

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

Vol. VI

Washington, D. C., February 16, 1926

No. 2

A MONTHLY PERIODICAL TO PROMOTE THE BETTERMENT OF GOLF COURSES

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The New and the Retiring President of the United States Golf Association



WILLIAM C. FOWNES, JR.,
President, United States Golf Association

All members of the Green Section will pride themselves, we are sure, on the fact that one so interested in turf maintenance problems as Mr. William C. Fownes, Jr., has been elected to the presidency of the United States Golf Association. Mr. Fownes has served for many years as chairman of the green committee of Oakmont Country Club, Pittsburgh, which position it is expected he will retain notwithstanding his newly acquired additional responsibilities. He has also served two years as vice-president of the Association, namely in 1924 and 1925. In 1910 he was United States Amateur Champion, and semi-finalist in the Amateur Championships of 1905, 1907, 1914, and 1919, and during the past 19 years has qualified in all but 3 of the Amateur Championships. He has

also been captain of the Walker Cup team.

No less gratifying is the news that the retiring president, Mr. Wynant D. Vanderpool, has consented to accept the chairmanship of the executive committee of the United States Golf Association Green Section, Incorporated. The immediate problem with which the directors of this Corporation are confronted is the raising of an endowment fund such as will insure the perpetuation of the work of the Green Section, and it is a source of great satisfaction to know that Mr. Vanderpool will be so actively connected with this movement. He has been one of the staunchest supporters of the Green Section since its inception, and much of its success is due to his efforts. He was secretary of the United States Golf Association in 1920 and 1921, vice-president in 1922 and 1923, and president of the Association in 1924 and 1925. Mr. Vanderpool is also president and chairman of the green committee of the Morris County Golf Club, Convent, N. J.



WYNANT D. VANDERPOOL,
Chairman, Executive Committee, United States
Golf Association Green Section, Incorporated

Annual Report of the Chairman of the Green Section of the United States Golf Association for the Year 1925

TO THE MEMBERS OF THE GREEN SECTION:

The fifth year's work of the Green Section is a record of satisfactory progress with appreciative support from its member clubs. There continue to be calls for visits that are far more numerous than is possible for our small staff to meet. If these calls for help are, as we believe, a proper criterion of the needs, it is clear that larger financial support is necessary. By personal visits much can be done to assist clubs not only in matters concerning turf maintenance but also with suggestions regarding the architecture of the course. It is a rare course that can not be greatly improved by the adoption of suggestions for its betterment, particularly when they come from an impartial source.

Especially important is the carrying on of investigations with turf in the different parts of the country, under unlike conditions of soil and climate. Work of this sort has already been inaugurated at the following State experiment stations: Florida (Gainesville), Kansas (Manhattan), Nebraska (Lincoln), Minnesota (St. Anthony Park), and New Jersey (New Brunswick). This work should be started also at other experiment stations strategically located.

GREEN SECTION MEMBERSHIP

Number of clubs enrolled on Dec. 31, 1924.....	802
Number of new clubs enrolled Jan. 1 to Nov. 30, 1925..	132
	934
Number of clubs withdrawing Jan. 1 to Nov. 30, 1925	48
Net enrollment on Nov. 30, 1925.....	886

This enrollment of 886 clubs was constituted as follows:

United States clubs members of the United States Golf Association	568
United States clubs not members of the United States Golf Association.....	268
Canadian Clubs.....	40
Other foreign clubs	10
	886

The growth in membership of the Green Section, by years, is as follows:

	CLUBS
Membership on Dec. 31, 1921.....	287
Membership on Dec. 31, 1922.....	557
Membership on Dec. 31, 1923.....	653
Membership on Dec. 31, 1924.....	802
Membership on Nov. 30, 1925.....	886

This record of steady growth from year to year is gratifying and

indicates that Green Section work of nation-wide scope is as vital a feature in golf course maintenance as is the local green committee of the individual club. It is certain that all those interested in providing the benefits of the game of golf to the greatest number in the United States and at the least cost, will be inspired with the idea of the extension of this national Green Section work to its ultimate limit.

THE BULLETIN

The BULLETIN OF THE GREEN SECTION has now appeared in five complete volumes. It has placed in the hands of greenkeepers and green-committeemen a compendium of information on turf establishment and maintenance problems which is of very high value. As a history alone of the complexity of the problems to the solution of which it is devoted it is of especial interest. It demonstrates plainly that the art of greenkeeping is still in its making. A glance through its pages will indicate at once the large number of problems which still remain unsolved. It will reveal the attempts which have been made to unravel these mysteries, both the successes and the failures. For the present we must continue to operate on the basis of an annual fee of \$15 from golf clubs which are members of the United States Golf Association and \$20 from golf clubs which are not members of the United States Golf Association (including Canadian and other foreign golf clubs), furnishing the member clubs for this fee two subscriptions for the BULLETIN and the privileges of our Service Bureau without additional charge. The subscription rate of \$4 per year for additional copies of the BULLETIN available to member clubs is taken advantage of by many of our members, a number of clubs subscribing for sufficient copies to supply their entire green committee.

THE SERVICE BUREAU

During the year inquiries have been received daily from golf clubs presenting problems in turf maintenance with which they have been confronted. The nature of these inquiries can be understood by a reference to the Questions and Answers pages appearing in each issue of the BULLETIN. Many samples of seeds and specimens of weeds and grasses have been received and identified, also frequently samples of soil and fertilizer for determination of value for golf turf purposes. Quite a few calls were received from golf clubs requesting a visit from one of the officials of the Green Section to survey local conditions at golf courses. Unfortunately it was impossible to comply with all of these requests, but where opportunity permitted the courses were visited and consultation freely granted. Our opportunities to cooperate with District Green Sections, through the Service Bureau, have been a source of great gratification to the officers of the National Green Section; the need of an harmonious working among the district Green Sections is keenly appreciated, and it is felt that by such cooperation great good will result.

GREEN SECTIONS IN OTHER COUNTRIES

Based on the success of the United States Golf Association Green Section, other countries have established or are about to start Green Sections. It is understood that the British Golf clubs now have their Green Section organized but no details are at hand. Thus far no

publications seem to have been issued. The New Zealand golf clubs are, judging from reports, enthusiastic about a Green Section, with very strong probabilities that it will be established.

FINANCIAL STATEMENT

A detailed financial statement for the Green Section for the year ending November 30, 1925, has been published in the Report of the Executive Committee of the United States Golf Association. A summary of the figures is here presented:

Cash in bank, December 1, 1924.....	\$464.90
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Receipts

Club dues	14,945.31
Sales of Bulletins, and special services.....	2,315.73

\$17,725.94

Disbursements

Bulletins and binders.....	\$2,370.02
Field service and office expenses (salaries, travel, experimental supplies and equipment, stationery, books and periodicals, meetings, etc.)	11,644.06
	14,014.08

Cash in bank November 30, 1925.....	\$3,711.86
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C. V. PIPER, *Chairman.*

Removing and Replacing Sod

By H. S. Humphrey, Gull Lake Country Club, Richland, Mich.

When temporarily removing sod in remodeling putting greens we have found it better to lay the sod, as it is taken up, with the earth side down than to turn it over and lay it with the grass side down and the earth side exposed. In this way the sod keeps moist better and remains in better condition. The sod should be stripped off in even thickness and laid, with earth side down, on good grass turf.

After the foundation of the green has been remodeled and we are ready to lay the sod back on the green, instead of tamping the relaid sod with a bare tamper, we tamp it on boards. The boards we use are 7/8 by 10 inches, 16 feet long. A number of boards are placed on the newly laid sod. The man with the tamper stands on one board and tamps on the next adjacent board. In this way both footprints and the impressions of the tamper are avoided and a smooth, even surface is obtained. The sods quickly knit together, and in two weeks' time one can hardly notice that sodding has been done.

Winter Brown-Patch in the South

Bermuda grass, the common putting green grass in the South during the spring, summer, and fall, fortunately seems to be immune to the brown-patch disease. It is different, however, with temporary winter greens of ryegrass and redtop. These latter two grasses are very susceptible to brown-patch in the North during the warm portions of the year, and have also been known to suffer severely in the South during winter when used as temporary turf for putting greens. Frequently on greens of this character the turf will turn brown in patches over night, and is very apt to be killed.

A large amount of experimental work in the control of brown-patch was carried on in the summer of 1925 near Washington, D. C., and the results of the experiments have been published in the BULLETIN, and summarized in the articles on pages 219 and 272 of the 1925 volume. Clubs having temporary greens of ryegrass or redtop should familiarize themselves with the control methods which have been found to be the most efficacious in our experimental work, and should be equipped to combat the disease at the first sign of its appearance.

In the control of brown-patch, too much emphasis can not be laid on the necessity for providing adequate drainage, both surface drainage and under-drainage. Perfect drainage does not necessarily mean immunity to brown-patch, but where the drainage is poor the ravages of the disease are sure to be much worse than where good drainage is provided.

A Method of Grub-Proofing Turf

By B. R. Leach and J. W. Lipp, Japanese Beetle Laboratory, Riverton, N. J.

A paper read before the Annual Meeting of the Green Section in Chicago, Illinois, January 9, 1926

There can be no doubt that any method which would insure the growing and maintaining of the turf of greens and fairways free from attacks and injury by grubs and earthworms would prove to be a decided advancement over the present methods of golf course maintenance. That such an insurance against turf insect depredation is possible is indicated by the results of the past four years' experimental work conducted at our laboratory, with the object of producing grub-proof turf. While the experimental work is far from complete the information obtained to date is herein presented.

Grubs in turf arise from eggs deposited therein by beetles and certain other types of insects. These eggs hatch, and the grubs feed on the roots of the grass, causing injury, often to such an extent that the turf is entirely ruined. The grub of the Japanese beetle is an example of this type of pest, while there are many native species of grubs found in various parts of the country of similar nature and habits.

Earthworms are objectionable in turf, especially on greens, not because they feed on the roots of grass but because they are constantly bringing up small accumulations of soil, commonly spoken of as worm-casts, which litter the surface of the green and ruin it from the standpoint of appearance and play.

The present-day methods of controlling the above pests in turf

consist essentially in treating the latter with toxic materials (usually in solution) which penetrate into the soil and kill a certain proportion of the grubs and worms present, that proportion depending upon the skill of the operator. The present method of controlling the grub of the Japanese beetle by means of the carbon disulfid emulsion, as reported in the articles on page 262 of the BULLETIN, October, 1923, and page 100 of the BULLETIN, May, 1925, and the method of controlling earthworms by means of corrosive sublimate solution, are typical examples of this general method of turf-pest control. These methods have been of great value in checking the ravages of turf insect pests; in fact, they will probably always play an important part in control work of this type. Certain habits of the grubs and worms in question, however, led the senior writer some four or five years ago to the belief that another and simpler method of control could be evolved.

Practically all grubs and worms which feed in turf have one common habit which renders them open to attack from the standpoint of control. This common habit consists of the fact that all grubs and worms are constantly taking particles of roots, organic matter, and soil into their bodies. This material is acted upon by the intestinal juices of the grubs or worms; the portions of the mass having a food value are extracted, and the remainder ejected from the body by the usual processes of elimination. It follows, therefore, that if the soil can be impregnated with poisonous material so that the latter is taken into the stomachs of these grubs and worms during the course of their feeding, there is every probability that these grubs and worms will be killed. The experimental results have demonstrated this possibility to be a certainty. In addition, the experimental results indicate that the types of grasses commonly employed on the greens and fairways of golf courses grow remarkably well in poisoned soil.

Let us suppose, as an example, that a certain green is no longer in a serviceable condition, and is about to be disked, raked over, reinforced with compost, and seeded. The poison in the form of a dry, fine, insoluble powder is spread evenly over the soil and thoroughly worked in to a depth of 4 inches by means of a harrow and rake. The green is then seeded in the usual manner. The upper 4 inches of soil will then contain the poison evenly distributed throughout while the soil beneath the 4-inch level will be normal.

Let us assume that this green was heavily infested with earthworms at the time it was reseeded. Any earthworms which move into the upper 4 inches of poisoned soil will, within a certain length of time, succumb to the poison which they take into their bodies together with the soil. Furthermore, the worms must travel through this poison layer in order to come to the surface and deposit their casts. It follows therefore that any infestation of worms present in turf so treated will be cleaned up within a reasonable length of time and the constant annoyance of worm-casts on the surface of the green will cease.

Let us further assume that at some time after this particular green has been treated as above, large numbers of Japanese beetles, May beetles, or other similar species appear and proceed to lay their eggs in the turf of the green. These eggs may be deposited in the soil at various depths and hatch into small grubs within a

few days. These young grubs immediately begin to feed in the soil. Within a very few days they have taken sufficient poison into the system along with their natural food to cause their death. It follows therefore that at no time are the roots of the grass injured by the long-continued gnawing of countless grubs.



Fig. 1.—Bent grass growing in soil that has been treated with grub poison (arsenate of lead) at the rate of 2,000 pounds per acre.

depth of 4 inches. This operation is preferably done when the soil is on the dry side. The ground can then be seeded and handled as usual. It is obvious that this operation must be carefully and intelligently performed in order that every portion of the upper 4 inches of the soil may be supplied with its proper share of the poison. If any portion of the green is neglected, it will of course result in a "spotty" control. Future topdressings of this green must, of course, be made with poisoned soil in order to maintain the surface layer. The poison should be mixed with the topdressing at the rate of 2-4/5 pounds per cubic yard.

The question naturally arises, Is the grass harmed by the poison? The effect of arsenate of lead, when mixed with soil, upon the growth of grass has been studied at this laboratory for the past three years. The initial tests were made in 12-inch pots in the greenhouse. Figure 1 illustrates a pot containing creeping bent grass growing in treated soil. As a result of the favorable nature of these pot tests, testing of grass growth in poisoned soil was extended to include field trials. In this test 9 species of grasses are included with 3 plots of each, as shown in Figure 2.

Of the grasses tested to date, the most pronounced success in the growing of grass in poisoned soil has been obtained with German mixed bent (seed) and creeping bent (stolons). (Figures 3 and 4.) Chewings' fescue, meadow fescue, and Kentucky bluegrass have also done remarkably well, while the growth of perennial ryegrass and sweet vernal grass has been fair to good. *Poa trivialis* and Canada bluegrass have not proved satisfactory. Redtop has done well in pots but has not as yet been tested in the field. It is of course realized that many other species of grass must be tested in this connection, but the above results, embodying a miscellaneous

The work of the last four years, during which many materials have been tested in order to determine their value as stomach poisons for the control of grubs in turf, has demonstrated the outstanding value of two compounds in this connection. These two compounds are *acid lead arsenate* and *sodium silicofluorid*. At this stage of the work the acid lead arsenate seems to be the better. Our present method of application consists in spreading the powder on the surface of the soil at the rate of 3 1/2 pounds per 100 square feet and then thoroughly working it into the soil to a

list of species, are a sufficient indication that the method is essentially sound and worthy of further extensive investigation. It is not expected that all species of grass will do well in poisoned soil, but it is probable that a sufficient number of grasses will be available to take care of the needs of the various sections of the country.

When grass seed or stolons are planted in poisoned soil, germination is from three to six days slower than in unpoisoned soil. For the first three weeks after seeding, the grass in the poisoned soil is somewhat slower in growth than the grass in untreated soil under similar conditions; but all during that period the grass in the poisoned soil is slowly but surely catching up with the grass in unpoisoned soil in vigor and appearance. At the end of six to eight weeks at most, no difference can be noted. For this reason it is well to reserve judgment on the quality of the turf grown in poisoned soil until at least two months after seeding.

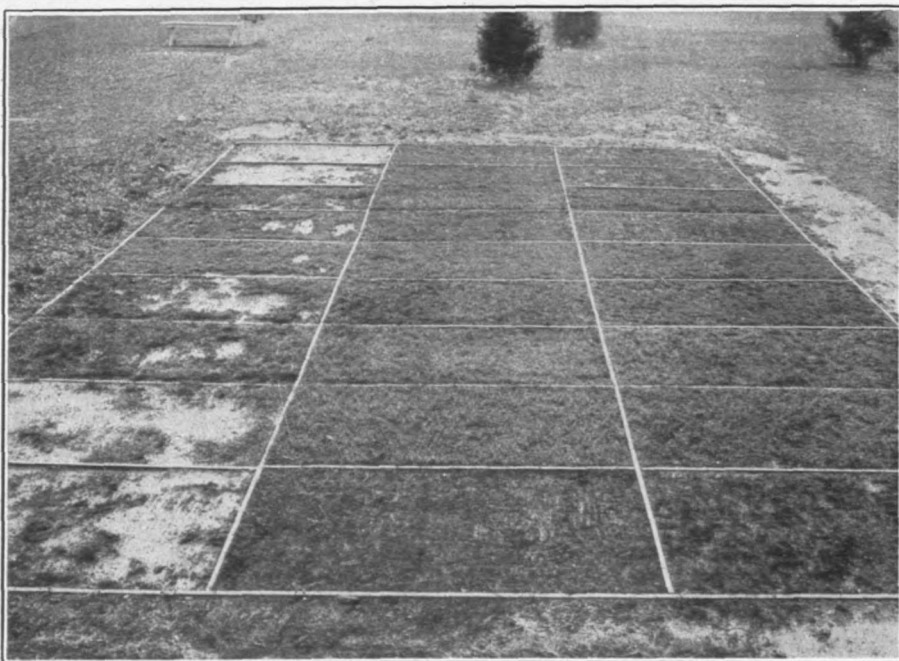


Fig. 2.—Field test plots of poisoned soil at Moorestown Field Club, Moorestown, N. J. The soil of the 9 plots on the reader's right was poisoned with arsenate of lead. The soil of the 9 center plots was left untreated with poison. The soil of the 9 plots on the left was poisoned with sodium silico fluorid. The bare spots in the plots on the left were caused by the soil "caking" when the seed was germinating.

In view of the slower germination of grass seed and stolons in poisoned soil it is highly advisable to so regulate the make-up of the surface soil that "caking" does not occur (observe the results of this as shown in Figure 2). This can be done, in the case of heavy soils, by the addition of organic matter and sand to the surface layer.

As regards the length of time over which soil that has been treated with poison will remain grub-proof, it is impossible at the present time to make a definite statement. It may be said, however, that a plot of turf treated with arsenate of lead and seeded three

years ago, is today apparently as grub-proof as the day it was treated. Recent examination of the poisoned turf showed no grubs present, while the untreated turf alongside had an infestation of 240 grubs to the square yard. Whether this turf will remain grub-proof for five or ten years longer, time only will tell; but there is every indication that the grub-killing power of this soil will persist for a long time. If that should be the case it is fairly obvious that insurance against grub injury can be secured for a relatively long period of time and at a relatively low cost.

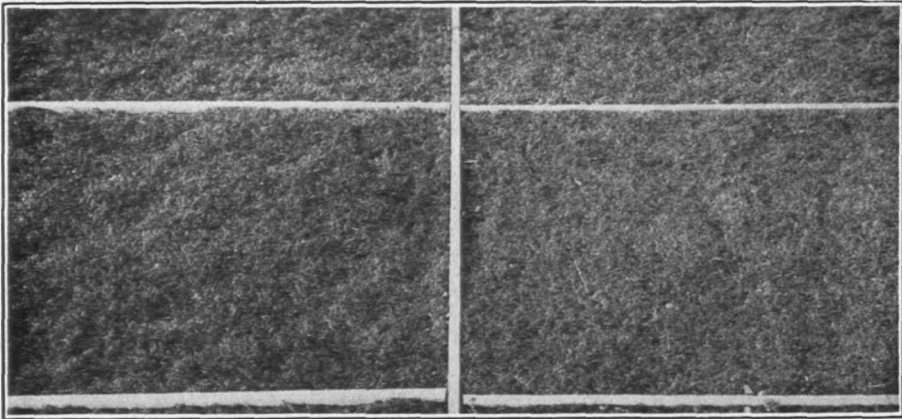


Fig. 3.—Turf from German mixed bent seed in poisoned soil test. The soil of the plot on the reader's left was poisoned with arsenate of lead, while that of the plot on the reader's right was not poisoned.

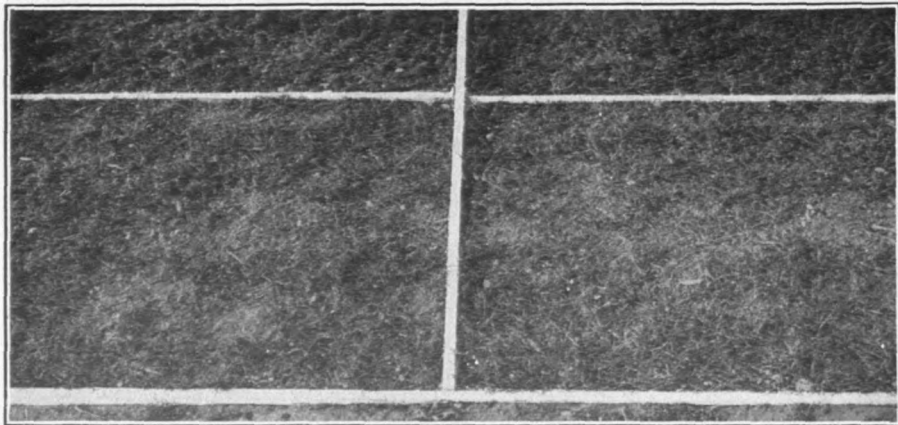


Fig. 4.—Turf from creeping bent stolons in poisoned soil test. The soil of the plot on the reader's left was poisoned with arsenate of lead, while that of the plot on the reader's right was not poisoned.

Acid arsenate of lead now sells on the open market for approximately 14 cents a pound. When used at the rate of 1,500 pounds to the acre ($3\frac{1}{2}$ pounds per 100 square feet) it would cost approximately \$210 for material per acre. A green 70 by 80 feet in size will require about 200 pounds of arsenate of lead, at a cost of approximately \$28. This of course is the initial cost. Divide this initial

cost by the number of years of grub-proof insurance obtained, and it is very probable than the annual cost of the method will be exceedingly small.

There is a possibility that a method can be worked out whereby a green in good tilth can be given a top layer of poisoned soil by means of topdressing. It is estimated that an average of $\frac{1}{2}$ inch is added to the average well-kept green, by monthly topdressing, during the course of a single season. We are reliably informed that if necessary an inch of topdressing could be applied in a single season without injury. It follows, therefore, that this method may offer a possible solution to the problem of making a green grub-proof without the necessity of tearing it up and reseeding. Extensive experiments are planned for the coming year on this point.

There are various phases of the problem with regard to which adequate information has not yet been obtained, and experimental work is being planned with the object of securing this needed information. One of the most important problems consists in determining the amount of arsenate of lead to use and to what depth it should be mixed. In the case of the Japanese beetle, observations indicate that 4 inches of poisoned soil is unnecessary, that in fact 2 inches will be ample. Whether a depth of 2 inches will be sufficient for earthworms and grubs other than the Japanese beetle, can not be said at the present time. In the same way it may be possible to reduce the amount of poison per square foot when the layer of poisoned soil is less than 4 inches, thus reducing the cost.

The chemical action of such fertilizers as ammonium sulfate, acid phosphate, and potassium chlorid upon arsenate of lead in the soil is not as yet fully understood; but the much-used ammonium sulfate will in all probability have very little chemical effect upon the poison. Under the circumstances, it is suggested that the use of commercial fertilizers in connection with the testing of arsenate of lead in experimental plots be avoided until more tangible information is obtained on their action.

Although the above information is based on four years of experimental work, the writers nevertheless realize that much more work remains to be done before the method can be placed on an extensive-scale basis. In the meantime, and in the absence of complete information, this paper is presented as a basis for those who wish to give the "poisoned-soil method" a trial. It is urged that any such trial, at the outset at least, be confined to small areas of turf, say not more than 100 square feet. Do not enlarge operations until you are sure that it is safe under your local conditions.

The writers are anxious to assist in any possible way and are very desirous of securing reports of trials.

The Maximum Desirable Slope of Putting Greens.—It is rather astonishing how many putting greens of golf courses both in America and Britain are too steep. Apparently such are built without measuring the slope or in ignorance of the limit of desirable steepness. Where the slope exceeds 3 percent or 1 foot in every 33, a ball putted downhill will gather momentum on a perfect putting green. Therefore a 3 percent slope should never be exceeded on a green, excepting, of course, on any mounds or ridges near the back of the green.

Annual Meeting of the Green Section, Chicago, January 8 and 9, 1926

By R. A. Oakley

The Green Section celebrated its fifth anniversary at Chicago on January 8 and 9. To those who are more or less intimately connected with it, it scarcely seems possible that five years have elapsed since the Section was organized; but its record of growth and achievement fully accounts for the time it has been in existence. As a matter of historical interest it may be stated that the first annual meeting was held at Chicago in 1921; the second, at Pittsburgh in 1922; and the third and fourth, at New York, in 1923 and 1924. It has been and doubtless will remain the custom to hold the Green Section meeting as a part of the regular annual meeting of the United States Golf Association. While three successful halfdays were devoted to the program at each of the 1923 and 1924 annual meetings, it was decided to have only two half-day sessions at the Chicago meeting. One reason for this was to ascertain the interest and staying qualities of the audience. If what are commonly accepted as indications are to be taken for guidance, next year's meeting will cover at least three half-days. The Green Section was particularly fortunate in having Mr. Chas. O. Pfeil, president of the Western Golf Association and vice-president of the United States Golf Association, to act as chairman of its program. Mr. Pfeil is an experienced hand at presiding, and besides he knew most of the audience more or less well, which is no small advantage. While the Green Section was fortunate in having Mr. Pfeil act as chairman, it was particularly unfortunate in that the condition of Dr. Piper's health would not permit him to be present. To say that he was greatly missed is indeed putting it lightly. The Green Section and Dr. Piper are synonymous terms to most of the followers of that organization. So it is only natural that the faithful who gathered at the Drake Hotel were free in their expressions of disappointment at his absence and of hope that next year he will be on hand with his usual fund of knowledge and enthusiasm.

Of course it is always necessary to have a regularly scheduled and printed program, but it is not always necessary to follow it. This being the case, the first feature, which was a business session, for good and sufficient reasons was held over until the morning session on Saturday. After announcement was made to this effect, the chairman called upon Mr. O. B. Fitts to lead off. He did so with a paper entitled "Materials Commonly Used for Topdressing Putting Greens." Mr. Fitts described the various materials used for topdressing putting greens and discussed their use under various conditions of soil and other environmental factors. When he stated that sand alone is rarely satisfactory for topdressing greens it was plainly seen that some of the members of the audience did not agree with him. However, the evidence he presented was very convincing. Mr. Fitts threw some photographs on the screen which showed very strikingly the advantages of topdressing putting greens of creeping bent with compost. Mr. Fitts' complete paper, as well as other technical papers presented at the meeting, will appear in early numbers of the BULLETIN.

Mrs. G. A. Farley, secretary of the Cleveland District Golf Asso-

ciation, followed Mr. Fitts on the program. She gave the high points of the correspondence course in greenkeeping which the Cleveland District Golf Association is now conducting. She explained that the course is an official function of the Cleveland organization and that the fee charged for it is merely enough to defray the cost of putting it out. So far as known, this is the first correspondence course in greenkeeping ever offered. Mrs. Farley was besieged with questions after the meeting which is sufficient evidence of her success in presenting the subject.

The chairman then called upon Mr. W. A. Alexander, a veteran of the Chicago District and one of the Green Section's most ardent supporters, for a brief talk. Mr. Alexander responded with words of genuine encouragement for the efforts of the Green Section. No one who heard him could have any doubt as to what he thinks of the work the Green Section is doing.

Next came Mr. Leach, of the Bureau of Entomology, United States Department of Agriculture. His paper was entitled "A Method of Grub-Proofing Turf." Mr. Leach has done considerable experimental work along a new line of controlling soil-inhabiting insects and worms, which involves the treatment of soil with chemicals poisonous to these pests but not injurious to the turf grasses. To date Mr. Leach's best results have been with acid lead arsenate and sodium silicoflourid mixed with the soil of the green before seeding or planting the grass. Greens treated three years ago, although having had ample opportunity to become infested with grubs, particularly those of the Japanese beetle, and with earthworms, are still free from these pests. Some of Mr. Leach's experiments were conducted in pots but many of them were conducted in the field on the course of the Moorestown Field Club. His paper was well illustrated with lantern slides. Mr. Leach's results point clearly to the value of carefully conducted scientific research in turf growing.

The Green Section was also favored by the presence of Mr. Le Prince, of the Gorgas Memorial Institution, who very kindly spoke for a few minutes on the subject of mosquito control on golf courses. Mr. Le Prince gave the advocates of the use of liquid manure something to think about when he stated that a trace of manure water or sewerage in streams or drainage ditches increases the mosquito population many-fold. He announced the willingness of his organization to cooperate with golf clubs in mosquito control work. Mr. Le Prince will be requested to write an article on this subject for an early number of the BULLETIN.

The Green Section was further honored in having present, by special invitation, Mr. C. A. Tregillus, manager of the Royal Canadian Golf Association Green Section. Mr. Tregillus was called upon for a few remarks, and in his clear and interesting manner told briefly of the work of his organization. He emphasized specifically the efforts to help golf clubs in the "back concessions" where there is an abundance of enthusiasm, outdoors, flags, and tomato cans but not an oversupply of funds for grass, architecture, construction, or upkeep. Mr. Tregillus also spoke of the cooperative efforts of his organization and the Dominion Department of Agriculture to develop a supply of seed of seaside bent grass on Prince Edward Island, where this grass occurs in abundance. Mr. Tregillus very gener-

ously expressed appreciation for the help the United States Golf Association Green Section had given them.

After showing a motion picture on earthworm eradication the afternoon session was brought to a close. There were approximately 125 in attendance.

Saturday morning's session brought out a larger audience than was present on the previous afternoon. It opened with the report of Mr. Rodman E. Griscom, chairman of the Committee on Green Section, United States Golf Association. Mr. Griscom's report covered the progress that has been made by the Green Section along various lines, particularly in growth in membership and financial resources. Dr. Piper's report was then read, covering in more detail the growth and activities of the Green Section than was covered by Mr. Griscom. General gratification was expressed at the announcement that the Green Section membership had grown from 287 clubs in 1921 to 886 in 1925, and that the growth had been accomplished without an intensive membership campaign.

Election to membership on the Green Committee of the United States Golf Association was next in order. The names of the men elected appear on the title page of the BULLETIN. Following this was the election of counsel for the Green Section; Mr. James Francis Burke was elected to that position. This ended the business session.

The chairman asked President Vanderpool to say a few words regarding the Green Section and particularly its future. Mr. Vanderpool spoke vigorously of the Green Section's needs and of the plans under consideration for placing the organization on a better financial basis. Best of all however was his announcement that he would be closely associated with the Green Section as its representative on the United States Golf Association Executive Committee. This augurs well for the future of the organization.

Senator Brooks, of Minneapolis, who had already demonstrated his devotion to the Green Section by coming all the way from Minneapolis with a broken shoulder and an arm duly braced and out of commission, again rallied to the standard by announcing that the Minneapolis District already had promised to contribute through the Green Section to the experimental work that is being done in cooperation with the Minneapolis Experiment Station. This statement was greeted enthusiastically.

No less enthusiastic than Mr. Vanderpool in his remarks on the Green Section work and its future was President-Elect Fownes. What he had to say amounted to a pledge of his whole-hearted support for the project during his administration.

Mr. John Monteith, Jr., of the United States Department of Agriculture, then discussed his work with brown-patch. He did so in a very entertaining and instructive manner. His lantern slides were a very helpful feature of his talk. The most important points Mr. Monteith brought out related to his success in isolating the organism that causes the large brown-patch and also the one which causes the small brown-patch, his ability to create the two forms of brown-patch artificially by inoculation, and his results with mercuric chlorid (corrosive sublimate) as a preventive and restorative agent. While it is probably too early to draw definite conclusions, it would seem that mercuric chlorid, if properly applied, may be expected to be as efficacious as the chlorophenol mercury compounds, such as

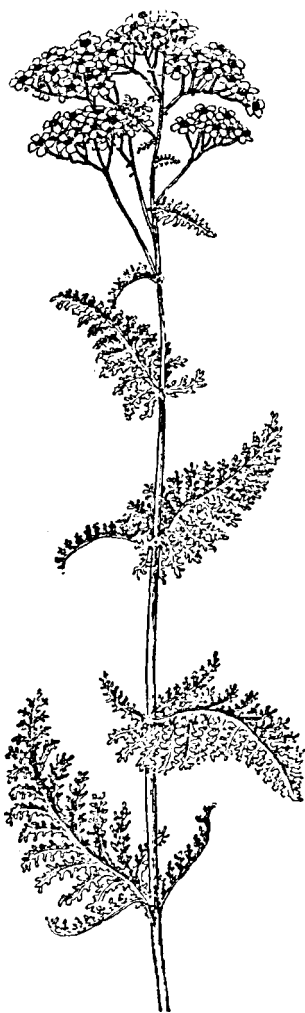
Semesan and Uspulun. However, much more work is necessary before definite recommendations for its use can be made. Mr. Monteith will continue his investigations with brown-patch, as there is still a great deal to be learned about it.

The talk given by Mr. Alexander Friday afternoon and those by Messrs. Vanderpool, Fownes, and Brooks during this session set the stage for Mr. A. J. Hood, of Detroit, who asked permission of the chairman to be permitted to express his views on the Endowment fund. Mr. Hood spoke vigorously for an aggressive campaign to raise the necessary funds. He announced that he had in mind a plan which he would present to the committee in the very near future. "Get the money and don't be too fussy about it," was Mr. Hood's advice. He surely started something. Others had also been thinking about the endowment fund and there was considerable discussion of it. Mr. Sol. Stix, chairman of the green committee of the Ravisloe Country Club; Mr. Van Evera, of the Golf & Country Club, Des Moines, Iowa; Mr. Davis, of Louisville, Ky.; Mr. Carr, of Des Moines, Iowa; and others took part. Some excellent suggestions were made, and all of those present were invited to send to Mr. Vanderpool suggestions regarding the raising of the fund. While the discussion of the endowment fund was not scheduled, it was nevertheless one of the most important features of the morning's session.

In the absence of Mr. George Sargent, Mr. Leonard Macomber, of the Chicago District Green Section, was asked to start the symposium on vegetative planting of bent greens. Mr. Macomber had, as he expressed it, "jotted down a few notes on criticisms heard at the Olympia Fields Country Club tournament last September, mostly from professional golfers." He used these to open the subject. The symposium was intended to give every one who cared to do so an opportunity to express his views on vegetative planting. The opponents of the method were urged to come forward, as it was desired to get a frank discussion of it. Unfortunately for a real free-for-all discussion, the opponents were conspicuous by their absence. The symposium however was a good one, and a number of experienced men took part. These included Mr. Porter, of the Kittansett Club, Marion, Mass.; Mr. Shea, of Oakland Hills Country Club; Mr. A. J. Hood, of Detroit, Mich.; Mr. Boggs, of Cleveland; Dr. McClenahan, of Washington, D. C.; President-Elect Fownes, of Pittsburgh; Mr. Davis, of Louisville; Mr. Pirie, of Chicago; and Mr. Evans, of Philadelphia. Much was said with regard to strains and their relative merits. There was almost unanimous agreement that no fair criticism can be made of greens produced by the vegetative method of planting good strains of creeping bent provided the greens are properly topdressed and kept cut close. Close cutting and relatively frequent topdressing were stressed by nearly every one who spoke. It was after 1 o'clock when the meeting adjourned, but there was no lagging of interest in it.

Criticism was freely expressed that two sessions are insufficient for the annual meeting of the Green Section, and it was urged that at least three half-day sessions be held in the future. This will probably be done.

A Place for Yarrow on the Golf Course



Yarrow (*Achillea millefolium*).
Flowering stalk: about one-half
natural size.

Yarrow, ordinarily classed as a weed, is a splendid plant to grow on cops, ridges, embankments, and places subject to much trampling, while even on putting greens it makes a turf of very satisfactory quality. It will thrive on the poorest and thinnest land. Its strong, creeping roots make it an excellent binder for light and sandy soils. Under close and regular mowing it produces a bright green turf thick and velvety in appearance and soft and springy to the tread. For some unknown reason it seems impossible however to establish a pure turf of yarrow, as it will allow grasses to creep in. Where it occurs on putting greens it should not prove to be at all objectionable. It is exceedingly difficult to eradicate; its dense, tough system of roots occupies the soil tenaciously, and if eradication is desired it is necessary to cut the whole patch out three inches deep and replace with fresh soil and clean turf. Young plants may however be easily removed with a weeding knife, care being taken to remove the entire root. It is readily distinguishable by its long, narrow, finely cut, almost fern-like, crinkled leaves, which form thick clusters when the plant is kept cut. Left uncut, it produces a flower stalk 12 to 18 inches in height capped throughout the summer with a single compact head of small, nearly white, dusty gray blossoms. Seed is available from Europe, but some of the native sorts are better than the European ones as turf formers. It is a common plant in open spaces over most of the United States.

Low spots in the fairways and rough.—Doubtless last season you observed low spots at places in the fairways and rough where water would accumulate or which were difficult to mow. Possibly at the time you had no chance to remedy these or did not care to disturb the turf. Winter or early spring is a good season to correct such conditions. The sunken turf in the fairway may be lifted and the hole filled in with soil and the turf replaced. The same may be done in the rough, or it may be just as satisfactory, and doubtless cheaper, simply to fill in over the old turf and reseed with some suitable grass for the rough, such as sheep's fescue, red fescue, or Canada bluegrass.

How We Managed Our Creeping Bent Greens at Kirtland Country Club

By Arthur Boggs

In September, 1923, the Kirtland Country Club, Willoughby, Ohio, planted 18 greens with stolons of the Washington strain of creeping bent, under the supervision of the Green Section of the United States Golf Association. Owing to the great demand for this strain of grass at that time we received a short shipment and had to thin the plantings out. Consequently the following season found us struggling to cover the bare spots. By July, 1924, we had succeeded in filling in almost all of the bare spots, but it left us with a coarse, ragged growth which made anything but a good putting surface, although it certainly presented a fine appearance.

The first season we cut as close as our mowers would cut, and until the greens were so slippery that you could hardly touch the ball. We tried every method we could think of to correct this condition; but when the turf was not cut close there would remain a grain to putt against or to putt across. During the second season the changes in the growth were remarkable. The coarse leaves of the grass changed to fine blades. The fluffy condition however remained until June, when we raked the greens with a broom-rake made of tempered wire and which brought to the surface all the mat of long runners that first helped to spread over the bare spots and cover the green. By cutting two ways we took off enough stolons to cover an acre of land, and still had some to spare. Needless to say, we topdressed immediately, and in ten days or two weeks we had perfect putting surfaces without the grain or fluffy condition. The crowding of this grass makes a finer blade which refines with age and proper care.

Just before planting our greens to bent we raised the surface of one green and used a part of our compost pile for the fill. This compost was rich, fine soil; and we did not realize our mistake until the season of 1925. This soil had caused such a rapid growth that it was necessary to cut twice a day in order to keep good putting conditions; but this growth has been checked to some extent by the use of poorer soil for the topdressing. In other words, we have found a soil that is not too rich, and after screening it we apply it as a topdressing, which holds the rapid growth in check and produces a finer blade.

One of our greens will not stand the rough treatment that we gave the others; because it is in a sheltered location. It is located at the bottom of a hill and is sheltered on three sides by trees, but is exposed to the morning sun. We gave this green the same treatment as the others, but it failed to respond; so we have learned that a green in such a location must be handled with care.

In February, 1924, small brown-patch developed on several of our greens, but by May all traces of it had disappeared. During the brown-patch season of 1925 the only evidence of a fungous disease was that caused by over-watering; it was not however brown-patch, but simply a thinning of the turf, which was not noticeable to the layman. We used chlorophenol mercury compounds on the greens affected, and they quickly recovered.

The Washington strain of creeping bent can not be cut evenly

with the ordinary greens mower that we have been using, and we find a mower with a high-speed revolving cutter will give the best results.

To sum up our experiences with this grass, we find that we have a grass which will withstand the roughest kind of treatment and will grow under almost all conditions, will recover quickly, will crowd out all weeds, and with which we are able to give our members greens all of the same color and texture and which furnish perfect putting surfaces.

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

A's ball lies in a water hazard (not in water). After striking at the ball twice in an attempt to play it out of the hazard he still lies 4 in the hazard. Is he then permitted to lift the ball and drop it back of the hazard, taking a 1-stroke penalty as provided in Rule 27, or, having once attempted to play the ball from the hazard, must he continue to play from the hazard or give up the hole?

DECISION.—The player has the privilege of dropping the ball with the stroke penalty as provided by Rule 27 at any time and without regard to whether he has played the ball previously in the hazard.

A finds his ball so lying that a large tree is directly between the ball and the hole. The ball is not in an unplayable lie, but A thinks it would be to his advantage to consider it an unplayable ball and to go back and play his next shot from where he played the former, adding a penalty stroke to his score. Would he be within both the spirit and the letter of golfing law if he took advantage of Rule 22 and called the ball unplayable?

DECISION.—The player is the sole judge as to whether or not his ball is unplayable, and if he decides it is unplayable he may go back and play another ball, as provided for in Rule 22.

I understand that the player having the lowest net score has the honor in playing the next hole; that is, it makes no difference whether the low score was secured through a handicap stroke, a bisque, two bisesques, or otherwise, so long as it is the low net for the hole.

DECISION.—The United States Golf Association has ruled on several occasions that the honor should go to the player making the lowest net score on any hole, as there is no reason why the high handicap player should not have the same honor privileges as the better player.

Topdressing fairways.—If material and labor can be made available for topdressing the fairways with compost reinforced with ammonium sulfate, the turf on the fairways will be benefitted enormously. Topdress them with loamy soil, if compost or ammonium sulfate is not available; but topdress them if you possibly can. This especially applies to the approach areas and such portions of the fairway on which a good shot from the tee will fall, say about 200 yards from the tee.

New member clubs of the Green Section.—Astoria Golf and Country Club, Astoria, Oreg.; Powers Lake Country Club, Powers Lake, Wis.; Lehigh Country Club, Allentown, Pa.; Country Club of New Canaan, New Canaan, Conn.; Chetremon Country Club, Cherry Tree, Pa.; Chestnut Hill Golf Club, Chestnut Hill, Mass.; White Oak Country Club, Macdonald, W. Va.

Why Fescue Does Not Make Good Putting Turf

It has long been observed that fescue is not satisfactory for putting green purposes. The reason for this is that it will not stand up under the close cutting that is necessary. This matter has been explained in some detail by Dr. R. A. Oakley in his article on "Morphology" which appeared in the "Journal of the American Society of Agronomy," Vol. 16, No. 9, September, 1924, and from which the following is quoted:

"Putting greens must have turf of fine texture and of uniform surface. To accomplish this, close cutting is necessary and, with the modern putting green mower, it is possible literally to shave the grass down to the very surface of the ground. Because of the urge of the players for fast greens, the greenkeeper is inclined almost unknowingly to cut the grass exceedingly close. The bent grasses thrive under this treatment, but red fescue does not. The latter will withstand close cutting for a time and then in the language of the greenkeeper it 'commences to go back.' The common treatment has been to apply a topdressing of compost, or some quick acting nitrogenous fertilizer, or both. Careful studies have revealed the cause of the trouble. It is due to a peculiar morphological character of the red fescue plant. At the crown or base of each turfgrass plant, regardless of species, there is a short stem or axis made up of a number of unelongate internodes from which new shoots, with leaves, are continuously developing. In the bents and certain other species, these shoots may come from the very lowest buds. In the case of red fescue, the shoots that make the turf are produced from the upper part of the basal axis. Consequently, when the top of the basal axis is cut off by the mower few shoots develop from the lower nodes and the turf becomes thin. Topdressing and fertilizing to improve such a turf is merely treating symptoms. What is needed is to raise the mower so that the basal axis of the plant is not injured."

Uncovered Compost Beds and Covered Compost Piles

If the location for an uncovered compost bed is carefully chosen comparatively little of the soluble fertilizing elements will be lost by leaching, and the bed can be turned frequently and very cheaply by the use of a team and harrow, thus hastening decomposition and destroying weed growth. On the other hand, a covered compost pile may be turned over or screened at any time, regardless of the weather; but decomposition and germination of weed seeds will not be so rapid and labor costs will be increased. The best practical method of storing and handling compost is probably a combination of these two methods. Build a compost bed, also a shed for storing screened compost only. When the compost is ready for use in top-

dressing, screen the entire bed as soon as the weather and routine of other work permit, and store this topdressing in a covered shed. Then rebuild the compost bed. By adopting this method, dry topdressing material is always immediately available, which is a most important feature in topdressing greens at regular intervals.

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. Improving "winter-killed" turf.—A recent examination of one of our greens discloses that the turf is far from being up to the quality desired. Our greenkeeper reports that it has suffered from winter-killing. Please inform us what causes this condition and what steps can be taken to remedy it. (Pennsylvania).

ANSWER.—Injury from winter conditions rarely happens to turf that is properly drained. Water-logging of soil over winter will however seriously injure turf, and this condition can be remedied only by giving the green proper drainage. If there is a reasonably good stand of grass on a green (thin but uniform), it can be thickened by applications of compost and ammonium sulfate. An application of 1 cubic yard of compost to 2,500 square feet of surface is recommended for the first dressing, to which has been added 8 to 12 pounds of ammonium sulfate, well mixed in. This should not be applied, however, until such time in the spring as the grass starts growth. Where the grass is entirely killed out it is advisable to prepare the green as for new seeding. Where there is sufficient grass to be worth saving, though not enough to permit of thickening by the use of compost and ammonium sulfate, the seeding of German mixed bent seed and redtop seed, in equal proportions, at the rate of about 3 pounds per 1,000 square feet, is recommended, to be followed at once by a topdressing of well-screened compost to cover the seed and serve as a germinating layer.

2. Fertilizers for greens and fairways (compost, mushroom soil, sheep manure, stable manure, poultry manure, bone meal, ammonium sulfate).—For the past two years we have been topdressing our greens about every two weeks with a mixture consisting of compost, mushroom soil, sheep manure, ammonium sulfate, and sand. We are in doubt as to whether we have been using the correct proportions of these fertilizers to obtain the best result. What do you think of this mixture, and what proportions do you advise us to use to the cubic yard? We have recently been urged to use pulverized poultry manure in place of sheep manure. What is your advice as regards this? For several years we have fertilized our fairways with No. 2 ground bone. Last spring we used 20 tons and had a

splendid growth of grass. We are now advised to use pulverized poultry manure for this purpose. We should be glad to receive your recommendations in these matters. (Connecticut.)

ANSWER.—In making compost for use on putting greens splendid results are obtained with a mixture of good loam soil, organic matter in the form of well-rotted stable manure or mushroom soil, and sand, in equal proportions. Mushroom soil may however contain considerable clay or loam, and when it is used its proportion in the compost should be increased and the proportion of loam soil correspondingly decreased. One cubic yard of compost is the proper amount to apply to 5,000 square feet of green. Better results are obtained when ammonium sulfate is also included in the compost mixture. To a cubic yard of compost 15 pounds of ammonium sulfate should be added for use when the weather is reasonably cool. In hot weather the amount of ammonium sulfate should be reduced to 7 pounds to a cubic yard of compost. Poultry manure and sheep manure are rather concentrated fertilizers but do not supply the quantity of organic matter which is obtained from stable manure or mushroom soil, and if they are used in place of these latter in making compost they should have to be used in double amounts to furnish the desired proportion of organic matter. Poultry manure appears to be superior to sheep manure for this purpose. As regards bone meal, this is an excellent fertilizer for fairways. It is preferable to poultry manure unless the poultry manure can be applied in mixture with considerable loam, in which case this topdressing, though expensive to apply, will give excellent results. Bone meal should be applied at the rate of 300 to 500 pounds per acre, and in the early spring. Well-rotted stable manure is an excellent fertilizer for fairways, but is of course regarded as objectionable when it interferes with play. However, on courses that are closed for the winter it may be applied fairly lightly and evenly after the course is closed, and any litter that remains should be raked off in the spring. The organic matter furnished by stable manure is of great value in fertilizing fairway grasses.

3. Treatment of and seeding sandy soil for putting green and fairway turf.—We have two fairways on our course which run parallel across a sandy area with a sandhill extending across them. Our course was built about three years ago, and through the misguided efforts of the green committee at that time a great amount of seed was wasted on this sand, as it blew away as fast as it was planted. We were not allowed to use these fairways, and this permitted the sand to remain loose and blow away easily. Finally it was decided to play on this part of the course with what little grass had started, and the resulting trampling of the sand seemed to help it considerably and prevent more seed from blowing away. During the last two years the grass has spread some, but it is mostly in clumps with cups between, and the top of the hill is bare. Last fall we decided to start working on these fairways near the greens and gradually extend them farther out. A rather large quantity of commercial fertilizer was scattered in front of the greens for a considerable distance. In the spring we expect to haul black dirt from near the river which runs through our property, topdressing the parts which have been fertilized, and then plant seed. Do you think this will give

the desired results? What seed should we use and at what rate? Would it be worth while planting some kind of seed on the balance of the fairways and on the hill, without topdressing? One of the greens on this sandy part of the course was never satisfactory, as it had too much grass in it of a poor quality. Last fall we rebuilt this green, placing 25 or 30 loads of black dirt from the river on it, which we intend to grade in the spring and plant with creeping bent stolons. How early in the spring should this be planted? (New York.)

ANSWER.—On very sandy land it is practically impossible to get good turf of any northern grass without special treatment. The best treatment is to keep topdressing with a loam or clay loam soil until you have enough to bind the top 1 inch or so of soil. Clay alone could be used, but it would have to be harrowed into the sand thoroughly. In getting the soil in shape to grow good turf, topdressing with soil is much more valuable than the use of fertilizers, although the latter help also. Fertilizer alone will not answer your purpose. The same treatment would apply in the case of your putting greens, except that it is usually better, for putting green turf, to thoroughly mix a 1-inch to 2-inch layer of soil into the top 1 inch of sand. For planting your fairways, after you have sufficiently topdressed them, we would recommend a mixture of 12 pounds Kentucky bluegrass, 4 pounds redtop, and 1 pound white clover sown at the rate of 125 to 150 pounds per acre. White clover is particularly helpful where the under soil is very poor. For your putting greens we would recommend creeping bent stolons or else South German mixed bent seed, the latter to be sown at the rate of 5 pounds per 1,000 square feet. You should do your planting at the earliest possible date in the spring or late winter at which the ground is in a workable condition.

4. **Soil foundation of a putting green.**—We are ready to construct three new greens and the majority of our committee recommend that the soil foundation be prepared as follows: first, a 6-inch layer of stable manure; second, a 6-inch layer of good top soil; third, a 2-inch layer of well selected and sifted loam. A few of our committee doubt the advisability of adopting the layer formation of the greens foundation. Your advice in the matter will be appreciated. (Georgia.)

ANSWER.—We would strongly advise against your using a layer of stable manure in your soil foundation. Turf on putting greens kept properly clipped rarely forms roots over 1½ inches deep. In our opinion a layer of stable manure over 4 inches below the surface of the green would be a waste of material which could be utilized to much greater advantage in the making of compost to be used for topdressing purposes after the turf is established. Furthermore, a layer of stable manure in the soil is the best possible attraction you could establish for grubs. The most important thing in building a putting green foundation is to provide ample drainage. After you have done this, the best you can do is simply to provide a top layer of a good loam to a depth of 3 inches or not to exceed 4 inches. With a top layer of this character, fertilizing is best done by surface applications after the turf has become established.

5. Improving thin putting green turf.—A number of our greens have a very thin and mottled turf, the indications being that they were sowed to a mixture, some of the grasses of which have died out. Last fall a coating of sharp sand was spread on them with a view to improving the turf. What treatment would you suggest this spring to improve this turf? (New York.)

ANSWER.—It is unfortunate that the coating of sharp sand was spread on your greens last fall. We would suggest that at the earliest date you can, you rake this sand into the surface of the soil as thoroughly as possible. Putting additional seed on bare spots of putting greens in the spring rarely gives good results. We would advise you to stimulate the growth of the grass all you can during the spring and summer by fertilizing with ammonium sulfate and topdressing with a good loamy compost, and seed the bare spots with South German mixed bent seed in the late summer or fall.

6. Inadvisability of early summer seeding.—You speak of sowing German bent seed the latter part of August. Is there any objection to sowing that seed in June if the greens are kept well sprinkled? We should like to get the benefit from new seeding this season if possible. (Massachusetts.)

ANSWER.—From the experience we have had in sowing grass seed in summer we would advise you to wait until the latter part of August before seeding. Seedlings of our northern perennial turf grasses do not seem able to combat the conditions of summer, and it is rare that under such conditions they come through and establish themselves. Of course, it is possible that a small percentage of the seedlings might survive the summer conditions, but we have found late summer or early fall seeding much more satisfactory.

7. Shredded cattle manure as compared in value with stable manure.—What is the value of shredded cattle manure for fairways, compared with well-rotted stable manure? The costs of freight, hauling, and preparing the shredded cattle manure are tremendously in its favor, as well as the fact that less attention is needed after it is spread on the turf. (Ohio.)

ANSWER.—The best form of manure is ordinary well-rotted stable manure. It loses value when dried, shredded, or treated in any form. It is used to best advantage when composted with top soil and a little ammonium sulfate, and the compost used as a topdressing.

8. Grass for salty conditions near the seashore.—Our course is constructed on a sand-fill over a salt meadow. On one part we are bothered with salt sweating through the soil. Do you know of a grass suitable for golf that will grow under salty conditions? (New York.)

ANSWER.—On parts of the Massachusetts coast there is a native strain of seaside bent which makes an excellent turf and withstands the conditions you describe. This bent can be very readily established by the vegetative method, although no seed of it is available. It is possible also that the strain of seaside bent, of which seed is harvested in Oregon, would withstand the same conditions; but it would be well first to test this strain on a small scale before attempting an extensive planting.

Meditations of a Peripatetic Golfer

Progress is achieved only where a nation or a group of people combine to foster research.

A new and wonderful fertilizer is heralded nearly every day. Don't become impatient that perhaps you are missing something exceptionally good. Thousands of fertilizers have already been tested thoroughly, and the chances of any new marvel are pretty small.

One hundred and fifty acres and a layout of eighteen holes totalling 6,000 to 6,500 yards is only the skeleton of a golf course. The real work must be done by an inspired artist.

The roots of grass clipped as on a putting green rarely go down more than 1½ inches, unless you starve the grass.

Manure is the surest of all fertilizers to stimulate plants. But it needs to be used with intelligence for such purpose.

On a putting green the top two or three inches of soil are most important for feeding grass. Below this any kind of soil will do if water will percolate through it.

An important consideration in the upkeep of a putting green is to avoid any kind of topdressing that will make a compact surface layer. Too much manure or clay or sand on clay will each tend to make a bad surface layer under certain conditions.

A very able greenkeeper reports good results from the spiked roller—not by spiking turf, but by rolling new greens when first seeded.

Too much manure in topdressing on some soils will tend to form a water-proof surface to the soil.

Progress in better greenkeeping can be gained only by experimental research. It can't be done by theorizing.
