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A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

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Sensible Golf

That a \$100,000 course is in no respect essential to golf has again been demonstrated at Napoleon, Ohio, a town of about five thousand people, on the banks of the Maumee River, forty miles above Toledo.

When the thought of having a golf course seized a few men in the town, they cast about to find a place, and quite naturally turned to seventy-odd acres of old pasture lying at the end of a street. The land, being near the river, was cut up by draws or ravines so that it was particularly suitable. A lease with an option of purchase at \$150 an acre was obtained. The rental being lower than the interest on the option price, the club will occupy the land on lease until the option must be exercised.

Nine really good golf holes were laid out by W. J. Rockefeller, of the Inverness Club, the length being about 2,700 yards. There was nothing mysterious about this layout. Natural places for greens were picked out, having due regard for the length of hole desired, and after a "once over" with a mowing machine the putting-greens were made.

The location of tees and tee boxes completed the course. Though the description may indicate a pretty rough sort of a course, it is far better than one would think. The greens have good shape and contours and need nothing in this world but top-dressing and cutting to make them good enough for anyone; and the great danger is that someone may try to improve on nature by rebuilding the greens and surrounding them with ill-arranged and nasty-looking sand traps and other hazards. If they will only let the greens alone and help them by top-dressing and cutting, they will probably have better greens than they can ever get otherwise.

The tees are all that any golfer is entitled to. Why should an ugly plateau be raised up and kept perfectly true in order to have a tee?

The town is golf crazy and in a sensible way, if it is possible for insanity to manifest itself in that way.

There is no clubhouse, no locker-room, "no nothing" except the golf course. The members dress and bathe at home and walk or drive to the course.

One man with a horse, a thirty-inch fairway mower, and a putting-green mower is able to take care of the course; and that is all there is to the expense.

If the good people of this town will only realize that they will get a better golf course by letting it alone than by trying to improve nature, this should be a conspicuous example of sensible golf. With just a little attention in the way of top-dressing and fertilizing, the fairways and greens should get better every year.

This is getting back to first principles, not only in the matter of good sense, but in the matter of layout, construction and maintenance. The first courses in Scotland were laid out in exactly this way.

Vegetative greens.—According to information received from various sources about 125 putting-greens were planted this season by the vegetative method. The results from these will later be of much interest.

Area needed for a golf course.—A golf course 6,500 yards with each hole 73 yards wide will occupy just 100 acres of land. It takes from 120 to 140 acres to have ample room for an 18-hole standard course.

Buying Seed for Northern Fairways

C. V. PIPER AND R. A. OAKLEY

The matter of economy in purchasing seed for the fairways is one that may well be given serious consideration. In seeding the fairways of a new 18-hole course, which will comprise about 50 acres for the fairways alone, approximately 10,000 pounds of seed is required. It is considered that 200 pounds of seed to the acre is the most desirable rate of seeding. North of a line from Richmond to St. Louis the customary seed mixtures for fairway use are 1 pound of redtop to 4 pounds of Kentucky bluegrass, or 1 pound of redtop to 4 pounds of red fescue; the redtop-bluegrass mixture is the more commonly used. Either mixture may indeed be used advantageously in the territory mentioned, but in nine cases out of ten the redtop-bluegrass mixture gives the better results. The relative costs of seed at present wholesale prices are about as follows:

2,000 lbs. redtop, at 18c.....	\$360
8,000 lbs. Kentucky bluegrass, at 25c.....	2,000
	\$2,360
2,000 lbs. redtop, at 18c.....	\$360
8,000 lbs. red fescue at 60c.....	4,800
	\$5,160

Aside from the saving in purchase money, we strongly recommend the redtop-bluegrass mixture as the better one for northern fairways.

In all the territory mentioned it is usually desirable to add about 10 per cent. of bent seed; but bent seed at present is very scarce and expensive.

The Course With Limited Means

A member of the executive committee of the Green Section recently spent an afternoon with the chairman of the greens on a nine-hole course in the Middle West, and was taken off his feet by the greeting, "Your Green Section and BULLETIN may possibly be fine for the course that is extravagantly maintained at an expense of from \$15,000 to \$25,000 a year, but you and the BULLETIN are 'too far uptown'—too fancy for 99 per cent of the courses like ours with only nine holes and only \$3,000 a year to spend."

Our member tried to explain our desire to promote modest-cost golf and our efforts to obtain material for the BULLETIN that would be specially helpful to just such courses, but the explanations did not seem to be acceptable, and \$20 a year for the BULLETIN was declared to be a wanton extravagance that would be instantly repudiated by the board of directors.

The two started around the course, and the first thing they came to was a green set in the end of a ravine with high banks on three sides, woods on the east and south, and water constantly running under the green through a large drain. There was not a hatful of grass on the green, but it had been recently sown with twenty-five pounds of "putting-green mixture" which cost 50 cents a pound. The green had been sown the third

or fourth time and was just as far from being a green as it was before it was touched.

In response to a request for an opinion, the executive committee member endeavored to explain the impossibility of ever getting a good green in such a location because of the uncontrollable seepage; and on the seed question he explained that better seed than was being sown could be bought of the local seedsman for less money.

The next green, and the next, and all of them were literally covered with vigorous growths of all the varieties of crab grass possible to imagine. Some of the plants were from six to eight inches in diameter, and one or two greens that had been prepared for seeding looked as though they had had the smallpox. Another green was found in a drainage hollow, and its soil condition was proved by large areas of sedge which were being taken out, leaving places 12 to 18 inches in diameter perfectly barren and ugly.

There was not such a thing as a fairway on the lot, but there were three or four weird-shaped greens, about which were a lot of dinky, shallow, ill-kept sand traps. The chairman explained that he had just paid out \$150 for sand for these traps, though there was not one from which a ball could not be bunted out with a putter. The seed purchase of the year amounted to \$250, the sand was \$150, and the traps and new work not included in the maintenance item of \$3,000 cost \$1,500. There was not a shovelful of compost on the place. There was grass enough on both the greens and fairways to make a good start, and there was too much, except on the crab-grass greens, to make seeding of much benefit. The greens and fairways both needed fertilizing and dressing. When questioned about fertilizing, the local chairman said they had never done anything except to buy and use a car of commercial humus the previous year at a cost of \$500.

There was a little free lecture on the removal of crab-grass in the first stage of its career, when it obviously costs less to get it out than after it has sent its tentacles out in all directions. There was an attempt to show that \$250 spent for compost and fertilizer would get better results than that value of seed. The executive committee member would have liked to have said what was in his mind about the dinky traps and the \$150 worth of sand; for the nature of the ground was such that there were all the natural hazards about the greens that any one could want; and why a club with only \$3,000 to spend should deliberately waste it on such traps and sand was beyond imagination. There were four or five pulpit tees built up a foot or so above the natural surface and always rectangular in shape, and all inconceivably ill-kempt in appearance. The rest of the tees were sensible—nothing but mowed sections smooth enough for the purpose, but it was explained that the funds ran out so that these tees could not be built up and finished.

The ridiculous phase of the whole situation appeared in the local man's statement that the nine holes were too "sporty" for the members, so it was intended to build nine more that would be easier to play. Instead of the course being too hard, it was too bad. There was not a thing about it to attract a member to go near it.

Any one with any sense could see how the \$3,000 a year could be spent to better advantage and how the waste could be turned into green grass.

With just a little sense and no more money, some grass, and in time turf, could be put under the players' feet.

The great aim of the Green Section is to be helpful to the courses that must be maintained for little or nothing; but it is hard to help those who know too much to learn.

Uniform Grass on All the Greens

DR. MAYNARD M. METCALF, *The Orchard Laboratory, Oberlin, Ohio*

Is it well to have the grass uniform on all the putting-greens of a course; or is it better to have one quality of grass on one green and other qualities on other greens, some grass being fast, some slow, some very slow? These diverse effects could easily be secured. One green might have a rich admixture of clover, making a very slow green. The coarsest strains of creeping bent are much slower than the finest-leaved strains, and there are all degrees of intergradation, and there are other good greens grasses of various degrees of fineness, making greens of various degrees of speed.

Putting-greens of varying quality (very slow, slow, fast, very fast) add decidedly to the difficulty of a course, each type of green calling for its own kind of putting. Half or more of the strokes are taken on or onto the greens, and diversifying the quality of the grass on the greens adds immensely to the difficulty of the game. Is it an advantage to have greens of diverse grass qualities?

There is chance here for difference of opinion, but the writer believes that uniformity in the quality of the grass upon all the greens of any one course is a great desideratum. Putting is perhaps the most ticklish part of golf, and in this department of the game confidence is perhaps a little more important than in any other. With uniform greens through the course one gets the feel of the greens and putts with confidence. On the other hand, diverse conditions on the greens turf worries a man badly in his putting, and all the more because the degrees of difference in the turf are hard to estimate by the eye and are even harder to carry accurately in mind when one is familiar with the several greens. Diversity of quality in the greens adds a most tricky element of hazard and, it seems to the writer, an undesirable one.

If it be admitted that uniform greens are an advantage, then emphasis is placed upon the stolon method of planting greens, for one can plant his greens nursery with stolons of a single strain of creeping bent, even all from a single plant, thus securing uniform quality in the greens planted with stolons from this nursery. The greenkeeper can select carefully for his nursery the strain which seems all around the best, and can know in advance just the quality of green he will ultimately have.

Betterment of heavy clay fairways.—The best way to improve fairways on heavy clay soil is to top-dress frequently with sand. The sandy layer helps absorb water quickly and prevents the clay from puddling and baking. Every addition of sand until one inch is secured will help.

Cost of Building and Seeding a Nine-Hole Course in the Fall of 1921 and the Spring of 1922

WILLIAM W. LONG, *Coatesville (Pa.) Country Club*

Dr. R. A. Oakley, vice-chairman of the Green Committee of the United States Golf Association, has written me the following letter:

August 31, 1922.

DEAR MR. LONG:

I have just had a letter from Mr. Alan Wilson, a member of our Green Committee, in which he says, "I was very favorably impressed by the article in BULLETIN number eight, written by Mr. Long on the Coatesville Club. It seems to me that this is just the sort of thing that would be helpful to clubs that have not much money to spend, and I am wondering if it would not be a good thing to ask him to write an article which would give us a little more detail of the division of the expense of building the last nine holes. If he could tell how much was spent on each green and fairway, that would, of course, be the best, but if he could not do that possibly he could tell us how much was spent on labor, how much on horses, how much on seed, how much on fertilizer, etc., and how much was given to them in the way of help."

I have written Mr. Wilson that I think his suggestion a good one and that I would pass it on to you. Could you please let me know if you think you could prepare something along the line that Mr. Wilson has indicated? We would appreciate it very much indeed if you could.

I regret that we did not keep the cost of each green and each fairway separate, but I can give the readers of the BULLETIN the total cost of constructing and seeding the nine greens and fairways, completing Coatesville's eighteen-hole course.

Since my article appeared in the August BULLETIN we have opened the second nine holes and played on them incessantly since Friday, September 2. The total length of the second nine is 3,139 yards, the longest hole, number 10, being 551 yards, and the shortest number 15, a mashie pitch, 115 yards.

The total cost of seed for both greens and fairways was \$1,168. Each green has an average of about 5,000 square feet of putting surface. We sowed about 30 pounds of German mixed bent and extra fancy re-cleaned redtop, half and half, on each green. The bent cost us \$1.40 a pound, and the redtop 25 cents a pound. The greens were built without traps, but the natural layout of the course makes it a hard one. No professional has yet covered it in 36, which is par. The greens are well set with grass, but owing to the lack of a water system they are too hard at the present time to hold a pitched shot. Early next spring we will put in a sprinkling system. Any club which does not do this at the start is taking chances. Fortunately we had an abundance of rain during the summer months, which saved our grass.

While the greens are all we could expect without a sprinkling system, the fairways could not be better for a five months' growth of grass. For the most part they are like a thick carpet, and I do not believe there is a missed spot as big as one's hand on the entire nine holes. We used 3 pounds of Kentucky bluegrass to 1 pound of extra fancy re-cleaned redtop, and sowed this mixture at a rate slightly less than 100 pounds to the acre. On good land any heavier seeding is likely to be a waste of money. While we are teeing up on these fairways now, I am confident that by next summer this sod will be thick enough to play each ball from its lie.

The best authorities on golf grasses advocate seeding in the fall. In my opinion fall seeding of greens is preferable to spring seeding only in case water is piped to the greens. One can never count with any certainty on fall rains, whereas one is always sure to have an abundance of rain throughout April in this locality. We seeded both our first and second nine holes in April and obtained an excellent growth of grass. Fairways, which must depend upon rains, I feel, should always be seeded in the spring. I would seed greens the latter part of August if I had water, and if I did not have a water system I would seed them in the spring just as soon as it could possibly be done after frost was out of the ground.

The total cost for fairways, greens, and tees for the nine-hole course, measuring 3,139 yards, follows:

Labor	\$2,275.95
Teams	799.45
Seed	1,168.00
Fertilizer	340.46
Sand	46.00
Total.....	<u>\$4,629.86</u>

Labor for the most part cost us 20 cents an hour. We paid a few men 25 cents an hour, and the labor foreman received 30 cents an hour. Labor has since been increased to 30 cents and 35 cents an hour.

With the acquisition of reasonably good farm land I believe any club could closely approximate the figures I have given providing there is some member who understands work of this kind who will without cost devote his time exclusively to the project during the course of construction. Most every newly formed club should be able to find someone who is interested enough to do this.

Mr. Wilson, in his letter, asks how much was given us in the way of help. Neighboring farmers, realizing a country club would increase the value of surrounding property, donated considerable work. As I pointed out in a previous article, the big steel mills loaned us trucks and tools and made us benches and tee boxes. While no solicitation was made for funds outside of the regular membership fee of \$100, several members voluntarily made donations, the total amounting to about \$1,000, all of which went into the treasury and is accounted for in the cost of the course as given.

On Handling Peat and Compost

E. M. BARROWS¹

All good greenkeepers build compost piles, and the bigger the pile the greater the pride of the green committee. Layer on layer of soil, manure, sand, peat and what not—easy enough to build and a monument to foresight and thrift. After a few months it is time to turn it over, and a couple of men start at one end with shovels. After a week or so, the green committee really appreciates the size of that pile, and the club's treasurer also goes down to look it over. Finally the sifting begins and the awakening comes. The workman with his screen and shovel toils and toils, and at

¹ Chairman of Greens, Golden Valley Golf Club, Golden Valley, Minn.

the end of the long day there is a tiny heap back of the screen and a big pile of hopeless-looking debris at the side that would not go through the screen. When the task is done, there is just one monument left for the club's treasurer to see and that is the pile left over from screening, and then he will consider the purchase of a compost grinder.

There are a number of these on the market ranging from the home-made rig derived from an old thrashing machine cylinder to the more elaborate type. The one we are using at Golden Valley² has a grinding cylinder leading to a revolving screen. The machine may be run with a belt and pulley from a tractor or a portable engine. We use a long belt running to our tractor, which keeps the engine well away from the dirt and dust. The long belt also has the advantage of throwing off when a rock gets into the machine, preventing serious injury to the cylinder. The teeth of the grinder are $\frac{7}{8}$ -inch square steel pegs about three inches long, and the compost is crushed rather than cut. Consequently, straw, roots and even the quack grass rootstocks are not broken and will not pass through the screen. It is a decided advantage over the machines with sharper teeth, which have a tendency to cut up all materials. Anything the machine rejects is really unfit for use.

We have recently screened material for a new green with this machine. The peat was dug about two months before using and was simply piled up without composting. It took three good shovelers to feed the machine, and about 60 per cent. went through the screen. This material was a pure sphagnum peat, practically unscreenable without grinding. There was no trace of broken root stocks in the finely sifted peat, although very abundant in the original material.

We are now sifting the clay topsoil taken from the green and traps. Nearly 90 per cent. is delivered and is almost as fine as flour. By using two men shoveling topsoil, one peat and one sand, the green's soil can be delivered ready-mixed at a very decided saving.

A good compost grinder will certainly pay its way on an eighteen-hole course and will deliver a far better top-dressing than can be obtained by hand-screening.

Turf Grasses in Canada

GEO. H. CLARK, *Seed Commissioner, Ottawa, Canada*

Ten years ago there were not more than about a dozen golf courses in Canada. Now, there are said to be more than two hundred, most of which have come into existence since 1918. The problems connected with suitable turf production, particularly for the putting-greens, would seem to be more highly technical than the business and professional men, who are enthusiastic in the work of developing new golf courses, had imagined. Most kinds of grasses look alike to them. The managements of some of these young clubs have been the unsuspecting victims of incompetent golf course "mystagogues" who are able to make a fair success in the arrangement and construction on the course, but who are able to identify grasses only by the name that appears on the invoice.

Perhaps it has been wrong to advise golf clubs in general to buy seed

²The machine referred to is that illustrated on page 268 of the September BULLETIN.—EDITORS.

of creeping bent grass and creeping red fescue for their putting-greens. These grasses depend for reproduction on their natural habit for spreading by stalks that creep along the surface or under the surface of the ground, and they produce seed quite sparingly. In consequence genuine seed of these varieties is scarcely available in quantity for commerce. It is exceedingly difficult to differentiate between the seeds of these desirable varieties and of some other common sorts; hence the opportunity to substitute.

In the hope of securing genuine seed of creeping bent grass and of creeping red fescue at any cost the writer has on several occasions ordered these seeds direct from European sources that were believed to be reliable, and produced therefrom bowling greens and putting-greens that were redtop or sheep's fescue with an occasional patch of grass that possessed the desired creeping habit of growth. The fault does not belong as much as has been supposed to our American seedsmen.

On the advice of golf course contractors, most golf clubs in process of development are ordering creeping bent grass and producing therefrom a green of ordinary redtop. The redtop of commerce is an excellent grass for the production of hay. The stalks grow upright. A fine putting-green may be developed from the seed of redtop; but it is not to be expected that any grass with the upright habit of growth, like the redtop, will stand the close cutting of a putting-green and survive severe winters followed by the superstimulating effect of the hot sun in the early spring during the process of transition from the dormant life to active growth. In our northern areas we are able to and sometimes do apply brush or lattice fence to the putting-greens to serve the double purpose of holding a deeper covering of snow throughout the winter and of screening tender grass from the full effect of the sun in the early spring until growth is well established. Fortunately it frequently happens that the critical days of the early spring are more or less cloudy with plenty of rain and not too much heat before growth on the putting-green has made a good start.

The annual repair of putting-greens entails a heavy charge on the revenue of most golf clubs. The purchase of more seed of the same kind that has winter-killed is the usual course followed. The borrowing of sod from the fairways is also commonly practiced. Some of the older clubs, having observed that the patches of creeping bent grass on the putting-greens do not winter-kill, proceed to take from the fairways any patches of creeping bent grass that have developed and transfer them to the putting-greens. This has tended to reduce the annual cost of repair of putting-greens.

During the last two or three years, following the lead of some of the best-experienced golf enthusiasts in the United States, a few of our Canadian golf clubs have made a start in the development of a nursery acre or two acres, where ideal patches of creeping bent grass from wherever they can be located are transplanted as one would transplant strawberries. By this process it is comparatively easy to develop ideal sod for the repair of putting greens. It is surprising how rapidly a desirable form of creeping bent grass will spread when not too closely cut. This week the Rivermead Golf Club of Ottawa is transplanting a large patch of desirable creeping bent grass that had been discovered by Dr. M. O. Malte, and transferring it to their nursery plot. This particular patch of creeping bent

grass produced practically no seed throughout the season. It would seem to depend for reproduction exclusively on its spreading habit of growth.

Our creeping red fescue at the Rivermead Club was obtained from Dr. Holy, plant breeder of Czecho-Slovakia. An endeavor is being made to have seed of this strain of creeping red fescue grown on contract, looking to future seed supply. The strain of creeping red fescue we have will produce seed sparingly.

Unless the managements of golf clubs can secure unquestioned assurance as to the genuineness of seed of creeping red fescue or creeping bent grass, they would probably meet with greater success by using in substantial part seed which is on the market under the name of Rhode Island bent grass and which is less difficult to obtain in commerce. It is much to be preferred to redtop and on most soils there ought to be much less danger of winter-killing on the putting-green where Rhode Island bent grass is used than with the ordinary redtop of commerce which may or may not have been supplied under the name of creeping bent grass.

A half-inch dressing each autumn, at the conclusion of the season, of fine compost made from peaty surface soil that is practically pure humus, will usually be found to be beneficial to the putting-green. An annual dressing of this material will maintain a surface soil for the putting-green of an inch or more of soft humus, in which the roots of the grasses will thrive notwithstanding repeated rolling and trampling. Acting on the recommendation of a golf course "mystagogue," one of our new clubs last year bought several carloads of "golf humus," paid a substantial price per ton, and freighted it more than two hundred miles, and then discovered that the surface soil of several acres of the low marshy ground on their own property was quite comparable to their imported golf humus.

Standard Cost Analysis for Golf Courses

GUY C. WEST,

Greenkeeper, Fall River Country Club, Fall River, Mass.

The recent discussion on standardizing cost analysis for golf courses has caused the writer, who has had some experience with cost analyses for park systems, to evolve the following system, whereby certain comparisons can be drawn between expenditures of different golf clubs for various lines of work.

It must be borne in mind that all expenditures must come under some heading or item. For these items the following are suggested to cover the work for the average golf course. Where other work is carried on, other items can be added.

A. NEW CONSTRUCTION.

1. Fairways.
2. Greens.
3. Rough.
4. Tees.
5. Traps.

B. MAINTENANCE.

1. Fairways.
 - a. Mowing.
 - b. Renovation (includes fertilizing, seeding, repairing divots, etc.).
2. Greens.
 - a. Care (includes mowing, rolling, sweeping, pest eradication, etc.).

- b. Renovation (includes fertilizing, seeding, etc.).
- c. Miscellaneous.
- 3. Rough.
- 4. Tees.
 - a. Care (includes mowing, watering, changing markers, etc.).
 - b. Renovation (includes composting, fertilizing, turfing, seeding, etc.).
 - c. Miscellaneous.
- 5. Traps and Bunkers.
- 6. Compost Pile.
- 7. Turf Nursery.
- 8. Tools and Equipment.
- 9. Stable (includes care of horses, etc.).

Cost cards should be kept showing the main heading and the sub-heading. For these cost cards, the writer suggests daily slips which will give information for monthly cards. From the latter very valuable and comprehensive data can be secured for a monthly report from the greenkeeper to his greens committee.

Suggested cost cards for both daily and monthly posting are appended. These are taken from some used very satisfactorily by several park systems.

It is the opinion of the writer that very satisfactory results may be obtained, where a small force of men is employed, by the use of small slips of paper, such as are sold in blocks, instead of daily time cards. On these should be written the heading, date, and man and horse hours under that heading for that day, and a new slip used for each heading.

Comparisons of the costs of mowing fairways for two different courses would be almost useless. For comparisons, a unit must be used; for the above heading a good unit would be per acre per mowing. Then if one club was spending much more for mowing an acre of fairway once than another, the difference would be easily apparent and the expensive club could well afford to investigate conditions and reasons.

Country Club

Date—Aug. 24, 1922

PLACE—Fairways Care	A. M.		P. M.	
	From	To	From	To
Greenkeeper	1 hr.			
Smith @ \$3.00	6:30	12:00	1:00	4:30
Jones @ \$3.00	6:30	12:00	1:00	4:30
Horse	6:30	12:00	1:00	4:30
Horse	6:30	12:00	1:00	4:30

During the experimental period before the hazards are actually built, the members can see the plans, not on paper but on the ground at full size, and criticisms are freely offered—a thing which is of much interest and value to the committee in charge. These criticisms at Leland were discussed, and in numerous instances adverse criticism was changed to understanding approval. It tended to good feeling on the part of all concerned to have objections and suggestions thought over in advance.

Bermuda Grass at Richmond, Virginia

W. E. BARRET, *Hermitage Country Club*

Richmond is located below the Piedmont, above the Coastal Plain, a little far north for Bermuda grass and south of where the bents and fescues grow best. Our fairways, if kept rich, do not present serious difficulties, as the cool-weather grasses and summer grasses succeed one another as the seasons come and go. But the putting-greens, where it is desirable to grow one variety of grass, present a problem. Observation of a good, rich lawn in this vicinity shows much Bermuda appearing naturally about the first of June and increasing until frost, at which time old patches of redtop and bluegrass begin to strength up.

Falling in line with these natural climatic conditions, last fall (1921) at the Hermitage Club we seeded eighteen new greens (previously well prepared by liberal use of mushroom soil) with redtop. We had splendid germination, and by early spring the greens were remarkably good for new greens. They were opened for play the first of April, and stood up splendidly for two and a half months. Early in June we noticed slight deterioration, and by the middle of the month were convinced the redtop was going; and we decided at once to sow Bermuda seed.

Without disturbing the redtop then on the greens (which was still passably good), we spike-rolled and seeded Bermuda at about the rate of 5 pounds to 1,000 square feet, and top-dressed, using a dressing of one-half mushroom soil and one-half our natural soil. The last green was seeded on the 28th of June.

As a rule the greens were put back in play within ten days from seeding (as soon as the top-dressing had settled in and germination had fairly started), and were played continually from that time on right through the germinating period.

During the month of July the redtop gradually disappeared and the Bermuda rapidly increased. For two or three weeks the greens were seriously threatened with crab grass and other foreign growths, but extra labor was put on to cut this out and patch the holes with seed and top-dressing. The first of August found us with practically clean Bermuda greens, with no bare spots, and no redtop in sight. They have improved steadily since, and at this writing (nearly the first of October) they are thought by many to be the best putting-greens we have had in this section.

Observation and experience are teaching us, however, that Bermuda putting-greens can be greatly refined by judicious top-dressing. The white Bermuda stalks (even when there are no runners) rise above the surface of the ground, and when cut close enough for good putting leave the green with white stalky spots. This condition can be prevented by keeping the green filled to the top of these stalks with a fine top-dressing. Our experi-

ence is not yet sufficient to say in what quantity and how frequently this top-dressing should be applied. The present thought is that frequent light dressings will do best, and perhaps at the rate of one yard every two weeks to a green of 5,000 square feet. If this be true, cheaper top-dressing and less expensive methods of screening and spreading must be found.

With our first heavy frost (about November 1) the Bermuda leaves will brown and wither. To overcome this we are now again (in September) seeding the greens with redtop and expect to have seedling redtop for late fall, winter, and spring play. And again the first of May we intend to seed with Bermuda for the summer. This may seem an expensive operation, but the entire cost of both the Bermuda and redtop seed will not be in excess of \$200, the labor cost for the actual seeding not great, and the same top-dressing being probably necessary anyway.

However, the above is by no means intended as a conclusion concerning grasses for putting-greens at Richmond, but rather a recital of the past year's experience. While we are treating sixteen greens, as previously outlined, we are also planting (by the vegetative process) two greens in carpet bent, using material grown on our grounds during the past year, and we have great hopes of succeeding with this superior putting-green grass.

We shall be thankful for suggestions along these lines from others more experienced. Send your contribution to the BULLETIN—it is doing great work.



NEW FAIRWAY ROLLER

Each roller weighs 500 pounds, the gangs being either of three or five units

Killing Weeds in Tennis Courts

L. W. KEPHART

The best time to insure against weed troubles on a tennis court is when the court is being built. In the case of a clay court, the surface 2 or 3 inches of soil should be of clay, taken from a depth of at least 1 foot below the surface of the ground. If surface soil is used it is almost certain to contain the seeds of weeds and grasses which will cause trouble for several years.

If the weeds appear in a tennis court they can be kept down very easily and cheaply by means of sodium arsenite solution. This can be obtained in the form of specially prepared "weed killers" from any dealer in garden supplies or from one or two manufacturers who prepare this material in large quantities for use by railroads, road commissioners and farmers. Sodium arsenite solution can also be prepared at home by use of the formula given below. The home-made solution costs about one-half as much as the proprietary weed killers; but unless the area to be treated is quite extensive and one is accustomed to handling chemicals, it is better to use the ready-made material.

The weed killer can be applied with an ordinary sprinkling can or with a pressure sprayer, the latter being somewhat more economical of material. The amount of solution to use depends upon the character of the vegetation and the condition of the soil. For average circumstances, where the vegetation consists of mixed grasses and weeds not over 6 inches high and where the soil is fairly moist, one gallon of concentrated weed killer should make sufficient weed killing solution to cover an area of 60 by 60 feet. Best results are secured on a cloudy, humid day when rain is not expected within 12 hours. If the soil is very dry it should be moistened a few hours before applying the poison. If the vegetation is large it should be mowed before treatment, both to save material and to permit the chemical to penetrate to the soil. It is well to wait several days after mowing and before applying the weed killer in order to allow the vegetation partially to resume growth and exhaust the roots.

If the vegetation consists merely of annual grasses and weeds, one thorough application a year will keep the ground clean. If some of the vegetation consists of perennial grasses like Bermuda grass and perennial weeds like buckhorn and plantain, two applications, one in May and another in July, are sometimes required. Other chemicals, principally ordinary salt and some form of petroleum oil, are often used for killing weeds, but they are not suitable on tennis courts because they keep the ground too wet or too oily for use.

<i>Formula for preparing sodium arsenite</i>	{	Caustic soda.....2 pounds
		<i>or</i>
		High-grade concentrated lye.....3 pounds
		White arsenic.....4 pounds
		Water1 gallon

The caustic soda should be in the granulated, not the solid form. Mix the caustic soda or lye with the white arsenic in a wooden, earthenware, or graniteware receptacle. Add the water slowly. The heat generated by the chemical reaction is usually sufficient to cause all the arsenic to dis-

solve. In case some of the arsenic remains in suspension it will be necessary to heat the solution until the arsenic disappears.

After the solution is cool add enough water to replace that lost by evaporation. This stock solution will keep for several months in an airtight receptacle. For use dilute it at the rate of 1 gallon of stock solution in 50 gallons of water.

Caution. All compounds of arsenic are deadly poisons when taken internally and the greatest care must be taken not to inhale the dust or vapor or swallow any of the material by putting the fingers to the mouth or otherwise. Areas treated with sodium arsenite should not be played upon by children or grazed by animals for several days after the treatment or until the poison has been washed into the soil by rain.

Stolon-Planting Versus Seeding for Putting-Greens

DR. MAYNARD M. METCALF, *The Orchard Laboratory, Oberlin, Ohio*

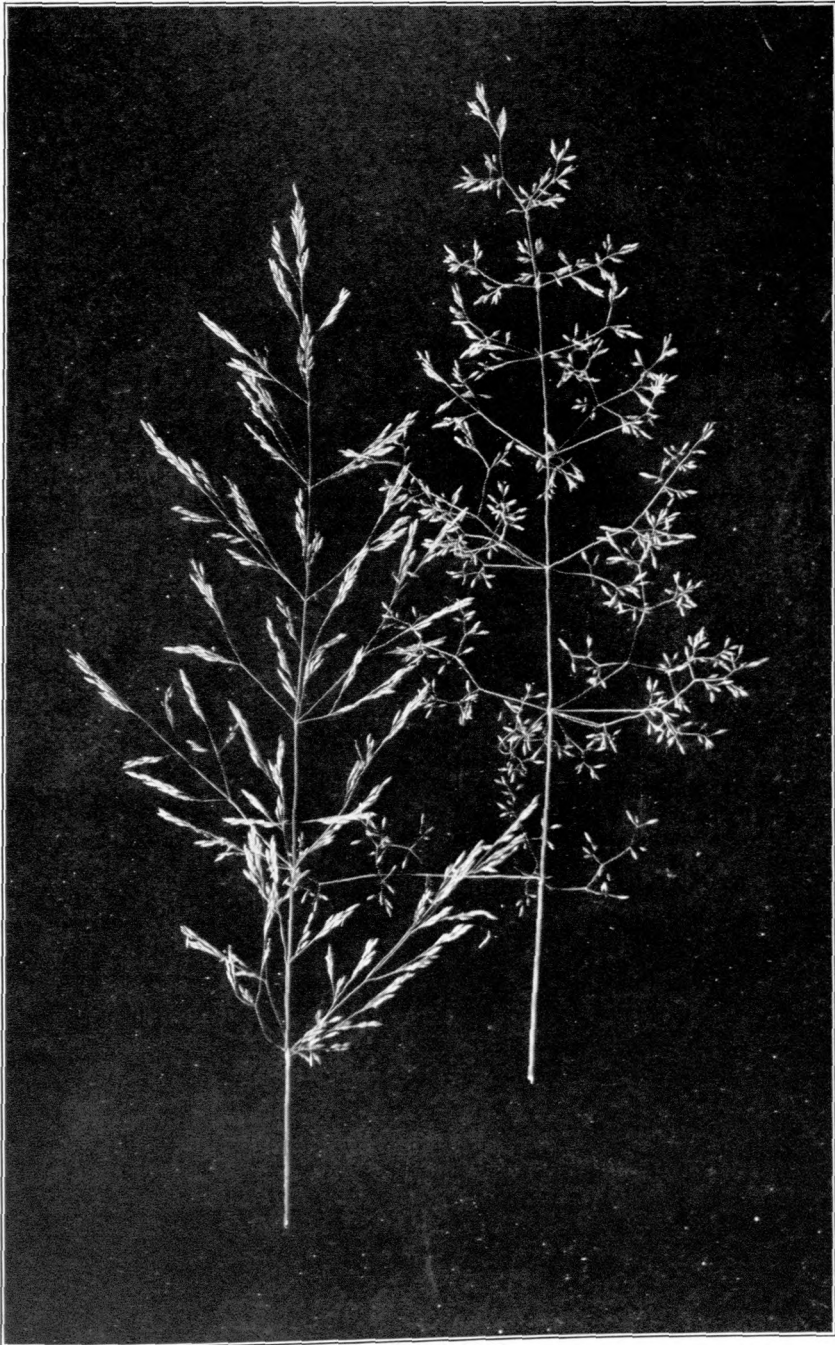
The writer believes that stolon-planting will completely oust seeding for putting-greens in regions where climate and soil favor the growth of creeping bent. Within the natural creeping bent area of this country there will be found, upon most courses, fairway patches of this grass showing diverse strains. Some will have coarse leaves and others will be of intermediate quality. Some will show vigorous growth and rapid spreading, and some will be less vigorous, spreading but slowly. Some will be dark green; some will be paler. Some will show short internodes on the stolons, some longer internodes. Study of these different strains can be given in advance and there can be selected the particular strain which in given soil and climate thrives and presents the most desirable qualities. From this particular patch, once chosen, can be gathered the runners with which to plant the greens nursery, and uniform greens of the exact quality desired may thus be secured.

By the seeding method such exactly predetermined results are not obtainable. One can't tell from the seed of the bents or of other grasses just what quality of grass will develop, for there are diverse strains of nearly all species of grasses and in any lot of seed obtainable there will generally be mixtures of different strains. Seeded greens will thus present a more or less patchy result even if seed of but one species is used, the different strains showing diverse conditions of fineness and of color. And diversity of color is a serious fault, greatly increasing the difficulty of estimating the roll in a sidling or otherwise irregular putt, the darker patches having the optical effect of shadows and fooling the player in estimating the contour of the green.

The stolon method of planting is far more exact, and plans can be made in advance with a refinement of detail not possible with the seeding method, and, after all, probably with less expense than is involved in seeding.

The Green Section will advise you as to sources of seed but does not guarantee the goods of any seedman.

Buy your seed on sample and quotation. Send in the sample, and later send a sample of the delivery.



REDTOP (LEFT) AND RHODE ISLAND BENT (RIGHT). MATURE PANICLES
In Rhode Island bent the florets, both in flower and in fruit, are spread widely apart so as to be loose and scattered. In redtop, especially in fruit, the florets near the ends of the larger branches contract together so as to be in narrow rather dense clusters. There are various other characters to distinguish the two species, but these illustrated are easy to discern and to remember

Puddling and Baking

C. V. PIPER

Soils that puddle and bake present some difficult problems on which there is much agricultural experience. These two phenomena occur only in soils with very minute particles, namely, in clays and in silts. They do not occur in sandy soils or in true loams, but in mild form are found in clay loams and silt loams. Puddling takes place in clays and silts when they are wetted and the particles are united into a sort of paste or jelly. As this dries, the soil bakes into a hard crust. Baking and puddling are largely independent of pressure, as they both occur in any bare clay soil that is alternately wetted and dried. Such soils are not desirable for golf courses, but often there is no choice. There are, however, methods which will greatly ameliorate the trouble.

First of all, clay soils should never be worked when wet. No farmer is so foolish as to do this, but we have seen construction work going on on many a clay golf course when the soil was soggy. This will always result in cloddy soil and difficult to bring back again into a friable condition—that is, like fine bread crumbs. *Never work clay soils when wet.*

Clays can be converted into soils resembling loams by adding sand and humus. This should certainly be done on new putting-greens on a clay course. In the top four inches of soil there should be about as much sand as clay, and besides a good deal of good humus.

If an old green is on a clay base much can be done to improve it by top-dressing with sand at frequent intervals until at least an inch has been added. The sand acts as a sponge to absorb the moisture and as a mulch to prevent the clay beneath from puddling and baking. Where sand is cheap, the same method should be used on clay fairways.

It is a curious fact that sand or very sandy soils are most compact when wet, as any one can notice on a beach. On the lower or wettest portions of the beach an automobile runs easily on the surface but on the drier levels it makes ruts in the sand. It has often been remarked that very sandy courses are fastest when wet. But there is no puddling unless silt or clay be present. Sand, when dry, resumes its former loose condition.

Much emphasis has been devoted to the damage by heavy rolling. This occurs only on clayey or silty soils, never on sandy soils. It is probably sound practice never to use a roller heavier than necessary—that is, enough to make the soil sufficiently firm so that foot or heel prints are not made. But even with the use of a light roller, or of no roller at all, puddling or baking will occur on bare clay soil or even where there is only thin turf. Thick turf will act much like a mulch and, therefore, tend to keep the soil beneath from puddling and baking. Therefore it is good practice to use fertilizers to stimulate a good thick turf on the fairways. Sand and fertilizer both are most desirable; but if sand is too expensive the fertilizer will help greatly.

New Member Clubs of the Green Section

(For Previous Lists See Pages 199, 220, 248, and 273 of This Volume.)

Concord Country Club, Concord, Mass.

Evanston Community Recreation Association, Evanston, Ill.

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.

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

1. **Vegetative propagation of bent grasses.**—We are developing an area of our finest creeping bent grass by transferring patches of matted sod from our fairway, which is more than twenty years old. We had no success in getting seed from this sod to grow, but we notice now (September) that the runners are about a foot and one-half long and every blade is divided into a number of sprouting sections, and it has occurred to us that we may successfully reproduce it by the vegetative process. This grass is in mats of various sizes, and we could collect enough perhaps for one green. The texture is as fine as seal fur, and if watered the grass keeps a brilliant light green color from April until December. We have other kinds, of a darker color, which are almost as fine. A solid putting-green of this grass would excel anything else, and cost of maintenance would be cut by one-half. It is our intention to develop a large meadow of it, if possible, for transferring, when mature, to many or all of our greens, except a couple which are solid bent now. We will appreciate your advice as to how to proceed. We are sending you a sample of the grass.—(New York.)

The sample you send is *velvet* bent. The material can be cut in lengths of 2 inches and then scattered over well prepared soil, covered slightly, and then, if kept moist, it will soon make a complete covering. The important thing is to keep the runners continually moist, after they are planted, until the grass is well rooted.

If you have any *creeping* bent which you desire to propagate vegetatively, a patch of 2 square feet (which may be obtained from a single plant) can be cut into 288 pieces 1 inch square, or double that number 1 inch by $\frac{1}{2}$ inch. If these pieces are planted 3 feet apart in rows 6 feet wide you will have 1,700 feet of lineal row. Under conditions at Washington, D. C., nursery rows established in this manner in September will make bands of grass approximately 6 feet wide a year later, made up mostly of runners. One hundred feet of such a row will plant a large putting-green, and, therefore, your 1,700 feet of nursery row should give you enough material to plant 17 putting-greens, or an area of special turf equivalent to an area of 17 putting-greens.

It is really much better to develop your nursery from a single patch of grass, as only by this means can you get an absolutely uniform turf. Patches that appear uniform on the putting-green are not really uniform, as their different behaviors in nursery rows indicate. However, if you pick out patches that are nearly alike, your green should be fairly uniform, at least. We would strongly suggest, however, in your continued work by the vegetative method, that you start with a single patch of grass, picking out the one that you regard as the best, and then develop your nursery rows from this.

2. **Charcoal and sour soil.**—Three of our greens are situated on either side of our skating and curling pond, and while the drainage on each is reasonably

good, yet it is slow in comparison with our other greens. An examination of the soil shows that it is sour. We use considerable charcoal in our kitchen at the clubhouse and there is quite an amount of charcoal dust that accumulates. If we do not use this dust we, of course, have to put it in our stock pile. Can this dust be used to advantage on these three greens of which I speak, or would this be time and material wasted?—(New Jersey.)

We think the first thing you should do in the way of improving your greens is to drain them thoroughly. Whether the soil is acid or not is a relatively small matter as far as the bent grasses are concerned. Excellent bent grass turf can be produced on acid soil, and in fact there is quite a tendency now to fertilize so that the soil of greens will become acid where the bents are used; this is done to discourage weeds. Poorly-drained greens, however, are never satisfactory, and too much attention can not be paid to the drainage. Both under-drainage and surface-drainage are highly important. It is possible that it will be necessary to build your greens up if the water table is near the surface. As for the use of charcoal, we have obtained no results from it from the standpoint of changing the chemical nature of the soil. It does help under certain conditions to improve the texture of the soil, and of course darkens the soil if used in considerable quantities. Charcoal is one of the most inert matters known. It decays exceedingly slowly, and since it has been tested as a soil amendment as far back as modern literature goes it is reasonable to suppose that it would be used very generally if it possessed any considerable value.

3. Converting redtop greens into bent greens.—Our new greens were seeded last fall to redtop. They have all done splendidly and are now in use. Our problem is to get the redtop greens into bent greens, if possible, without taking them out of use. Could we top-dress these greens, then plant bent stolons, and top-dress again, and get a fair proportion of bent through the late fall and winter, or would it be necessary to remove the redtop?—(Ohio.)

We do not believe that redtop greens can be converted into bent greens by the vegetative method of propagating bents, as is described in the BULLETIN. For success with this method it is necessary to prepare the seed bed as for sowing seed, spreading the chopped runners over the surface evenly, and then covering them with a light dressing of compost or soil. We have conducted some experimental work in the converting of redtop greens into bent greens by dibbling in pieces of bent runners or plants at relatively close intervals. The results so far have been very promising. It is, however, a rather expensive method. We think it would take one man a day to do approximately 200 square feet, although an experienced man might do much more than this. It leaves the green a little rough for a few days, but after it has been rolled and cut it is put in a very good condition for play. We are also trying to convert redtop turf into bent turf by reseeding, and although this seems to be a rather slow proposition, we think it can be accomplished in time. The subject of the vegetative propagation of bent grasses has been quite fully discussed on pages 124 to 126 of the 1921 volume of the BULLETIN, and on pages 100 and 248 of the current volume.

4. Addition of sodium nitrate or ammonium sulfate to the compost pile.—On page 36 of the February number of the BULLETIN you describe a method of composting straw by the addition of sodium nitrate or ammonium sulfate. What quantity of these chemicals would you advise adding to the compost pile?—(Massachusetts.)

In the article you refer to it will be noted that 100 pounds of sodium nitrate or ammonium sulfate is added to one ton of straw. A ton of straw, however, would be considerably more in bulk than a ton of manure or of sod. We should think that for ordinary manure just as it comes from the stable 25 pounds of either of these chemicals would be sufficient for one ton. If ammonium sulfate is used, it is well to add about equal parts of pulverized limestone, as the reaction does not take place under acid condition, but only under neutral or alkaline conditions. We might add that this method of making compost with large amounts of straw or similar material has been used with success by several golf clubs in the United States.

5. Removal of crab-grass infested turf to prevent recurrence of crab-grass on replanted greens.—Where greens infested with crab-grass are replanted either with seed or by the vegetative method, is it any protection against future growth of crab grass to remove the turf before plowing?—(Pennsylvania.)

There will probably be no appreciable effect on crab grass by removing the turf before plowing.

6. Digger wasps.—We are enclosing a specimen of insect that has been infesting our greens and fairways for the past week. Early in the morning some greens are literally covered by them, and the casts they have made are many on every square foot. We are fearful of destruction by the product of the eggs, which we presume are deposited. Will you kindly identify the bug and advise us about getting rid of the pest?—(Virginia.)

The insects in question are specimens of a beneficial digger wasp known to science as *Scolia dubia* Say. This insect is known to be the principal parasite of the grubs of the green June-beetles which are so troublesome on golf links throughout the eastern part of the United States. You need have no fear, therefore, of any unfavorable results of the present great abundance of this wasp, as it probably means a great reduction in the number of green June-beetle grubs during the next year or two. It would be well worth while to put up with any temporary inconvenience by the presence of these wasps rather than to undertake their destruction.

7. Digger wasps.—We have been troubled lately with holes on our course, with heaps of earth—in some places as large as 6 to 9 inches—worked up behind them. They appear in the rough and in some places in the fairway, where they are very numerous. We are at a loss to know the exact cause. Last summer we had a similar attack. We are sending to you a species of a large fly which we found coming out of one of the holes. Kindly identify this specimen for us, and advise us with regard to the matter.

This insect proves to be a species of digger wasp known to science as *Chlorion (Ammobia) pennsylvanicum* Linn. Agriculturally speaking, this is a beneficial insect, as it provisions its nest with grasshoppers and crickets, although we realize that its presence on the links may become a serious annoyance. It ought to be possible, however, easily to discourage its efforts by the application of an infusion of tobacco stems or a little kerosene emulsion or a similar offensive substance to the soil in the areas affected by these wasps.

8. Bermuda grass (wire grass) as an asset and as dangerous weed.—What is your opinion on the availability for fairways of a kind of wire grass abundant on the island which spreads like Bermuda grass—(Maryland.)

This so-called wire grass is the common Bermuda grass of the south. While it makes a very tough turf and grows freely during hot weather, it

turns brown with the first heavy frost in the fall and is unsightly all the rest of the winter and spring. It does not start growing until the hot weather comes in the late spring. There is quite a lot of this on your land and you will not be able to keep it out of all of your fairways. The heavy crop of cowpeas this summer will tend to reduce the stand of wire grass, but we do not think this will eradicate it all by any means. It is one of the most difficult grasses we know of to get rid of when it gets into the soil. We would not encourage the growth of it any more than possible, and would use considerable care in keeping it away from the putting-greens. It is a serious weed pest on putting-greens in your latitude, due to the coarse stems, which will deflect the ball in putting unless kept covered with top-dressing, as they do in the south, where they can not have anything but Bermuda greens.

9. Objections to red fescue as a fairway grass.—We have about decided to seed our fairways to fescue, for the reason that the seed which was supposed to have been planted in the putting-greens several years ago and which had been blown out by a heavy wind and lodged on the faces of some of the traps guarding the greens, had germinated, and a very healthy plant resulted. We have examined these plants and found that they sent the roots down quite deep into the gravel faces of the traps. The seed had had practically no water, and, of course, no attention, but still had grown under most adverse circumstances. We naturally felt if fescue would do that in gravel with no attention it would thrive very much better on the fairways with some fertilization and intensive irrigation. Have you any recommendations to make with regard to this procedure?—(Colorado.)

While red fescue will grow on poor soil and under conditions too dry for the successful growing of bluegrass, we do not favor it on fairways, because of its almost universal tufted habit of growth. There are some red fescue plants which will spread and make a desirable spot of turf, but it has been our experience that this kind of seed is rare. The usual result is a lot of little tufts 2 or 3 inches in diameter with bare depressed spots among them. For that reason we much prefer bluegrass and redtop.

10. Ridding a putting-green of redtop.—We sent you recently a box containing samples of grass which were taken from our putting-greens. Last spring we sowed 50 per cent Chewings fescue, 25 per cent redtop, and 25 per cent bluegrass. Owing to a late start in seeding and a very early hot spring (we had really no spring) no results were obtained. We tried protecting the green with hay, but all to no avail. Late in July we uncovered the greens and they at once started to grow very thickly with redtop. We thought it was the fescue delayed in germinating and left it, but it proved to be disastrous; for we had a bad time trying to get rid of it. There were hardly any signs of bluegrass, but the redtop was good in spots. Last fall we sowed straight redtop and got a good growth and it has stood the winter well. Now we are going to sow straight bluegrass and this fall bent or red fescue, whichever is in the market and is considered good seed. We are just cutting out the redtop with knives, for that seems to be the only way. Kindly advise us with reference to this matter.—(Minnesota.)

The grass you sent is redtop. It always behaves as it has with you in this instance. It is very fine when in the seedling stage, but after about six months of growth it begins to turn coarse and then becomes unsatisfactory for putting-green purposes. If you have quite a quantity of the red fescue scattered through the turf it may eventually crowd out the redtop, and if so you will have a red fescue green eventually. You probably understand that the Chewings fescue is a strain of red fescue grown in New Zealand.

11. Bluegrass and white clover as a northern putting-green turf.—Until we read your article on page 208 of the July number of the BULLETIN, we were not aware that you advised a mixture of bluegrass and white clover to be sown to produce a putting-green turf. In fact, we thought you advised against those grasses if fancy redtop could be had in preference. Of course, we understand that the bent or fescues are much the best, but we refer now to the cheap, easily-maintained green you describe. We notice that you do not mention redtop at all in this article. Can you give me any information with reference to this?—(Kentucky.)

The reason bluegrass and white clover for a cheaply maintained, permanent putting-green are recommended is because these plants are long-lived, while redtop, under putting-green conditions, is a short-lived grass. There is no objection to using the redtop seed for short-lived greens, but it must be seeded nearly every year, and besides this it is subject to brown-patch. These are the reasons which make us believe that for permanent greens the bluegrass-white-clover mixture is the best for low-cost cheaply-maintained greens.

12. Eradication of yarrow from putting-greens.—One of our greens was seeded to the bent grasses. The stand of grass obtained was very good, but it was also very full of weeds. Most of these have been eradicated, with the exception of the yarrow, of which there is an unusual amount. We have been after it constantly, but from the nature of its growth it gives us a great deal of trouble. The roots branch or creep out and put up new plants very rapidly, and weeding them out causes considerable damage to the green. Can you make any suggestion to help us in this matter?—(Ohio.)

We regret to say that we have no definite data on this subject. Yarrow has been regarded by many as making very satisfactory putting-green turf. In fact, its use on putting-greens has been advocated by some. We presume it is partly because of the favorable opinion regarding it that little work has been done in the way of its eradication. A few years ago we studied its habits somewhat and found, as you have, that it has an exceedingly vigorous root system. We do not think it possible to eradicate yarrow by means of herbicides or other common methods of treatment.

13. Use of mucks and peats.—We are mailing sample of soil, under separate cover, of which please give analysis of fertilizing qualities and advise if same contains toxins injurious to grass.—(Missouri.)

The sample of soil you sent is evidently a good muck. We do not make analyses of soils or mucks, as such analyses do not give any information commensurate to their cost. The mucks and peats are all very much alike in their value as fertilizers, and the only thing one has to guard against is whether or not they are toxic. This condition depends very largely upon the character of the underlying rock or soil. If you will take a box full of this substance and plant it to grass seed you can tell very quickly whether or not it contains any toxins. If the grass grows vigorously it is all right. If shortly after it germinates it turns yellow and dies it is to be avoided. In general we consider mucks and peats valuable mostly for use in connection with compost piles. They may also be employed for plowing under either in connection with clay or sandy soils, but we do not regard them as valuable for top-dressing if used alone. For this latter purpose they should be mixed with or incorporated in the compost pile.

Meditations of a Peripatetic Golfer

A really first-class golf hole should be fair to every degree of skill.

One volume of Whitman's Poems is entitled "Soil Preparation and Grass Seed." We have a suspicion that some clubs are using this as the basis of their greenkeeping.

In selecting a site for a golf course SOIL is very important. Sandy loam is most desirable, then in order loam, sand, silt loam, clay loam, silt, clay, and last of all adobe. Gravel is always to be avoided.

Golf architecture designed to deceive the player defeats its own ends. At best it fools only the players new to the course.

Another lot of greens seeded to Google's Gorgeous Grass Goulash. Better try Mulligan's Marvelous Mixture. There is a sucker born every minute.

A backed-up green of 8,000 square feet for a mashie hole. It's a real dub that can miss such a target.

A millionaire's golf course with neither seats nor shade on the tees. Looks as if it must be managed by some one who "has it in" for the idle rich.

Some architects must think that a course with the holes closely contiguous adds to the thrills. Certainly it adds the spice of danger necessary to some sports.

"Humus"—that is, the commercial article—is like a paste diamond. It looks very beautiful but is actually worth very little.

Some greens we know are much like the golf player. The first year they are rotten, and after that grow steadily worse.

Every green on a new course, one of the built-up-at-the-back type. This is probably the best type of green, but there are others that deserve a place on every course, notably a few built on the natural surface.

"No," the manager said, "we have no turf problems, but our greens are rotten."

An exquisite sward of bird grass or rough-stalked bluegrass in the shade under the trees. This is the best of all shady lawn grasses.

A red fescue green two years old and still very cuppy. This is the common behavior of red fescue.

Some architects seem imbued with the idea that excellence in a golf course is proportional to its difficulty.

Watch your putting greens on a very rainy day; then you can tell which ones need better surface drainage.