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

Vol. V Washington, D. C., September 15, 1925 No. 9

A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

CONTENTS

Published by the Green Committee of the United States Golf Association at Room 7213, Building F, 7th and B N. W., Washington, D. C.
Address all MAIL to P. O. Box 313, Pennsylvania Avenue Station, Washington, D. C.
Send TELEGRAMS to Room 7213, Building F, 7th and B N. W., Washington, D. C.
Subscription Price: To golf clubs that are members of the Green Section of the U. S. Golf Association, $4.00 per year (included in membership fee).
Entered as second-class matter December 16, 1921, at the postoffice at Washington, D. C., under the Act of March 3, 1879.

Theory and Practice

"Medicine," said Home (1752), "has attained its present perfection only from the history of diseases and cases delivered down." Even up to a quarter of a century ago, whatever of science there was in medicine was largely of the kind that results from the slow accumulation of a great body of data. The same may truly be said of plant culture. Doctor and plant culturist are practitioners with much in common in so far as the development of their particular art or science or profession is concerned. Cut-and-try methods have been the stepping stones that have brought medicine and agriculture to their present development. To empirical methods must be attributed much of progress which has been attained in each. The advent of the modern thirst for knowledge—the desire to know why, to learn the answer—has produced the professional investigator, who has sought not only to propound theories to fit established practices but also to establish new practices on purely theoretical bases. He has found the going hard, partly because his inexperience and enthusiasm have caused him to overlook important details, such as are prone to turn up unexpectedly to upset the best of calculations, and partly because of a reluctance on the part of the practitioner to accept him as a fellow worker. Consequently a sort of barrier, artificial though it may be, has been erected between those who are primarily concerned with practicing and those whose compelling interest is in investigation. This fence or barrier has in a measure restricted the viewpoints of both groups of workers and has given the layman a totally erroneous conception of the differences that lie between them. To the layman the investigator is a theorist, nothing more and nothing less, and somehow or other in the layman's mind theory and practice are quite antagonistic, rarely working in harmony. No more erroneous notion could exist than that theory and practice are in any serious sense opposed. There is nothing incompatible in their relations; in fact, they are for the most part inseparable. However, what are often regarded as theories are nothing but fallacious hypotheses, and to this much of the existing confusion is due. An hypothesis is based on little more than an unorganized tangle of hasty observations, frequently only on pure figments of the imagination. A theory before it can truly be called such must have back of it the support of unquestioned facts. When sufficient facts or proofs are at hand, a law is adduced; but in the mind of the layman, hypothesis, theory, and law are synonymous, all definitely the product of the scientist and all more or less hopelessly out of accord with the practical working out of things. Let it not be understood that theories are never wrong. Theories may be unsound and impracticable; but practices may also be unsound, even though generally adopted and of long standing. Furthermore, unsound theories usually give way more quickly than unsound practices when critical tests are applied, and they do less harm while they last.

There is no need to defend either scientist or practitioner, for if the scientist with his theories becomes helpless in the realm of practice, certainly he is no more so than the practitioner in the realm of theory. But there is need of vigorously attacking the false doctrine, unfortunately too widespread, that scientist and practitioner can not in the very nature of things work in sympathetic cooperation. This doctrine is destructively false and is tending to keep the two groups

of useful workers from uniting as they should in the interest of greater accomplishments. Both are valuable servants and neither is necessarily the master. Investigations produce the new knowledge that is needed to improve practice, and practice is the proving ground that makes theory worth while.

How to Prevent or Overcome Grainy and Fluffy Conditions of Turf in Vegetative Greens

By O. B. Fitts

The Green Section has received from some clubs descriptions of a "grainy" condition of their creeping bent putting greens which makes them unsatisfactory for putting. Other clubs have complained of a loose or "fluffy" mat of turf, which is undesirable for both putting greens and tees. The grainy condition usually occurs with some of the poorer strains of creeping bent, namely, strains which have a tendency to produce surface runners in turf, and those broad-leafed strains the leaves of which lie down flat, producing a cow-lick or radiating effect which, when the putting is against the grain, renders the putting slow and bumpy, and when the putting is with the leaves renders the putting fast. In either case the putting is more or less puzzling. The fluffy condition occurs with almost any strain of creeping bent which has not been kept closely clipped and properly topdressed or filled. These two conditions, while they are entirely unlike and present distinctly different problems to the greenkeeper, may be prevented or overcome by the same treatment; the preventive method is preferable to the curative treatment.

PREVENTIVE METHOD.—Begin cutting the grass down to a putting green length as soon after planting as it has become established and attained a growth of 1½ to 2 inches. Thereafter the grass should be kept cut to a putting green length at all times. The greens should be topdressed with about 1 cubic yard of well-pulverized compost to which has been added 15 to 25 pounds of ammonium sulfate or ammonium phosphate, to each 5,000 square feet of green. The first application should be made as soon as the grass becomes well established, which is usually from four to five weeks after planting. This treatment should be repeated as frequently as is necessary to keep the turf filled to such an extent that it presents a smooth, firm surface. Each application of compost should be brushed well down into the turf and then thoroughly watered to prevent the ammonium sulfate or ammonium phosphate from burning the grass.

CURATIVE TREATMENT.—In case either of the above-mentioned conditions is in evidence on the greens, it is advisable to rake the surface lightly with a light iron-tooth rake and thereby comb up the surface runners and flat-lying leaves so that they may be cut off with a putting green mower. The mower should be set down so as to clip the grass as low as possible without crowning or scarring the turf. In this way the surface runners and leaves which have been combed up in the process of raking may be clipped off. It is then necessary to follow immediately with a topdressing, as suggested in the preventive treatment. This treatment will probably leave the green in a rather browned, sickly-looking condition, but the surface should be firm and smooth. Then if the topdressing is thoroughly watered in, it will be only a short time until the grass should be in a

good healthy condition and the greens smooth and firm. After the greens have been thus treated it is necessary to follow with the preventive method as suggested above to avoid a recurrence of the undesirable condition.

Soil analyses.—On page 128 of the June, 1925, Bulletin the following item appears: "Soil analyses.—These are of practically no value. No one living can tell what they mean." This was meant to refer only to chemical analyses of the traditional sort. Mechanical soil analyses are helpful, as are also those which determine the acidity or alkalinity of the soil.

Centipede Grass (Eremochloa ophiuroides)

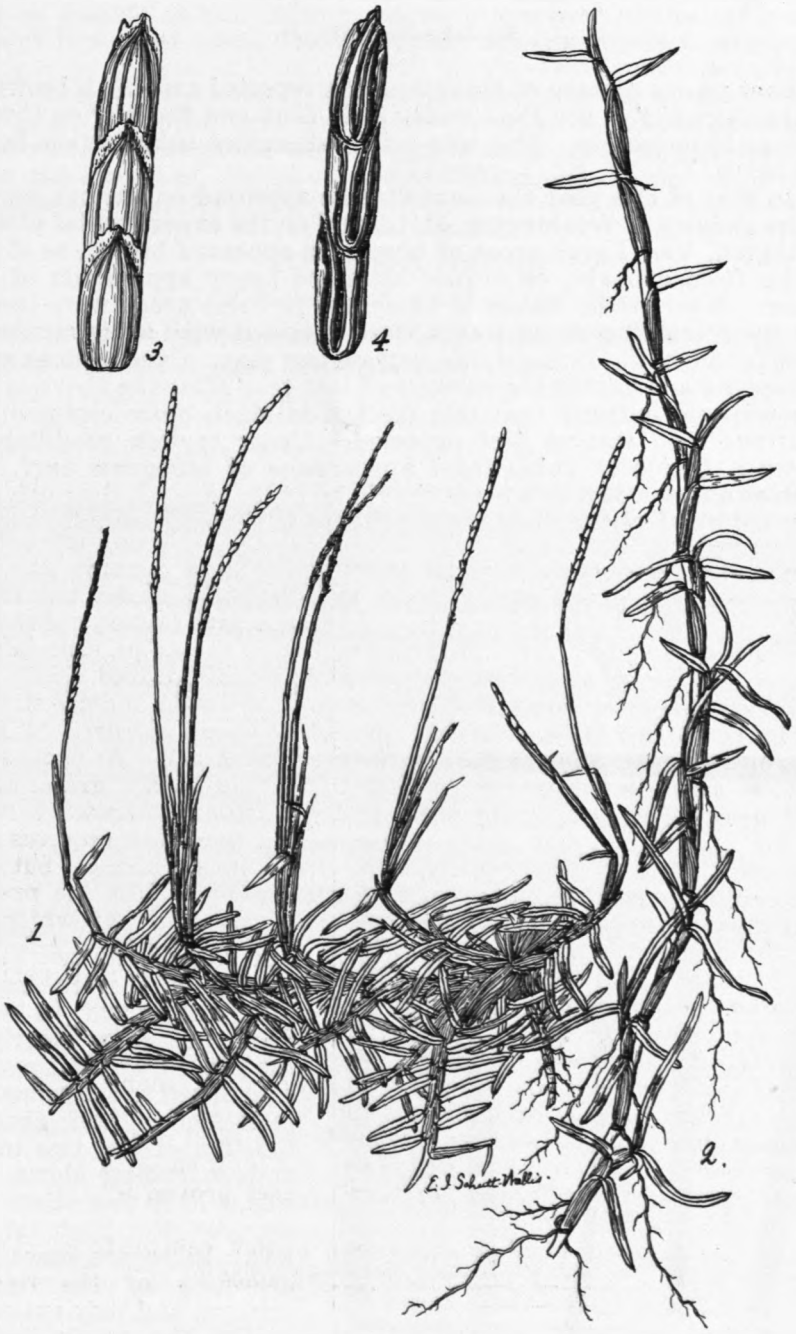
By C. V. Piper and W. E. Stokes

Centipede grass is a creeping perennial grass occupying much of the southern half of the Chinese Empire and forming there the principal pasture and lawn grass. It was introduced into the United States by the Department of Agriculture in 1919, and since then has been widely tested. It proves hardy in the United States only far southward, south of a line from Shreveport, La., to Wilmington, N. C. The illustration shows its characters well. In a general way it is intermediate between carpet grass and Bermuda grass, but it will make excellent turf where neither of these is satisfactory. For most of Florida and along the Gulf strip for 100 miles inland, especially on the lighter soil, it is the best fairway grass yet discovered.

It spreads by stolons which lie close to the ground and are strongly anchored by roots at each joint. These stolons may grow 3 to 5 feet long in a season; and the turf formed is very dense. At Gainesville, Fla., it proves superior for fairway turf to any other grass, and it will spread over that of any other species. It is low-growing, rarely over 6 inches high even when in bloom, and therefore requires little mowing. Seed of good quality is produced in abundance, but commercial supplies have not as yet been developed. For the present, therefore, it must be planted by stolons, each joint of which will readily produce a new plant.

In critical comparisons at Gainesville, Fla., it proves superior to all other grasses for lawns and fairways. It is immune to brown-patch, not attacked by chinch bugs, grows well in shade, and spreads rapidly. It is somewhat browned by frost, but not so much so as carpet grass or Bermuda grass. Also it greens up more rapidly after frost. When runners or joints are planted in rows 12 inches apart a complete sod may be secured in 90 days if well cared for. In an experiment continued over three years on a light sandy soil, centipede grass in competition with other turf grasses proved by far the best for fairway or lawn turf.

At the present time our conclusion is that centipede grass is by far the best of fairway grasses for great areas of soils in the region to which it is adapted. It is hoped that every Green Section golf club in the region will start a nursery of this grass so as gradually to make its fairways of this turf. Material for this purpose will be furnished gratis, together with full instructions. One firm has already planted a large nursery of this grass so as to furnish material commercially. Within a few years seed supplies will, it is hoped, be available.



CENTIPEDE GRASS (EREMOCHLOA OPHIUROIDES)

1. A piece of a plant, one-half natural size.
2. A runner, one-half natural size.
3 and 4. Front and back views of a piece of a spike, enlarged.

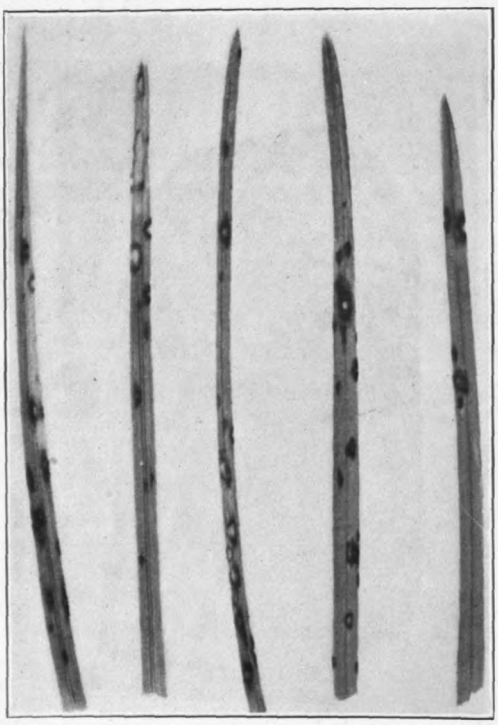
Leaf-Spot of Bluegrass

By John Monteith, Jr.

Last year a disease of bluegrass was reported causing a browning of the fairways of the Pine Valley Golf Club and the Merion Cricket Club at Philadelphia. This was briefly described in an article in the BULLETIN, Vol. IV, No. 7, page 172.

In May of this year the same disease appeared on various courses in the vicinity of Washington, D. C., and on the experimental plots at Arlington, Va. Large areas of bluegrass appeared brown, as if suffering from drought, or burned by a too heavy application of fertilizer. Most of the leaves of bluegrass in these areas were brown, and the remaining green leaves were speckled with spots similar to those found on the Philadelphia courses last year. Observations made this spring and during the summer of last year after the above article was written, indicate that this disease is much more common and injurious than was at first expected. Under certain conditions it causes a decidedly unhealthful appearance of bluegrass turf, and often at a time when this grass should be at its best. It does not, as a rule, kill many of the plants, and the turf in time recovers its normal green color.

The disease appears to be generally distributed and will probably occur from time to time in a more or less serious degree on many golf courses. In order that it may be readily recognized, a photograph is printed here to supplement the description given last year in the BULLETIN. The three blades on the right were green throughout except for the diseased spots with the dark, reddish-brown or black borders and light brown or gray centers. The tips of the two blades on the left were brown. This difference in color does not show clearly in the photograph but may be recognized as the somewhat indistinct lighter area at the tips of the two leaves and extending down one side, a little more than half way, on the blade at the left. In severe cases this browning of the tips is common and may extend to involve the whole leaf or even the entire plant. In such extreme cases the turf has a brown, dried-out appearance.



Bluegrass leaves affected with leaf-spot

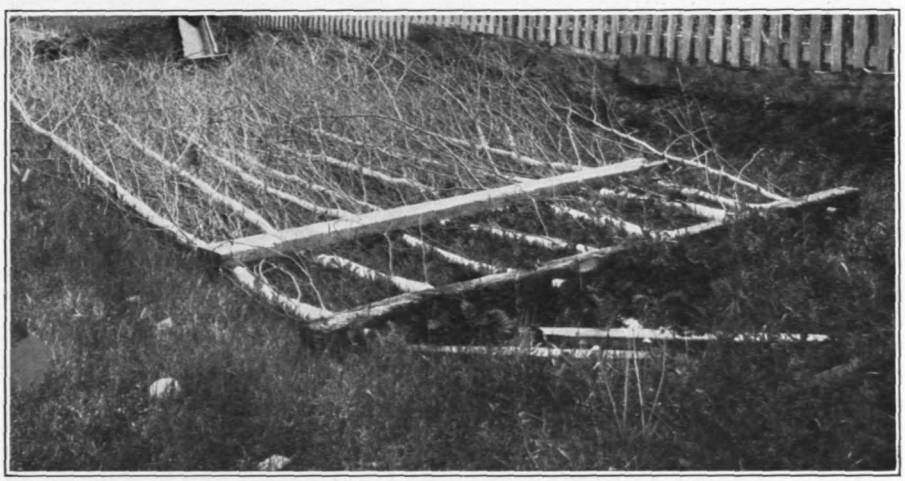
This disease is entirely different from brown-patch of putting

greens. It does not spread to grasses other than bluegrass. Spraying or dusting is not likely to prove a practical method of control except in limited areas. Any ordinary treatment which will induce a vigorous growth of bluegrass will usually prove effective in hiding the affected leaves even if it does not eliminate the disease. When the grass is clipped close the injury from the disease is much more pronounced. Therefore, when a turf is badly affected with this leaf-spot the blades of the mower should be raised as high as circumstances will permit.

The Brush Harrow

By Frank B. Barrett, Hollywood Golf Club, Deal, N. J.

In looking over implements at golf courses it is surprising how seldom one sees a good brush harrow. Such a harrow is not only useful for construction purposes but it is also quite necessary for maintenance where fairways are topdressed. It is also excellent for brushing worm-casts on the fairways in the fall.



Brush harrow made from young poplars

A brush harrow may be made from a 2 by 8 plank 14 feet long into which a hole 1¼ inches in diameter is drilled about 3½ feet from each end and 2½ inches from the front edge for a chain hitch. When it is desired to use the front edge it is necessary only to shorten the hitch. Then get about 15 cedars about 15 feet long and fasten their butt ends equidistant to the plank by bolts, and then wire the brush and pole together to maintain firmness.

When it is desired to use typical brush or switch, use two planks 2 by 8 inches, bolting them together with about a dozen bolts and split washers. The use of a wire here will assist to maintain position of the brush and keep it firm.

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

In taking a stance to play a ball from the rough, when a bush or tree obstructs so that a proper stance may not be taken or prevents the player from getting free back swing, may he break living objects and remove them so that branches of trees or bushes may not hinder him in swinging?

Decision.—The interpretation of Rule 15 is that in taking a stance a player must not deliberately break or bend living objects with a view to improving his swing at the ball.

A player on the 9th hole drove his second shot near the boundary line and played a provisional ball. Before coming to where his first ball lay, without ascertaining whether the first ball was in or out of bounds he played a second shot to the green with the provisional ball. Then finding his original ball was not out of bounds, he played that ball to the green. The provisional ball was over the green and he chipped on to the green with that; then holed out his original ball for a 4; then holed out in 2 more with the provisional ball. One player stated that having played 2 shots with the provisional ball he must continue with that ball and accept the score (8) made with it, and that the original ball was out of play and did not count after he elected to play a second shot with the provisional ball.

Decision.—A player is entitled to play shots with the provisional ball only until it is up to or beyond the spot where the first ball is presumed to lie. If the original ball is found in bounds he must play on with it and play no more strokes with the provisional ball.

A ball is sliced by B from the 17th tee to the 10th green. A tree stymies him. He moves his ball off to the right, so he has a clear shot to the hole. He insists he can move to right or left, or back, just so he is not nearer the hole. A insists he must move back on a line between his ball and the hole, keeping the spot where the ball lay between himself and the hole. Who is right?

Decision.—If there is no local rule the ball must be played where it lies, under the rules. If there is a local rule, a ball is dropped "near as possible but not nearer the hole." "Near as possible" means a club's length.

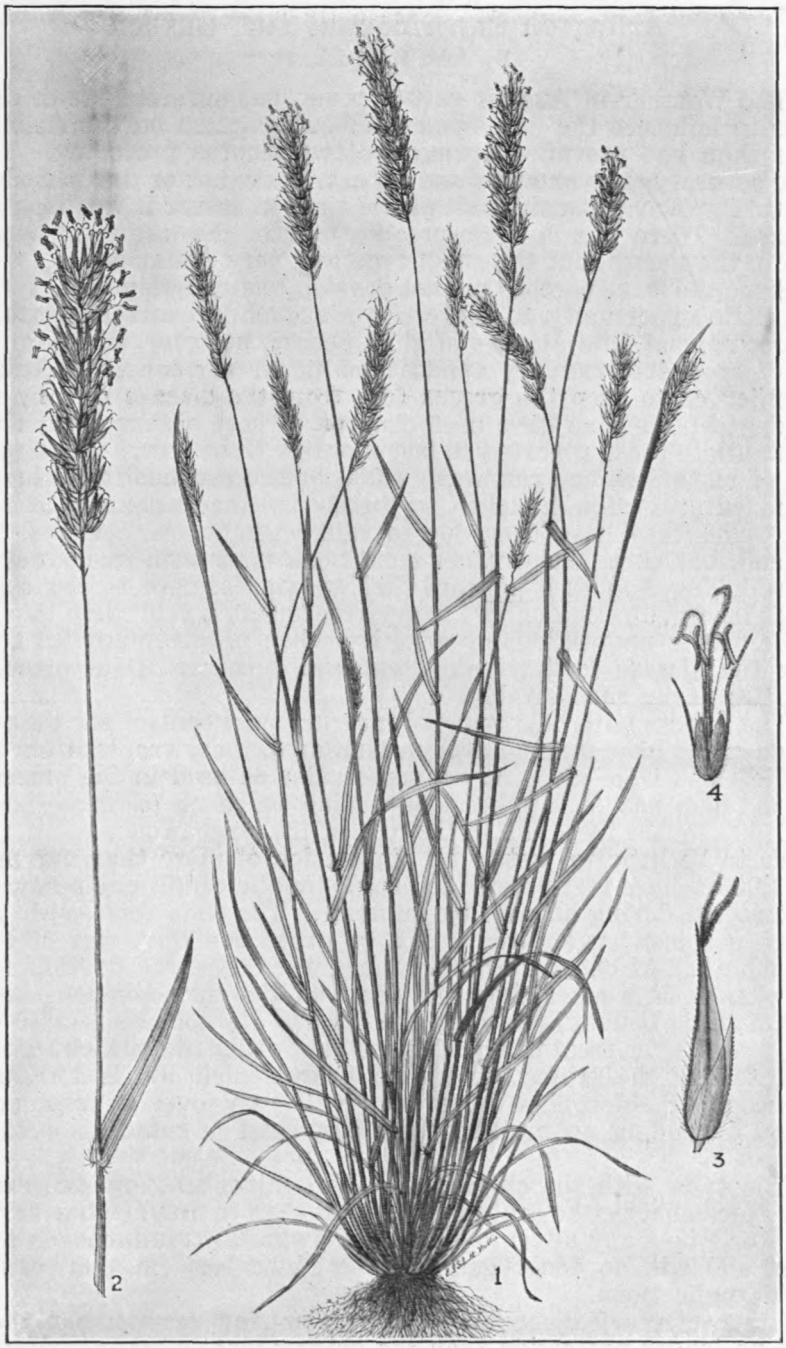
Defective drainage.—Often turf will die out in spots on a green or fairway without apparent cause. In nine cases out of ten, however, the cause is defective drainage.

Sweet Vernal Grass

By C. V. Piper

Sweet vernal grass is native to the Old World but is abundantly introduced in the northern half of the United States, except in the semiarid regions. The grass is notable for two reasons: First, its sweet odor, resembling that of vanilla, most evident when the grass is cut or when it is ripening; second, its ability to grow and spread on very poor land. On account of its odor many golfers like to have it in the rough. Formerly it was used in meadow mixtures to impart a sweet odor to the hay, but it is bitter to the taste, so that cattle do not like it.

It is a bunch grass in habit and excellent for use in the rough. If mowed when in full bloom it will usually require no other care in the rough. As part of a mixture of grasses for the rough, sweet vernal grass has great merit. Seed of sweet vernal grass is cheap and abundant. For the rough, 25 pounds an acre should be used, if sown alone.



Sweet vernal grass (Anthoxanthum odoratum Linnaeus): 1, Plant showing habit (about one-third natural size); 2, a panicle (about natural size); 3, a spikelet (much enlarged); 4, a single floret (much enlarged).

August Experiments For Control of Brown-Patch At Arlington Experimental Turf Garden

By John Monteith, Jr.

The Weather in August gave a somewhat different set of conditions to influence the development of brown-patch on the Arlington plots than had prevailed during the two months preceding. There were several heavy showers and no extremely hot or dry periods; so the turf grew vigorously most of the time wherever it was free from disease. There was no widespread attack of the large brown-patch during the month, but the small type was very common.

Since the large patches did not develop to any serious extent there was little opportunity to make observations on control treatments. The occasional mild attacks of this disease, however, did show that the chlorophenol mercury applications under our conditions can not be relied on to keep the greens free from the disease for any such prolonged periods as have been claimed. These observations simply substantiate those reported in last month's BULLETIN. Any application of more than one pound per 1,000 square feet has failed to show an added protection sufficient to justify the increased cost of material. This may have been due to rain washing the chemical from the soil, but since the weather conditions have been in no way unusual during August it appears that we can not hope to prevent the disease simply by one or two heavy treatments a year with this fungicide. It is unquestionably effective when properly applied at the time the disease is developing, but the duration of its protective qualities varies considerably.

The results with chlorophenol mercury as a control for the small brown-patch have in general been similar to those reported for July. Applications were made at the same rates as used in the preceding month; also heavier applications—using as much as three pounds per 1,000 square feet. As in the case of the large brown-patch, there seems to be little to justify an application of more than one pound per 1,000 square feet under the usual climatic conditions which may be expected during an average summer. The tests this month have shown a somewhat shorter period of protection than was observed last month. At one time new patches were observed developing on the plots 6 days after they had received the chlorophenol mercury treatments. Usually, however, the disease did not occur in 10 days to 3 weeks after treatment. The results during the last two months indicate that the protection against brown-patch obtained from applications of chlorophenol mercury will vary over a considerable range, depending on numerous factors, chief of which is probably rainfall.

The tests with the chlorophenol and nitrophenol mercury dusts gave somewhat better control in August than in July. They did not, however, show any advantages over the similar treatments in liquid form, and will no doubt generally be found less efficient than the liquid applications.

Other mercury compounds gave promising results, but usually gave no longer protection than the chlorophenol mercury; they will be investigated more thoroughly and be reported on later. Bordeaux, copper sulfate, and copper stearate further showed that the copper fungicides are practically ineffective in controlling the small brown-patch.

Certain formaldehyde tests also gave some promise of control and will be reported as soon as they are tested under more varying conditions.

The Use of "Activated Sludge"[1] As a Fertilizer For Golf Courses

By O. J. Noer, Fellow, Department of Soils, University of Wisconsin

Milwaukee's new $10,000,000 sewage disposal plant is now in operation, and by October 1, 1925, will produce approximately 100 tons of so-called "activated sludge" fertilizer daily. This plant is unique, inasmuch as it will recover some of the valuable plant-food elements now lost to agriculture by the present-day wasteful methods of sewage disposal.

Activated sludge is a granular, porous, organic material containing less than 10 percent moisture, and of uniform chemical composition. The finished product is slightly acid, testing about pH 4.4, because sulphuric acid is added to the wet sludge in order to facilitate dewatering. This acid treatment, together with the high temperatures in the dryers, produce a sterile product, free from weed seeds and bacteria of all kinds. The chief plant-food element is nitrogen, which constitutes 6 to 7½ percent, calculated as ammonia. In addition, it contains from 2½ to 3½ percent of available phosphoric acid, and less than one-half percent of potash.

In order to obtain definite information regarding the value and utilization of its product, the Milwaukee Sewerage Commission established a fellowship at the University of Wisconsin, where investigations have been conducted for several years under the direction of Prof. E. Truog. It seems desirable to present some of the results pertaining particularly to the use of activated sludge on golf courses.

When obtainable, good manure is prized for use in topdressing mixtures, but, unfortunately, supplies are rapidly diminishing. It must be composted to destroy weed seeds and subsequently screened to obtain a desirable mechanical condition, processes which involve time, possible shrinkage of the manure, and large labor expense. Activated sludge can be used to replace manure in topdressing mixtures, and actually possesses some distinct advantages for this purpose. Composting and screening are unnecessary; hence the sludge is available for immediate use. Where sulphate of ammonia is mixed with the topdressing, activated sludge, due to its colloidal properties, fixes the ammonia and reduces the possibilities of burning. The nitrogen will be released gradually and a longer continued feeding of the plant thus results.

Very satisfactory results have been obtained by using 100 pounds of activated sludge to each 3,000 square feet of green. Applications three times as strong have been made without any bad effects due to so-called burning.

To obtain quick and certain results, activated sludge should be used in conjunction with sand and soil in order to provide bacterial inoculation and to insure conversion of the nitrogen into soluble

[1] The manufacture of activated sludge is part of the sewage-disposal system of the city of Milwaukee. The material is sold not for profit but to defray as far as possible the expenses of the sewage disposal.

forms available to the plant. Activated sludge, in supplying nitrogen, causes the grass to take on a dark green color and to grow more vigorously, which is evident in the larger amount of clippings obtained. Two methods of application on established greens have been successfully used and are recommended.

1. Mix the desired amounts of sludge, sand, and soil, allow the mixture to stand in a pile for 10 to 14 days, and then apply to the green as a topdressing.

2. Broadcast the sludge over the surface of the green and apply a soil and sand mixture over this.

When the topdressing mixture is allowed to stand in the open for 10 to 14 days, heavy rains may destroy its mechanical condition and make uniform distribution difficult. This necessitates reworking the compost, involving extra labor, which, however, can be avoided by storing under cover.

Activated sludge has been applied to greens on a large number of courses in Milwaukee, Chicago, St. Louis, Cleveland, Detroit, Louisville, Kenosha and other cities for the past three years. All applications were made by the greenkeepers based on instructions forwarded with the sludge. On the whole, very satisfactory and positive results were secured.

No. 12 fairway, Milwaukee Country Club; photographed May 2, 1925. Seeded August 28, 1924, to mixture of Kentucky bluegrass (70 percent), redtop (20 percent), and ryegrass (10 percent), at 250 pounds per acre. The dark strip in the center of the picture had been fertilized with 5-6-4 activated sludge, at 2,000 pounds per acre. The light strip in the foreground had been left unfertilized

Proper fertilizing of new greens prior to planting bent stolons, will undoubtedly bring the greens into play earlier. The indiscriminate use of large quantities of manure on the average good loam soil is not only unnecessary but positively harmful. Thick layers of manure imbedded deep in the greens not only place the plant food beyond reach of the feeding roots but may also encourage worms, and may eventually produce an uneven surface due to settling.

Activated sludge has been used at the rate of 100 pounds per 1,000 square feet as the only fertilizer on a number of new greens. It was worked into the surface soil prior to planting the stolons. At the Lynx Club, Milwaukee, the green which received sludge at the

time of planting was in playing condition before any other green on the course. The following spring the grass on this green was the first to start growth and forged ahead so rapidly that the difference was evident at a distance of 80 rods. Very good results were obtained at the Milwaukee Country Club during the past year.

By exercising foresight in the selection, fertilizing and preliminary treatment of turf nurseries, much subsequent hand labor can be eliminated and a maximum growth of stolons assured. A mellow loam soil, easily worked, and which does not bake after rains, is to be preferred. Early plowing is essential so weeds can be killed by frequent disking and harrowing prior to planting. Then the liberal use of fertilizer will promote growth and insure an abundant production of stolons in a short time. While nitrogen is essential, the use of phosphoric acid, in addition, on many soils will stimulate root development and aid in quickly establishing the plant.

In the fall of 1924 fertilizer experiments were started on some new fairways in the process of construction. The soils were good silt loams, which, while they had been cropped for about 50 years, had received regular applications of manure and were considered fertile. A 5-6-4 mixture (5 percent nitrogen as ammonia, 6 percent phosphoric acid, 4 percent potash) in which the nitrogen was supplied from activated sludge was used at the rate of 2,000 pounds per acre. The fertilizer was applied broadcast and disked into the soil prior to seeding. By October 1 the half-acre fertilized plots, on fairways seeded the latter part of August, were completely covered with grass, and by early spring were in good playable condition, while the unfertilized plots still contained many bare spots, which have since been reseeded.

A Monument to Jock Inglis

The Country Club of Montgomery, Alabama, has erected on its golf course a monument to the memory of the late John M. Inglis, who died January 17, 1924. Mr. Inglis was for a long time the greenkeeper of the club, and by careful observations and experiments developed putting greens of Bermuda grass of surpassing excellence; indeed, for years they were generally regarded as the best in the South. The Club has continued to maintain the high standard of its greens. During the year the course has been improved in many particulars. It is now building a new club house along the lines urged by Mr. Inglis so that it can entertain the winter guests who in increasing numbers are using its splendid advantages.

Building a monument to a greenkeeper is a unique thing in the world of golf, and one which some other clubs may emulate.

Washing balls with liquid soap in pails.—"We tried two of the ball washers on the market in which the balls are placed and washed by turning a handle, but the players did not like them. We then bought some gallon pails, which we painted and hung on fire hooks at the various tees, either on trees favorably situated or on upright posts. Towels are attached to the pails. We use water in the pails, to which a small amount of liquid soft soap is added. This cleans the balls in fine shape. At first we supplied brushes at the pails, but found they were not needed, as the soap loosens the dirt so that it comes right off."—*Earl B. Kent, Highland Country Club, Attleboro, Mass.*

Water As An Essential In Growing and Maintaining Good Turf

By O. B. Fitts

Water is frequently mentioned and discussed as one of the most important elements in golf course maintenance, but in most cases it is not given the consideration which its importance requires. Evidence of this stands out boldly in the fact that many golf courses fail to get the desired results while others succeed to a certain extent and a very few achieve excellence. Water is applied on practically all golf courses, particularly on the greens. In some cases, however, it appears that very little practical judgment is exercised. Good judgment must be used in applying water in order to obtain satisfactory results, no less than in the other important features of putting green maintenance. There are many things which a greenkeeper should know about his greens and fairways in regard to the applying of water. Each of these things should be thoroughly considered, the amount of water, time of watering, and frequency of watering being determined after particular study and attention is given to the requirements of each individual green or fairway. Questions frequently asked are: At what time of the day should greens be watered? How much water should be applied? And how often should the greens be watered? There is no definite answer to any one of these questions which could be applied with satisfaction under the varying conditions of soil, climate, exposure, contours and drainage. However, there is one general answer which under any conditions may be given to each of these questions and be reasonably sure of producing good results; it is this: Water early in the day if you can, but if not water later, and in any event be sure to water. Apply plenty of water, sufficient to meet the requirements of your turf under prevailing conditions. Apply water when you think it is needed. A more frequent and light sprinkling is preferable in most cases to heavy watering or soaking at longer intervals.

Another question frequently asked is, Why do putting greens require more water to keep them in good condition than do ordinary lawns? The grasses forming a putting green turf do not necessarily require more moisture per given area than do the ordinary lawn grasses. When, however, we take into consideration the fact that when grass is kept cut very short, as it should be on putting greens, we shall find that under such conditions it has a very shallow root system. The length and depth of roots vary with the height of the plant. Ordinary lawns are not clipped so close; consequently the grass roots grow deeper and are able to make use of the moisture stored up in the soil several inches beneath the surface. Short roots, on the other hand, can make use of the moisture contained in only a very few inches of the top soil, and therefore require more frequent applications of water to keep the moisture within their reach. The close-clipped grass, with its shallow root system, has not the capacity the taller and longer-rooted plants have.

Thorough soaking of the greens at less frequent intervals for the purpose of encouraging a deeper root system has been advised by some writers. Unfortunately for this advice, it does not give the results stated. Short turf always has short roots, which condition,

indeed, makes for a dense, resilient turf. This is clearly shown in the accompanying illustration.

Another important fact to be considered is that the surface of the average green is very much exposed to the sun and wind, so that the surface moisture evaporates rapidly. When the green is watered heavily or soaked at intervals of four days or a week the surface becomes firm from the watering and the trampling of players over it and is made uneven by impressions or footprints. Then the sun and wind have a tendency to bake or harden the surface soil. Consequently, after about one good day of sunshine and play, the surface of the green will be hard and more or less uneven until time for another soaking. This not only makes the green unsatisfactory for play but is not conducive to the continuous growth of the grass which keeps the turf perfect and makes putting a pleasure.

Cross section of bent turf, showing the compact mass of grass and roots about 1½ inches in depth, necessitating frequent watering.

One of the many interesting results of the use of water is that it is a helpful factor in the control of the brown-patch disease. Its effectiveness in this respect has been studied in connection with the experimental turf garden at Arlington. When water is freely applied early in the morning before the heat of the sun has become sufficiently intense to dry the moisture from the grass at times when the brown-patch fungus is active, the fungus is affected in some manner which retards or checks it to such an extent that little injury is done to the grass and its recovery from the disease is more rapid. This point alone is worthy of careful attention in combatting brown-patch.

The amount of water to use and the frequency of its use can be determined only by careful observation on each green from day to day. The character of the turf is the only criterion, and the responsibility of the decision must rest with the greenkeeper.

New Member Clubs of the Green Section.—Bass River Golf Club, South Yarmouth, Mass.; Blink Bonnie Golf Club, Sorrento, Me.; West Hartford Golf Course, Hartford, Conn.; Elyria Country Club, Elyria, Ohio; Shenecossett Country Club, Groton, Conn.; Tuscumbia Country Club, Green Lake, Wis.; Elwood Country Club, Elwood, Ind.; Spring Brook Country Club, Lima, Ohio; Town and Country Club, Washington, D. C.

Getting Rid of Ground Squirrels At the Scioto Country Club

The Scioto Country Club, Columbus, Ohio, has been pestered with the 13-line ground squirrel on its course for the past nine years, to the extent, as Mr. George Sargent advises us, of nearly undermining the entire course. The problem was laid before the United States Biological Survey, through the Green Section, and the following poison bait was recommended as the most effective means of exterminating the squirrels:

Mix 1 tablespoonful of gloss starch in ½ teacup of cold water, and stir into ½ pint of boiling water to make a thin, clear paste. Mix 1 ounce of powdered strychnine (alkaloid) with 1 ounce of baking soda (bicarbonate), and stir with the starch to a smooth, creamy mass free of lumps. Stir in ¼ pint of heavy corn sirup and 1 tablespoonful of glycerin, and finally 1 scant teaspoonful of saccharin. Apply to 20 quarts of oats and mix thoroughly to coat each kernel. Each quart of poisoned grain is sufficient for 40 to 60 baits. This quantity, scattered (1 teaspoonful to a place) along squirrel trails, or on clean, hard surfaces near the holes, will not endanger stock.

Columbia Ground Squirrel

The bait was prepared and scattered as suggested, under Mr. Sargent's direction, and he writes that the following day the men on the course gathered up between 150 and 200 dead squirrels, and that since then a live ground squirrel has not been found on the course.

More than 50 species and races of ground squirrels occur in the United States and Canada. They comprise a group of long, slender animals, of grayish or grayish-brown color, sometimes mottled or striped, and with a medium or long tail, usually less bushy than that of the larger of the tree squirrels. These ground squirrels are often,

but wrongly, called "gophers," and are locally called "digger squirrels" and "picket pins." They dig numerous deep burrows, and are very destructive to both crops and turf.

Among the largest and most destructive of these animals is the California, or "digger," ground squirrel. It is gray in color and has a long, rather bushy tail. It occurs in the Southwest and West from western Texas to California and Oregon. In parts of California the race known as the Beechey ground squirrel is especially abundant and menaces not only crops and irrigation ditches but also human life, in that it is a known carrier of bubonic plague. Another large and destructive species is the Columbia ground squirrel, occurring within the United States in parts of Montana, Idaho, eastern Washington and eastern Oregon. Another species, destructive and widely distributed, is the Richardson ground squirrel. In its larger form it is found in much of Montana, the Dakotas and northward into Canada. A somewhat smaller race is found in southeastern Oregon, northern Nevada, southern and eastern Idaho, southern Wyoming and southern Colorado. The striped ground squirrel, the Franklin ground squirrel and some other species are less gregarious and seldom occur in great numbers in any locality.

Trapping is a slow process to use effectively against large colonies of ground squirrels; the use of poison baits is therefore recommended for their extermination. The same bait can not, however, be used effectively against all of the species, and three different formulas are therefore recommended. The formula given above has been used successfully against the Richardson ground squirrel and the striped ground squirrel. For the California or "digger" ground squirrel the same preparation is used except that 16 quarts of clean barley are substituted for the 20 quarts of oats.

For the Columbia ground squirrel the following formula is advised: Mix 1 ounce of powdered strychnine (alkaloid), 1 ounce of powdered bicarbonate of soda, 1 teaspoonful of saccharin, and ½ pound of dry powdered laundry starch, and stir with enough cold water to make a smooth, creamy paste. Apply to 12 quarts of good, clean oats in a metal tub or other vessel, and stir thoroughly to distribute the poison evenly. When the poisoned grain is dry, scatter it along squirrel trails or on hard soil on the surface near the squirrel burrows. A quart of the grain should make 40 to 50 baits, and if properly distributed stock will not be endangered by this quantity.

A word of caution must be given when the use of poison of any kind is contemplated on a golf course. All poison containers and all utensils used in the preparation of poisons should be kept plainly labeled and out of reach of children, irresponsible persons and live stock.

The foregoing data on ground squirrels and exterminating them with poison are taken from Farmers' Bulletin 932, "Rodent Pests on the Farm," which may be obtained free upon application to the United States Department of Agriculture. The bulletin also discusses field mice, cotton rats, kangaroo rats, pocket gophers, prairie dogs, woodchucks, rabbits, and other native rodents.

"The Case for the Caddie."—Under this title the Metropolitan Golf Association, New York City, has issued a very attractively printed pamphlet dealing with the caddy problem. It contains very helpful advice and suggestions.

Time of Day to Water Greens.—"In the summer of 1924 we conducted an experiment on our course, near Washington, D. C., in Maryland, to determine the best time of day to water putting greens. For one month the first nine greens were watered at night and the second nine in the daytime. After one month the process was reversed—that is, the first nine were watered in the daytime and the second nine at night. The greens are all very nearly uniform, all being vegetatively planted to bent. At no time during the experiment was the slightest effect observed due to the time of watering. My conclusion is that the best time to water is that which is most convenient."—*Marshall Whitlatch, Burning Tree Golf Club.*

Poisoning Moles

Mr. R. H. Carter, of the Edgewood Arsenal Golf Club, Edgewood Arsenal, Md., who has conducted experiments in the poisoning of moles, makes the following report under date of June 11, 1925: "We have obtained excellent results in poisoning moles on our course with strychnin and potassium cyanide. In using the strychnin, peanut butter was mixed with about an equal weight of olive oil to render it more easily worked, and then about 1 percent of strychnin was added to the mixture and thoroughly incorporated by stirring. Application was made by opening the mole's burrows at 10 or 12-foot intervals and inserting small pellets of the preparation. In using the potassium cyanide, small cubes of raw potato were immersed in a 20 percent solution of this poison and inserted in the burrows. There is no danger of injury to children or livestock in using the poisons in this manner, although the peanut butter preparation is probably safer in this respect."

Successful results in combatting moles with poisons have previously been reported in the BULLETIN. Nevertheless, as pointed out in the article on trapping moles on page 90 of the BULLETIN, April, 1925, the only method that seems to have met with universal success is the use of specially designed traps. In this connection the comments of Dr. A. K. Fisher, of the Bureau of Biological Survey, United States Department of Agriculture, will be of interest:

"In regard to the report on poisoning moles with strychnin and potassium cyanide, our experience would indicate that the method was probably less successful than might have seemed to have been the case. Moles cease to work near the surface of the ground during periods of hot, dry weather, so that it is very hard to obtain definite information concerning the use of any preparation used for the control of moles. So far as known, this Bureau has never succeeded in poisoning a sufficiently high percentage of moles to warrant recommending this method."

Do Not Neglect Your Approach Areas.—It is of course necessary that an approach shot to a green should be given every reasonable chance to run straight. This can not happen if the approach area is occupied with rough, uneven, thin fairway turf. Depressions in the approach area can best be remedied by frequent light topdressings. Fertilizing, weeding, and mowing should not be abruptly terminated at the established edges of the green but this work should be continued outward until a turf very nearly approaching that of the putting green in quality is maintained in the approach areas.

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 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. Ribbed or checkerboard effect when turf is cut.—We notice that after cutting our putting greens this year the grass is ribbed, presenting a square checkerboard effect, when cutting both ways. Can you suggest a remedy? (Massachusetts.)

ANSWER.—The effect you describe will be produced if the cutting blades of a mower are not evenly adjusted or if the roller on the mower is not set level. In both cases the grass at one end of the knife is not cut as close at the grass at the other end, producing unevenness, or ridges or ribs of uncut grass running parallel with the direction in which the mower is pushed. By cutting both ways with such a mower the checkerboard effect is produced. In cutting thick turf too much attention can not be given to the adjustment of the blades of the mower. The blades must also be sharp, else an uneven, or corrugated, turf will result.

2. Winter treatment of Bermuda greens; Poa annua and Poa bulbosa for early spring and late fall turf on Bermuda greens.—Putting during the early spring and late fall on our Bermuda greens has been rendered difficult on account of the abundance of *Poa annua* in the turf, notwithstanding everything possible has been done to check the growth of this grass, even to cutting it out, but only to see it return the following fall thicker than ever. We accordingly came to the conclusion that by the use of manure on the greens we would not only increase the growth of the Bermuda grass, but also the growth of the *Poa annua,* and to such an extent that this latter grass would spread all over the greens and thus provide a good putting surface during the early spring and late fall. With this in view we covered the greens with stable manure the last week in December and first week in January, and early in March we raked off what was left. The greens where the manure was thickest were well covered with *Poa annua* and furnished good putting at that time of the year. On the greens which did not receive a very thick covering the putting was also good but the grass was later in coming through. We are also of the opinion that by planting 15 to 20 pounds of redtop seed on the Bermuda greens before the manure is put on early in December we can have true putting greens by the last week of February and at the same time greatly help the growth of the Bermuda the following season. (Virginia.)

ANSWER.—The only objection we can see to covering your Bermuda greens over winter with manure is the probability that the manure will invite grubs. Where much manure is used grubs and earthworms become troublesome. As an alternative to the use of

manure you might try fertilizing your greens in late fall and early spring with ammonium sulfate applied at the rate of approximately 3 pounds to 1,000 square feet. Excellent results have been secured with this method. However, it is clear that Bermuda, like creeping bent, must have abundant water and abundant fertilizer for good results. The practice of starving Bermuda turf, which has been followed by many clubs in the past, certainly makes very inferior greens. As regards *Poa annua,* it has seemed impossible to get a solid stand of it, as it almost invariably appears in spots, thus making a most unsatisfactory turf. If however by your topdressing methods you can secure a full stand of it, that would certainly make it very desirable in winter. There is another grass, *Poa bulbosa,* which, unlike *Poa annua,* is a perennial and which, when once established in Bermuda turf, comes up every winter and disappears by the middle of May or the first of June. It would be slow in becoming established in a Bermuda green, but when once established it ought to make wonderful winter greens. Many of the southern courses have given up planting redtop, Italian rye grass, or other grasses on the Bermuda for the winter play, as the winter grass always gives the Bermuda a considerable setback. They keep up their Bermuda greens in essentially the same way creeping bent greens are kept up in the North, namely by topdressing and fertilizing with ammonium sulfate, and in the winter they play on the dormant or even browned Bermuda turf.

3. **Improving thin stands on fairways.**—Our fairways are badly cupped on certain holes owing to rain, wind, and hailstones. The grass growth is very sparse. We are topdressing with old rotted cow manure, using a light drag, and so filling the cups, and then rolling with a light horse roller. We are not harrowing, for fear of uprooting the present grasses. In the spring it would be possible to use a sharp knife harrow that would cut and not tear the soil. Do you think we will gain any great benefit from the manure in the way of having the present grasses spread? Also would you advise seeding with Kentucky bluegrass, redtop, and clover in the spring, then dragging with a chain harrow to cover the seed, and lightly rolling? Where our fairways have been slightly cultivated and seeded we have obtained a fair catch of grass, with only two rains to cause germination and growth. We have no watering system for use on our fairways, but expect to install one. (Alberta.)

ANSWER.—We doubt whether you can do more to improve your fairways than to fertilize them with well-rotted manure, or with bone-meal, in the way you have been doing. We do not believe you will obtain any improvement from the use of a harrow on your fairways. We have tried harrows under similar conditions and they have not been at all helpful in thicking up turf. Fertilizers of this character however do help materially, especially if applied in the winter and early spring, so that their effective principles may be available for the turf during the growing season. We are confident it would be a waste of money for you to attempt to thicken up the turf of your fairways by sowing bluegrass and other species of grasses before you have installed an adequate watering system for your fairways. If however you can provide adequate water for your fairways, it would be well to seed the thin spots in the early fall or

late summer with a mixture of bluegrass, redtop, and white clover. Be sure to roll your fairways once in the spring after the frost is out of the ground.

4. Grasses for winter greens in the South; rate of seeding redtop, Italian rye grass, and Kentucky bluegrass.—What seed would be best for our winter greens? Would October 15 be about the right time to sow the winter greens? (Louisiana.)

ANSWER.—We would suggest that you use redtop alone, or Italian rye grass alone, or redtop and Kentucky bluegrass mixed. We do not know whether you have any brown-patch in winter, but we have seen it pretty bad at New Orleans. Redtop and Italian rye are both susceptible to brown-patch, whereas Kentucky bluegrass is perfectly resistant. White clover is likewise absolutely resistant to brown-patch, and if you care you could use that. The only objection to Kentucky bluegrass is that it is slower to become established than either Italian rye grass or redtop. We should say you are perfectly safe in seeding for a winter green any time beginning the first of October. It would be very interesting if you would try one green in redtop, one in Italian rye grass, and one in Kentucky bluegrass, so that you could get an actual comparison of them. You would need to seed your redtop at the rate of about 5 pounds per 1,000 square feet, Italian rye at 10 pounds per 1,000 square feet, and Kentucky bluegrass at 8 pounds per 1,000 square feet.

5. Bone meal as a fertilizer for putting greens.—We are to begin (October) final topdressing on our greens for the season. They are in need of a good stimulant. We can buy pure bone meal from a local plant here at what we consider a very reasonable price in comparison with fertilizers sold by regular seed houses. Will bone meal itself bring good results? The grass on our greens is mostly fescue and in fairly good shape. Our soil is hard clay. How much of the bone meal would you recommend to use in topdressing for average size greens? (Pennsylvania.)

ANSWER.—Bone meal is a very good grass fertilizer, but for bent or fescue greens we prefer ammonium sulfate mixed with good compost such as we have described at various times in the BULLETIN. Bone meal, while quite highly nitrogenous, carries with it other elements that have a tendency to encourage clover and other weeds on putting greens. For the fall we have found a mixture of compost and ammonium sulfate—15 to 25 pounds of the former to 1 cubic yard of the latter—sufficient for treating 5,000 square feet of green. If bone meal is used, 10 pounds to 1,000 square feet is not excessive.

6. Fall mowing of fairways.—We have an excellent sod on our fairways consisting of clover and bluegrass, with a very heavy stand of mixed fall grasses, which latter predominate at this season. The fairways are getting ragged, but we are afraid to clip them so late (October). Is it customary to clip the fairways of golf courses at this time of the year and later in the fall? (Virginia.)

ANSWER.—As for mowing fairways at this time of the year (October), we would advise you to do so. Fairways should be kept at the proper height throughout the season. That means that they should be mowed as late in the year as necessary to keep them at

good fairway height. There is no danger from winterkilling of turf that is well drained, and height of cutting apparently does not enter in to any appreciable extent.

7. Injury to turf from lack of sufficient topdressing.—We are sending you two samples of turf taken from brown patches that appeared during October. The patches are irregular in shape and up to 12 inches in diameter. Can you ascertain if there are brown-patch spores present? The weather has been cool here, and as we understand it brown-patch does not occur except in hot, muggy weather. (Michigan.)

ANSWER.—Your samples have been examined and they bear no evidence of being affected with the brown-patch disease. The turf does however appear to be suffering from lack of watering and topdressing. If you will examine it yourself you will find quite a mass of runners above the surface of the soil. Unless these runners are topdressed regularly the plants will have difficulty in securing sufficient moisture and nourishment. We would suggest that you topdress your turf with a compost consisting of four parts clay loam, one part sand, and one part well rotted manure or similar organic matter, applying this topdressing at the rate of 1 cubic yard to 5,000 square feet of surface. One application late in the fall should be made, and frequent applications throughout the growing season.

8. Redtop, Italian rye grass, and Poa bulbosa for winter turf on Bermuda greens.—Is there any perennial grass that can be used on Bermuda greens to keep them playable in the winter? Our objection to the use of redtop and Italian rye grass is that they must be sowed each fall. (Tennessee.)

ANSWER.—*Poa bulbosa* is a perennial grass which may be used in the South in conjunction with Bermuda grass for putting greens. When the Bermuda grass turns brown in the fall the *Poa bulbosa* will revive and take its place as a green turf during the winter. There is however no seed of *Poa bulbosa* available, but it can be easily established if you can obtain a supply of its bulbous roots. If you decide to use redtop and Italian rye grass, the seed should be sown in September on the Bermuda turf, keeping the Bermuda grass closely mowed, and then topdressing. Redtop is generally preferred for this purpose to Italian rye grass.

9. How close to cut turf.—In discussing the cutting of turf the terms "close" and "relatively close" are often used in THE BULLETIN. Defined in measurements I would assume that "close" would mean about 3/16-inch, "relatively close" about ⅜-inch, and "high," possibly ½-inch. Is that about right? In my first cutting of our new bent greens I set our mowers at about ½-inch. Later, as the turf started to knit, I lowered them to about ⅜-inch. Should I cut shorter or longer than these measurements? (Ohio.)

ANSWER.—The best collection of opinions on the close cutting of putting greens you will find in the article on page 291 of the November, 1923, BULLETIN; and you will notice that the opinions there expressed differ. Our own belief is that knitted turf should be kept cut close at all times. We can not agree that the allowing of the turf to grow tall has any advantage; indeed, our evidence indicates that it is disadvantageous. It is difficult to define the terms "close" and

"relatively close" in inch measurements. We would guess that your measurements, 3/16-inch, 3/8-inch, and 1/2-inch, would approximately mean what is meant by "close," "relatively close," and "tall." We do not think you can cut well-knitted turf too short—provided, of course, you do not cut it so short as to skin the turf.

10. Ridding putting greens of moss.—On a green we recently built there are bare spots which are being invaded by moss. We believe that this is an indication of extreme sourness and are writing to inquire how the condition may be corrected. (New York.)

ANSWER.—The invasion of your greens by moss is not necessarily due to acidity of the soil. In fact, we have found in our experimental plots that moss is more abundant on soils that have been heavily limed than on soils which are acid in reaction. We have never had any difficulty in eliminating moss from our greens by the proper use of ammonium sulfate, and we, therefore, suggest that you treat the mossy spots with a topdressing of compost and ammonium sulfate mixed in the proportion of 2 pounds of ammonium sulfate to 1/5 cubic yard of compost, and apply this quantity of the topdressing to 1,000 square feet of surface. The mixture of compost and ammonium sulfate is more effective than either used alone; moreover, when applied mixed in compost the ammonium sulfate is less likely to burn the grass. The compost and ammonium sulfate should be mixed thoroughly, applied evenly, and then well watered. The systematic use of ammonium sulfate in the spring and summer should entirely prevent the invasion of moss.

11. Policy in reference to special dues for tennis privileges.—We should be glad to receive such information as you have regarding the policy of golf clubs in the matter of special dues for persons playing tennis only. (Connecticut.)

ANSWER.—We have information from four golf clubs on this matter. One club has but one membership fee, which covers all the facilities, including both golf and tennis. Another club is operating under the same plan, but states that in the near future it expects to charge extra for persons who play golf. Another club has three classes of membership; $50 family membership, for all privileges; $25 family membership, for all privileges except golf; $15 individual membership, for all privileges except golf. Another club has an extra charge, either by the hour or by the season, for tennis privileges.

12. Fescue as a turf beneath pine trees.—We are having great difficulty in establishing turf within a space extending between 10 and 15 feet around several large pine trees. The shade beneath these trees is not at all intense, and we are of the opinion that the pine needles, or perhaps the rosin from the trees, affect the soil in a way detrimental to the grass. Have you any suggestions to offer? (Alberta.)

ANSWER.—The difficulty of growing grass under pine trees is a well-known fact, but its cause is entirely obscure. Red fescue and sheep's fescue seem to succeed better than any other grass under such trees, and our only suggestion can be that you try these grasses if you have not already done so.

Meditations of a Peripatetic Golfer

A greenkeeper is known by the quality of his putting green, and rightly so. Good greens throughout the year bespeak a skilful greenkeeper—while poor greens mean the reverse.

It is hard to acidify soil if a lot of lime has been mixed in it during construction.

It is never fair to build a hole so that the shot which rolls over the putting green is more severely penalized than the one which is short. Think it over.

Sowing seed every spring and fall, or even once a year, is an expensive and usually ineffective method. Fertilizer will go much further than seed in maintaining old turf.

A thick, vigorous turf is a very good insurance against weeds.

If you want trouble on your golf course, use lime. This ought to keep you awake nights, if anything will.

It does not help to fill up divots with soil and seed; and besides, it is very expensive.

Some so-called "fertilizers" are worthless, or nearly so—including the peat preparations commercially called "Humus."

Too much building up of the greens means too deep holes in the ground. There is a happy medium.

EARMARKS OF A GOOD GREENKEEPER:

Vigorous turf.
Uniform, even mowing.
Putting swards free from white clover, chickweed, and pearlwort.
Absence of dead or dying plugs in the old holes.
Few ants or earthworms.
Fairways cut in sweeping curves along the sides.