, the loss of turf is insignificant as compared with what might have occurred if the test had been made over the entire green. If the effect is beneficial, this plot will stand out distinctly, whereas if the results are not satisfactory, the turf in this plot will not be distinguishable from that on the rest of the green. There will be no need for guessing as to slight differences, for where the plot is surrounded by untreated turf on the same soil, with exactly the same watering, clipping and other care, any differences in appearance must be due entirely to the chemical. Two or more similar chemicals can be compared accurately by placing them on small adjacent areas on one green. A convenient size for such a test plot is an 8-foot square. This gives an area of 64 square feet, which is approximately one-sixteenth of 1,000 square feet. Chemicals for use on greens are usually recommended on the basis of the common unit of 1,000 square feet. In using the 64 square foot plot one simply has to use ounces instead of pounds as recommended for the larger area. That is, if the recommendation commonly made is for 3 pounds per 1,000 square feet the equivalent amount for the 64 square foot plot is 3 ounces.

Another method which is commonly used by greenkeepers in comparing two similar chemicals is that of dividing the green into two equal parts and applying one chemical to one side and another to the other half. This is a desirable method for comparing a new chemical with one which the greenkeeper already has proven to be valuable on his course. Different fertilizers are often tested in this way, using ammonium sulphate, or some other standard fertilizer with which the greenkeeper is thoroughly familiar, on one side and the new fertilizer on the other half. In the cases where greenkeepers have already used some of the mercury compounds, such as Semesan or Uspulun, it would be wise in testing calomel to treat the greens in two sections, putting calomel on one half and the other compound with which they are familiar on the other section. This would be much better than

FIGURE 1—TESTING A NEW CHEMICAL ON A GREEN

By marking off a small square at one side of a green and treating that only, the greenkeeper can determine whether an unfamiliar chemical is of value on his course. If injury results the loss of grass in this small area is of little consequence. On the other hand, if the treatment proves satisfactory it can then be applied to the entire green.

shifting entirely to the cheaper chemical at once or than comparing them on different greens. If clubs will make such tests and report results to the Green Section, they will not only obtain valuable information for their own local use but will help us in drawing conclusions as to the relative values of these chemicals under various conditions of soil and climate. The trials will be even more conclusive if a portion of the green is left untreated, for a time at least, to enable the greenkeeper to observe whether brown-patch develops in the untreated portion and to what extent it injures the turf. Naturally, we do not expect greenkeepers to leave any large area of the green unprotected during a severe attack of the disease, but a small portion can be left as a "check" during the lighter attacks.

In making tests with calomel it must be remembered that this chemical is not soluble. The more finely ground calomel stays in suspension longer than the coarser material, and therefore is more suitable for liquid applications. Much confusion already is apparent as to the distinction between soluble material and that in suspension. Since this difference has a direct bearing on application of calomel, perhaps a more detailed explanation of these terms will be helpful. Ammonium sulphate, for example, is soluble; that is, it is entirely dissolved and disappears in the quantity of water used in applying it to greens. Sand and clay differ in that the particles making up clay are extremely small as compared with the individual grains of sand. If sand is shaken up in a jar of water and let stand, it quickly settles to the bottom, whereas a like amount of clay treated in the same way

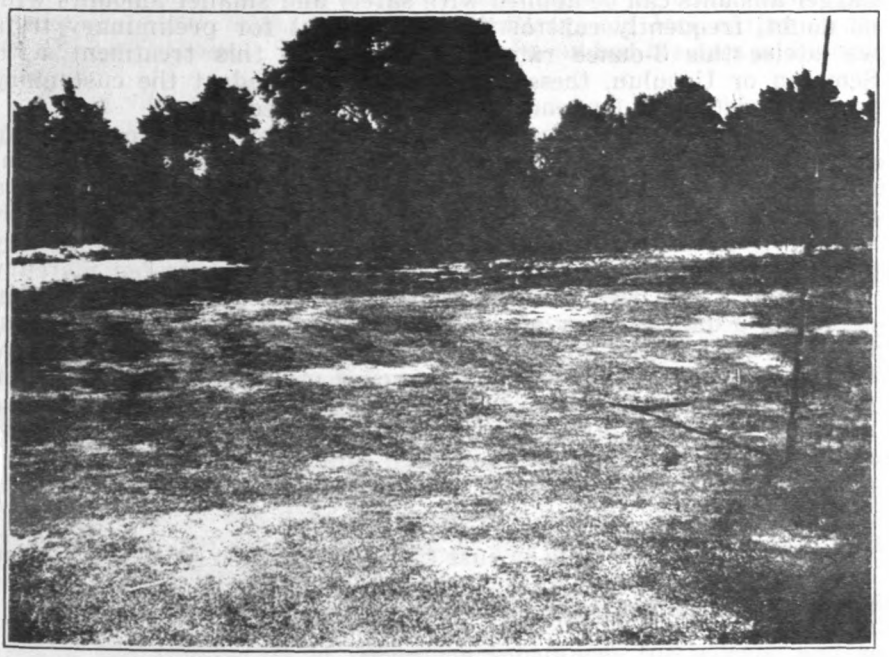


FIGURE 2—"BURNING" CAUSED BY CHLOROPHENOL MERCURY
The light areas represent patches of grass permanently injured by excess of the chemical. On this green the dusting method of application was used; a method which is usually unsatisfactory due to the difficulty in obtaining uniform distribution.

takes perhaps hours to settle out entirely. The clay particles are not soluble but remain suspended in the water for some time. Likewise, the more finely calomel is ground, the longer it will remain suspended in water and the more suitable it is for use in liquid applications. However, even the most finely ground calomel we have been able to obtain contains a relatively large amount which settles out quickly. Therefore, if calomel is used in barrel sprinklers or proportioning machines, it should be constantly stirred to avoid uneven distribution.

The method of applying calomel, which at present appears most practical, is that of mixing it with a small amount of fine compost or sand. This material should not have any large lumps which will be picked up by the mower, for some of the chemical would stick to

them and be removed from the green. The compost or sand simply gives sufficient bulk for even distribution and the amount will vary with the desires of the greenkeeper. Usually one pail for each 2,000 to 5,000 square feet will be sufficient. The calomel, and ammonium sulphate if desired, should be *THOROUGHLY MIXED* with the compost or sand and then broadcast over the green as one would sow seed. This may be done by hand, or it may be possible to adapt the various hand seeders to applying this mixture. The principal objective is to scatter the material evenly. The green should then be watered thoroughly, but care must be taken not to let it wash or puddle. If ammonium sulphate is used, watering must follow immediately.

Whatever method is employed in making the application of calomel, the rate should be 3 ounces for each 1,000 square feet. Larger amounts can be applied with safety and smaller amounts will, no doubt, frequently control the disease, but for preliminary tests we advise this 3-ounce rate. In comparing this treatment with Semesan or Uspulun, these latter should be used at the customary recommendation of 1 pound per 1,000 square feet.

It is perhaps well to give a warning against dust guns for applying any of these chemicals. The dust method of application became general when Bordeaux Mixture was used against brown-patch. It is a rapid method, and for that reason has some stubborn supporters. It is entirely possible to use this method with safety, but the majority of the experiences in dusting with the more concentrated mercury compounds have been disappointing. This is due to difficulty in obtaining a uniform flow of dust and the resulting uneven distribution. The accompanying illustration (Fig. 2) shows injuries produced by one of the chlorophenol mercury mixtures that were much more serious than would have been the fungous damage which it was intended to prevent. The same quantity applied with the liquid or compost method, using any reasonable care, would have caused little or no injuries.

Often a tiny pit placed in just the right spot, so small that it can have little effect upon actual play, can be a mental hazard with tremendous effect upon the morale of the golfer.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF THE BULLETIN OF THE UNITED STATES GOLF ASSOCIATION GREEN SECTION, PUBLISHED MONTHLY AT WASHINGTON, D. C., FOR APRIL 1, 1927.

District of Columbia, ss:

Before me, a notary public in and for the District of Columbia personally appeared G. T. Cunningham, who, having been duly sworn according to law, deposes and says that he is the business manager of The Bulletin of the United States Golf Association Green Section, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, United States Golf Association, 110 East Forty-second Street, New York, N. Y.; editor and managing editor, R. A. Oakley, Washington, D. C.; business manager, G. T. Cunningham, Washington, D. C.

2. That the owner is the United States Golf Association, a corporation organized and existing under the law not for profit and having no capital stock.

3. That there are no outstanding bonds, mortgages, or other securities.

(Signed) G. T. CUNNINGHAM, Business Manager.

Sworn to and subscribed before me this 26th day of March, 1927.

(Seal) (Signed) BERNARD CONNOR.
(My commission expires August 6, 1927.)

Why the Green Section?

An Address by Alex Pirie, President of the P. G. A., Delivered at the Annual Meeting of the U. S. G. A. Green Section at Pittsburgh, Jan. 7, 1927.

Mr. Chairman, Ladies and Gentlemen: Well, I feel it quite an honor to be asked to come to this Association and talk, not for myself, but for my Association which I have the honor to represent at the present time. At the same time, I feel very much like the old Scotchman by the name of Jock Brown must have felt. He had been drinking pretty heavy. His business was peddling fish in a cab, and on his way home he fell asleep in the cab by the side of the road. Somebody came along and thought they would play a joke on the old fellow, and they took out the horse and turned it loose, knowing of course the horse would go on home and leave old Jock sitting on the street sound asleep. When he woke up he rubbed his eyes and looked around.

"Well," he says, "if I am Jock Brown, I have lost a horse; and if I am not Jock Brown I have found a cab."

After all the technical explanations for the treatment of the green which the trained men of the Green Section have shown us and told us about, that is really about how I feel, but it answers the question of "Why the Green Section?"

After Mr. Fitts finished this morning, the Chairman asked for questions, and there were no questions.

I was sitting beside Alex Campbell, and he said nobody was going to ask any questions about greens, because everybody has good greens; and that was another answer to "Why the Green Section?"

I think that the Green Section began when Messrs. Piper and Oakley wrote their book on "Turf for Golf Courses."

That was the inception of the Green Section. It is only six years ago since it was properly organized; in its present shape, well, you all know what it has done and what it is leading up to. So there is no use of my taking up your time by any more explanation of what the Green Section has done.

The outstanding things from a greenkeeper's viewpoint that have been done, the startling methods of economy in seeding, fertilizing, and in the application of poisonous substances for worms, and so forth, need not be gone into by me.

Before the Green Section started its work on golf courses, we were all going along pretty much in the dark. We had a fairly good idea of what we could do, but we did not know enough to know how to do it.

In the six years of the Green Section's official existence, we have learned more about the whys and wherefores than we had in all the years before in which men have been playing golf on green grass. That is also an answer to "Why the Green Section?"

I believe this officially finishes the sixth volume of THE BULLETIN. I have them all, and I am proud to be able to say I have them all. In that bulletin I have learned many, many things, and some of the things I have forgotten that I read in that bulletin, but the majority of them were new and I have remembered them. What does this do to a greenkeeper? It teaches him, and sometimes he wonders how he has been taught, how he came to know about such and such a thing. Now if he sits down himself and begins to trace back, he will find

that the most of his advanced information for the past six years has come directly through the Green Section, either from the personal representatives, or through THE BULLETIN. That is another answer to "Why the Green Section?"

If there should be any criticism of the Green Section's work from the greenkeeper's viewpoint, it might be this: That they have not obtained the close cooperation from the working greenkeepers of the country which might have been given to the trained men of the Green Section, but this condition is understandable.

The older greenkeepers felt that they had spent their lives in learning what they knew, and do not forget we have learned more in the last six years than we have in the previous twenty, and there has been more or less of a tendency to look upon the trained man as something over their heads, and something not quite to be trusted.

The whole future, and I believe it is a great future, for the Green Section, must be changed from that very understanding, which I believe is now about to go into working effect with the practical working greenkeepers' organization of the country. It might have been because of the fact that the greenkeepers had no organization through which practical experience could be "swapped" for theory, if I may use the word "swapped." I will take that back—through which practical experience and theoretical experience can get on a common meeting ground.

Now, the greenkeepers throughout the country have organized themselves, and if I may be allowed to make the suggestion, I would suggest that in addition to all the work of the Green Section throughout the clubs and through the chairmen of the green committees that they cultivate a closer and more intimate co-partnership, or cooperation rather, with the greenkeepers of the country.

I think really, gentlemen, that that is the only thing that is needed now in order to get the full benefit of all of these six years of splendid work on the part of the Green Section.

Speaking of experimental stations, if such an intimacy—or if such cooperation, rather—were established with the different greenkeepers' associations, there would not be any trouble at all about experimental stations, because I am quite sure there is no club for which any greenkeeper works that would not gladly give a piece of their ground for an experimental station, and I can imagine no happier and no greater opportunity of cooperation than to see the trained men come to a practical agreement with us, and discuss our problems together on the ground, through which they may arrive at a solution.

The Green Section announces that seed analyses and germination tests as well as analyses of fertilizers can not be made without cost to the clubs requesting such service. Owing to the large number of such requests made to the Department of Agriculture it is not possible for its analysts to give preferred service to anyone. For this reason the Green Section must seek the help of competent commercial analysts and will charge the interested clubs no more than the fee asked by the firm actually making the tests.

Municipal and Public Golf

Just how Municipal Golf has expanded since the first public golf course was opened at Van Cortlandt Park in New York City in 1895 is forcefully presented in a booklet just issued by the United States Golf Association. One hundred and forty-eight cities maintaining 208 Municipal and Public Golf Courses are presented, distributed through 37 States and the District of Columbia.

Statistics supplied by 120 courses giving the number of 9-hole rounds played during the year 1925 show a total of 5,744,104 rounds. Ninety courses furnished information as to the cost of maintenance in the amount of $1,298,241, an average of $14,425 per course. Individual course maintenance costs range from $2,000 to $40,000 per annum, the lower figures applying to courses with sand greens. Playing fees are as low as 5 cents per round of 9 holes and as high as $1.00 per day. A majority of the Municipal Courses are similar in their charges, 25 cents for 18 holes, with this charge doubled on Saturdays, Sundays and holidays, where on a good many courses the patronage is tripled. Eleven courses listed are maintained free from playing charges. A large majority of the courses are self-sustaining, exploding the old theory that a Municipal Golf Course is a charge on the taxpayer.

Probably the longest Municipal Course is maintained by the city of Denver, Colo., known as the City Park Municipal Course, which is 6,767 yards in length and a par of 74. Rockford, Ill., enjoys a 9-hole course of 3,511 yards with a par of 35. The shortest course appears to be the one located in Jermain Park, Toledo, Ohio, which is only 815 yards long, par 27. Municipal Golf Courses that have been maintained by cities for twenty-five years or more are: Franklin Park Course, Boston, Mass., opened in 1896; Ottawa Park Course, Toledo, Ohio; Riverside Course, Indianapolis, opened 1898; Lake Golf Course, Milwaukee; Cherokee Park, Louisville; Wing Park Course, Elgin, Ill., opened 1900; Burnet Park, Syracuse, N. Y.; Waveland Course, Des Moines, Iowa, opened 1901; Genesee Valley Course, Rochester, N. Y., opened in 1902. Savannah, Ga., park officials have started constructing golf courses on a most pretentious scale, and in December, 1926, dedicated an 18-hole course, the first of four to be built on a tract of 714 acres.

Thirty-two years ago the City of New York, through its Department of Parks, authorized the construction of a 9-hole golf course in Van Cortlandt Park. This appears to be the pioneer movement in the United States for the establishment of Municipal Golf Courses. In the first four years the attendance had grown to such an extent that the Park Department felt justified in enlarging the course, and it was rebuilt and extended to 18 holes. In November, 1899, the new course was formally opened with a tournament in which 120 players competed. A. G. Hamilton is recorded as the winner, and the newspapers of that period state that he "Lived within a stone's throw of the grandest public golf course in the world." It was also stated that he had been identified with the Baltusrol Golf Club in New Jersey for many years. Pictures of scenes during that event bear little resemblance to the attire worn at the present time by golfers, and it is quite doubtful if a contestant of today would have the courage to appear on a course wearing a Derby hat.

In September, 1896, the Van Cortlandt Park Golf Club was organized at a meeting held in the Vanderbilt Building, Nassau and Beekman Streets, New York City. Twenty-one members were enrolled and the entrance fee was fixed at $2.00 with annual dues of the same amount. The officers elected were: President, C. S. Jensen; vice-president, A. Owles; secretary, A. P. Meyer; and treasurer, W. E. Kingsbury. In 1922 the United States Golf Association inaugurated and conducted the first Public Links Championship at Ottawa Park in Toledo, Ohio. During the five years that these championships have been held 44 cities have been represented, three of this number being Canadian cities. Not more than 30 cities have been represented at any one tourney. The annual staging of this competition has served in no small way to arouse the interest of municipal authorities throughout the country and set them planning for the construction of public golf courses, especially in those localities where the recreation officials have been backward in providing facilities for the playing of the game. The number of Municipal Golf Courses opened each year since 1922 has been most gratifying, and in 1823 nineteen courses were opened; in 1924, fifteen courses; in 1925, the banner year, twenty-one courses were ready for the public golfer, and this number was duplicated in 1926. This year nine more cities are preparing to dedicate Municipal Golf Courses. A large number of Municipal Golf Courses have regularly organized golf clubs and associations which serve to promote the interest of the members in the playing of the game, its etiquette and the proper enforcement of the rules. Only a small proportion of the courses listed in the booklet, sixty in all, have supplied information as to membership in each club. These 60 clubs have enrolled 15,842 players, but this total does not include clubs identified with the various New York City courses.

When the late Hon. Warren G. Harding was President of the United States in 1923, he donated a trophy for competition between cities, and this is now known as the Inter-City Team Championship. Four players are nominated by each city that enters a team, and the trophy is retained by the city returning the winning team for one year, and each member of the team receives a gold medal. Whenever the players from the city of Chicago win the Harding Trophy it is placed on exhibition in the City Hall, so that all may see that the humble public links player has at last been recognized and afforded an opportunity to journey forth and match his skill against brother golfers from all sections of the country.

TO MEASURE THE AREA OF A GREEN

Rectangular. Multiply the length in feet by the breadth in feet. Allowance should be made for projections from or indentations into the rectangle.

Circular. Take the distance from the center to the outside and multiply it by itself. Then multiply the product by 3.1416.

Triangular. Multiply the length of one side by half the distance from the middle of that side to the tip of the triangle.

Oval or Elliptic. Add the long diameter to the short diameter, divide by 4, multiply the resulting figure by itself, and then multiply this final figure by 3.1416.

QUESTIONS AND ANSWERS

All questions sent to the Green Section will be answered in a letter to the writer as promptly as possible. 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 Section.

While most of the answers are of general application, please bear in mind that each recommendation is intended specifically for the locality designated at the end of the question.

1. European red fescue and Chewings' (or New Zealand) red fescue.—Are these two red fescues the same? (California.)

ANSWER.—No. Chewings' fescue (*Festuca rubra fallax*) is a European grass introduced in New Zealand. It is one of the numerous varieties of red fescue, about forty of which occur in Europe. The European seed is mainly true red fescue (*Festuca rubra genuina*) but with a little seed of other fescues intermixed, usually including sheep's fescue. The New Zealand variety does not creep as widely as the European, but there is not great difference in the two. If anything, the latter is the better, but neither of them is to be recommended except on sandy or gravelly soils. The seeds of the two can be distinguished only by the impurities which each contains.

2. Exterminating groundhogs.—The new course here is infested with groundhogs. What is the best way of exterminating them? (Vermont.)

ANSWER.—We know of no better method of getting rid of these animals than to place a tablespoonful of calcium cyanide in each burrow and then close the mouth of the burrow. This material should be placed far enough down the mouth of the burrow so as not to be covered with the soil used for stopping up the hole.

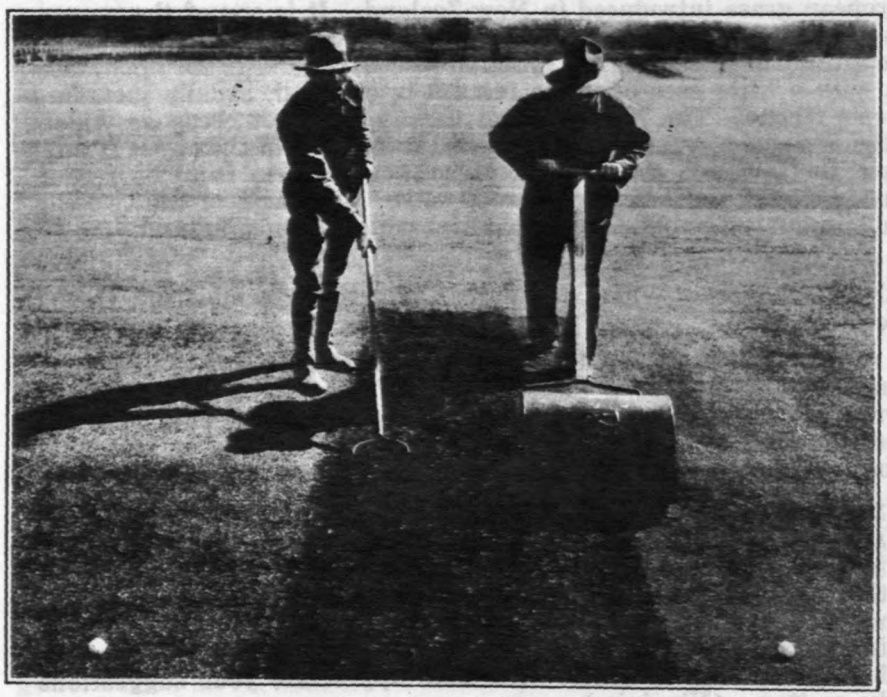
3. Comparative Value of Different Manures.—In the preparation of land for several new fairways we are about to construct, we have advice from one source to fertilize it first with horse manure, while another source advises us not to use horse manure under any circumstances but that sheep manure should be used, and still another source advises us that the proper thing to do is to grow a crop of peas on the land first and turn it under. We shall appreciate your suggestions in the matter. (Virginia.)

ANSWER.—The character of turf grass can always be regulated by fertilizing the established turf from the top, and in the end this is just as cheap and more satisfactory than trying to get the soil rich enough to grow turf indefinitely without fertilizing. As for the value of the different manures, cow manure gives the best results. Horse manure is excellent, and so are some grades of sheep manure. If you buy any manure, we would advise you to buy that which is cheapest, as the differences between them are of minor importance when cost is considered. As for growing a crop of peas on the land and plowing it under, that is an excellent plan, provided you are in position to wait a year longer, as it will take that long for a crop to mature.

The better strains of creeping bent never form a "grain" because of the fact that under turf conditions their blades are so crowded together as to stand upright. But unless constant care is taken to keep the putting surface keen these desirable strains will become "fluffy," building up such a mat of turf that contact with the ground is lost and the putting surface becomes slow and untrue.

Daily close cutting and light topdressings applied at regular intervals throughout the playing season can not be dispensed with if greens of this type are to be kept firm and true.

At least once during the season, preferably in the early spring, the turf should be brushed or raked to bring the runners and long stems to the surface. After close mowing the operation should be repeated, this time the turf being raked and mowed at right angles to the line first taken.



The turf at the left of the photograph was a putting surface well above the average. That on the right has been raked and mowed as above described and was practically perfect even before being lightly topdressed.

The difference in texture of the turf to right and left can be distinctly seen.

Turf so treated is not injured even for a short time. On the contrary, it seems to be stimulated by this shallow cultivation. But if a thick dense mat has been allowed to form, a temporary setback is inevitable. It must be endured, however, if uniform, fast, true put-ing surfaces are desired.