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The Annual Meeting of the Green Section

Astor Hotel, New York, January 9 and 10, 1925

The Annual Meeting of the Green Section will be held at the time and place above indicated. There will be both morning and afternoon sessions on Friday, January 9, and a morning session on Saturday, January 10. Mr. Findlay S. Douglas, President of the Metropolitan Golf Association, New York, will serve as Chairman. A very instructive series of papers and addresses will be given, and in addition several moving pictures relating to golf, including a film on earthworm eradication and films illustrating the styles of great golfers.

Every Green Section club should send its Green Committee Chairman and its Greenkeeper to this meeting. It will be money well invested. Come along and meet the other fellows and help boost the Green Section. It needs your support and encouragement.

Some of the special addresses to be given are as follows:

Annual Report of the Chairman.....C. V. Piper, Washington, D. C.
 The Japanese Beetle.....B. R. Leach, Riverton, N. J.
 Modernism vs. Fundamentalism in Greenkeeping.....E. J. Marshall, Toledo, Ohio
 Acapulco Grass.....Frederick Snare, Havana Country Club, Havana, Cuba
 Golf Turf in Great Britain.....C. V. Piper, Washington, D. C.
 The Root Growth of Turf Grasses.....O. B. Fitts, Washington, D. C.
 Fertilizers in Relation to Quality of Turf and to Weed Control.....R. A. Oakley,
 Washington, D. C.

Local Green Section Work:

Philadelphia.....H. Kendall Read, Philadelphia, Pa.
 Cleveland.....J. K. Bole, Cleveland, Ohio
 The New England Greenkeepers' Association..John Shanahan, Brae-Burn Country Club
 Known and Unknown Factors in Greenkeeping.....K. F. Kellerman,
 U. S. Department of Agriculture
 Why the Green Section Must Be Enlarged.....C. V. Piper, Washington, D. C.

Greenkeepers' Club of New England

The following interesting letter has been received from the Secretary of a new type of club that should be copied in all parts of the country. Greenkeepers' clubs can do much to advance the status of greenkeeping.

"The Greenkeepers' Club of New England was formed in January of this year (1924) and holds a meeting on the first Monday of each month. The officers consist of a president, first and second vice-presidents, secretary, treasurer, and three trustees. The purpose of the club is the social and educational advancement of its members.

"In April a meeting was held at which the chairmen of the green committees of the various clubs were present. At this meeting Dr. C. V. Piper was present. Since that time we have visited and inspected several golf courses—in June, the Brae-Burn Country Club, West Newton, Massachusetts; in July, the Pawtucket Country Club, Pawtucket, Rhode Island; in August, the Nashua Country Club, Nashua, New Hampshire.

"The September meeting was held at the Massachusetts Agricultural College, at Amherst, where the club heard lectures on grasses, pests, soils, fertilizers, and examined grass plats and equipment of various kinds.

"The October meeting was held at the Winchester Country Club, Winchester, Mass. The club has planned a very interesting winter program of talks on subjects of vital interest to greenkeepers. We have at present 60 greenkeepers enrolled and will before the first of January (1925) have 100. The club insignia consists of a pin the center of which is a rolling green around the outside of which is lettered 'Greenkeepers' Club of New England'."

Watering Putting Greens

The following additional contributions to our discussion of the subject of watering putting greens which appeared in the October and November numbers of THE BULLETIN will be of interest to our readers.

"I find that the water outlets on most golf courses are too small. In some cases the outlets are only $\frac{1}{2}$ inch or $\frac{3}{4}$ inch. They should not be less than 1 inch. Hose of 1-inch diameter also should be used. I do all of my watering in the morning, starting at 7 o'clock. I have one man for every three greens. During July and August I water each green for one hour every morning, while in September and October the period is reduced to one-half hour. We have only 20-pound pressure. With 60-pound pressure the watering can be done in half the time. Our greens are all uniform. You do not have to play one green that is soggy and another green that is lightning fast. I have been keeping greens for 27 years and have never been troubled with brown-patch. With this system also you have finished watering by 10 o'clock in the morning, and there is thus no interference with the players. Greens should not be allowed to become too dry before they are watered."—*John Pressler, Allegheny Country Club, Sewickley, Pa.*

"We seldom use water on our course except at night. We start our sprinklers at 8 o'clock at night and run them until 8 o'clock in the morning. When the range of a sprinkler is not enough to cover one green, we use two sprinklers, and they require no attention other than setting them up at night and taking them down in the morning. The sprinklers and hose are stored in concrete pits with the covers flush with the ground adjacent to the tees and greens, which does away with the necessity of handling and carting them from the tool shed to their various positions. When we were building our new 9 holes we watered the greens and tees during the day and tried to keep the ground damp or moist at all times so that it would not crust. We have never been troubled with brown-patch, to our knowledge."—*W. R. Hurd, 2d, United Shoe Machinery Athletic Association, Beverly, Mass.*

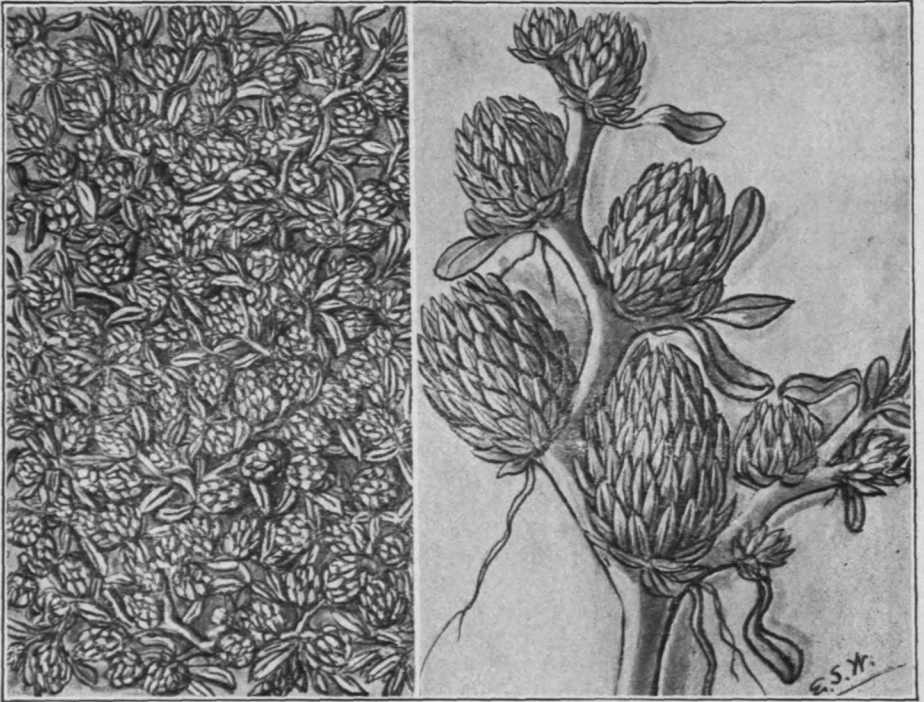
THE "BIG LEAGUE" STUFF.—"Years ago when our love for the great outdoors induced us to build our golf course, we used tomato cans for cups, and the weeds were so high at our tees that we could not use our drivers but had to use our irons. I forget the number of holes we had. Did you ever play on a course like that? If so, you know now how to enjoy the regulars, the 'big league' stuff."—*W. B. Meixner, Cornell University Golf Club, Ithaca, N. Y.*

Chaff-Head, a Dangerous Weed

By C. V. Piper

Chaff-head (*Achyranthes repens* L.) is a weed of tropical origin that has become established at several places in the South. It is reported from South Carolina and California, and we have seen it on golf courses at New Orleans and Houston.

The plant is a somewhat fleshy perennial and before blooming resembles certain chickweeds. The leaves are opposite, thickish, a little harsh to the touch, and in shape like those of mouse-ear chickweed or "Creeping Charley." When in bloom there are numerous nearly globose heads as large as a pea, whitish in color. At this stage it makes a very objectionable putting surface. Besides, the plants are inclined to heave, due perhaps to the dense mass of thick fleshy roots.



The plant as it appears in bloom;
natural size

A flowering branch; enlarged

CHAFF-HEAD (*Achyranthes repens* L.).

If not promptly eradicated the weed spreads with amazing rapidity, seeds being produced in immense numbers. No golf club should take chances with this weed. It is hardly fair to the neighboring golf clubs not to do everything possible to get rid of the pest. It should be cut out clean and burned, as if not destroyed the fleshy plants are very likely to grow again where they are thrown. No other satisfactory method of fighting this weed is known except the one described. It will probably take two or three years of work to get rid of the weed completely, especially if it has been allowed to produce seeds, which are easily scattered over the course, being carried on the shoes of players.

Treatment of Bermuda Greens

The following interesting letter on winter treatment of Bermuda greens, from Mr. Hugh H. Miller, of the Colonial Country Club, Memphis, Tennessee, has led us to ask for the experience of others who have had to do with Bermuda turf. Thus far seven reports have been received in response to our request, and we are glad to be able to publish them in connection with Mr. Miller's experience. It is hoped that additional reports may be received later, in which case they will be published in later numbers of *THE BULLETIN*.

"I have been chairman of a green committee for six years, and have built three 18-hole golf courses and maintained one or two of them for that length of time, and all have Bermuda greens. My greens have purer and more luxuriant Bermuda turf than any others I have seen. *THE BULLETIN* has repeatedly advised planting Bermuda greens with winter grasses, and playing on them all the year round. My method of taking care of these greens is directly opposed to the advice given in *THE BULLETIN*.

"Between the 1st and 15th of January our greens are closed for play and the cups put in smaller temporary greens previously sown with winter grasses and put in condition for play. The regular Bermuda greens are then forked with a spading fork, in order to loosen the underlying soil. The turf is not broken. The fork is forced down into the greens the full length of the tines, and then gently shaken so that it breaks the soil under the turf. It is then withdrawn and the operation repeated. The men work across the green in an approximately straight line, and start the next line about 6 inches from the first. This operation leaves little ridges in the green where the forks were withdrawn. The greens are then covered with about an inch of rotted manure, and are thus laid by until about the 1st of April, or until *Poa annua* begins to show up rather thickly on the greens. What remains of the manure is then raked off, the surface is lightly rolled to depress the little ridges, and regular mowing begins. At this stage the Bermuda has not begun to grow, but close cutting of the *Poa annua* and warm weather bring it out, and in a few weeks all the *Poa annua* disappears. Just as soon as the Bermuda is thriving, with the weather warm and balmy, the greens receive their first light top-dressing. This, together with other top-dressings used during the summer, do not ordinarily need any fertilizing ingredient. The function of these top-dressings is to smooth the surface of the green, and in hot, dry weather to insulate the surface from the direct rays of the sun. This dressing should never be wet down, but should be applied dry and left dry. A light dressing of sandy loam, dry and well screened, will work down in the grass and practically disappear after one or two mowings. By lightly top-dressing in this manner every two or three weeks, I have brought Bermuda greens through ninety days of drought, without a drop of water, and showing a clear, thick, healthy turf at the end of the drought. If the season has plenty of rain, top-dressing is not done nearly so often, and then only to improve the surface. Bermuda is never top-dressed unless the weather is warm and the grass growing vigorously.

"My objection to playing on the greens all the year round and planting them into winter grasses is as follows. Bermuda grass grows in warm latitudes wherever air can get to the roots. It will grow on a pile of sand or cinders. On the clay soil which we have here, the continued walking over and mowing the greens during the spring, summer, and fall pack the soil almost solid. If the soil is not loosened in the winter, the following

year the grass is not nearly so vigorous, a bare spot develops, the Bermuda is not strong enough to cover it up, and crab grass or other weeds take possession. This goes on with increasing rapidity until you have a crab grass green.

"Bermuda is the last grass that begins to grow in the spring. Like cotton, it must have heat and plenty of it. A cover crop of winter grass over the Bermuda shades it and keeps it cool, and it does not begin to grow until long after the uncovered Bermuda is up and thriving. This delay naturally gives other grasses and weeds a dandy chance to take possession.

"Why artificial watering kills Bermuda turf is a problem for experts. I only know that the turf begins to sicken after a few treatments, and that ultimately it will give up the struggle to crab grass and weeds. Not until a Bermuda green has absolutely gone to the bad will I put water on it. This is then done with no hope of reviving the Bermuda, but only to grow some sort of vegetation on the green to get by the season when the green can be renovated.

"My method has been successful here for the last six years, while clubs both here and in Nashville have practically lost their Bermuda greens by planting them in winter grass and playing on them all winter."—*Hugh H. Miller, Colonial Country Club, Memphis, Tenn.*

"Our work on the Bermuda greens starts in the fall after the frost, when we apply a heavy top-dressing of sharp sand. About the latter part of February, when the danger of frost is gone, we fork the greens and take off as much of the old Bermuda grass as can be raked off, then top-dress with either cottonseed meal or ammonium sulfate and a good sandy loam. The rest of the season we top-dress with loam once a month and cut the greens every day. We water in the evening when needed about twice a week during the hot, dry weather. This is not really necessary unless you want to keep the greens fairly soft and green. Our experience in using winter grass was disastrous, as it brought on brown-patch the next summer. Since we have stopped using rye and redtop we have not been bothered with brown-patch. You would be surprised to see what wonderful fairways we have also obtained by the use of ammonium sulfate. About thirty tons did the work for the entire course. Briefly, our method is to top-dress, using ammonium sulfate and watering when needed. We have to use a tremendous amount of water after ammonium sulfate to prevent burning. In the summer we do not use ammonium sulfate but simply top-dress with sandy loam. It is not necessary to keep the greens soaked. This in a way keeps down the growth and gives us a keen, true putting surface for some time. We have used ammonium sulfate all over our fairways with a wonderful result. Continued heavy watering and the use of fertilizer during the summer season makes the grass entirely too rank, and doubtless this is the reason why some of the growers of Bermuda turf have cautioned against the practice. We cut our Bermuda greens at least once a day with a close-cutting mowing machine to prevent the grass from getting long and crisp."—*C. B. Buxton, Dallas Country Club, Dallas, Texas.*

"In regard to forking Bermuda greens, it is undoubtedly the best procedure where a green has become over-hard, as an alternative to tearing up the whole green. In opening the turf, however, the holes should be filled with a good compost, preferably screened cow manure, since one of the first principles of making a good Bermuda green is that the soil shall be loose enough in texture to allow the runners to spread.

"Artificial watering has a tendency to make Bermuda very coarse, and it also keeps the runners near the surface. Nothing compares with a good rich compost; it gives the grass not only a richer color but a finer texture. Bermuda seems to respond very well to the use of cottonseed meal or tankage.

"Particular attention should be paid to mowing. The closeness all depends on the amount of Bermuda there is in the green. When the grass is scanty the knives should be raised a trifle, but if the grass is abundant the knives should be let down and close cutting should be the rule, as it forms a much finer mat. If the runners are left too high the green becomes too stubbly and never has the rich olive-green color.

"I am not yet ready to give my opinion on sowing greens for winter play. I am trying it out for the first time this winter, on the regular summer greens. I will tell you our experience later. Last winter I planted winter grass off to one side of our regular greens, and I will say that the Bermuda which came through in the spring was much finer than at any other place.

"One thing I can not quite understand is why our greens are never as good during the whole season as they become at this time of the year (October). The grass is now finer and much thicker."—*Howard Beckett, Capital City Club, Atlanta, Ga.*

"In our southwestern section of the country many clubs are still tolerating sand greens which can afford, and should by all means have grass greens. Thus far Bermuda grass has proved to be the only practical grass for greens in this section. An important consideration in this respect however is the strain of Bermuda grass selected for the purpose, as it has been found that certain strains, particularly the Atlanta strain, possess marked superiority. A little time and trouble spent in the selection of the better strains will yield handsome returns.

"When installing a Bermuda green, choose sandy soil if possible. Grade the green during the winter months, and be ready to plant the grass upon the approach of spring. The earlier in the season the planting is done the better. A period of 100 to 120 days of growing weather is usually sufficient to bring a green to putting condition. Much better results are obtained when the green is planted from stolons of a superior strain of Bermuda grass than when the green is seeded or sodded. Thick planting of the stolons is a good investment when quick results are desired. From the time the stolons are planted the soil should be kept moist and, most important of all, free from weeds. Begin to mow when the ground is nearly covered with new growth, and mow continuously. Top-dress lightly but frequently until a good turf is formed. My experience during the past season has convinced me of the greater importance of very frequent top-dressing than I formerly believed. The top-dressings should be of the lightest soil possible, containing a high percentage of sand.

"The greens should be cut daily. During the season of fastest growth, cutting twice a day is often advantageous, yielding fine results. Water sufficiently to keep the grass growing luxuriantly."—*P. D. Maxwell, Dornick Hills Country Club, Ardmore, Oklahoma.*

"Referring to your request for a statement from me as to my method of treating Bermuda turf, I must state that I have followed generally the advice contained in *THE BULLETIN* and have never been misled. Our experience with forking has never gone farther than the forking up of small

depressions and bumps, which has been very satisfactory. We have never risked the forking up of an entire green, being without information on that subject. The past two seasons we have seeded our greens in the fall to Italian and perennial rye-grass, Kentucky bluegrass, and Bermuda grass, but this season I am following the advice of THE BULLETIN and am seeding to re-cleaned fancy redbtop, which will be quite a saving. We sprinkle the greens every morning lightly to assist in removing the dew from the grass and also to help prevent brown-patch, which by the way, I am glad to say we have never experienced. Also through the winter season, when necessary, we give the greens an all-night soaking which has kept them very beautiful. As for fertilizer, I use tankage and ammonium sulfate mixed with a little top-dressing consisting of a made-up soil, 3 parts of marl to 1 of humus and sand. All of the other courses in this section top-dress in summer with nothing but a black hammock sand, which they can do on account of their greens being flat. As our greens are, however, beautifully contoured, we are obliged to use the clay mixture. In the cutting of Bermuda greens my experience has been that by cutting too close or neglecting to top-dress often enough, the crowns of the plants are cut and the grass dies back, and only by top-dressing and plenty of watering can it be brought back. Without frequent light top-dressing, rather than a single heavy application, the roots of the grass seem to die."—O. S. Baker, *Miami Hialeah Municipal Golf Links, Miami, Florida.*

"I have tried forking only on one green, and while I obtained very good results as far as the growth is concerned, the imprints of the uplifted turf remained on the green for a great length of time and it took more than ordinary top-dressing to cover these places so as to make the green smooth again where the turf was turned from the fork. We also top-dressed with well-rotted cow manure compost, but the final results were no better than if we had used the same rich mixture on the greens in the regular way.

"In regard to winter grass on Bermuda turf, I do not think well of this practice, as in my experience it retards the early spring growth of the Bermuda grass and makes cuppy places later on in the season. It is impossible to keep the winter grass from bunching in spots. The Bermuda does not always quickly cover these spots. We are therefore making our winter greens separate from our Bermuda greens this year.

"I do not believe in too extensive watering of Bermuda grass in a soil as sandy as ours, as there is a tendency to wash the soil away from the roots and produce coarser growth than would obtain in the case of a clay soil. With a clay soil the clay sticks to the joints of the grass, allowing the new growth something to hold to. If it were possible it would be better for us to top-dress after extensive watering, in order as far as possible to replace the soil in which the new shoots from the soil-covered joints may grow.

"The only artificial fertilizer I have tried is sodium nitrate, and this has been only in the case of greens produced from seed, when in the early spring it helps materially. I have also found that a new green can be produced more quickly from seed sown in the early spring on a rich seed bed, provided frequent watering is given, than it can be produced from stolons. My experience has been that seed sown in March will produce a very good turf by the latter part of July."—Arthur W. Solomon, *Savannah Golf Club, Savannah, Georgia.*

"I have found that when a Bermuda green becomes hard and the grass shows signs of retarding of growth, if the green is spade-forked thoroughly and then top-filled, the green seems to take a new lease on life. This is done during the playing season, and while the green is a little bumpy for a while we do not stop playing on it.

"At Druid Hills we have two sets of greens, one winter greens and the other summer greens; or rather, the greens are so large that we split them and sow one-half in winter grass. This year we are using Italian rye grass exclusively. The greens have been sown for about fifty days and are ready to play now (November 8), although our regular Bermuda greens are still in good shape.

"I have found that the best fertilizer for Bermuda greens is one that contains a high percentage of ammonia. We are using cottonseed meal, and sometimes tankage, which runs as high as 10 per cent ammonia. This has given us our best results.

"I have never found that mowing Bermuda greens close hurts them, provided top-filling is done frequently. I think the success with Bermuda greens is based entirely on keeping the soil loose and allowing the small leaves to come through and keeping the vine buried with top-filling. I think we have filled our greens eight or ten times this year.

"Bermuda greens should not be artificially watered, except in long droughts. We had very little rain in Atlanta for the six weeks preceding the present date (November 8), and yet our greens are now in perfect condition.

"On some of our greens I am going to try ammonium sulfate and water. I have just returned from Dallas, Texas, where I saw the prettiest Bermuda greens I ever saw in my life, at the Dallas Country Club, and I was told the greens at the other clubs were equally beautiful. They have been using water and ammonium sulfate, but of course they have a different soil from what we have here."—*Thomas P. Hinman, Druid Hills Golf Club, Atlanta, Georgia.*

"During the season when greens are entirely Bermuda grass, which is from about May 1 to October 15, we use the following method in caring for them. Starting May 1 the greens are treated twice monthly with ammonium sulfate, about 15 pounds to each green. The greens are top-dressed once a month with a mixture of well-rotted cow manure and local top soil, which is screened and well mixed in the proportion of one-third manure and two-thirds soil. The greens are kept well watered; in fact, we try never to let them get real dry at any time. About October 15 we begin seeding our greens with a mixture of redbud and Italian rye grass, and in this way we are able to keep our greens in good playing condition the year round."—*Willie Maguire, Houston Country Club, Houston, Texas.*

COMMENT BY THE EDITORS.—The above reports of experience indicate that two radically different principles are followed by the writers. Some use essentially the same treatment found best for bent greens, namely, top-dressing, ammonium sulfate, and ample water. Others employ a semi-starvation system, namely, using both water and fertilizer to a minimum degree. It may be that the best method will vary with the soil characteristics. In any case it is very desirable that both methods be tested side by side, say the two halves of the same green. We hope every club with Bermuda greens will test the two methods in comparison.

Important Northern Golf Grasses

By R. A. Oakley

The September (1922) number of THE BULLETIN contains an article entitled "Some Simple Facts About Our Northern Golf Grasses," by Doctor Piper and the writer. The article apparently has in it information that readers of THE BULLETIN are seeking, since the edition was exhausted in a very short time after it was issued. So many requests are received for information on the subject that it appears desirable to publish another article on the northern golf turf grasses. The statements which follow are largely reiterations of those in our former article; in fact, much of it will be freely quoted here. However, there will be additions of some importance on points overlooked when the previous article was published and also new information resulting from recent investigations.

The only grasses of outstanding importance for our northern golf courses, by which is meant, broadly speaking, those courses lying north of the 37th degree of latitude, are Kentucky bluegrass, redtop, the bents, red fescue, and *Poa trivialis* (or bird grass, as it is sometimes called). Sheep's fescue, Canada bluegrass and the rye grasses may be added to this list, since the first two are used for the rough and are very valuable for this purpose, while the latter are in a way emergency grasses, particularly for the fairway. There are a few other species used occasionally but they are of so little importance that they will not be discussed here.

THE BLUEGRASSES

The grasses belonging to the genus *Poa* are commonly called bluegrasses. There are many of them, but only one (Kentucky bluegrass) is purposely cultivated to any considerable extent on our northern golf courses. Canada bluegrass, however, is valuable, but only for the rough, and *Poa trivialis*, or bird grass, has a limited place particularly on fairways. Annual bluegrass (*Poa annua*) is a very common species on putting greens, where it volunteers abundantly and is largely regarded as a weed; however, it is not without merit.

Kentucky Bluegrass.—Because of its wide range of adaptation and the character of its turf, Kentucky bluegrass tops the list of fairway grasses for northern courses. It requires fairly rich soil for its best growth, and when given such soil the other perennial turf grasses can scarcely compete with it under fairway conditions. Kentucky bluegrass should be used as an important constituent of fairway mixtures on all northern golf courses. On very sandy soils, red fescue may sometimes do better, but such soils to produce really good turf should be top-dressed with clay and manure; when so treated they will produce better turf of Kentucky bluegrass than of red fescue. The bent grasses make excellent fairway turf, particularly in parts of Pennsylvania, New York, and the northeastern states, but at the present time seed of the bents is too high in price to permit their very general use in this or other parts of the country where they do well.

Kentucky bluegrass seed should not be sown alone, since it germinates slowly. Furthermore, it usually requires a year or more from the time of sowing for the grass to make good playable turf. This fact has given rise to the well-known bluegrass-redtop mixture. These two grasses make an almost ideal fairway combination. Redtop is an excellent starter but a poor finisher. Kentucky bluegrass is the reverse—it starts slowly but finishes well. The first year from time of seeding, redtop is the dominant

grass; after that, Kentucky bluegrass characterizes the turf. It is a vital mistake therefore to sow Kentucky bluegrass seed alone on fairways or lawns. Redtop seed should always be sown with it. Three to 4 pounds of seed of Kentucky bluegrass to 1 pound of re-cleaned redtop seed is a very satisfactory proportion for a mixture of these two grasses. On a well-prepared fairway seed bed 100 to 150 pounds of seed of such a mixture is an ample quantity for sowing one acre. In the Northeast, especially in New England, some bent seed, as much as 10 pounds to the acre, should be added if available, since conditions there in general favor the ultimate dominancy of the bents. Seeding should always be done in the late summer or early fall.

It is popularly supposed that Kentucky bluegrass is a lime-loving grass and requires a sweet soil for its best growth. This opinion probably is due to the fact that it is found in greatest abundance on limestone soils. In general these are rich soils. Really poor soils must have added to them something besides lime before they will grow good bluegrass, but rich soils will produce excellent bluegrass turf, other conditions being favorable, even though they be low in their lime content. There is evidence to indicate that Kentucky bluegrass can be grown on acid soils if such soils are rich, especially in available nitrogen. Kentucky bluegrass is not at its best during the hot, dry periods of summer, but over much of the area where it is used as a fairway grass, summer annual grasses, including crab grass, come in to produce playable turf. When the short days and cool weather of fall arrive, bluegrass asserts itself and produces turf of almost ideal quality, so that the weedy summer grasses often really are a benefit rather than a detriment.

Good Kentucky bluegrass seed should weigh approximately 22 pounds to the bushel and should not have more than 13 per cent of inert matter (chaff and trash). It should have less than 2 per cent of weed seeds, and it should germinate not less than 80 per cent. However, new-crop seed, as it is called, may be potentially viable but because of its freshness may not germinate as high as it will one year later. Conditions of harvesting and curing being satisfactory, seed one year old, if properly stored, will usually germinate appreciably higher than new-crop seed. Even under ideal conditions its germination is slow, two to three weeks usually being required from the time the seed is sown until the seedlings are much in evidence.

Canada Bluegrass.—While often recommended for the fairway and frequently included as a constituent of fairway and putting green mixtures, Canada bluegrass has no place on the fairway proper in any part of this country. The stubby, rather thin character of its turf makes it undesirable as a fairway or putting green grass. For the rough, however, it is very good, especially south and west of New England, on clay soils. Canada bluegrass does not require as rich soil as does Kentucky bluegrass; in fact, it will make better rough on poor clay soil than on good soil. It fits in well with sheep's fescue, and the combination makes an almost ideal one for the rough. For original seedings of the rough, 30 to 40 pounds of Canada bluegrass and 40 to 50 pounds of sheep's fescue are sufficient for one acre of well prepared soil. The seed of Canada bluegrass closely resembles that of Kentucky bluegrass, but specialists can easily tell one from the other.

Poa Trivialis (Rough-Stalked Bluegrass or Bird Grass.)—There is a distinct difference in color between *Poa trivialis*, the name commonly used in the trade for this grass, and Kentucky bluegrass. The former is shiny and apple-green in color, while the latter is a deep blue-green. *Poa trivialis* is much more spreading in its habit of growth than is Kentucky bluegrass,

and when grown in mixtures with other northern turf grasses it has a tendency to form definite patches, as do creeping bent and velvet bent. It is an excellent northern shade grass, especially for lawns, and is found in considerable abundance on fairways and somewhat sparingly on putting greens on many golf courses in the New England states. On fairways it will apparently withstand poor drainage better than Kentucky bluegrass and probably quite as well as redtop or the bents, but its vitality is seriously reduced by hot, dry weather. On putting greens it is not nearly so satisfactory as either creeping bent or velvet bent. It should be sown in mixture with redtop and at approximately one-half the rate recommended for the Kentucky bluegrass in the bluegrass-redtop mixture. The present market price of the seed is nearly that of Kentucky bluegrass seed. In its germination characteristics it is much the same as Kentucky bluegrass seed but requires somewhat less time to germinate.

REDTOP

In the language of Ingalls, redtop is a "valuable servant." In making turf on northern golf courses its chief function is to supplement other grasses. Although very closely related to the bents botanically, it is quite different from them in its turf-forming habits. Used alone it makes good turf only in the early stages of its development. After the first year it becomes too coarse and open in its habit of growth to make turf of satisfactory quality. Redtop should never be sown alone on the fairway or elsewhere where permanent turf is desired. It is an ideal grass to mix with bluegrass for seeding fairways, since it makes up the turf for the first year, or until bluegrass becomes established. Usually after the first year it gives way almost completely to bluegrass where the conditions are even fairly well suited to the latter.

The great value of redtop is the ability of its seed to germinate quickly and produce vigorous seedlings. It is because of this that it should be used extensively with other grasses, particularly Kentucky bluegrass, for the original seeding of fairways. The bents have the same characteristic, but their seed is too scarce to be used extensively on fairways at this time. One pound of recleaned redtop seed to 3 to 4 pounds of Kentucky bluegrass is the standard mixture, but considerable latitude may be allowed in the proportions.

Where red fescue is used either on the fairways or greens, redtop helps out greatly. Red fescue does not form close turf quickly and needs a grass of the habits of redtop as a temporary filler. The usual proportions of the red-fescue-redtop mixture, either for fairways or greens, is approximately 4 pounds of the former to 1 pound of the latter. While redtop alone will persist for a relatively long time under putting green conditions it soon gives way to creeping bent where the two are sown together.

In the South it has become quite a common practice to sow redtop seed in the fall for winter putting greens. This is usually done on newly prepared seed beds and sometimes on old Bermuda turf, but it does not appear to be as satisfactory as is Italian rye grass seed for sowing on Bermuda grass turf. Redtop seed is abundant, relatively cheap, and of good quality. Recleaned redtop seed should weigh approximately 40 pounds to the bushel.

THE BENTS

The correct common names for the bents, seed of which is now on the market, are (1) South German mixed bent (this is still sometimes erro-

neously called "creeping bent"), and (2) Rhode Island bent or Colonial bent, depending upon whether the seed is of domestic or of New Zealand origin. Steps are now being taken to place upon the market the seed of the bent commonly found in the Pacific Northwest. This bent resembles the so-called seaside bent of the New England states. It appears to be a good turf-producing grass but its value for fine turf making is yet largely to be determined. Seed of South German mixed bent comes mostly from the Rhineland region. Some, however, is produced in Holland and elsewhere in Continental Europe. Average lots contain approximately 10 to 15 per cent of seed of velvet bent, usually only a mere trace of seed of true creeping bent, and the remainder, exclusive of weeds and other seeds, is seed of the same species of grass which is commonly known as Rhode Island bent. There is no seed of true creeping bent or of velvet bent on the market.

Rhode Island bent seed at present is harvested only in Rhode Island, although the grass is very abundant in much of the northeastern part of the United States. Colonial bent seed comes from New Zealand, and botanically is the same as Rhode Island bent—that is, it produces the same kind of plants and turf. However, the seed of Colonial bent as it is now on the market contains very much less chaff and other inert matter than does commercial seed of Rhode Island bent.

The bents taken collectively are by far the best of our northern putting green grasses. There are few who will dispute this. They make playable turf quickly from sowing and produce permanent turf that maintains itself better under unfavorable conditions imposed by soil, climate, disease, and play than does red fescue, their closest competitor for putting green honors. There is scarcely a place where red fescue does well that the bents will not do equally well or better, and there are many places where the bents thrive but where red fescue practically fails. The bents will withstand poor drainage better than does red fescue, and likewise continuously high temperatures; consequently, they can be used farther south than can red fescue. Furthermore, the bents seem to be more resistant to the brown-patch disease, which is a very important characteristic.

The supply of bent seed is adequate for present putting green needs. Particularly is this true of German mixed bent seed. In the period between July 1, 1924, and November 30, 1924, there were 45,900 pounds of pure bent seed imported. The high prices which have prevailed here in recent years have greatly stimulated bent seed production abroad.

Preference has been expressed for German bent seed as compared with seed of Rhode Island or Colonial bent. This is due to the fact that it contains a small percentage each of creeping bent and velvet bent seed, while commercial seed of the other bents does not contain them. Creeping bent and velvet bent are regarded as exceedingly valuable in putting green turf. On old greens that have been sown with German mixed bent seed there will be found distinct patches of creeping bent and velvet bent a foot or more in diameter. Some greens are made up almost completely of these patches. On some of the New England courses velvet bent constitutes most of the turf of the greens, and also covers large areas of fairway. The reason for this is not known. Southward creeping bent predominates over velvet bent where the two are found together.

The species of bent commonly known as Rhode Island bent, the seed of which makes up the great bulk of seed of all commercial bents, makes an excellent turf for putting greens and fairways. The plants of this species spread, but not so rapidly or in quite the same manner as those of creeping bent or velvet bent.

Trained seed analysts now can tell the seed of the bents from that of redtop. The ultimate user therefore may be fully protected if he will take the trouble to have samples properly examined before he makes his purchases.

Creeping (or carpet) bent and velvet bent can be propagated vegetatively. The former lends itself better to this method than does the latter, because it spreads much more quickly by runners or stolons. The vegetative method of propagating creeping bent is becoming very popular for the making of putting greens. There are now a number of companies and individuals engaged in the production of creeping bent stolons or runners for the market. A large supply of this material is now available.

THE FESCUES

The common fescues of our northern golf courses are red fescue and sheep's fescue. There are several others that occur to some extent but they are relatively unimportant. In the past considerable quantities of meadow fescue seed were used in fairway mixtures, and even now there are some who recommend this grass for the fairway. It is a serious mistake to use meadow fescue on any part of the golf course, since it is a relatively coarse, tufted grass and not a turf former. The name "fescue" doubtless has aided in placing it among the golf turf grasses, where it clearly does not belong.

Red Fescue.—Seed of red fescue is on the market under two designations, namely, *European red fescue* and *Chewings' (or New Zealand) red fescue*. The former is produced mostly in Germany and the latter in New Zealand. Whatever their botanical differences may be, they appear to have essentially the same characteristics so far as their turf-making habits are concerned; therefore the single designation *red fescue* is used here to include both. The seed of the variety known as Chewings' fescue (named for a Mr. Chewings) is the kind now most abundant on our market. A careful, extensive, and unprejudiced study of golf grasses in America leads to the definite conclusion that red fescue is a much overrated grass so far as its use in this country is concerned. The reputation which it enjoys abroad and the shortage of good bent seed doubtless have helped to make it easily possible to extend the use of red fescue here. Those who are making a careful study of golf turf grasses are coming to realize that it is not all that its advocates have claimed for it. Red fescue, under the best conditions, makes excellent turf. Its leaves are unusually fine, but they are somewhat wiry in texture. This is particularly noticeable in hot, dry weather of summer, and although not seriously objectionable it is not a very desirable characteristic. Red fescue is capable of making both good greens and fairways. It can withstand more shade than can our other common golf turf grasses, and it has the ability to grow on very sandy soil in the northeastern part of the United States. This, however, is not a great asset, as the turf it forms on such soils is not first-class fairway turf. The chief objection to red fescue is that it forms close turf very slowly; and on poor soils, especially poor sandy soils, it has a decided tendency to become bunched. It is largely because of this fact that Kentucky bluegrass and the bents are very generally preferred to it. Where red fescue has made cuppy or bunched turf it is a very difficult matter to get it or other grasses to fill in successfully. Hot weather affects red fescue much more adversely than it does Kentucky bluegrass, redtop, or the bents; therefore it can not be used successfully on courses as far south as Washington, D. C., and at that altitude. Brown-patch also seems to attack

it more severely than it does the bents. Kentucky bluegrass, it will be remembered, is practically immune to this disease.

Everything considered, red fescue is decidedly second to Kentucky bluegrass as a fairway grass, and to the bents on the putting greens. The cases where it is superior to these grasses are very few indeed. It is by no means uncommon for the bents to crowd out red fescue on the greens and for Kentucky bluegrass to overrun it on the fairways; but no cases have been noted where red fescue has replaced either the bents or Kentucky bluegrass.

The germinability of red fescue seed is not very dependable. The seed loses its vitality quickly. It does not remain viable as long in storage as does seed of the bluegrasses, bents, or redtop. Every lot, therefore, should be tested before it is sown. Most of the seed that is on the market is relatively free from other seeds and inert matter; this is particularly true of seed of Chewings' fescue.

Sheep's Fescue.—As a grass for the rough on northern golf courses, sheep's fescue is nearly ideal, especially if it is grown upon poor soil. It forms just about the right kind of bunches to afford the proper penalty to the player. It is also useful on bunkers to produce what is commonly called "whiskers." On most of the older courses in the North there is more or less sheep's fescue on the fairways and some even on the greens. Many of the fairway and putting green mixtures formerly used contain seed of it. It should never be sown on either fairway or green, as it is not a turf-forming species. The use of sheep's fescue should be confined strictly to the rough and bunkers. For the rough it should be sown at the rate of about 50 to 70 pounds to the acre. Seed of Canada bluegrass can be sown with it to advantage. The commercial seed of sheep's fescue is difficult to distinguish from that of red fescue.

RYE GRASSES

Grasses which grow quickly and seed of which germinates quickly sometimes have a place in the making of golf course turf. The best of such species for northern golf courses are the rye grasses—perennial or English rye grass, and annual or Italian rye grass. Neither of these is of value permanently; in fact, neither, strictly speaking, is a turf-forming grass, but each is useful as a temporary turf maker in mixtures with other grasses.

Perennial Rye Grass.—Although resembling Kentucky bluegrass in certain characteristics, including color and texture of herbage, perennial rye grass (*Lolium perenne*) is very unlike Kentucky bluegrass in its habits of growth. While this seed has been frequently included in putting green mixtures, it has no place on putting greens of northern golf courses. Its use is confined to certain situations on the fairways and newly cut or filled areas elsewhere that need quick protection from washing. While perennial rye grass is a tufted grass, it is known to persist for a number of years under putting green conditions, and on lawns it lasts indefinitely. It closely resembles Italian rye grass in appearance and general habits of growth. The under surface of the leaves of each species is bright green and shiny, thus characterizing and distinguishing them from the other common golf turf grasses.

Perennial rye grass seed is grown mostly abroad. Recently, however, some interest is being taken in its production in the Pacific Northwest. The seed weighs approximately 24 pounds per bushel and usually retails at an appreciably lower price per pound than seed of Kentucky bluegrass.

Italian Rye Grass.—In general appearance Italian rye grass (*Lolium*

multiflorum) resembles perennial rye grass very closely. Furthermore, it serves much the same purpose on golf courses. Although it is an annual species, it nevertheless commonly has a tendency to persist for more than a year under conditions such as are found on fairways. Where quick-growing emergency grasses are needed on the golf course to provide a grass covering for any reason whatsoever, Italian rye grass is better than perennial rye grass. In the South, Italian rye grass is very useful for making a winter covering on Bermuda grass putting greens and lawns. Seed of it is sown on Bermuda grass turf in the fall, and in a short time a very good putting surface results if proper care is given. Heretofore the supply of seed of Italian rye grass has come from abroad. Recently a considerable quantity has been produced in the Pacific Northwest, which section promises to become the important source of supply for our American golf courses. The seed resembles that of perennial rye grass in general appearance but has an awn at the tip which is not completely removed even in carefully milled commercial stocks. In the weight per bushel and price per pound there is little difference between the seed of Italian rye grass and that of perennial rye grass. Seed of neither species should be used as an important constituent of turf grass seed mixtures.

The Psychology of Fescue

By C. V. Piper

The word fescue has a soft, alluring sound to the ear, and this apparently is the reason why a lot of people who know little about grasses look wise and say "fescue." It was such a one doubtless who started the myth about the wonderful fescue greens of Britain. There are no pure fescue greens in Britain. Excepting perhaps a few newly sown greens, there is not one in Britain which has fifty per cent fescue. If one ignores the weeds which are all too abundant in British putting greens, the average putting turf is considerably less than one-half fescue, the rest being bent. These two grasses get along together pretty well in Britain. In the United States they do not; the bent will crowd out the fescue.

There are very few passably good fescue greens in America. At their best they are far inferior to bent. Furthermore, if by any chance bent is sown on a fescue green, it is but a few years until the green is all bent.

It is unquestionably true that many golfers have no clear conception of fescue. Due perhaps to the British myth, they think any particularly good turf must be fescue. It has been a common experience to have well-known golfers show us their splendid "fescue" greens, as they thought, when the greens were really all bent. Not long ago a greenkeeper showed us a new green of pure fescue, as he thought, and the seed which he said he sowed was, upon inspection, found to be true Chewings' fescue. Nevertheless his green was pure bent. The source of the error is not clear; but the greenkeeper insists that his bent green is pure fescue.

In a few places in America, upon sandy soils northward, red fescue has shown merit. In over ninety per cent of the region where it will grow at all it is a delusion and a snare. If a seedsman or an architect insists on your using fescue, better quit him cold. He knows better, if he has any intelligence at all.

There are hundreds of species of fescue, fine and coarse, tufted and creeping, etc. Sheep's fescue is superb for the rough and for the rough alone. The only good turf formers are red fescue and fine-leaved fescue, and these are what are in mind when putting greens are discussed.

On very sandy soil northward, especially on fairways, some red fescue is probably desirable. It is not advisable to sow it alone.

Green Section Clubs by States

On November 1, 1924, there were 800 clubs which were members of the Green Section. In the following table the number of clubs by states is shown. Some states have a much smaller number of member clubs than should be the case. In such cases there is a fine opportunity for Green Section boosters to get busy.

UNITED STATES

New York.....123	Maryland 12	North Carolina.. 5	Utah 1
Pennsylvania ... 86	Virginia 12	West Virginia... 5	Wyoming 1
Illinois 66	Florida 11	Nebraska 4	Dist. Columbia.. 1
Massachusetts .. 58	New Hampshire. 10	Oklahoma 4	Hawaji 1
Ohio 58	Rhode Island... 10	Oregon 4	Alaska 0
New Jersey 51	Texas 10	South Carolina.. 4	Arizona 0
Michigan 35	Georgia 7	Tennessee 4	Arkansas 0
California 28	Maine 7	Louisiana 3	Idaho 0
Minnesota 23	Washington 7	Vermont 3	Mississippi 0
Connecticut 21	Iowa 6	Delaware 2	Montana 0
Indiana 18	Kansas 6	North Dakota .. 2	Nevada 0
Wisconsin 18	Colorado 5	Alabama 1	New Mexico..... 0
Missouri 14	Kentucky 5	South Dakota... 1	

CANADA

Ontario 17	Alberta 4	Nova Scotia 1	Saskatchewan .. 0
Quebec 10	Manitoba 2	Newfoundland... 0	Yukon 0
Brit. Columbia.. 5	New Brunswick. 2	N. W. Territory. 0	

FOREIGN

Mexico 2	Bermuda 1	Chile 1	Cuba 1
Argentina 1			

How To Select and Compare Vegetative Strains of Creeping Bent

In the course of its investigations the Green Section has selected and compared about 100 strains of bent grown vegetatively, most of which have since been discarded. A number of greenkeepers in various parts of the country have made selections of their own. Some of their selections are very promising, others distinctly inferior. A few greenkeepers have grown a selection in considerable areas of turf before discovering that it was very susceptible to brown-patch or in some other way inferior. It is very desirable to have each greenkeeper select bents in his own locality, as there is good evidence that a bent may behave differently in one place from the way it does in another. This type of work requires care and at least three years of testing to secure results at all reliable. It is therefore important that efficient methods be used if success is to be achieved. The methods used by the United States Golf Association Green Section will, it is believed, be helpful.

1. MAKING THE ORIGINAL SELECTION.—On any old putting green long sown to South German mixed bent, a careful inspection will disclose circles

of grass usually 2 to 3 feet in diameter, often larger, and varying in color and texture. Each of these circles grew from one seed. So far as color and texture are concerned, one can take his choice. The size of the circle is to some extent an indication of vigor. The appearance of the turf at different times of the year should be noted and particularly its vigor during mid-summer. Of particular importance is its susceptibility to brown-patch, either the large or the small sort. Resistance to this disease is perhaps the most important single characteristic. At the outset after one season's close observation it will be well to make about six different selections. Select only from putting greens. The using of bents from the rough or from various places is too much of a gamble, as it is impossible to judge of the putting quality.

2. **NURSERY ROWS.**—From each plant selected cut out a piece 4 inches square from near the center, being sure that no other strain of bent or other grass is intermixed. Tease this turf in small pieces. Plant these 1 foot apart, making a nursery row 1 rod long, in well-prepared soil. If several selections are made the rows should be 4 feet apart. It is best to plant these about September 1. At the end of one year these nursery rows should each form a band about 4 to 6 feet wide, the stolons on each side being 2 to 3 feet long.

3. **TRIAL TURF PLATS.**—Turf plats may very conveniently be 10 feet square. Do not make them larger, as it involves unnecessary work. Chop up the stolons and plant them in the usual vegetative manner. This should be done late in August or early in September. Have at least one, preferably two, plats of Washington bent to use as a basis of comparison.

4. **POINTS TO CONSIDER IN JUDGING MERIT.**—Color, texture, and vigor are all important characteristics which are relatively easy to determine. Disease resistance can be judged only after the turf has gone through two or more brown-patch seasons. The turf in all its characteristics should be constantly compared with that of Washington bent, which has been very thoroughly tested. Unless a selection proves as good or better than Washington bent it should be discarded. Probably better bents than the Washington strain will be discovered, but to use an inferior one simply invites trouble. Do not be in a hurry to make your judgment. Some of the bents at first distributed by the Green Section would not have been sent out if they had been tested two years more. However they have given valuable information relative to their unlike behaviors in different localities.

Some U. S. Golf Association Decisions on the Rules of Golf

QUESTION.—In order to settle a dispute, will you be kind enough to give a decision, and penalty if any, relative to the following condition? A and B are playing C and D in a four-ball match. A is putting, and B's ball lies about four feet from the cup but not in line with A's ball. After A putts, C runs over and hits B's ball with his club as he sees A's ball about to hit B's ball. B contends that C and D lose the hole.

ANSWER.—Rule 7 under Best-Ball and Four-Ball Matches covers this point. The opponent being C in this case who moved the ball, his side would therefore lose the hole.

QUESTION.—Two men are playing a match-play tournament, but they make up their foursome with two men not in the tournament, not playing partners with either one. One of the match-play players, in approaching

the hole, hits the caddy, who is holding the pin still in the hole, and the ball drops dead to the hole. The caddy belongs to one of the players not in the tournament. Apparently, according to the rules, there would be no penalty and the ball would be played as it lay. However, I am under the impression that there is or was an old rule to the effect that the caddy at the pin shall be treated the same as the players' own caddy. In other words, while he is holding the pin he belongs to the man who is approaching and is affected by the same penalties.

ANSWER.—Under Rule 32, if the flag is still in the hole and not removed there is no penalty whatever if the ball strikes the flag. The United States Golf Association has ruled on a previous occasion that anyone outside the match who is designated to hold the flag is exempt from any penalties imposed under the rules.

QUESTION.—In a best-ball foursome one side concedes the other seven strokes, the strokes coming on certain holes designated on the back of the score card. The side giving the strokes is in possession of the honor. The next hole is halved in fives. On that particular hole the side with the handicap is entitled to a stroke. Does the honor remain or pass?

ANSWER.—In a handicap match play where players receive strokes on certain holes, the lowest net score made on the hole wins the hole and the honor goes to the player who wins the hole. The handicap man is entitled to the same privileges as the scratch man.

QUESTIONS AND ANSWERS

All questions sent to the Green Committee will be answered in a letter to the writer as promptly as possible. The more interesting of these questions, with concise answers, will appear in this column each month. If your experience leads you to disagree with any answers 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. CREEPING BENT AS A SOUTHERN TURF GRASS.—A great number of our members are urging us to try creeping bent for our putting greens. Do you think it will be able to stand up in a climate such as ours, particularly during the summer months? (Louisiana.)

ANSWER.—It is practically certain that creeping bent will not survive your summer conditions. You could start these greens in the fall and they would be all right through the winter, but with your hot weather of summer they would be pretty sure to go to pieces even though you were able to keep Bermuda and other plants from invading the greens. Under California conditions—that is, in a relatively dry climate—northern grasses can be pushed much farther south than they can in humid regions. It would be an easy matter for you to test out creeping bent under your conditions, by planting a small plat of it, say 10 or 15 feet square.

2. SEEDING BERMUDA GRASS GREENS; CONSTRUCTING COMPOST BEDS.—We have purchased Arizona Bermuda grass seed for seeding nine new greens

and would be glad to have your advice with regard to soil preparation, fertilizing, and rate of seeding. Our soil is red clay. (South Carolina.)

ANSWER.—On your red clay soil you should grow most excellent Bermuda turf. It will be desirable to incorporate some well-rotted manure in the top few inches of your soil. If you can not obtain rotted manure, use bone meal or cottonseed meal, applying it at the rate of about 15 pounds per 1,000 square feet. The seed should be sown at the rate of 2 pounds per 1,000 square feet. In the further upkeep of your greens, good compost having a fair proportion of sand will be the proper top-dressing to use. Your compost should contain 50 per cent of good top soil, 25 per cent of humus material, preferably manure, and 25 per cent of sharp sand. You will find the bed system much cheaper and more satisfactory than the heap system in making compost. With a large, low heap you can do all of the turning of the material and keep down weeds, by the use of a plow and a harrow. The compost should be screened before being applied to the greens. Compost improves with age. Arizona Bermuda grass seed always contains a considerable percentage of the strain which is being called Atlanta Bermuda and which is the best of all strains for putting greens. A good many golf courses in the south have planted their greens from cuttings of this grass.

3. WINTERHARDINESS OF REDTOP SEEDLINGS.—It has been represented to us that redtop seed may be sown with safety at any time during the winter that the ground is in condition for seeding. If this is correct, may we expect that a hard freeze would not kill the young grass in case the seed sprouted? (New York.)

ANSWER.—We have never seen a case where redtop seedlings have been killed even in midwinter, except where drainage is poor. Therefore, we believe you would be safe in seeding redtop at any time in the winter when the soil is in condition for seeding. The great advantage of early seeding is that in spring the young grass is given a better chance to combat weeds.

4. VALUE OF TOP-DRESSING IN WINTER.—We are planning to open our course in full swing the first of April, and it seems to us that February would be the proper month for top-dressing our greens, although we have been advised that March is soon enough. When is the best time for us to top-dress the greens? (Kentucky.)

ANSWER.—We top-dressed last winter and the results were rather surprising. The grass seemed to show as much benefit from a dressing then as it did in summer. We see no reason at all why you should not top-dress your greens in February if they are in condition to work on at that time.

5. ERADICATING COCO OR NUT-GRASS.—Do you know of any way to get rid of nut-grass on putting greens? We have been trying to dig out this grass but find that it comes back about as fast as we dig it out. (Georgia.)

ANSWER.—This is an extremely difficult weed to eradicate from lawns and putting greens. The plant is spread by the little nuts or tubers, the seeds apparently never being good—at least we have never yet obtained any seed that would germinate. Therefore the logical thing to do would be to get the ground completely free of the nuts before planting the putting green. One way to do this is to put a fence around the ground for a short time and put in some geese. They will find and eat nearly all of the nuts.

It is possible the nuts might be removed by screening the soil, but as some of them are extremely small we doubt if this would be effective. A third possibility would be by sterilizing the soil by use of a steam portable sterilizer, but this is expensive and in the light of our present knowledge we can not recommend it. If the ground is free from the nuts in the first place there would be little or no danger of their finding their way to the putting green. If you have putting greens badly infested, we suspect that if the turf were removed clean to a depth of about $1\frac{1}{2}$ or 2 inches and used as compost for fairways, the ground beneath would be perfectly free of the nuts, and this would probably be the cheapest way of getting rid of the nut-grass in badly contaminated greens, and then of course planting the green anew.

6. TREATMENT AND DRAINAGE FOR WET MUCK LAND WHERE GRASS DOES NOT THRIVE.—The drainage of our No. 8 hole is giving us considerable trouble. This hole slopes from the tee to a brook, and then again downhill beyond the brook. There is a section of this fairway, from the brook beyond the green, of about fifty or sixty yards, which is of a very black, mucky soil. We have drained that in a manner which we supposed would be adequate to dry it out. We then plowed and harrowed and sowed to 50 per cent Kentucky bluegrass and 50 per cent recleaned redtop. This portion of the fairway did not dry out as quickly, and this seed made a good start, but after the grass was up about $1\frac{1}{2}$ inches and was of a healthy green, it died down within thirty days and we were obliged to harrow the land again. Thinking the soil contained too much acidity, we sprinkled it with lime, and sowed it again with the same mixture of seed. The grass from this second seeding is now about the same height as that from the first seeding, but it is beginning to show very brown. If this grass does not thrive, what other grass would you suggest seeding on this soil? We believe we have satisfactory drainage. There is however a large hill back of the green and the water soaks into the ground above the green and comes out again at this particular wet place. The fairway at this point is about 70 yards wide. We have in it 8 tile drains, all starting beyond the brook. (Maine.)

ANSWER.—We are inclined to think that your trouble is caused more by the nature of your soil than by poor drainage, although probably both factors are effective. We have found it exceedingly difficult to grow grass on certain muck soils. Frequently it is not difficult to get a good stand of grass, but the grass seedlings turn yellow and die before turf is formed. This is true even where drainage is provided. Lime seems to help but little. If your second seeding is not successful we would suggest that you top-dress your muck fairway with well-rotted manure, or with manure and soil made into a compost after the manner frequently described in *THE BULLETIN*. If a fairly heavy top-dressing, say one-half inch or more thick, is applied, we believe you will be able to grow grass on that particular fairway, provided the drainage is good. If it is necessary to improve your drainage we would suggest that you run a line of tile deep enough at the upper edge of the fairway to cut off the seepage completely. Redtop and bent do fairly well on soils not perfectly drained, but if the soil is too wet for these grasses the only other worth trying is bird grass (*Poa trivialis*), which makes beautiful turf where it succeeds.

7. THE BIRD'S-NEST FUNGUS IN TURF.—I am sending you a small piece of bent turf from one of our greens. You will notice in it a growth

of some nature in all appearance like worm holes. Upon examination you will find these to be growths $\frac{1}{2}$ to $\frac{3}{4}$ inch in length, with well-defined roots. They began to grow about October 1 and are increasing now (November 18) in number. So far there is no damage to the greens except in appearance. (Washington.)

ANSWER.—The cup-shaped or vase-shaped growth in your turf is a species of bird's-nest fungus, known botanically as *Cyathus*. This fungus often occurs on manure and decayed wood or other vegetable matter, but we have never before seen it growing in turf. The only explanation that we can offer for its presence is that you have used manure in excessive amount and in large chunks. We do not think the fungus will injure your grass, although where abundant it may interfere with the putting quality of your turf. We would suggest that for a time you avoid applications of manure, but fertilize your greens with ammonium sulfate. The turf you send is a very nice sample but you seem to be using entirely too much sand in the top-dressing. The top inch of the soil seems to be pure sand. Your top-dressing should be of a loamy nature to give best results.

8. INTRODUCING BENT GRASS INTO BERMUDA GREENS.—This summer we planted four new greens with German mixed bent seed. The grass on these new greens has done splendidly, and from present appearances they will be by far the best greens on our course. We have tried the experiment of raking out the coarse grass on some of the old greens and then top-dressing the green heavily and sowing creeping bent stolons as we would on a new green. The top-dressing stimulated what Bermuda there was left in the old greens, and this went ahead much faster than the bent. However, the bent is coming along nicely now (November), and during the winter season, when the Bermuda is dormant, may prevail. Have you had any experience in converting Bermuda greens into bent greens in this manner? (California.)

ANSWER.—We have never seen Bermuda greens converted into bent greens in the manner you describe, and doubt that it can be done successfully. During the hot weather of summer the Bermuda is very apt to kill out the bent. Greens of other grasses can however readily be converted into bent greens by sowing stolons of creeping bent on the old turf, and then top-dressing.

9. TOBACCO PRODUCTS AND CARBON DISULFID IN ANT CONTROL.—I wish you would be good enough to advise me if tobacco products are effective in the control of ants. (Colorado.)

ANSWER.—We have tried two or more tobacco products and have received reports from golf clubs who have tried others. On the basis of the experience and information obtained we have reached the conclusion that these preparations are not satisfactory for the control of ants. They appear to repel ants for a brief period, but the ants soon return. In fact, they are repelled for only a short time, especially if rain follows the application of the tobacco or the greens are watered shortly afterward. As long as the fresh material is on the surface the ants seem to be repelled, but after it is washed into the turf it seems to have little influence on them. For the control of ants we have found nothing better than the injection of about a teaspoonful of carbon disulfid into each nest. This is a tedious way of ridding greens of ants, but so far it seems to be the most satisfactory. The carbon disulfid may be applied with a spring-bottom oil can. One squirt is sufficient for a nest, and the hole of the nest should be closed immediately after the application. Care should of course be taken to avoid

touching the grass with the carbon disulfid, as it kills the grass with which it comes in contact.

10. CINDERS AS A BED FOR DRAINAGE TILE; DEPTH OF LAYING TILE; SUB-IRRIGATION OF PUTTING GREENS.—We are building a new golf course and are ready to start work on the tiling of the greens. We are not clear however on the following points, and should like to have your opinion. Is it advisable to bury tile in cinders, say approximately 2 inches underneath and on each side with about 6 inches on top? Is a depth of $2\frac{1}{2}$ feet proper for placing the tile? In *THE BULLETIN*, Vol. I (1921), page 85, is an article describing the sub-irrigated greens at the St. Louis Country Club. Have any other experiments been conducted along this line? It seems to us that if we can depend on capillary action of the soil particles, sub-irrigation has many attractive features over the method of sprinkling, since it would appear that we could arrange such a layout so that the water pipes would lead directly into the drainage tile, necessitating merely the opening of a valve so that this irrigation could be done at any time of the day, by laborers on the course, without interfering with play. It would also eliminate the necessity of having hose and sprinklers. (Illinois.)

ANSWER.—We believe it is generally considered that tile buried in coarse cinders is more efficient than tile covered mostly with soil, as in the former case there is much less danger of the joints becoming clogged. The depth for laying the tile is a matter that will vary according to conditions. Two feet is about the minimum. In regard to sub-irrigation by a comprehensive plan such as that employed at the St. Louis Country Club, several clubs have experimented with it but the results have been unsatisfactory. It is a very expensive method and the whole apparatus is likely to become clogged. No evidence has yet been put forward to show that sub-irrigation has any advantage over surface irrigation.

11. LAKE BOTTOM SEDIMENT AS A TOP-DRESSING.—We are forwarding a sample of sediment taken from our lake. Our green committee is anxious to ascertain the chemical analysis of this sample, and your opinion with regard to any possible benefits that might be expected from the use of the sediment as a top-dressing for fairways and sub-surface for greens. (North Carolina.)

ANSWER.—Your sample consists of coarse sand, a considerable amount of silt, and some rather sticky clay. The clay in the sample is too sticky to warrant its use with satisfaction, and we believe that you can find on your course very much better material than this. There is nothing in it to indicate that it has any particular fertilizer value. For top-dressing purposes, texture of the material is the all-important thing. This texture should preferably be that of a loam, or, if your soils are heavy, that of a sandy loam. The expense of a chemical analysis of a soil sample is rarely justified, as it throws no light on its fertilizer value.

12. GETTING RID OF MOSS.—Have you any suggestions as to how we may rid our putting greens of moss? (Connecticut.)

ANSWER.—In our experience we have found that the presence of moss is due to impoverishment of the soil, resulting in an inability of the grass to spread, and that the best corrective measure consists in fertilizing with ammonium sulfate, used either alone or in compost, after the manner which has been described in various places in *THE BULLETIN*.

Meditations of a Peripatetic Golfer

Sowing red fescue on the turf of any other kind of grass is hopelessly futile. No one but the seed dealer profits.

If you have a new idea about greenkeeping, test it out by all means. But—test it first on a very small scale.

If golf architects were compelled to explain the reasons back of each design, many of them would have to hire an alienist or a psychopathologist.

Do not take chances with any new or strange weed in the putting greens. Fight it from the start.

If you are forced to build a hole of 260 to 300 yards in length, make it of the so-called "Cape" type. It is desirable feature on any golf course.

A hole which most of the players criticise is likely to be one of poor design. One which all the players commend is a rarity.

A running-up shot is a desirable thing to encourage. Design two or three of the 2-shot holes which call for this type of approach to the green. The green should be so built that a pitched shot can not be expected to hold on the plateau where the cup is located.

Never ask a man what he thinks of your course unless you insist that he be perfectly free to make suggestions or criticisms. Otherwise he will lie to you like the traditional gentleman.

A good architect must constantly strive to secure variety with harmony in his architecture. A golf course with all the bunkers or all the greens alike is a sad sort of affair.

Every feature of every good golf hole should be designed for a definite purpose. The problem to solve should be evident to the player. It should not be a puzzle.

Bobby Joy, the caddy, lost his job because he could not learn never to laugh. Here's hoping the readers of "The Bulletin" have a sense of humor so they won't fire the Editors.