

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

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A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

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Twenty-sixth Competition for the Open Championship of the United States

CHAMPIONSHIP COMMITTEE, 1922, OF THE UNITED STATES GOLF ASSOCIATION

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Mr. Joshua Crane, Boston, Mass.

Mr. Albert D. Locke, Boston, Mass.

Mr. Edward S. Moore, New York, N. Y.

Mr. Thomas B. Paine, Atlanta, Ga.

Mr. Alan D. Wilson, Philadelphia, Pa.

The competition will be played on the course of the Skokie Country Club, Glencoe, Illinois, on Monday, Tuesday, Wednesday, Thursday, and Friday, July 10, 11, 12, 13, and 14, beginning at 8 o'clock a. m., under the Rules of the United States Golf Association.

The competition shall be played as follows: The entire field of contestants will be divided into three equal sections, and on each of the three days preceding the championship each section of contestants will play 36 holes. The best 24 scores and ties of each section in the 36-hole play of the qualifying rounds, totalling best 72 scores and ties, will start in a 72-hole circuit for the title, 36 holes to be played on the first day, and the same on the next day. The qualifying scores not to count but simply to qualify the contestants for the championship proper.

In order that the field may be divided as equally as possible as far as strength is concerned, the player who made the best score in the championship last year will play on the first day; the player who made the second best score will play on the second day; the player who made the third best score will play on the third day; and so on down through last year's field.

All foreign entries will be divided equally in the three days' play.

The competition shall be medal play as follows:

MONDAY, JULY 10. 8:00 a. m. Qualifying round (36 holes).

TUESDAY, JULY 11. 8:00 a. m. Qualifying round (36 holes).

WEDNESDAY, JULY 12. 8:00 a. m. Qualifying round (36 holes). The 24 players and ties for last place made on July 10, 11, and 12, totalling 72 players and ties to continue.

THURSDAY, JULY 13. 8:30 a. m. Tournament round (36 holes).

FRIDAY, JULY 14. 8:30 a. m. Tournament round (36 holes).

The 72 holes played on July 13 and 14 to decide the winners of the tournament.

In case of a tie it will be played on Saturday, July 15, 18-hole stroke competition.

The entrance fee shall be \$5.00 and must be received by Mr. T. J. McMahon, 55 John St., New York City, not later than 5:00 p. m. on Friday, June 30. Draw checks to the order of the United States Golf Association.

All entries are subject to the approval of the Executive Committee of the Association, and any entry may be rejected by the Committee.

Any player who fails to appear at the tee within 15 minutes of the time he is called to play by the Committee shall be disqualified, unless reason satisfactory to the officials in charge of the Tournament be given.

All disputes shall be settled by the Executive Committee of the Association, whose decision shall be final.

Any person paying his entrance money shall be considered thereby to have submitted himself to the Rules of the Association, both as to restrictions enjoined and penalties imposed. On these conditions alone he is entitled to enjoy the advantages and privileges of the Association competition.

The *Rules of Golf* booklets, containing the correct rules, are now available for distribution; quantity prices will be quoted on application to Mr. T. J. McMahon.

CORNELIUS S. LEE,

Secy., U. S. Golf Association.

June 1, 1922.

The United States Amateur Championship will be held at The Country Club, Brookline, Mass., September 4 to 9, inclusive.

The United States Women's Championship will be held at the Greenbrier Golf Club, White Sulphur Springs, West Virginia, September 25 to 30, inclusive.

Membership of the Green Section

In this number of THE BULLETIN we are publishing a list of the golf clubs that are now enrolled in the Green Section. While the number of clubs enrolled is very encouraging indeed considering our little over one year's existence, yet it is the ambition of the Green Committee to have enrolled in the Green Section every golf club in the United States and Canada. In looking over this list you will at once see that there are many clubs in your State which are not, but which should be, enrolled in the Green Section. We feel we will not be doing our duty to the game of golf until we enlist in our work every golf club active in the game. A united effort of all clubs, through the Green Section, will mean that the best that can be expected has been reached, in cooperation, to promote economy and efficiency in turf production and management; and it is this "best" which we have set out to achieve. Here is your opportunity to cooperate with the Green Committee in striving for the goal.

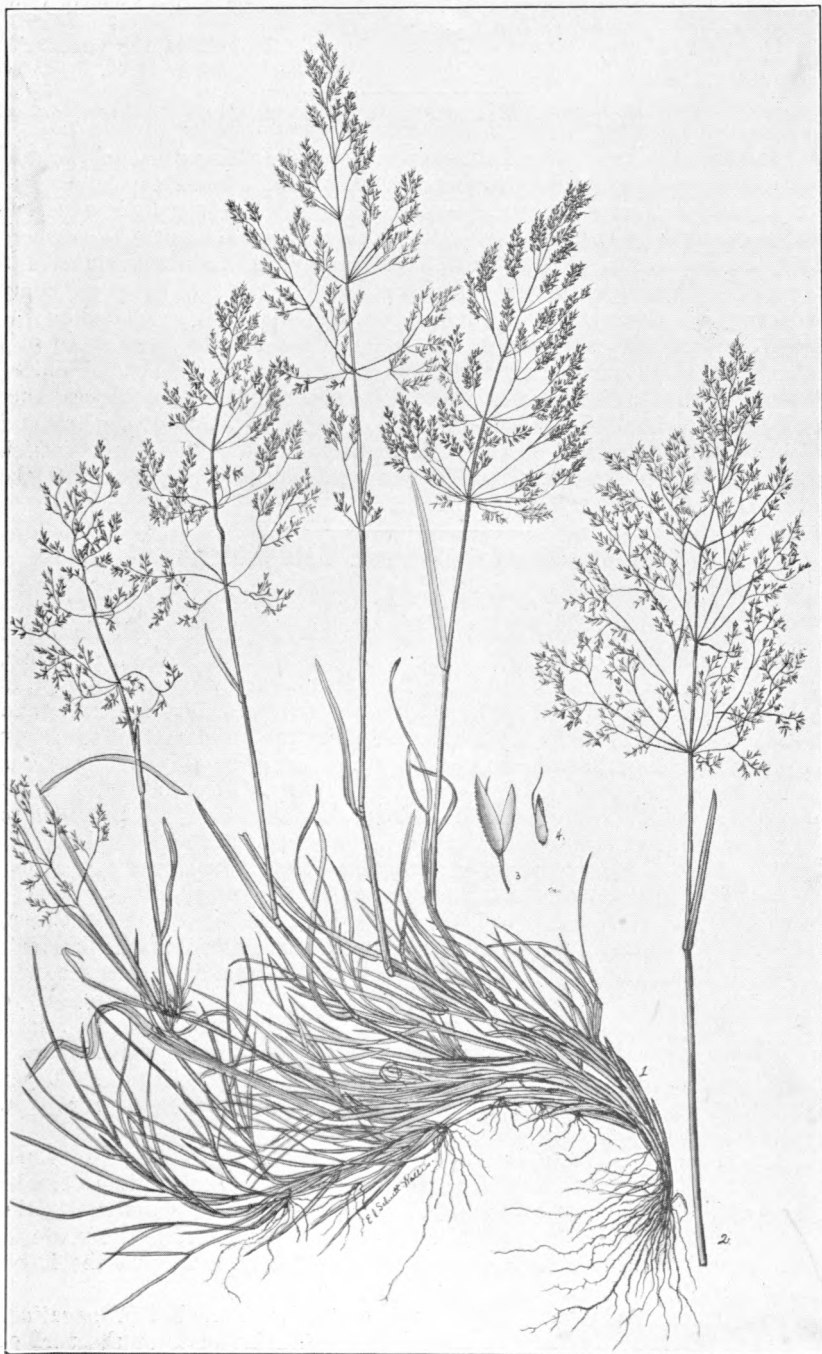
Some Observations on Velvet Bent

C. V. PIPER AND R. A. OAKLEY

Velvet bent (*Agrostis canina* Linnaeus) is the finest of all the bents and makes the most exquisite turf known. The grass is native to Europe, but long since introduced into the United States mixed with other fine grass seeds. For a long time American botanists supposed that Rhode Island bent was the same thing as *Agrostis canina*, but the former is not nearly so fine-leaved and is otherwise very different. Pure seed of velvet bent has never been on the market, but its seeds are always in the natural mixture now known as South German Mixed Bent, usually about 10 per cent to 15 per cent, but occasionally as high as 40 per cent. Notwithstanding this fact, there are several northern golf courses which have one or more pure velvet bent putting-greens, and many in which the greens are 50 per cent velvet bent. Such pure velvet bent putting-greens occur at Braeburn, Brookline, Ekwanok, Siwanoy, and very notably at Wollaston, the last-named the finest examples that we have seen. At Brookline there are even two fairways that are practically pure velvet bent. On other courses large areas of the grass occur on the fairways at Wykagyl. Towards the southward the percentage of velvet bent on old putting-greens sown with German bent decreases. At Nassau and Wykagyl several of the greens are 50 per cent velvet bent; about Philadelphia and Washington there is rarely as much as 25 per cent.

Inasmuch as all these greens were sown to the South German mixed bent, how have these areas of pure velvet bent come about? There can be apparently only one answer, namely, that the velvet bent crowded out the other grasses. If such be admitted, why should not the effort be made to secure pure velvet bent greens—unquestionably in our opinion the finest quality of putting turf?

Velvet bent lends itself easily to the vegetative method of propagation. At Arlington Farm we have made many experiment plats of the turf of



Velvet bent (*Agrostis canina* Linnaeus). 1, entire plant, natural size. 2, stem and inflorescence, natural size. 3, outer glumes, enlarged 5 times. 4, floret, enlarged 5 times

many different strains. Unfortunately in the latitude of Washington it does not thrive so well as creeping or carpet bent and in particular is more susceptible to brown-patch, and mainly on this account has not been recommended. Northward, however, especially in New England, the grass is amply vigorous, indeed, as before stated, crowding out other grasses under favorable conditions. Clubs that are favorably situated should experiment with velvet bent. The method is not expensive, and is virtually the same as that for carpet bent (see page 124, July, 1921, *BULLETIN*). We would suggest growing the turf first and then transferring it by the sodding method to the putting-green. In this way there will be practically no interference with play. Nassau has already engaged in this enterprise. It may well be taken up by many New England clubs.

The strains of velvet bent differ in their vigor of growth considerably. Some in one season will from a small sprig make a circle 3 feet in diameter; others, only 6 inches. The color of most strains is a deep apple-green, but in some it is as dark as bluegrass. We suggest a trip to Wollaston to any club that is interested. If the exquisite greens there do not inspire action, —then the spirit of the golf turf “bug” is lacking.

Suggestions for the Rough

C. V. PIPER AND R. A. OAKLEY

Although much less attention is given to it than to other parts of the golf course, the rough nevertheless is an exceedingly important feature. Frequently with the “duffer,” and in fact with the real player, much of the game is played in the rough. It would appear that there should be a sort of standard for this feature, especially on courses where important events are held. There seems to be a general agreement among those who have given thought to the subject, that a shot into the rough should result under fair conditions in a lighter penalty to the player than a shot to a sand trap or grassy hazard. Furthermore, all will agree that the rough should not be of such a character as to make it practically impossible or at least a very difficult matter to locate the ball that lands in it. Much of the congestion and confusion that occurs on holidays and other days when the course is crowded is due to the lost ball. A ball driven to the legitimate rough should be relatively easy to find. In much of the rough as it occurs on a majority of our golf courses it is exceedingly difficult to locate it even when the player or his caddie has a definite idea of where it landed.

Ordinarily the rough is composed of practically the same species of grasses that are in the fairway, with some of the coarser grasses, such as orchard grass, timothy and the coarser growing native grasses and weeds included. These grasses and weeds do not make good rough. They have to be cut frequently and make too rank and continuous or too bunchy a growth to be suitable. The rough should not be composed either of continuous thick turf or of large tussocks such as are formed by orchard grass, broom-sedge, and other large bunch-grasses. An almost ideal grass for the rough is sheep's fescue. It is a fine grass, requires little cutting, and grows in relatively small tufts or bunches. These tufts are just about of the right size to impose a proper penalty upon the player. Sheep's fescue, especially when grown on poor soil, makes a rough that is satisfactory from nearly every viewpoint. It is economical to maintain. The ball driven to it can be located with comparative ease, and it affords a sufficient penalty for the player. In many cases the soil of the rough is sufficiently poor to produce

the proper growth of sheep's fescue. There are, however, some courses on which the soil is much too rich for the production of ideal sheep's fescue rough. On such courses excellent results may be obtained by scalping off the top soil with the sod and sowing sheep's fescue on the under stratum. In addition to providing suitable conditions for the growth of this grass, there is also obtained a very large quantity of good material for the compost pile.

Sheep's fescue may be used for the rough as far south as the Potomac river and even southward at high altitudes. Its range is much the same as that of red fescue, but since the conditions in the rough are not so exacting as those on the fairways or greens it may be used even farther south than the latter.

Objections have been raised to sheep's fescue on the ground that even when used in the rough it spreads by seed to the fairways and even to the greens. This objection does not appear to be valid. On courses where critical observations have been made covering a period of many years no evidence has been found to indicate that this grass encroaches on territory outside of the area where it was grown.

Canada bluegrass is another good grass for the rough in the northern states. It is not bunchy, as is sheep's fescue, but it is a slow-growing species on poor soil and forms an open, wiry, stubbly turf in which a ball can easily be located, and it affords about the proper penalty for the player. Seed of this grass is relatively cheap, and it is quite an easy matter to obtain a stand of it from sowing in the fall under unfavorable cultural conditions.

To summarize.—Most courses are concerned chiefly with improving their greens and fairways, but there are some which have good greens and fairways that could well afford to devote more attention to the rough. The rough could be improved by the use of the grasses heretofore suggested, without interfering with play, and as much time as is necessary could be given to the improvement. It is practicable to treat one side of the fairway at a time, or as much as the labor regularly employed on the course is able to handle. It does not require occult powers to foresee a time not far distant when the rough proper will in some measure be standardized or at least will be given intelligent and special consideration.

Quack-Grass for Fairways on Very Sandy Soil

Some years ago we were very much struck with the excellent quality of fairway turf made by quack-grass in patches on the course of the Pine Valley Golf Club, at Clementon, New Jersey. On this course there are on several of the fairways patches of quack-grass, six to ten feet in diameter. In most cases these are made by single plants. Perhaps similar patches occur on other golf courses, but these are the only ones we have specifically noted.

The following experience of the Escanaba Golf Club, Escanaba, Michigan, is of interest in this connection:

"We planted in the fall of 1920 about 1½ acres of sand dunes with quack-grass rootstocks and now have a very fine solid turf that is mowed with a regular mower and makes a surprisingly good fairway—much better than other fairways of better soil planted to other grasses years ago. We sowed 5 acres more of sand knolls this spring with quack-grass seed and will

report later the results. We are also now planting red fescue in the quack-grass turf and expect from the showing so far good results."

This experience at Escanaba is extremely interesting. It is highly probable that good turf of quack-grass can be secured on soil too sandy even for such sand-loving grasses as red fescue and Rhode Island bent. The weedy character of quack-grass need not be feared at all on a golf course, except that perhaps care should be taken not to plant it too close to the putting-greens, as the grass can easily evade the putting-greens by means of the long creeping underground rootstocks.

Divots—Replacement of Turf

A. J. HOOD, DETROIT GOLF CLUB

An old golfer of quite mediocre caliber as far as his game is concerned, but who claims that he aims to make up for his lack of physical prowess as a player by his manifestation of the proper spirit and interest toward the other end of the game—the golf course—has given himself the privilege of riding a hobby, and said hobby takes the form of divots—replacement of turf. He insists it is one of the vital things connected with the cost of maintenance and upkeep, with which we are all so much concerned these days, and points to the emphasis laid upon the subject of replacement of turf by every green committee actively engaged in the improvement and betterment of its course. He proclaims loudly and long on his hobby whenever and wherever opportunity offers; and not infrequently the air of indifference with which it is received would indicate that he misjudges his moment of opportunity; but, giving the devil his due, it must be said he remains undismayed even though he may stand meekly by and wait for another day.

He reasons that most of the money spent on a golf course is for the purpose of building up the turf. Therefore it is highly important that every precaution should be taken to keep it in good condition after getting it there. And in this direction, one of the first and foremost steps to be taken, is to insure the proper replacement of turf. Suiting his words to action, he goes forth each day with a first-aid equipment of two boxes of fine grass seed—one in each hip pocket. The containers are metal cigar boxes of concave shape that snuggle on the hip like a corset on "a perfect 36." The boxes have a small hole about the size of a lead pencil, in the upper corner, through which the seed may be readily distributed. In one front pocket he carries an assortment of small wooden pegs; and in still another pocket an instrument that might be mistaken for a Dago's stiletto, a colored man's friend, or a tree surgeon's pruning knife.

With the above ammunition he nonchalantly sallies forth to help heal the unsightly scars made by himself and his associates—to give battle to the unbelievers—and incidentally to push his propaganda by active example among the foursome with which he may be traveling. If he or one of his crowd takes a divot or if he finds one en route left by some careless predecessor, he picks up the divot if he can find it, scratches the scar with his big knife, sprinkles some grass seed, replaces the turf, tamps it down with his foot, takes out a couple of the little wooden pegs, drives them in with his iron, and the job is done. Often his reward is some frost-bitten quips, ironical queries, or indulgent smiles. Perhaps this fat man thinks he needs exercise. Here is plenty of chance for it. While the foursome may be

waiting for the players ahead, he is always finding lots of spots for the doctor; if he can't find turf to replace, he stirs up a bald spot, spreads grass seed, and tamps it down firmly with his foot. If there is moisture in the ground there is a good prospect for the grass seed to grow. Where the divot has been laid down on top of seed, it has a chance to act in one of several capacities. Some skeptics who never originated an idea in their lives will pooh-pooch your humble effort and tell you that the scar would heal of its own accord from the old roots. It might, and again it might not; there is no certainty about it at all. A great deal depends on the nature of the turf, how deep the roots are, and how deep the scar is. There are always literally hundreds of places all over a course where the turf did not come, or where it was very slow coming back; and usually a little grass seed works wonders, particularly during the growing or moist season of the year. During July and August, when you are apt to get the smallest percentage of moisture, the minimum of results will follow; but even seed sown then is likely to produce results in September or earlier, should chance rains come along.

Frequently divots that have been replaced become loosened and then kicked away, but if moisture has gotten under the divot, the grass seed may have germinated and gathered head. At any rate, outside the effort, which is good exercise and furnishes activity for the idle moments of a nervous man, it costs little, gives good promise of results, and furnishes an insurance for the future.

On the putting-green he is not idle. He hates dandelions, plantain weeds, or any other old kind of weeds. He gets out his murderous-looking knife, and if opportunity occurs, while the others are not looking or are putting, he slips the blade into Mr. Weed an inch or two below the surface, and yanks him out, sprinkles some grass seed in the hole, tamps it down with his foot, and proceeds on his victorious march. If there are no players following closely behind and there are prospects for some delay for his gang at the next tee, he remains behind following his little hobby to his heart's content.

He stoutly maintains that he can show you fifty spots at a time where his hobby is producing results, and that if he could persuade all the members of his green committee to follow suit, the results would be decidedly pronounced, and that if he could go a little farther and enlist the officers of the club and the members of the various club committees the showing would be astounding. He asseverates that even if no results were visible, other than the moral object lesson, it would be worth while. If good company breeds good manners, or a good example has a healthy influence on bystanders, it should inculcate the thoughtless with a more serious consideration for the care of his turf. He espouses the work of the missionary pioneering the way among the heathen, recounts his converts, proclaims his following, and asks for support from all good golfers.

(We know a player who for years has followed the practice of kicking or otherwise removing stones from the paths and fairways of his home course. This is done while walking between shots and between greens and tees. It does not interfere in the least with his game or the play of others. His course still has a good many stones on it in spots, so that the casual observer can not see much to our player friend's stone-removing activity. But there is something to his practice,—a great deal, in fact. Through his influence and example other players have adopted it, and the clearing that has resulted is very noticeable to those who have their eyes open.

Mr. Hood tells of the practice of a certain golfer with divots and dandelions. He is quite right in his contention that the gentleman's practice has a good moral effect on his fellow-players. This brings up the question, Why not launch a movement to enlist players in the cause of bettering their golf courses by doing a little improvement work with every game, not enough to make it burdensome but enough to give them an intelligent interest in the course and a better understanding of what it means to produce good turf and keep the course in first-class condition? Get them started to replacing divots, removing loose stones from the paths and fairways, removing weeds from the greens (some instruction should be given in this connection to prevent injury to the turf), and doing other kinds of "police" work to polish up the course. When a player once begins to take a real intelligent interest in his home course he usually becomes a devoted student of the turf end of the game and incidentally a more useful member of his club. Possibly his score may suffer somewhat, but he will get a lot more fun out of golf. Let us hope that players with hobbies similar to that narrated by Mr. Hood will develop by the hundreds wherever golf is played.—EDITORS)

The Folly of Trying to Beat Nature

Patience is still a virtue even in these times when all else seems to be sacrificed to the desire for speed. The waste of haste is perhaps nowhere better illustrated than in the attempts made to build golf courses hurriedly. When a new club is formed, it is perfectly natural for the members to want the course finished as soon as possible, even if it involves much greater expenditure. It is true that the physical features of a new course, the putting-greens, the bunkers, the fairways, etc., can be built more quickly if many men are employed and the work pushed regardless of season or weather. But there are other considerations that no amount of money can overcome.

First, if the soil on the new course is at all clayey, it is very unwise to work on it while wet or water-logged. Not only is such work more expensive, but it necessarily involves puddling the soil so that it becomes baked when dry. No farmer is such a fool as to work heavy soils when wet. The injury done may require years to correct.

Secondly, when the soil conditions are very favorable, grass seed may be sown about September first and a turf good enough for winter rules secured by the following May. If, on the other hand, the sowing is done in spring, as too often done foolishly, it is practically out of the question to produce turf the same season fit for golfing. Nearly always it will involve additional seeding in the fall to fill up the spaces killed by crab-grass and other weeds. Dame Nature can't be hurried, flurried or worried. She must be treated as the diplomatic old negro learned to manage his wife,—“Whatever my wife don't like, I naturally hates.”

If you are going to build a new golf course, be wise. Begin work in spring, with the aim of getting the construction work done so as to seed between August 15 and September 15. Don't work in heavy soils when they are wet. Sowing fine grass seeds in the north except in late summer or early fall nearly always gives disappointing results, and never gives you good turf any sooner.

It is proverbially difficult to save a foolish man from folly, but in these days when we are trying to cut needless waste and extravagance out of golf, it is worth endless labor to try to get the golfing fraternity “to use its bean,” as the high-school girl would say. There is a proper time for everything. The proper time to seed fine grasses is late summer, and no matter what else you do, spring seeding will bring you disappointment. Don't let any one persuade you otherwise.

Fertility of Sod Land

LYMAN CARRIER

The question is sometimes raised as to what extent the producing power of a soil is reduced by the continual growing of grass on putting-greens. To put it in a commonly expressed term, does the growing of turf on putting-greens deplete the fertility of the soil, fertility being taken to include all of the factors of a soil involved in the production of plants? We have some unpublished data obtained several years ago at the Virginia Agricultural Experiment Station in connection with a grazing experiment which have a direct bearing on that question.

A series of 1/50-acre plats in an old bluegrass pasture which had not been plowed for years was fenced, staked off, and kept cut with a lawn mower equipped with a basket attachment to collect the clippings. The experiment was started in 1908; but owing to lack of care in drying the first clippings of grass that year's results were not complete. The plats were mowed regularly however during that season, and our observations led us to believe that the yields were higher than those of following years. There was one plat which was clipped every week, three every ten days, two every twenty days, one once a month, and one once a year, during the growing season. Some of the plats were harrowed, a disk and a spike-toothed harrow being used. Our observations, confirmed by the figures obtained on both these harrowed plats and on larger fields treated in the same manner but which were grazed by animals, were to the effect that no benefit resulted to the grass from the harrowing, and that harm could be easily done if the harrowing was severe. No fertilizing or artificial watering was attempted. The sod was composed of a mixture of plants, Kentucky bluegrass, redtop and white clover predominating. The height of the grass after mowing would correspond to that ordinarily found on fairways.

The following table gives the results, summarized by years, obtained in this experiment and computed on an acre basis. The green weights of the grass were taken, but they fluctuated to such an extent, depending on the weather conditions, that it was found to be more satisfactory to bring all the clippings to an air-dry basis under cover before weighing. The air-dry weights are the only ones given:

WEIGHT OF AIR-DRY GRASS IN POUNDS PER ACRE

Year	<i>Cut every 7 days; 1 plat</i>	<i>Cut every 10 days; average 3 plats</i>	<i>Cut every 20 days; average 2 plats</i>	<i>Cut every 30 days 1 plat</i>	<i>Cut once a year; 1 plat</i>
1909.....	2111	2075	2156	2437	3363
1910.....	1512	1917	1744	1975	2600
1911.....	845	870	817	1128	1850
1912.....	1098	818	1030	1382	2050
1913.....	906	917	864	875	1525

The season of 1911 was dry and very poor for grass, which accounts for the decided drop in yield that year. But the last two years were equally as good as the first two, judging from the gains made by the cattle in the adjoining fields. These figures show that cutting grass with a lawn mower, where the clippings are all removed, rapidly depletes the produc-

tivity of the soil. The nitrogen content of each mowing was determined and the results are significant. The nitrogen ranged from an average of 2.3 per cent in the grass from the most frequently mowed plat to 1.3 per cent in that from the one cut but once a year. The fine grasses practically all disappeared from the latter plat and their place was taken by coarse weeds.

After 1913 these plats were turned back into the pasture field and the ill effects from taking off all the material for six years without putting anything back to take its place was noticeable for several years. The results of this experiment show conclusively that the producing power of a soil is reduced where turf grasses are grown and the grass clippings removed, as happens in the case of putting-greens; and the common practice of top-dressing greens with compost and nitrogenous fertilizers appears to be based on sound principles.

Another experiment in connection with that pasture work may be worth mentioning. A tall coarse-growing grass commonly called broom-straw or broom-sedge (*Andropogon virginicus*), has been of late invading the bluegrass pastures of Virginia. It is highly objectionable from a grazing standpoint. As much of that land is too rough or steep to plow, any remedial measures taken must be such as could be applied directly to the sod. An evenly developed patch of broom-straw in an old pasture field was laid off in 1/10-acre plats, and a number of different fertilizers were applied in order to study their effects on the turf. Every fertilizer used except potash alone benefited the stand of bluegrass and tended to eradicate the broom-straw. Other experiments showed that that particular soil had plenty of potash and that it did not respond to additional applications. The most effective fertilizer and the one giving the most permanent results was acid phosphate, but that one greatly increased the stand of white clover. Nitrate of soda gave almost as good results the first year as the acid phosphate, and the increase in clover was not so noticeable. Ammonium sulfate was not used, as the clovers are an asset in a pasture. A top-dressing with stable manure and also an application of bone-meal made a marked improvement in the turf with a corresponding decrease in the stand of broom-straw.

The results of this experiment, which are confirmed by many observations and other experiments of a similar nature, show that the best and easiest method of controlling coarse-growing weeds is to have the soil sufficiently rich so that a dense turf of desirable plants is formed. Many weeds, like the broom-straw, indicate depleted soils; they will thrive under more adverse conditions than will the cultivated turf plants. But put the conditions right for the cultivated plants and the weeds will not be able to compete. Of course this does not apply to all weeds. Some will thrive (unless pulled out) no matter how dense the turf, but in general it is true that the more fertile the soil the fewer the weeds in the turf.

Plenty of sand and water in the tee-boxes.—This if attended to daily saves a world of growling.

Fertilizer from the woods.—Rake up the dead leaves in the woods at the end of winter and put them into compost piles.

Fairy Rings¹

DR. H. L. SHANTZ

On many well-kept lawns and greens there occur circles or circular areas where the grass is of a different color or often more rapid in growth than on the remaining portions. These areas are known as fairy rings, the name originating in the belief that they marked the paths of dancing fairies.

“* * * you demy-puppets, that
By moon-shine do the green sour ringlets make,
Whereof the ewe not bites; and you, whose pastime
Is to make midnight-mushrooms—”

Although we now know the cause of these rings, we still retain the old name.

The early literature is filled with references to these circles. The supposed origin, dating from the days of superstition, is found in the names which are applied to them. In England they are known usually as *fairy rings*, *fairy circles*, or *fairy greens*, and were supposed to mark the paths of dancing fairies. To have these circles on a lawn was regarded as a good omen, for here the fairies danced at night. On the continent of Europe they received a greater variety of designations. In France, for example, the terms used were *anneaux magiques*, *circles magiques*, *circles du sabbath*, *circles des fées*, *circles de sorcières*, *danse de fées*, *ronds de fées*, and *ronds de sorcières*, signifying the dancing place of fairies, sorcerers, witches, or devils, as the case might be. Often people could not be induced to enter these circles, since to do so was sure to bring disaster, but if they were entered unknowingly at night it was not necessarily a bad omen. In these circles “huge toads with bulging eyes” were to be found.

In Germany they were known as *elfenringe*, *hexenringe*, *hexenplatz*, *hexentansplatz*, *hexenkreise*, *hexentanze*, and *zauberringe*. Here also they were associated with fairies, witches, devils, and dragons. The dead grass which often occurs on the inner side of the ring was regarded as evidence of the resting place of a red-hot dragon on some previous night.

In Holland, where dairying is a prominent industry, an unusually large number of superstitions were supposed to explain the presence of these fairy rings. The terms here used were *heksenkringe*, *ko'ringe*, *tooverkringe*, *duivels karnpad*, *duivelstjeinpad*, and *tjenmolenpad*. It is not surprising that in a cattle country so many of their superstitions concerning fairy rings should also be connected with cattle and butter-making. Occasionally the cattle were the cause of them; but in most cases, while having nothing to do with causing the rings, they were often injured by them. The “fact” that the devil churned his butter there was in itself a bad omen, and for cattle to eat the taller, greener grass of these circles would surely ruin them as milk cows.

Following the period of pure superstition, which is still represented to a surprising extent, there came a period when the causes of these rings were honestly sought by scientific men. These studies began in England over two hundred years ago. Some of the investigators maintained

¹ For a more complete account of fairy rings see “Fungus Fairy Rings in Eastern Colorado and Their Effect on Vegetation,” by H. L. Shantz and R. L. Piemeisel, Journ. Agr. Research, vol. XI, No. 5, Washington, D. C., Oct. 29, 1917.



A small fairy ring, photographed by Ernest L. Crandall at Arlington, Virginia. An unusually large number of mushrooms are shown. Just inside the circle of mushrooms there is a zone of nearly bare ground.



A general view showing a large number of fairy rings, each marked by a circle of Mushrooms. Photographed by Ernest L. Crandall, at Arlington, Virginia.

that they were caused by thunder and lightning, but when observed for a period of years were found to have a regular annual growth, and this seemed hard to explain on the basis of thunder. Ants "wrought the earth into such fineness that it became unusually favorable for the growth of vegetation and also that the hollowness of the ground afterwards produced a growth of mushrooms." Whirlwinds, haystacks, moles, and the urine of animals were assigned as causes. But gradually attention began to be centered on the mushrooms, and we now know that these are the cause of the fairy rings.

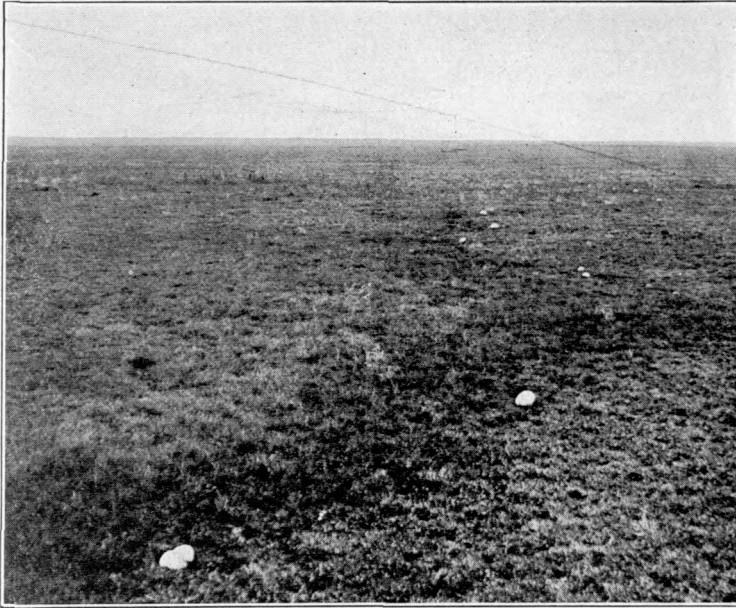
Many different kinds of mushrooms and other fleshy fungi cause fairy rings. They do not all cause the same type of ring. Some of them kill the grass, others stimulate it only slightly, while still others produce almost no visible effect upon the grass growth.

These fairy rings may be distinguished in many different ways. When the mushrooms are in fruit they are arranged in circles. At other times they may be distinguished by the appearance of the natural vegetation. The grasses in these circles are of a deep rich-green color, due to the higher chlorophyll content, and are also of more luxuriant growth. During the summer when hot dry spells occur this taller grass withers and often dies, leaving a zone of dead grass where the tall grass grew before. The following year a new zone of taller, greener grass will occur in advance of the dead grass, and in time grass again becomes established on the ground which was previously bare.

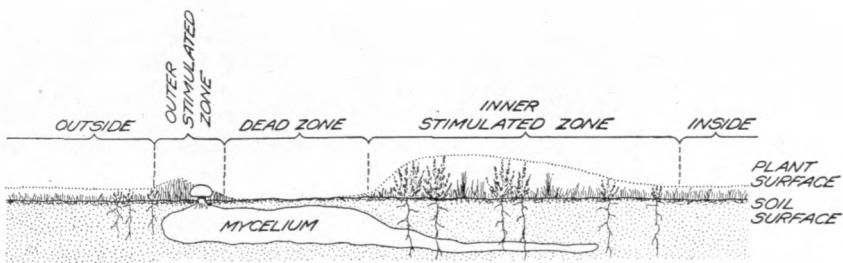
If we could see below the ground, the cause of these changes above ground would become apparent. A mushroom, as we know it in the market or as we pick it in the field, is only the fruit of the plant. When the spore of a mushroom germinates in the soil, it branches and ramifies in all directions. It consists of fine threads of growing material usually light in color and of delicate texture. These spread out only in the surface foot or two of soil. These filaments grow outward and never recede. The food on which this plant feeds is chiefly the decaying vegetable matter, which is consumed as the plant advances. This material, which furnishes the mushroom both nitrogenous and carbohydrate food, is at the same time broken down and much of it reduced to ammonia. This is taken up by bacteria and changed into nitrates, which are absorbed by the grasses. The mushroom is therefore instrumental in making available for the grasses nitrates which cause their rank green growth. This excessive growth in turn takes more water from the soil and makes it more susceptible to damage by drought.

The growth of the fungus fairy ring has been likened to the spread of a flame in dry grass. If a match is dropped in dry grass the flame spreads outward in all directions. In doing so it destroys the grass. Even if the grass could be restored rapidly a few inches behind, the flame would not strike back. We may think of the flame as representing the active mycelium which spreads outward and destroys the humus of the soil and the grass as representing the humus.

Year after year these circles become larger. At times they are intercepted and only fragments of the complete circle remain. These have a tendency to "heal over" and again become complete circles. On the high plains circles of unusual size occur. They may often be from 50 to 200 yards across. The age of these circles is estimated at from



Portion of a puffball ring over two hundred yards across and probably over four hundred years old. The grass just inside the ring of fruits is darker green than that outside. Photographed by H. L. Shantz, in Eastern Colorado.



Sketch of section through a fairy ring. This section shows the area of soil occupied by the mycelium of the mushroom. Near the left, at the outer edge of the ring the grass is stimulated. Just back of this is the dead zone, and back of this again is the re-established growth on the inside of the ring. It is stimulated by the material left by the decay of the mushroom mycelium. Jour. Agr. Research, v. XI, No. 5, 1917, Fig 4

250 to 450 years, and if some of the larger fragmentary circles are included there seems good reason to believe that they are over 600 years in age.

Fairy rings are detrimental on greens and lawns, and their eradication is a matter of considerable importance. They not only cause bare spots or patches, but irregular growth and unequal color. Since the value of a lawn is dependent largely upon the uniform appearance of the turf, the presence of even small areas influenced by fairy rings destroys the effect of the whole. Usually these dead areas are easily reseeded, but no permanent recovery can be secured in this way, since the mycelium moves on to new grass and the following year the appearance is as bad as before. The best method is to soak the ground thoroughly with sulphate of copper or Bordeaux mixture within the ring and a little beyond. This, if thoroughly done, will kill the fungus.

The Use of Arsenite of Soda in the Extermination of Chickweed

C. E. WITMER, GREENVILLE (PA.) COUNTRY CLUB

Green committees have many trials and discouragements; and I want to say that THE BULLETIN is simplifying these troubles for us. We have confidence in the messages it brings, as they are actual experiences, not theories.

Not having a grass garden to resort to for inserts, we were up against the proposition of either entirely reconstructing a new green which had become infested with chickweed to the extent of about one-fourth, or else taking a chance on some radical method of exterminating the pest. On page 126 of the 1921 volume of THE BULLETIN we noticed Mr. Alan D. Wilson's article on the use of arsenite of soda for the purpose and decided to follow the procedure which Mr. Wilson recommended. We are glad to report that our experiment proved successful. Following Mr. Wilson's directions, we dissolved 1 pound of arsenite of soda (C. P.) in 10 gallons of water, and applied this over the entire surface of about 4,000 square feet with a spraying outfit costing \$8 and which the greenkeeper carried strapped to his back and operated by hand. The initial results seemed to be very disastrous, for after three days the entire green turned a dead brown color, and, to the skeptical, apparently the entire surface was destroyed. A close inspection, however, disclosed the fact that it was only the blades of the grass which were injured, and the roots were not destroyed. In ten days' time, and after two or three mowings, the grass returned to its original green color. The chickweed was dead, root and stock, and there has been no evidence of its return. We scarified the bare spots and reseeded them heavily, applying the usual spring top-dressing to the green from our mulch pile.

This application of arsenite of soda was made on April 15, and by May 26 the green looked better than ever before. The course was opened May 3, since which time the green which we thus treated has been in constant play, and there has been no variation in its putting surface, in contrast with the other greens, which nevertheless our fans say are fine. The expense of the treatment was negligible, as the arsenite of soda cost but 60 cents, and less than two hours' time was necessary for its application.

The turf on our green is red fescue, with some German bent, resulting from last fall's reseeding.

The only further suggestion we have to make is that it would be better if the application were made quite early in the spring so that the burned grass would have a chance to recover before the arrival of players. We are preparing to repeat the experiment about September 1, on another green infested with chickweed, as we believe we will then get quicker results from the reseeding. With spring seeding, in our latitude, we can not expect the seed to germinate before May 1.

It might be of interest to note, in this connection, that we did not observe that any other weeds, nor any coarse grasses, were killed by the chemical. I would state also that our application was made on a bright, clear day, which was followed by a spell of similar weather, a condition undoubtedly favorable for the action of the chemical, which otherwise might have been hindered in its effectiveness by the falling of rain.

Brown-Patch

LYMAN CARRIER

Brown-patch made its appearance here at Washington on May 27, and about the same time we had reports of it from Toledo, Chicago, and St. Louis. Greenkeepers should be on the alert to recognize these brown spots when they first appear, and apply the remedy—Bordeaux mixture.

As soon as we discovered the trouble, we got out the gun and dusted the entire grass garden except where we expect to experiment with different methods of treatment for this disease. At the time of this writing (June 2) there has been no additional spread of the affected spots and no evidence of new points of infection.

It is surprising how easy it is to apply this powder when one has the proper equipment with which to do the work. With either the dust gun or the wheelbarrow duster the time required to treat a green need not exceed five minutes, and the expense for materials is negligible. Bordeaux powder costs us in one hundred-pound lots 10 cents a pound, and when applied with a dust gun, one pound appears to be ample for an average-sized green. There does not seem to be much choice between the dust gun and the wheelbarrow duster for applying the powder. It might be said that the wheelbarrow duster applies the powder more evenly, and the dust gun more thoroughly. Such a statement needs explaining. The wheelbarrow duster drops the dust directly onto the turf in an even manner, and as the hopper is twelve feet long, it covers a wide area. The dust gun, with the aid of a gentle breeze, will cover a still wider strip but the powder is deposited in a heavier layer near the operator than it is a few feet away. This, however, is not a serious fault so long as there is a sufficient covering of the dust at all points to prevent the fungus from getting in its deadly work. There is a tendency for the wheelbarrow duster to drop the powder in little pellets, which is not so desirable as having a complete dust covering all over the blades of grass. In dusting orchards, small fruits, or fields of cotton, it has been found satisfactory to blow a cloud of dust into the air and let it settle where it will on the foliage.

We believe it is best to dust when there is dew on the grass or immediately after watering. Under such conditions the powder sticks to the leaves better than it does if everything is dry.

With either the dust gun or the wheelbarrow duster it is necessary, in order to do a satisfactory dusting, to have the powder absolutely dry. Freshly made Bordeaux dust is nearly white in color, and it will remain that color as long as it is free from moisture. But if it stands exposed to the air, especially in rainy weather, it will absorb moisture, which is evidenced by the white anhydrous copper sulfate taking on the characteristic color of blue-stone. It then becomes pasty and is likely to gum up the feeding apparatus. It has been found that the wheelbarrow duster works best when the hopper is full of the powder and the operator walks at a rapid pace, thus giving a decided jar to the machine.

Watering Putting Greens

A Discussion

Here's what some of the fellows believe about watering putting-greens. Most of them have had long experience.

My belief is that the best results are obtained by saturation, provided greens are properly drained. Twice a week is sufficient, and even three times in the driest weather would do no harm. Sprinkling keeps the roots so near the surface they are more likely to be affected by the heat of the sun. I favor watering very late in the day, but would prefer to have it done at night, if possible.

JAS. L. TAYLOR,

The Ekwanok Country Club, Manchester, Vt.

In regard to watering greens, we find that with good sprinklers and plenty of pressure we get very satisfactory results. We water always after sundown.

F. C. ARMITAGE,

Toronto Golf Club, Long Branch, Ontario.

In considering the question of sprinkling putting-greens, climatic conditions should, of course, be taken into consideration. Seaside golf courses enjoy conditions of moisture which do not prevail in the plains states west of the Mississippi river. As you are, of course, aware, we in this territory experience long and severe droughts during midsummer, and we have found by practical experience that in order to keep our greens soft and thoroughly saturated with moisture, it is necessary during periods of dry weather to sprinkle them every other night.

We employ a man who comes on duty at 5 p. m. and works until 1 o'clock the following morning. He is able properly to look after the sprinkling of nine greens each night. This enables us to sprinkle each green three times a week, no work being done Sunday night. The results obtained have been very satisfactory, the ground being thoroughly wet to a depth of two or three inches. This keeps the surface soft so that a ball pitched onto the green holds.

We have experimented with various types of sprinklers and have come to the conclusion that the only proper way to sprinkle the greens is by means of a rotary sprinkler with a standard 4 or 5 feet high with two revolving arms which distribute the water vertically upward in a very fine spray-like mist. Water so distributed comes as near a natural rain as any method that can be employed, and this certainly is the object to be attained. Any sprinkler delivering the water close to the ground or which has some of the outlets pointing horizontally or down, tends to wash the soil away from the roots of the grass, which, of course is bad.

The temperature of the water is an important factor. Water from deeply driven wells or artesian wells is usually too cold. We take water from a large lake in front of the club house, and the water in the lake during the sprinkling season runs from 50 to 70 degrees. Some clubs, where they are obliged to use cold well water, first pump the water into an outside basin or artificial lake and then repump it, after it has become warm and aerated.

I am aware that the amount of sprinkling recommended above is considered excessive by a great many good greenkeepers, but I think those who hold this opinion enjoy better climatic conditions than we do in this drier climate.

WM. F. BROOKS,
Minikahda Club, Minneapolis, Minn.

The proper watering of the greens is a matter which I believe requires more latitude in the judgment of the greenkeeper than a good many other problems. I believe that greens should be watered before they dry out, starting even as early in this section as the first of May.

Our policy is to keep the grass a little bit softer on the greens on which we expect pitch shots to be made. It has been our practice to water the greens thoroughly whenever they are dry, and we have done this by a man using a hose, and also with different types of sprinklers. We have found that if the green is covered first with a preliminary wetting, the main application of water is much better absorbed than if poured on directly at first.

I believe that a properly-built and properly-fertilized green does not require as much watering as one which has not been properly kept up. During the driest time, in exceedingly hot weather, it may be necessary in this vicinity to water as often as every other day, if the greens are desired to be kept nice and green.

SHERILL SHERMAN,
Yahnundasis Golf Club, Utica, N. Y.

In the writer's opinion, the watering of putting greens should be done only at night, and under normal weather conditions about three times a week. When this watering is done, the greens should be well saturated with a spray, as surface moisture is of very little use. The writer does not approve of daily watering; and while every day or two is sufficient, the moisture should be left with considerable depth instead of in a shallow surface.

FRANK B. BARRETT,
Hollywood Golf Club, Deal, N. J.

It has been our experience that the less water used on Bermuda-grass greens, the better they are. Special care must also be taken in the use of artesian water, as it causes deterioration of the putting-green surface. Top-dressing gives us much better results than watering.

C. B. BUXTON,
Dallas Country Club, Dallas, Tex.

In designing the system at Glen Echo it was first necessary to determine what we wanted in the way of water on the greens; and so far as I have been able to find out, no data have been compiled on the subject. We studied this question thoroughly and adopted a unit requirement of 20 gallons per minute as being sufficient to run three sprinklers of fairly large capacity. This would give on a green 100 feet square a volume of water equivalent to one inch of rain. This we estimated would be about equal to a good, heavy summer shower. For this climate we decided we should be able to put this amount of water onto the greens every other day, necessitating sprinkling nine greens each day or requiring a supply of 180 gallons per minute into our mains.

We were very much surprised at the size of pipes required to give this result, and believe our failure in the past to get sufficient water onto the greens has been due to our ignorance as to the capacity of the ordinary sprinklers and the size of pipe required to operate those sprinklers economically. Of course, these results would vary for each club, and possibly for different greens in the same club. It might require ten hours for a green to absorb an inch of water if the soil had become hard and dry, while on other greens that amount of water might be absorbed in from two to four hours. We hired a hydraulic engineer to design the system for us, and believe that other clubs would experience much less difficulty in getting water onto their greens if they had their sizes of pipe looked into.

W. C. FERGUSON,
Glen Echo Country Club, Normandy, Mo.

At Ortega we use all the water we can get during dry times. Our supply is limited and we can not use as much as we would wish. We use sprays, and run them all night. Our course is sandy, and during dry weather no amount of water is too much.

L. C. MENAGER,

Florida Country Club, Ortega, Fla.

My thought is that when greens are watered they should be watered thoroughly so that you will get penetration of at least three inches, and I would much rather water comparatively seldom in this way than to water frequently for only a short time with almost no penetration. In the former method you teach the roots of your grass to go deep for their moisture, and that is where you want them to be, while in the latter method of frequent and light waterings you teach the grass roots to come to the surface, which results first in a thinner turf and second in a turf that is more liable to burn out.

Most people realize the necessity for watering after the spring and fall reseeding of greens and before the seeds have germinated. While this is important, I feel that it is even more important to see that the greens get an adequate supply of water for at least six weeks after the new grass has germinated, for it is just in this stage of its existence, when it has very small and shallow roots, that it is sure to die unless it receives plenty of moisture.

ALAN D. WILSON,

Merion Cricket Club, Haverford, Pa.

Weather and physical conditions will naturally have a strong bearing on any policy that may be established in connection with watering putting-greens. For the excessively hot weather that normally comes in July and August, in this latitude, I believe in the practice of giving putting-greens a good, thorough soaking once every two or three days, as circumstances demand.

Our observation shows much more beneficial results from this method than the old system of light watering at more frequent intervals, say, once every twenty-four hours.

A. J. HOOD,

Detroit Golf Club, Detroit, Mich.

The question of how often a putting-green should be watered is a difficult one to answer, as conditions of weather, soil, and many other things enter into the problem. My offhand answer would be, to sprinkle them when they need it. Sometimes they need flooding, sometimes sprinkling lightly. The only hard and fast rule that I can think of is not to water them in the hot sun but in the evening after 4 o'clock. A good greenkeeper will know when and how to water his greens, just as a mother will know when her baby needs milk.

W. A. ALEXANDER

Old Elm Club, Fort Sheridan, Ill.

Our practice at Morris County is to give the greens a thorough soaking two or three times a week. We can see no objection to watering in the day time except the possible loss of water by evaporation in a very hot sun. Personally, I think it is preferable to have the blades of grass dry at night rather than to allow them to enter the night freshly watered, as I think the latter tends to encourage the brown-patch fungus.

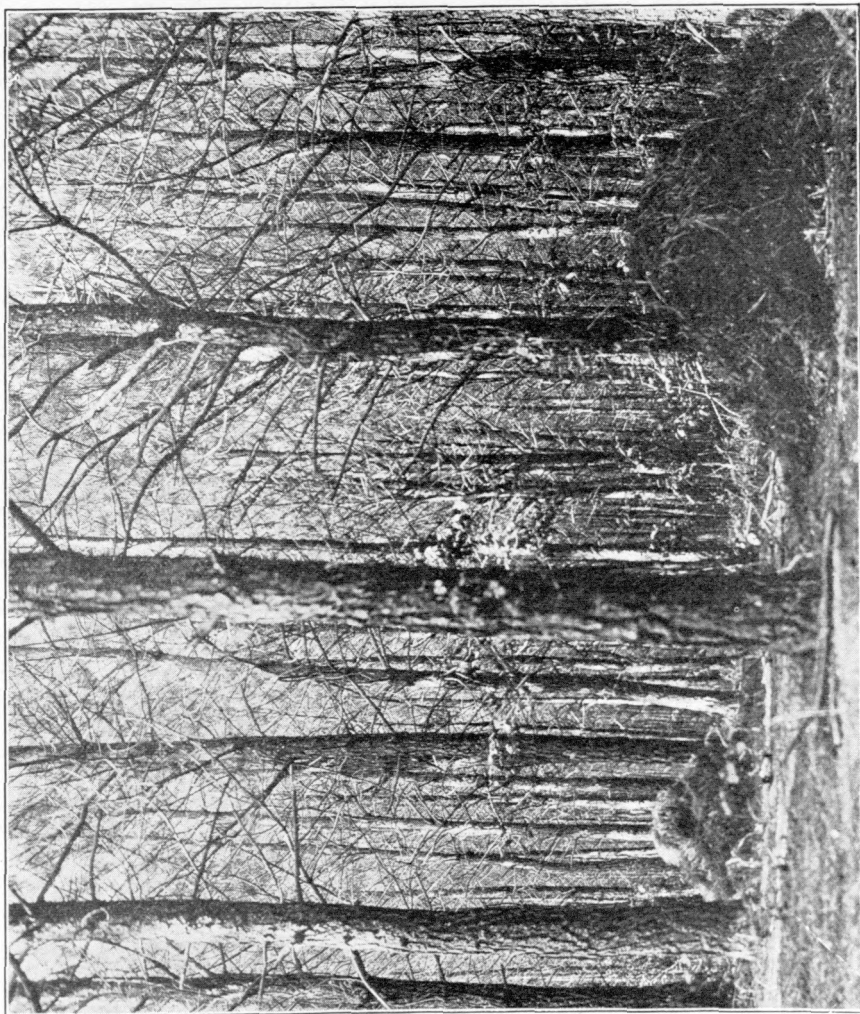
We always start watering our greens before the grass shows the slightest sign of becoming brown or scorched. I think a number of greenkeepers wait too long before they start with their watering. It is much more difficult to bring back turf than to keep it in a good condition.

We give our greens light top-dressing very frequently during the summer, and water this into the greens. This tends to keep the grass strong and vigorous during the periods when it is most apt to get brown and lose vitality owing to the excessive heat.

We have tried a number of kinds of sprinklers and have no particular make to recommend. The main point is to get plenty of water on and let it soak in thoroughly.

WYNANT D. VANDERPOOL,

Morris County Golf Club, Convent Station, N. J.



Composting pine needles and forest litter with stable manure. A common practice in Eastern Virginia

Green Section Membership

Maine

Portland Country Club, Portland. Poland Springs Golf Club, South Poland.
Waterville Country Club, Waterville.

New Hampshire

Cochecho Country Club, Dover. Nashua Country Club, Nashua.
Mojalaki Country Club, Franklin. Lake Tarleton Club, Pike.
Bald Peak Country Club, Moultonboro. Portsmouth Country Club, Portsmouth.

Vermont

Ekwanok Country Club, Manchester.

Massachusetts

Bay State-Arlmont Country Club, Arlington Heights.
Highland Country Club, Attleboro.
Woodland Golf Club, Auburndale.
United Shoe Machinery Athletic Assn. (Golf Division), Beverly.
Belmont Spring Country Club, Boston.
Country Club, Brookline.
Brockton Country Club, Campello.
Chatham Country Club, Chatham.
Homestead Golf Club, Danvers.
Fall River Country Club, Fall River.
Woods Hole Golf Club, Falmouth.
Framingham Country Club, Framingham Centre.
Bass Rocks Golf Club, Gloucester.
Island Club, Haverhill.
Crow Point Golf Club, Hingham.
Hyannisport Club, Hyannis.
Merrimack Valley Country Club, Lawrence.
Long Meadow Golf Club, Lowell.
Vesper Country Club, Lowell.
Essex County Club, Manchester.
Marion Golf Club, Marion.
Bellevue Golf Club, Melrose.
Wollaston Golf Club, Montclair.
Charles River Country Club, Newton Centre.
Wianno Golf Club, Osterville.
Country Club of Pittsfield, Pittsfield.
Plymouth Country Club, Plymouth.
Hoosic Whisick Club, Ponkapoag.
Meadow Brook Golf Club, Reading.
Kernwood Country Club, Salem.
Salem Golf Club, Box 243, Salem.
Cohasse Country Club, Southbridge.
Country Club of Springfield, Springfield.
Tedesco Country Club, Swampscott.
Segregansett Country Club, Taunton.
Oakley Country Club, Watertown.
Brae-Burn Country Club, West Newton.
Winchester Country Club, Winchester.
Tatnuck Country Club, Worcester.
Worcester Country Club, Worcester.

Rhode Island

Metacomet Golf Club, East Providence.
Jamestown Golf and Country Club, Jamestown.
Sakonnet Golf Club, Little Compton.
Newport Country Club, Newport.
Pawtucket Golf Club, Pawtucket.
Agawam Hunt Club, Providence.
Wannamoissett Country Club, Providence.
Silver Spring Country Club, Riverside.
Misquamicut Golf Club, Watch Hill.
Rhode Island Country Club, West Barrington.

Connecticut

Brooklawn Country Club, Bridgeport.
Country Club of Farmington, Farmington.
Greenwich Country Club, Greenwich.
Hartford Golf Club, Hartford.
Highland Country Club, Meriden.
Shuttle Meadow Club, New Britain.
New Haven Country Club, New Haven.
Wee Burn Golf Club, Norton.
Race Brook Country Club, Orange.
Wethersfield Country Club, Wethersfield.
Sound Beach Golf and Country Club, Sound Beach.
Manchester Country Club, South Manchester.
Country Club of Fairfield, Southport.
Woodway Country Club, Springdale.
The Country Club of Waterbury, Waterbury.
Westport Country Club, Westport.

New York

Auburn Country Club, Auburn.
Owasco Country Club, Auburn.
Bellelaire Golf and Country Club, Bayside, Long Island.
Oakland Golf Club, Bayside, Long Island.
Bedford Golf and Tennis Club, Bedford.
Suffolk Country Club, Bellport, Long Island.

Grassy Sprain Golf Club, Bronxville.
 Lawrence Park Country Club, Bronxville.
 Country Club, Buffalo.
 Park Club of Buffalo, Buffalo.
 Rockaway Hunting Club, Cedarhurst, Long Island.
 Lake George Club, Diamond Point.
 Maidstone Club, East Hampton, Long Island.
 Westbrook Golf Club, East Islip.
 Long Island Country Club, Eastport, Long Island.
 Wheatley Hills Golf Club, East Williston, Long Island.
 Fairview Country Club, Elmsford.
 Fresh Meadow Country Club, Flushing, Long Island.
 Pomonok Country Club, Flushing, Long Island.
 Cherry Valley Club, Garden City, Long Island.
 Garden City Country Club, Garden City, Long Island.
 Garden City Golf Club, Garden City, Long Island.
 Nassau Country Club, Glen Cove, Long Island.
 Brookville Country Club, Glen Head, Long Island.
 North Shore Country Club, Glen Head, Long Island.
 Glens Falls Country Club, Glens Falls.
 Soundview Golf Club, Great Neck, Long Island.
 Scarsdale Golf Club, Hartsdale.
 Longue Vue Golf Club, Hastings-on-Hudson.
 Huntington Country Club, Huntington, Long Island.
 Oneida Community Golf Club, Kenwood.
 Town and Country Club, Lockport.
 Piping Rock Club, Locust Valley.
 Mahopac Golf Club, Mahopac.
 Quaker Ridge Golf Club, Mamaroneck.
 Orange County Golf Club, Middletown.
 St. Andrews Golf Club, Mount Hope.
 Siwanoy Country Club, Mount Vernon.
 Powelton Club, Newburgh.
 Wykagyl Country Club, New Rochelle.

Pelham Country Club, Pelham Manor.
 Irondequoit Country Club, Inc., Pittsford.
 Blind Brook Club, Port Chester.
 North Hempstead Country Club, Port Washington, Long Island.
 Dutchess Golf and Country Club, Poughkeepsie.
 Oak Hill Country Club, Rochester.
 Teugega Country Club, Rome.
 Engineers Country Club, Roslyn, Long Island.
 Links Golf Club, Roslyn, Long Island.
 Apawamis Club, Rye.
 Saint Albans Golf Club, Saint Albans, Long Island.
 Saranac Lake Golf Club, Saranac Lake.
 Saratoga Golf Club, Saratoga.
 The McGregor Links, Saratoga Springs.
 Sleepy Hollow Country Club, Scarborough.
 Sunningdale Country Club, Scarsdale.
 Mohawk Golf Club, Schenectady.
 Saint Georges Golf and Country Club, Seauket, Long Island.
 National Golf Links of America, Southampton, Long Island.
 Shinnecock Hills Golf Club, Southampton, Long Island.
 Rockland Country Club, Sparkill.
 Stafford Country Club, Stafford.
 Fox Hills Golf Club, Stapleton, Staten Island.
 Bellevue Country Club, Syracuse.
 Onondaga Golf and Country Club, Syracuse.
 Oak Ridge Golf Club, Tuckahoe.
 Tuxedo Golf Club, Tuxedo Park.
 Saranac Inn, Upper Saranac.
 Sadaquada Golf Club, Utica.
 Yahnundasis Golf Club, Utica.
 The Glen Springs, Watkins.
 Westhampton Country Club, Westhampton Beach, Long Island.
 West Point Golf Club, West Point.
 Century Country Club, White Plains.
 Knollwood Country Club, White Plains.
 Westchester Hills Golf Club, White Plains.
 Woodmere Club, Inc., Woodmere, Long Island.

New Jersey

Seaview Golf Club, Absecon.
 Beacon Hill Golf Club, Atlantic Highlands.
 Baltusrol Golf Club, Baltusrol.
 Somerset Hills Country Club, Bernardsville.
 Cohanzyck Country Club, Bridgeton.
 Pine Valley Golf Club, Clementon.
 Colonia Country Club, Colonia.
 Morris County Golf Club, Convent.
 Echo Lake Country Club, Cranford.
 Deal Golf Club, Deal.
 Hollywood Golf Club, Deal.
 Englewood Golf Club, Englewood.
 Essex Fells Country Club, Essex Fells.
 Glen Ridge Country Club, Glen Ridge.

Hackensack Golf Club, Hackensack.
 Lakewood Country Club, Lakewood.
 Linwood Country Club, Linwood.
 Norwood Golf Club, Long Branch.
 Merchantville Country Club, Merchantville.
 Montclair Golf Club, Montclair.
 Moorestown Field Club, Moorestown.
 Country Club of Atlantic City, Northfield.
 Yountakah Country Club, Nutley.
 Plainfield Country Club, Plainfield.
 Princeton Golf Club, Princeton.
 Ridgewood Country Club, Ridgewood.
 Riverton Country Club, Riverton.

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| Roselle Golf Club, Roselle. | Upper Montclair Country Club, Upper Montclair. |
| Rumson Country Club, Rumson. | North Jersey Country Club, Warren Point. |
| Spring Lake Golf and Country Club, Spring Lake. | Shackamaxon Country Club, Westfield. |
| Tavistock Country Club, Tavistock. | Westfield Golf Club, Westfield. |
| Knickerbocker Country Club, Tenafly. | Essex County Country Club, West Orange. |
| Mountain Ridge Country Club, West Orange. | |

Pennsylvania

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| Huntingdon Valley Country Club, Abington. | Bala Golf Club, Philadelphia. |
| Pittsburgh Field Club, Aspinwall. | Cedarbrook Country Club, Philadelphia. |
| Philadelphia Country Club, Bala. | Green Valley Country Club, Philadelphia. |
| Nemacolin Country Club, Beallsville. | Philadelphia Cricket Club, Philadelphia. |
| Beaver Valley Country Club, Beaver Falls. | Roxborough Country Club, Philadelphia. |
| Highland Country Club, Bellevue. | Stenton Country Club, Philadelphia. |
| Gulph Mills Golf Club, Bridgeport. | Whitemarsh Valley Country Club, Philadelphia. |
| Saint Clair Country Club, Bridgeville. | Philmont Country Club, Philmont. |
| Butler Country Club, Butler. | Country Club of Allegheny County, Pittsburgh. |
| Coatesville Country Club, Coatesville. | Shannopin Country Club, Pittsburgh. |
| Montour Heights Country Club, Coraopolis. | Stanton Heights Golf Club, Pittsburgh. |
| Aronimink Golf Club, Drexel Hill. | Brookside Country Club, Pottstown. |
| Eagles Mere Golf Club, Eagles Mere. | Berkshire Country Club, Reading. |
| Ellwood Country Club, Ellwood City. | Wanango Country Club, Renovo. |
| Kahkwa Club, Erie. | Saint Davids Golf Club, Saint Davids. |
| Sunnybrook Golf Club, Flourtown. | Allegheny Country Club, Sewickley. |
| Hannastown Golf Club, Greensburg. | Sharon Country Club, Sharon. |
| Greenville Country Club, Greenville. | Shawnee Country Club, Shawnee on Delaware. |
| Country Club of Harrisburg, Harrisburg. | Edgewood Country Club, Swissvale. |
| Merion Cricket Club, Haverford. | Brackenridge Heights Country Club, Tarentum. |
| Hazleton Country Club, Hazleton. | Titusville Country Club, Titusville. |
| Old York Road Country Club, Jenkintown. | Torresdale Golf Club, Torresdale. |
| Kittanning Country Club, Kittanning. | Uniontown Country Club, Uniontown. |
| Lancaster Country Club, Lancaster. | Westmoreland Country Club, Verona. |
| Bucks County Country Club, Langhorne. | Springhaven Club, Wallingford. |
| Country Club of Lansdowne, Lansdowne. | West Chester Golf and Country Club, West Chester. |
| Llanerch Country Club, Llanerch. | Wyoming Valley Country Club, Wilkes-Barre. |
| Youghiogheny Country Club, McKeesport. | York Country Club, York. |
| Lu Lu Temple Country Club, North Glenside. | |
| North Hills Country Club, North Glenside. | |
| Oakmont Country Club, Oakmont. | |
| Overbrook Golf Club, Overbrook. | |
| Tredyffrin Country Club, Paoli. | |

Delaware

- Wilmington Country Club, Wilmington.

Maryland

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| Suburban Club of Baltimore County, Arlington. | Columbia Country Club, Chevy Chase. |
| Baltimore Country Club, Baltimore. | Catoctin Country Club, Frederick. |
| Maryland Country Club, Baltimore. | Green Spring Valley Hunt Club, Garrison. |
| Chevy Chase Club, Chevy Chase. | Bannockburn Golf Club, Glen Echo. |
| Elkridge Hunt Club, Woodbrook. | Indian Spring Golf Club, Sligo. |

Virginia

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| Hampton Roads Golf and Country Club, Hampton. | Lakeside Country Club, Richmond. |
| Albemarle Golf Club, Charlottesville. | Roanoke Country Club, Roanoke. |
| The Country Club, Norfolk. | Washington Golf and Country Club, Rosslyn. |
| Country Club of Virginia, Richmond. | Princess Anne Country Club, Virginia Beach. |
| Hermitage Country Club, Richmond. | |

West Virginia

Guyan Country Club, Huntington.
Wheeling Country Club, Wheeling.

Green Brier Golf Club, White Sulphur
Springs, W. Va.

North Carolina

Asheville Country Club, Asheville.
Pinchurst Golf Club, Pinchurst.

Charlotte Country Club, Charlotte.
Pinchurst Golf Club, Pinchurst.

South Carolina

Palmetto Golf Club, Aiken.

Ridgewood Club, Columbia.

Georgia

Capital City Club, Atlanta.
Druid Hills Golf Club, Atlanta.

Jekyl Island Club, Brunswick.
Savannah Golf Club, Savannah.

Florida

Belleair Country Club, Belleair Heights.
College Arms Golf Club, De Land.
Florida Country Club, Ortega.
Everglades Club, Palm Beach.

Palm Beach Country Club, Palm Beach.
Pensacola Country Club, Pensacola.
Saint Augustine Links, Saint Augustine.
Temple Terraces Country Club, Tampa.
Useppa Golf Club, Useppa Island, Fla.

Tennessee

Kingsport Country Club, Kingsport.

Nashville Golf and Country Club, Nashville.

Kentucky

Fort Mitchell Country Club, Covington.

Louisville Country Club, Louisville.

Ohio

Fairlawn Heights Golf Club, Akron.
Portage Country Club, Akron.
Ashtabula Country Club, Ashtabula.
Brookside Country Club, Barberton.
Lakeside Country Club, Canton.
Hillcrest Country Club, Cincinnati.
Hyde Park Country Club, Cincinnati.
Losantiville Country Club, Cincinnati.
Maketewah Country Club, Cincinnati.
Western Hills Country Club, Cincinnati.
Canterbury Golf Club, Cleveland.
Country Club Co., Cleveland.
Highland Park Golf Club, Cleveland.
Westwood Country Club, Cleveland.
Columbus Country Club, Columbus.
Scioto Country Club, Columbus.
Dayton Country Club, Dayton.
Miami Valley Golf Club, Dayton.

Defiance Golf and Country Club, Defiance.
East Liverpool Country Club, East Liver-
pool.
Elyria Country Club, Elyria.
Lorain Country Club, Lorain.
Westbrook Country Club, Mansfield.
Norwalk Country Club, Norwalk.
Plum Brook Country Club, Sandusky.
Mayfield Country Club, South Euclid.
Oakwood Club, South Euclid.
Springfield Country Club, Springfield.
Steubenville Country Club, Steubenville.
Inverness Club, Toledo.
The Country Club, Toledo.
Sylvania Golf Club, Toledo.
Shaker Heights Country Club, Warrensville.
Willowick Country Club, Wickliffe.
Youngstown Country Club, Youngstown.

Indiana

Hazelden Country Club, Brook.
Fort Wayne Country Club, Fort Wayne.
French Lick Springs Hotel Co., French
Lick.
Country Club of Indianapolis, Indianapolis.
Highland Golf Club, Indianapolis.

Kokomo Country Club, Kokomo.
Country Club of La Fayette, La Fayette.
Delaware Country Club, Muncie.
South Bend Country Club, South Bend.
Wawasee Golf Club, Syracuse.

Michigan

Ann Arbor Golf and Outing Club, Ann
Arbor.
Battle Creek Country Club, Battle Creek.
Bloomfield Hills Country Club, Birmingham.
Oakland Hills Country Club, Birmingham.
Birch Hill Country Club, Detroit.
Detroit Golf Club, Detroit.
Rambouillet Country Club, Detroit.

Escanaba Golf Club, Escanaba.
Kent Country Club, Grand Rapids.
Grosse Ile Golf and Country Club, Grosse
Ile.
Country Club of Detroit, Grosse Pointe.
Wawonowin Golf Club, Ishpeming.
Lochmoor Club, Grosse Pointe Shores.
Portage Lake Golf Club, Houghton.

Kalamazoo Country Club, Kalamazoo.
 The Country Club, Lansing.
 Detroit Masonic Country Club, Mount
 Clemens.
 Muskegon Country Club, Muskegon.
 Meadowbrook Country Club, Northville.
 Automobile Country Club, Pontiac.
 St. Clair River Country Club, St. Clair.

Port Huron Golf and Country Club, Port
 Huron.
 Plum Hollow Golf Club, Redford.
 Redford Country Club, Redford.
 Brooklands Golf and Country Club,
 Rochester.
 Red Run Golf Club, Royal Oak.
 St. Clair River Country Club, St. Clair.

Illinois

Aurora Country Club, Aurora.
 Midlothian Country Club, Blue Island.
 Beverly Country Club, Chicago.
 Edgewater Golf Club, Chicago.
 Ridge Country Club, Chicago.
 Briergate Golf Club, Deerfield.
 Dixon Country Club, Dixon.
 St. Clair Country Club, East St. Louis.
 Elmhurst Golf Club, Elmhurst.
 Evanston Golf Club, Evanston.
 Flossmoor Country Club, Flossmoor.
 Idlewild Country Club, Flossmoor.
 Harlem Golf Club, Forest Park.
 Old Elm Club, Fort Sheridan.
 Skokie Country Club, Glencoe.
 Glenview Club, Golf.
 Bob O'Link Golf Club, Highland Park.
 Exmoor Country Club, Highland Park.
 Hinsdale Golf Club, Hinsdale.
 Calumet Country Club, Homewood.

Ravisloe Country Club, Homewood.
 Joliet Country Club, Joliet.
 Edgewood Golf Club, La Grange.
 La Grange Country Club, La Grange.
 Onwentsia Club, Lake Forest.
 Shoreacres Golf Club, Lake Forest.
 Olympia Fields Country Club, Matteson.
 Ridgemoor Country Club, Norwood Park.
 Oak Park Country Club, Oak Park.
 Park Ridge Country Club, Park Ridge.
 Country Club of Peoria, Peoria.
 Pontiac Golf and Country Club, Pontiac.
 Northmoor Country Club, Ravinia.
 Riverside Golf Club, Riverside.
 Rockford Country Club, Rockford.
 Sinnissippi Park Golf Club, Rockford.
 Illini Country Club, Springfield.
 Chicago Golf Club, Wheaton.
 Glen Oak Country Club, Wheaton.
 Indian Hill Club, Winnetka.

Wisconsin

Delavan Country Club, Delavan.
 Fond du Lac Town and Country Club, Fond
 du Lac.
 Chenequa Country Club, Hartland.
 Kenosha Country Club, Kenosha.
 Lake Geneva Country Club, Lake Geneva. Blue Mound Country Club, Wauwatosa.

Tripoli Country Club, Milwaukee.
 Milwaukee Country Club, North Milwaukee.
 Oshkosh Country Club, Oshkosh.
 Sheboygan Country Club, Sheboygan.
 Waukesha Golf Club, Waukesha.

Minnesota

Northland Country Club, Duluth.
 Ridgeview Golf Club of Duluth, Duluth.
 Interlachen Country Club, Hopkins.
 Oak Ridge Country Club, Hopkins.
 Golden Valley Golf Club, Minneapolis.
 Minikahda Club, Minneapolis.
 Minnetonka Country Club, Minneapolis.

Lafayette Club, Minnetonka Beach.
 Midland Hills Country Club, St. Paul,
 Minn.
 Minneapolis Golf Club, Saint Louis Park.
 Town and Country Club, Saint Paul.
 Woodhill Country Club, Wayzata.
 White Bear Yacht Club, White Bear.

Winona Country Club, Winona.

Iowa

Golf and Country Club, Des Moines.

Sunnyside Country Club, Waterloo.

South Dakota

Minnehaha Country Club, Sioux Falls.

Nebraska

Omaha Country Club, Omaha.

Kansas

Bellevue Country Club, Atchison.
 Milburn Golf and Country Club, Merriam.

Fort Leavenworth Officers' Club, Fort
 Leavenworth.

Missouri

Excelsior Springs Golf Club, Excelsior
 Springs.
 Hillcrest Country Club, Kansas City.

Kansas City Country Club, Kansas City.
 Meadow Lake Country Club, Kansas City.
 Kirkwood Country Club, Kirkwood.

Bellerive Country Club, Normandy.	Forest Park Golf Club, Saint Louis.
Glen Echo Country Club, Normandy.	Saint Louis Country Club, Saint Louis.
Midland Valley Country Club, Overland.	Sunset Hill Country Club, Sappington.
Algonquin Golf Club, Webster Groves.	

Louisiana

New Orleans Country Club, New Orleans.

Texas

Beaumont Country Club, Beaumont.	El Paso Country Club, El Paso.
Dallas Country Club, Dallas.	San Antonio Country Club, San Antonio.

Oklahoma

Dornick Hills Country Club, Ardmore.	Muskogee Town and Country Club, Muskogee.
Oakhurst Country Club, Tulsa.	Tulsa Country Club, Tulsa.

Colorado

Boulder Country Club, Boulder.	Colorado Springs Golf Club, Colorado Springs.
Broadmoor Golf Club, Colorado Springs.	Lakewood Country Club, Denver.
Denver Country Club, Denver.	

Washington

Manito Golf Club, Spokane.	Seattle Golf Club, Seattle.
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Oregon

Illehee Country Club, Salem.	Waverly Country Club, Portland.
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California

Belvedere Golf and Country Club, Belvedere.	Menlo Country Club, Redwood City.
Los Angeles Country Club, Beverly Hills.	Victoria Club, Riverside.
Midwick Country Club, Los Angeles.	California Golf Club, San Francisco.
Rancho Golf Club, Los Angeles.	Presidio Golf Club, San Francisco.
Wilshire Country Club, Los Angeles.	San Francisco Golf and Country Club, San Francisco.
Claremont Country Club, Oakland.	La Cumbre Golf and Country Club, Santa Barbara.
Annandale Golf Club, Pasadena.	Brentwood Country Club, Sawtelle.
Flintridge Country Club, Pasadena.	

Arizona

Ingleside Club, Phoenix.

Canada

Calgary Golf and Country Club, Calgary, Alberta.	Royal Ottawa Golf Club, Ottawa, Ontario.
Edmonton Golf and Country Club, Edmonton, Alberta.	Essex County Golf and Country Club, Sandwich, Ontario.
Vancouver Golf and Country Club, New Westminster, British Columbia.	Rosedale Golf Club, Toronto, Ontario.
Shaughnessy Heights Golf Club, Vancouver, British Columbia.	Beach Grove Country Club, Walkerville, Ontario.
Colwood Golf and Country Club, Victoria, British Columbia.	Weston Golf and Country Club, Ltd., Weston, Ontario.
Winnipeg Canoe Club, Winnipeg, Manitoba.	Oxford Golf and Country Club, Ltd., Woodstock, Ontario.
Winnipeg Golf Club, Winnipeg, Manitoba.	Grand Mere Golf Club, Grand Mere, Quebec.
Riverside Golf and Country Club, St. John, New Brunswick.	Beaconsfield Golf Club, Montreal, Quebec.
Glendale Golf and Country Club, Hamilton, Ontario.	Country Club of Montreal, Montreal, Quebec.
Lambton Golf and Country Club, Lambton Mills, Ontario.	Kanawaki Golf Club, Montreal, Quebec.
Toronto Golf Club, Long Branch, Ontario.	Laval Sur Le Lac, Montreal, Quebec.
	Mount Bruno Country Club, Inc., Saint Bruno, Quebec.
	Senneville Country Club, Senneville, Quebec.

Bermuda

Bermuda Development Co., Ltd., Hamilton, Bermuda.

Hawaii

Oahu Country Club, Honolulu.

Questions and Answers

All questions sent to the Green Committee will be answered as promptly as possible in a letter to the writer. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answer given in this column, it is your privilege and duty to write to the Green Committee. *Please bear in mind that the recommendations given apply specifically to the locality designated at the end of the question.*

1. **Do not cut the grass in your bent nursery rows.**—Some of the carpet bent grass that we planted vegetatively last autumn is now over a foot high. Do you recommend letting this grass grow and seed itself, or cut it down close and depend upon the creeping of the roots for the extension?—(Maryland.)

Let your creeping bent alone until about the end of August; then get busy to make your vegetative plantings as described in the July (1921) number of THE BULLETIN. You will need the utmost growth available during the summer so as to get the long runners, which are the easiest to lift and to chop up for the broadcast plantings.

2. **The eradication of crab grass.**—In the latter part of July of each year, crab (fall) grass makes its appearance in great quantities in our putting-greens and fairways. This necessitates putting a gang of men on the greens and digging it out by the roots. After this is done, the greens are in very poor shape for about two months. Could you suggest any method of treatment in the spring that would keep the crab grass out of the greens? Would you suggest not cutting the greens so close?—(Pennsylvania.)

Crab grass in the latitudes of Washington and Philadelphia is exceedingly troublesome as a weed, especially in putting-greens, and we do not know of any royal road to success in eradicating it. The best method we have found for keeping crab grass in check is to fertilize the greens well, preferably with good top-dressing of compost such as is described in the April (1921) number of THE BULLETIN. As soon as the grass appears, remove it by hand. After the grass becomes fairly well established in putting-greens its eradication invariably leaves the greens in a ragged condition; therefore the advisability of starting early. By top-dressing, let us say once a month from spring until the time crab-grass becomes evident, it is possible to so stimulate the grass as to lessen the abundance of crab grass in the greens. We have had numerous reports on the effects of raking, and there are special rakes for this purpose. We are not prepared, however, to recommend this method unqualifiedly, particularly because we have had no personal experience with it and also because of the fact that in connection with its use the turf is quite badly torn. In the hot, dry weather of summer this is not always desirable.

3. **Determination of the amount of plant food extracted from soil by the growing crop.**—I would like to inquire whether or not any experiments have been conducted with a view to determining the amount of plant food extracted from a putting-green during the course of a season? Would the following experiment lead to any reliable conclusions? Suppose I take say the green that comes nearest to being ideal with regard to the turf that we have, measure the green accurately, and throughout the season try to mow when the dew is absent, and keep a record of weights of grass that is cut off each mowing; and then take a sample say every two weeks of the fresh grass clippings and have it analyzed for moisture so as to ascertain the amount of dry matter and also the amounts of such plant foods as nitrogen, phosphorus, potassium, calcium, etc.—(Michigan.)

The question you bring up is that involved in the old so-called "bank account" theory of fertility, namely, that there is a definite amount of nitrogen, phosphorus, potassium, calcium, etc., in the soil and that every bit of vegetation removed as a crop reduces the supply in the soil just that much. An enormous amount of agricultural experimenting has been done on the basis of this assumption. This has resulted in a large stock of knowledge on the amount of salts removed from the land by its crops, and, in related experiments, in the amount of salts removed by leaching. The practical value of these investigations is very small. The amount of salts removed by cropping or by leaching has not been found to be a definite index as to the amount of fertilizer that should be applied, which was one of the things hoped for in connection with such experiments. So far as a golf course is concerned, there is no danger of wasting any fertilizer value which may be contained in grass clippings if these are used in the compost heaps.

4. Eradication of daisies.—Our club is very much bothered with daisies on our greens, and we have tried every method we can think of to eradicate this hindrance but to date have not been successful, and we would appreciate very much your advising us as to whether or not you know of any method by which we can rid the greens of this pest.—(Oregon.)

We know of no easy way to get rid of this pest. Where it is not too troublesome, weeding will probably keep it in check, but where there is a bad growth of the weed it is probably best to lift the sod and replace it with clean turf. For this purpose we advise every club to have a piece of good turf for patching purposes. It is not necessary to go to the expense that is required in building a putting-green to do this, and it will be found to pay for itself many times, to say nothing of the satisfaction of being able to repair the greens with a minimum loss of use.

5. Carbon dioxide as a stimulant to plant growth.—We have seen it stated that the confining of carbon dioxide gas beneath light-excluding covers on turf will greatly stimulate the growth of the grass. Is this practicable?—(Pennsylvania.)

It has long been known that green plants, that is, plants with green coloring matter in their leaves, can use more carbon dioxide than is present normally in the atmosphere provided they have an abundance of sunlight and water. This fact has been well established by laboratory tests. However, the problem of utilizing the gas economically is a very difficult one. It has been suggested that possibly carbon dioxide may be used in greenhouses, but it is very doubtful if it will ever be used economically in open fields. The gas diffuses so quickly that it would require a large supply really to be beneficial. In greenhouses, of course, the gas would be confined, and there would also be plenty of light for its assimilation by the plants. Green plants can not utilize carbon dioxide in the absence of light, and therefore the proposal would appear to be valueless, because it involves the covering of turf with a light-excluding canvas or oilcloth. An excess of carbon dioxide in the absence of light has a tendency to be detrimental rather than beneficial. While we do not wish to discourage any experiments that have indications of being more or less well founded, we do not think the one here suggested would be worth while, since it violates one of the fundamental principles of plant physiology, which is that light is necessary for the assimilation of carbon from the air in the manufacture of organic compounds through the agency of the green coloring matter

known as *chlorophyll*. It may be well, however, to remember that one of the functions of barnyard manure, or indeed of any soil material rich in humus, is, through its decay, the supplying of large quantities of carbon dioxide to the soil. There can be but little doubt that this is one of the reasons why humus materials stimulate the growth of plants. All in all, this would seem to be by far the most practicable way of increasing the amount of carbon dioxide available for plant growth.

6. **Eradication of pennywort; salt in weed eradication.**—We mailed you yesterday a box containing some sod with a flat weed in it. It is giving us a great deal of trouble; in fact, it is ruining our greens, as when it takes possession it kills out the Bermuda grass. Can you recommend some chemical which will kill this weed without taking any chance of damaging the Bermuda grass?—(Mississippi.)

The weed you sent in for identification is one of the pennyworts. This causes a great deal of trouble in lawns and fine turf on golf courses. Unfortunately we have never discovered a good remedy for fighting it. We believe it would be worth your while to experiment by spraying with an ordinary solution of common table salt. You could apply it with one of the ordinary hand-spray outfits such as used in gardens for spraying vegetables. We would advise starting with a solution of about 3 per cent by weight, and increase it to 5 per cent or 6 per cent if the grass will stand it that strong. Grasses will usually stand more salt than will the broad-leaved plants like the weeds you have; but it will be necessary to work carefully with the spray or the grass will be injured.

7. **Applying nitrate of soda to putting-greens.**—How much nitrate of soda should be applied to ordinary greens where we want a quick, thick growth? How is it best to apply nitrate of soda—in its ordinary form, or dissolved in water?—(Illinois.)

We have recommended that nitrate of soda never be used in single applications to a greater amount than 5 pounds to one thousand square feet. It can be applied by dissolving it in a solution of 1 pound to 10 gallons of water and then sprinkled on with a sprinkling can. The green should be well watered immediately after the application of the material, as otherwise the solution which is on the leaves becomes strengthened as the water evaporates, and this will cause burning. A better way in our judgment is to mix the nitrate of soda, well pulverized, with many times its amount of sand, and then scatter the mixture over the green, after which the green should be sprinkled. Five pounds to one thousand square feet is a fairly heavy application, but this may be applied every month of the year if desired. If the applications are made monthly we would suggest, however, that it would be better to reduce the application to just about half of what is above indicated.

8. **Bee hills on turf.**—We send you by parcels post a sample bee which we have found boring holes in our fairways, especially the part that has been resown last year and heavily fertilized. The fairway is near a woods. The holes resemble the ant holes only they are very much larger holes, and the earth piles are quite bigger. One fairway is quite infested with these. Any information you can give us will be much appreciated.—(New Jersey.)

The bee sent with your letter of recent date is a species of *Colletes*. The holes and piles of earth now appearing in your fairway and caused by the insect are the exits made by the mature insects, which do not return to these same burrows; it will therefore be useless to treat these burrows for the destruction of the insect, and all you can do is to brush or wash

the hills away. The mature insects dig out of the ground in March or April, mate, and the male dies, but the female returns to the same grounds from the latter part of April to June, burrows again into the soil for a depth of two to three feet, deposits her eggs in the bottom of the burrow, and makes several returns to the burrow during the season to deposit pollen and other food for the next brood. By the following March or April the new brood is ready to dig itself out. The work of this insect in golf turf has never been brought to our attention before. The insect does not feed on the grass roots, and its only injury to the turf appears to be the unsightly hills which it constructs as it burrows. If these hills are objectionable we would advise the adoption of measures to destroy the eggs or newly hatched insects in the burrows. The burrows are, however, rather deep, and to combat the insect successfully would probably require a soil injector, by means of which carbon bisulfid could be injected a foot or more beneath the surface of the soil. It might be, however, that by squirting about a half-ounce of carbon bisulfid down the new holes bored by the bee from the latter part of April to June, and closing the mouth of the hole securely with soil, the eggs or newly-hatched insects can be destroyed. It is possible also that about 2 ounces of sodium cyanide solution of 8 ounces to 50 gallons of water, as recommended on page 233 of the November, 1921, BULLETIN, might be effective. The problem is to destroy the new life deposited into the ground by the females in late spring, so as to prevent the depredations of a new brood next spring. As above stated, this is the first time this matter has been brought to our attention, and all that we can suggest is experimentation along the above lines, if you care to go to the expense and if the situation is so serious as to warrant it.

9. **Top-dressing of greens with sand.**—At our new club, which we will start using this fall, we have built in our greens, using a top layer of equal parts of humus, top soil and sand. Three of the greens although constructed in the same manner as the rest, get harder than the others. We attribute this to the fact that that section of the ground upon which these greens are built is of a heavier clay texture, which is more plastic, and the top soil in that section is thinner and poorer than that which went into the other greens, consequently there should have been more humus and sand incorporated in it to make it of the proper consistency. The top-dressing used this spring was composed of three parts compost (sod, humus, garden soil and well-rotted manure) to one part sand, and we expect to use this application lightly two or three times through the season. It, however, occurred to us that on the greens which have shown the tendency to harden, a bigger percentage of humus and sand should be used. Would a light application of sand alone, or just sand and humus, be beneficial to the greens in question?—(Minnesota.)

You are probably correct in your statement that the three greens that get harder than the others are composed of the more plastic soil, and on these greens it might be well to be very liberal in your top-dressings of sand, and indeed to continue with top-dressings, mainly of sand, until the surface texture is considerably changed. To make the whole matter more concise: (1) Use sand top-dressings on greens which are composed of a rather heavy clay or clay loam, as this top layer of sand will bring about better water absorption and reduce very materially the tendency of such soils to puddle and bake; (2) where the general growth of the soil and the putting-green is already satisfactory, use just such a mixture as you have been using for your top-dressing.

Meditations of a Peripatetic Golfer

A putting-green with its margins flared up at a steep angle, giving it a cocky appearance. It would not be bad if the flaring edges were not so steep.

The first fine grass to show life and growth in early spring is annual bluegrass. Only a little behind it is Kentucky bluegrass; then creeping bent; and last of all, red fescue.

"Grass is the forgiveness of nature," said Ingalls. Some putting-greens we have seen are probably "forgiven" only "with reservations."

If tractors and trucks added something to the compost pile they would strike us with more favor. We are going to ask Ford if he can't build us a hay-digesting motor more efficient than the horse.

Caveat emptor! Let the buyer beware! Golf clubs should not blame it all on the glib salesman, but credit part to their own gullibility.

If a rich golf club spends money like a drunken sailor, we do not waste sympathy on it—but we do worry because it helps foster the erroneous idea that golf is a game only for rich men.

They wasted money trying to get a first-class golf course quickly. About half the cost could be saved if a club will spread its construction work over two or three years.

Some golf courses have remained unchanged so long that it is sacrilege to suggest an improvement. Give us the course that is constantly being changed to its betterment rather than a sacred relic of bygone golf architecture.

Some enthusiast has published a statement to the effect that nearly every golf club about Chicago uses a carload of seed each year. Now, a carload of grass seed is at least 30,000 pounds. These Chicago fellows certainly do throw away money, unless some one is exaggerating.

A famous statesman once said, "The stupidity of the average man is beyond belief." Sometimes we think the stupidity of the average golf club is about as abysmal as the ocean.

There was great consternation at the Blueblood Country Club recently when a countryman applied for admission. A wise club would take him in and make him chairman of the green committee. Farmers have a lot of horse-sense about growing things, which city men rarely acquire.

A slow, lingering death should be suffered by the player who loses his temper and takes a divot out of a putting-green.

Golf is a peculiar game. It takes one's mind off of business cares, but it also makes one work harder to keep his mind off of golf.

One has such a sense of freedom on a golf course. There are no "keep off the grass" signs.