

THE BULLETIN

of the

UNITED STATES GOLF ASSOCIATION GREEN SECTION

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Annual Convention of the National Association of Greenkeepers of America

The National Association of Greenkeepers of America held its third annual convention at the Hotel Statler, Buffalo, N. Y., February 13 to 16, 1929. The convention was well attended and was characterized by the customary enthusiasm of a young organization. A program of educational addresses was presented on the first three afternoons of the convention. The program follows:

WEDNESDAY AFTERNOON, FEBRUARY 13

- Resodding a putting green. By Joe Valentine, greenkeeper, Merion Cricket Club.
- Greenkeeping yesterday and today in Canada. By W. J. Sansom, greenkeeper, Toronto Golf Club.
- Soils I have seen. By O. J. Noer, soil expert, Wisconsin.
- Animal vs. chemical fertilizers. By Victor George, greenkeeper, Country Club of La Fayette.

THURSDAY AFTERNOON, FEBRUARY 14

- Humus and its uses. By J. A. Smith, soil expert, London, Ohio.
- Grub control. By B. R. Leach, entomologist, United States Department of Agriculture.
- Can golf course maintenance be standardized? By R. H. Montgomery, manager, Hawthorne Valley Country Club.
- Planting around the club house. By A. H. Tomlinson, professor of horticulture, Ontario Agricultural College.

FRIDAY AFTERNOON, FEBRUARY 15

- Education of greenkeepers. By L. S. Dickinson, professor of horticulture, Massachusetts Agricultural College.
- Brown-patch causes and cures. By John Monteith, Jr., plant pathologist, United States Golf Association Green Section.
- The trend in the greenkeeping profession. By B. R. Leach, entomologist, United States Department of Agriculture.

On Saturday morning the association held its business meeting, electing officers for the ensuing year. Mr. John Morley was elected president, an office he has held since the founding of the association.

During the convention an exhibition of equipment and maintenance materials was held under the capable direction of Mr. Fred Burkhardt and his committee. An invitation had been extended by

Mr. Burkhardt to the United States Golf Association Green Section during the past summer to take part in this exhibition by arranging an educational exhibit representing some of the Green Section's work. Judging from the many expressions of interest from the large number of greenkeepers who spent much time at the Green Section's booth, its participation in the exhibition was highly appreciated. Great interest was shown by the greenkeepers in the Green Section's collection of books and pamphlets representing the "greenkeeper's library," many of the greenkeepers making lists of the publications which seemed to have most appeal. This interest in scientific and semi-popular scientific publications indicates that the greenkeeper of today is becoming more and more interested in the opinions of the

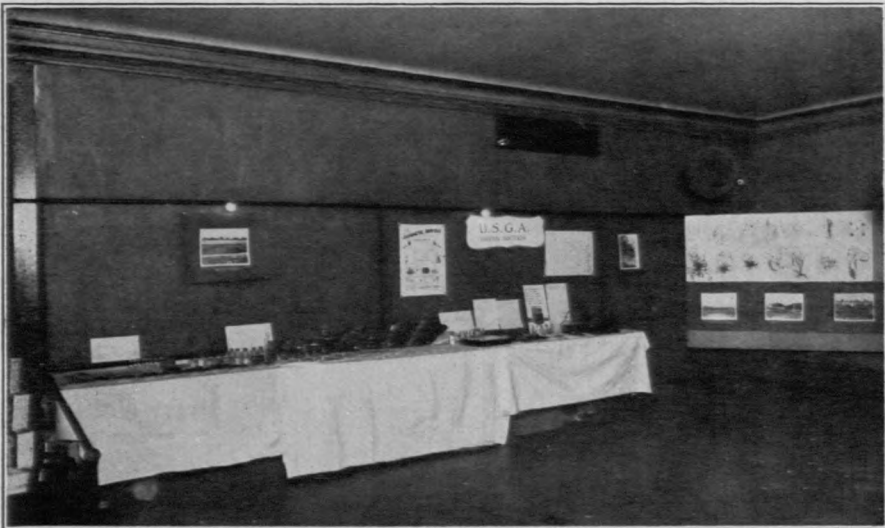


Exhibit of the Green Section at the Hotel Statler, Buffalo, during the annual convention of the National Association of Greenkeepers of America

experts in the various fields of agricultural science which have some bearing on the growing of turf. Many requests were received for the publication of a list of this collection of books and pamphlets. It is especially gratifying to note this gradually changing attitude toward scientific work as an aid to greenkeeping—all in the face of the constant activities of a few individuals and groups with some ulterior motives who from the beginning of the Green Section have endeavored to hold the minds of greenkeepers away from modern scientific developments and expert opinions.

The demand for outdoor recreation is increasing steadily. The change of the location of the home from the farm and village to the city has greatly restricted outdoor play space, and this movement has been accompanied by increasing demand for parks and playgrounds. From 1880 to 1928 the acreage of parks and playgrounds in 127 cities in the United States with a population of 30,000 or more has increased 8 times.

Plans for Research on Turf Problems in Great Britain

For some time there has been intimation of establishing an organization for conducting turf research in Great Britain along lines somewhat like those of the United States Golf Association Green Section. In the January issue of *Golfing* we read that these plans are now taking definite form. It is stated: "The English Golf Union has now issued its official appeal for support of the scheme for the formation of a Board of Research for the scientific investigation of greenkeeping problems, which is to be under the control of the Joint Advisory Committee of the British Golf Unions. The main objects of a Board of Research would be three: (a) to improve existing golf courses; (b) to reduce maintenance costs of golf courses already in good condition; (c) to cheapen and simplify the formation of new courses."

It is apparently recognized in Great Britain as in this country that there is still much to learn about the fundamentals of producing and maintaining fine turf such as is demanded for modern golf. The proposed Board of Research is to act as a clearing house for information on technical questions relating to turf culture, much as our Green Section office functions in Washington. In addition to this extension or educational service it is to operate experiment stations in different localities for conducting research. Concerning the research work the magazine further states: "In course of time, say in three or four years, the harvest from the research work would begin to come in and, if one may judge from American experience, it would give a return in reduction of costs and improvement of greens entirely profitable to the contributing clubs."

Financing of the new organization is to be arranged through the county unions. It is interesting to note that plans are being made to start the work on a five-year basis. This indicates that the founders are quite aware that research which is worthy of the name can not be conducted on a year-to-year basis, but must have some assurance of stability for a period of at least five years. Americans on the other hand are prone to want their problems settled almost overnight. Research in the natural sciences must of necessity be a slow process, and apparently the British Golf Unions are building well. Naturally we shall all be interested to hear of their progress and extend to them our heartiest wishes for success.

A vegetable garden is by no means out of place on a golf course. In fact, it can be made a thing of profit while at the same time lending much to the rural attractions of a country club. We know of one golf course that runs a vegetable garden to supply its club house kitchen, and besides raises sufficient produce to sell to its members and at the end of the season produce a profit. In connection with its garden it feeds a number of hogs with leavings from the kitchen and tables, and also harvests the hay from a two-acre meadow. The grease from its kitchen it exchanges with a soap maker for washing powders. There is profit even in waste.

Contributed articles in this number of the Bulletin contain material presented in addresses at the annual meeting of the Green Section in New York City, January 4 and 5, 1929.

The Organization of the Green Section

By Wynant D. Vanderpool

There has been a great deal of confusion in the minds of many people about the Green Section's organization, and this is not to be wondered at, because it is impossible, in creating an organization of this size, to foresee the many developments into which work of this sort will lead. For this reason I am glad to be able at this time to give you briefly an outline of what the Green Section aims to accomplish and what its organization is, as I see it.

The Green Section was organized in November, 1920, by the appointment of a committee of about 15 members representing the different sections of the country, of which Dr. C. V. Piper was chairman and Dr. R. A. Oakley vice chairman. This organization was carried on in substantially that way until the amalgamation of the United States Golf Association and the Green Section, which was effected at the annual meeting of the association in 1927.

During the early years of the Green Section the work was carried on with considerable difficulty, owing to the lack of funds. Now, however, since the amalgamation, the United States Golf Association supplies a budget of approximately \$27,000 a year for this work, the amount being practically that which is received by the association from the membership dues. Thus all the money received from club dues is expended in Green Section work for the benefit of the clubs, which receive the monthly Bulletin and the benefit of all the experiments which are carried on at Arlington and other places.

When the United States Golf Association took over the Green Section the organization was changed and a small executive committee was formed consisting of myself as chairman, Dr. R. A. Oakley, Mr. H. L. Westover, Mr. H. Kendall Read of Philadelphia, Dr. W. S. Harban of Washington, and Mr. H. Y. Barrow of New York. In addition to this committee there is a research committee, consisting of Dr. R. A. Oakley as chairman, Mr. H. L. Westover as acting chairman, Dr. John Monteith, Jr., Mr. Kenneth Welton, and an executive secretary, Mr. F. H. Williams. There is also an advisory committee, consisting of 21 members, representing all parts of the country. These gentlemen are called upon for advice and guidance when any problem comes up in their respective territories.

The executive committee, composed as it is of men active in golf affairs, together with Dr. Oakley and Mr. Westover, who represent the United States Department of Agriculture, forms a very close contact between the United States Golf Association and the Department of Agriculture. Dr. Oakley and Mr. Westover, being employed by the Department of Agriculture, very generously give their Green Section service without any recompense whatsoever. Dr. Monteith and Mr. Welton are employed by the Green Section to carry on the work in Washington and other places.

The work of the Green Section embraces the following features:

(1) The main experiment station at Arlington; the new station which is being established on Mr. Lasker's property in Chicago; and the experiment station at Stanford University, Calif., which was established in the fall of 1928 after arrangements had been made by Dr. Oakley.

(2) State colleges and experiment stations working in cooperation with the United States Department of Agriculture.

(3) Demonstration turf gardens established in 1928 at 15 courses in various parts of the country.

(4) The extension service, which includes the publication of the monthly Bulletin and the answering of hundreds of letters of inquiry from the Washington office.

The main experiment station of the Green Section is at Arlington, on the south bank of the Potomac River immediately across from Washington, D. C. It is under the direct supervision of the United States Department of Agriculture. This serves the United States Golf Association as an experimental laboratory, very much as the laboratories of the American Telephone and Telegraph Company and the General Electric Company serve those respective companies. Disease work, the control of insect pests, weed control, the reaction of different fertilizers on the various strains of grass, as well as the relative merit of different strains of grass, both putting green and fairway, are all tried out on small test plots at Arlington. This work at Washington is under the direct supervision of Mr. Westover, Dr. Monteith, and Mr. Welton, with Dr. Kellerman and Dr. Pieters, of the Department of Agriculture, acting in an advisory capacity. The work at the new experiment station at Chicago is being laid out on a larger scale than at the Arlington station. It is a Green Section project and the Green Section assumes full responsibility for its maintenance. Mr. Lasker has complied with every demand we have made of him, and has gone even further than we asked in giving us a 10-year lease, subject to cancellation in case the property is sold.

A further extension of the Green Section's work is carried out by local associations, and I have in mind particularly the Metropolitan Golf Association, which should be heartily congratulated on the splendid cooperation which they have given the Green Section. The Metropolitan area naturally divides itself into three districts,—Westchester, New Jersey, and Long Island; and green sections have also been formed in these three districts. These three district associations are cooperating with the Metropolitan Golf Association in further extension work in their districts and are all working in harmony and close cooperation with the central station at Washington. Dr. Monteith and others from the United States Golf Association Green Section attend their frequent meetings. This work is in no way a duplication, but affords an opportunity for the local greenkeepers to visit various courses and hold discussion with the Green Section's representatives.

The whole theory of the Green Section's work is to avoid as much as possible duplication of labor and effort. It must be borne in mind, however, that unless the work is actually brought to the different localities and frequent meeting are held in various parts of the country, the work can not be properly brought home to the greenkeepers. We wish to emphasize the fact that this whole work is being done for the benefit of the member clubs of the United States Golf Association by giving their green chairmen and greenkeepers an opportunity of sharing in the cooperative experiments in disease control and tests of different strains of grass which are being conducted in Washington and elsewhere. We can assure them that we wish their hearty cooperation and will in every way accept their constructive suggestions and aid them as much as possible.

The Metropolitan District Green Section

By Harry P. Kidd

The enormous growth of the game of golf in the Metropolitan district is shown by the fact that there are nearly 200 member clubs in the Metropolitan Golf Association.

The Metropolitan district is divided into three sections, each functioning separately,—Westchester, New Jersey, and Long Island. In each section there are today more clubs than there were in the Metropolitan Golf Association a very few years ago. The officers of the association are drawn from the three sections, which insures a most harmonious organization. A little over three years ago we established an office at 2 Rector Street, which takes care of a lot of the detail and clerical work which it would be very unfair to ask the officers to do without providing help. This office has developed into a sort of clearing house for everything connected with the game of golf, from the club house to the last hole.

The Green Section of the Metropolitan Golf Association will function as an extension service to the parent body, the United States Golf Association Green Section, with a field man working under its direction and available to all the member clubs. Westchester and New Jersey have green sections, and Long Island has one in the making. Four demonstration plots have already been established, two in New Jersey, one in Westchester, and one on Long Island. We expect to lay down another in Westchester and another on Long Island, making six in all, which will be available to the green chairmen and greenkeepers for observation of treatments of the various grasses under various conditions. Meetings of the green sections in these districts will be held during the year, at which a member of the United States Golf Association Green Section will talk on some interesting subject pertaining to the maintenance of golf courses.

In this way the Metropolitan Golf Association is cooperating with the United States Golf Association Green Section and extending the work which the latter has so ably conducted for the last decade. We would ask all interested in the game of golf, particularly the green chairmen and the greenkeepers of the Metropolitan district, to cooperate with us. We are all working for the same end, after all, to make the courses in the Metropolitan district the best possible, and the best can be obtained only by cooperation.

The New Experimental Turf Garden in Chicago

By C. A. Tregillus

I should like to describe in part the development of the experimental station mentioned by Dr. Monteith as having been recently established for the Middle West.

There has been a movement on foot for some years with a view to establishing such a station. That there is definite need for it is well recognized on all sides. In the first place, the weather and seasons affect the turf and soils differently in that section of the country; secondly, the distance from Arlington is so great that it is impractical for many people who wish to do so to make the journey to see the work that is being done at Arlington and get inspiration from that point.

The early efforts in establishing the station were made by the Midwest Greenkeepers' Association, which felt that experimental and research work in turf culture should be undertaken near home, and by the Green Section of the Western Golf Association, which was conscious of the same need. The United States Golf Association was sympathetic and anxious to help, but it was not until 1928 that Mr. Traylor, its president, and Mr. Peters, of Olympia Fields Country club and chairman of the Midwest Green Section, were able, with the warm support of the Greenkeepers' Association, to start the ball definitely rolling.

It was first thought best to establish the plots on some city or county property, and an offer of such land was made by Mr. Charles (Chick) Evans, who administers the Forest Preserves of Cook County. Of the sites available, however, there was none which was in close enough contact with the golfing interests to be as fully utilized as would be possible were it established in connection with an active course. Mr. Traylor got in touch with Mr. A. D. Lasker, the advertising magnate, who has a large property near Chicago, and interested him in the project, and as a result he donated a lease of sufficient ground to carry on the scheme. Mr. Lasker has an 18-hole golf course on his estate which will rank with any in the country. The soil and climatic conditions there are about the same as are found on a large proportion of the courses in the district. So with the land provided at no cost to the association and with the assurance of several years of occupancy, subject, of course, to its present ownership, we feel that we are off to a good start. The garden is located on the golf course grounds, a situation that can not be other than helpful to those in charge of the actual work of planning the experiments. In addition, it is readily accessible for visiting greenkeepers, green chairmen, and interested golfers, to whom, of course, it will be open at all times.

It is arranged in two sections,—demonstration and experimentation. On the demonstration or show plots we include all the recognized botanical types and commercially known strains of putting green grasses. A number of these plots are 24 feet square—large enough for practical putting; and in this group we have the best known of the creeping bents produced at Arlington and multiplied from stolons, also creeping bent from seed, velvet bent from stolons, Rhode Island bent, redtop, red fescue, Kentucky bluegrass, and mixed annual bluegrass. It so happens that as the land thus occupied has a slight slope we have been able to reproduce the same grade in each small putting green, a happy circumstance that will help materially in determining the influence of slope upon the so-called "grain" of some strains of creeping bent, and the extent to which grain may be considered as a mental or physical hazard.

In addition to these greens there are some 18 or 20 smaller plots, also kept in the best possible putting condition. These include the better-known commercial strains of creeping bent vegetated from stolons and grown from seed, velvet bent from stolons and from seed, Rhode Island bent from seed from the East and the West, and fescues from this continent and Europe. These plots will be added to as occasion warrants, as it is the aim of those directing the work of the garden to have this section embrace all the grasses we know of that have any connection with putting greens. This will serve a two-

fold purpose; it will allow visitors to compare grasses on their putting merits and will also assist in the identification of established greens. The identification of creeping bent strains is a vexing problem, as they seem to respond differently to varying climatic influences; a particular strain that in the East will take on certain characteristics of color and texture might be very different in the Midwest or on the Pacific coast, due entirely to the reaction of climate, soil texture, and other conditions. Those who have worked with bents know how hard it is to separate and identify them, and no competent man will really try to do so—on sight, anyway.

The experimental section will be devoted entirely to investigational work, such as the study of fertilizers, chemicals for weeds, disease, and pest control, soil textures, drainage, cultural methods, and so on.

We feel that we have a good layout and that we can conduct this work to advantage and serve that large section of the country that lies around and west of the Great Lakes, where many special problems are in need of such work as this. We feel also that we have a rare good fortune in the earnest and hearty cooperation of the Midwest Greenkeepers' Association, the Midwest Green Section, and the United States Golf Association Green Section, and that this combination will really make the project a complete success.

The New Green Section Demonstration Plots as an Aid to the Greenkeeper

By F. H. Wilson

I think we all appreciate the wonderful work done by the Green Section at Arlington and the valuable information that we have received, and shall continue to receive, in the Bulletin from time to time. I remember well two years ago the visit I made to Washington and the valuable amount of information I gathered there. I think many of us in New England, from where I come, were wondering if the experiments at Washington would work out with us in New England in the same manner under the different soil and climatic conditions. This last summer Mr. Hood, chairman of our New England Service Bureau, asked the Greenkeepers' Club of New England to appoint a committee to confer with him on the establishment of a demonstration plot, of which Dr. Monteith has spoken, under the direction of the Green Section. The Charles River Country Club was chosen, and with the help of Mr. Welton, and under his direction, we planted the plots on September 16, 1928.

I was much surprised to find what an interest was taken in these plots by my club members, many of whom have gone over the plots with me. The different plots do not show any great results as yet, but all visitors, including greenkeepers of the locality, have been enthusiastic about them.

Greenkeepers have no time for consistent work along experimental lines. I shall give you a demonstration of that by a questionnaire on brown-patch sent out several years ago to the chairmen of our green committees in New England. That questionnaire, when it came back, after a season of severe brown-patch attack, had everything under the sun on it. The greenkeepers tried everything on the calendar—spraying with calomel, early morning watering, brushing the green, applying compounds of sulphate of ammonia, and so on.

Something stopped the attack, but they did not know which treatment was the effective one. They all agreed the attack occurred on warm, muggy nights, when the humidity was high. But sometimes on nights when the conditions were identically similar the attacks did not appear. Why? That is one of the things we should like to find out.

Every small item of added information that we can obtain is needed. Experiments scattered through the country should be of immense value to the greenkeeper. Few of us can get to Washington, but we can keep in close touch and can carefully check up on the local plots by watching the various putting greens and fairway mixtures at seeding and at any time thereafter. Our local fertilizer problems can be worked out; also brown-patch control, the most costly item this last season. These plots should be used by the greenkeepers several times a year for get-together meetings to discuss their problems. Valuable information can be obtained in this way. The items of weed control, worm control, and thousands of other questions that come up on the average golf course can be settled here. The experiments on mowing grasses at different lengths would prove valuable in determining whether certain varieties of grasses will stand close mowing.

The expense of the project is borne by the Green Section and the clubs in the vicinity of its location. This gives each greenkeeper a personal feeling regarding the plots. He should use them. The opportunity to try out grasses which he thinks have special merit is important. Already we have four plots that have been planted with grass from different golf courses, the planting material having been sent in by greenkeepers who thought the turf on their courses had special merit.

I think the greenkeepers of the country should give the Green Section a vote of thanks for this opportunity they have given us in bringing part of the work at Arlington nearer to us.

Improvement of Golf Turf in Canada

By G. P. McRostie

In the northward progression of agriculture there appears to be a compensation of climatic factors that allows for the development of many crops far north of what was considered their natural habitat. One of these factors is a longer summer day, resulting in more growing hours and a more equable soil temperature during the growing season. If some of you gentlemen who play golf as late as you can see the ball were to follow the same practice in the Peace River section of the Province of Alberta I am afraid that your wives would see even less of you than they do now. In the section under discussion about a couple of hours of twilight constitutes the non-playable part of the day in the midsummer period (I believe that a little over 20 hours of golf a day would satisfy the most ardent golfer). It is quite probable that our total playing hours for the season in the more northerly sections of Canada do not fall far short of what you experience in the central and northern tiers of states.

Golf in Canada has not escaped the universal wave of increasing popularity that has been associated with it in the United States in recent years. There are not many sizable villages that can not boast

of at least one golf course. Even some hamlets, the existence of which might be easily overlooked by the passing motorist, point with pride to the municipal golf course only recently graduated from the status of a community cow pasture.

Experimental work with turf grasses is much more of an infant in Canada than it is in the United States. In fact, it was the excellent assistance given to golfers of both countries by the United States Golf Association Green Section that finally induced the Royal Canadian Golf Association to request that a similar line of endeavor be undertaken by the Canadian Department of Agriculture. A cooperative policy was adopted by the department under which the botanist of the National Museum became responsible for the identification and classification of the various turf grasses. The Dominion Seed Branch agreed to further the commercial production and distribution of the seed of these grasses, and to the forage plant division of the Experimental Farms Branch fell the task of conducting the research concerned with the production and maintenance of satisfactory turf.

In the spring of 1924 definite plot experiments were begun with various turf grasses at the Central Experimental Farm. Two representatives from the forage plant division visited the chief centers in the eastern United States where work of that kind was being carried on with turf grasses. Supplies of seed and stolons of the more promising species were obtained. In this connection we should like to express our appreciation of the encouragement and assistance which we received at the hands of the officials carrying on the turf grass researches at Washington. From the Arlington experiment farm we were supplied with stolons of the most promising strains of creeping bent. Some of these are measuring up well under eastern Canadian conditions.

During the summer of 1924 collections of native bents were made in the various sections of eastern Canada, particularly in the maritime provinces and in the Ottawa district. Some miscellaneous lots of seed of strains of *Agrostis* secured from Sweden in earlier years have produced a few strains of creeping bent that are very promising. Miscellaneous lots picked up here and there make up the remaining strains under test. Practically all of the strains of creeping bent and velvet bent are first put through a row test before they are included in plots. This system allows us to make a careful vegetative study of each strain and to determine its probable utility under green conditions.

We have duplicate plots about 6 by 50 feet in size on which putting green turf produced from both seed and stolons is being tested. At the present time the seeded plots consist of Chewing's fescue, South German mixed bent, sheep's fescue, Rhode Island bent from two different sources, three different commercial putting green mixtures, Canada bluegrass, redtop, Kentucky bluegrass, and velvet bent from Prince Edward Island. We have 16 plots of bent grass planted from stolons, 8 of the plots being planted in 6-inch rows and 8 of the plots planted in a mat. The row plots include Ball Park bent, Brewery Creek bent, Metropolitan bent, Washington bent, Columbia bent, Ekwanok bent, Virginia bent, and one commercial strain. The mat plots include Metropolitan bent, Washington bent, Columbia bent, Ekwanok bent, Virginia bent, Ball Park bent, Acme velvet bent, and the same commercial strain as in the row plots. These plots are kept under putting green conditions as far as watering, cutting, top-dress-

ing, and other treatments are concerned. They constitute a convenient means of demonstrating the relative value of the various strains and seed mixtures.

It may be of interest to note in passing that to the best of our knowledge the first green in Canada to be put down with vegetative cuttings was on the course of the Royal Ottawa Golf Club, in Ottawa. This was about 1923. The green in question was planted with stolons of a native bent found in the Ottawa district. The type of turf secured was so satisfactory that the club in question decided that all future plantings of greens should be made with stolons rather than seed. At the present time the Washington strain of bent is being used almost exclusively for both new plantings and renewals.

Of the creeping bent strains tested to date in the larger greens the Washington and Metropolitan strains appear to be the most desirable. The strain of velvet bent, while very slow in covering under our conditions of planting, gives promise of making a desirable turf.

Of the seeded greens, the South German mixed bent and the velvet bent from Prince Edward Island appear to give sods that are very similar in texture and general appearance, while the Prince Edward Island browntop and the Rhode Island bent appear to be almost identical. Canada bluegrass and Kentucky bluegrass give very poor results under close cutting. Among the fescues tested the most promising appear to be Chewing's fescue and the so-called creeping red fescue.

Supplementing the tests of the various turf grasses under green conditions, we have planted a number of plots that are kept under ordinary lawn conditions and without any artificial watering. Several of the strains of creeping bent are thriving reasonably well under such treatment, but are becoming mixed with white clover and several of the native grasses.

In connection with the range investigations being carried on in the ranching sections of the prairie provinces of Canada the extensive collection of native species of grasses is being studied with the hope of securing a more satisfactory turf grass for both greens and fairways in the drier areas of the Dominion.

The only fertilizer that is being used at all extensively on our experimental greens in addition to the regular application of compost is sulphate of ammonia in small quantities. This fertilizer is giving us excellent results on both the greens and some lawn areas under test. For the application of this fertilizer we have found a little apparatus put out by a firm in Toronto to be very satisfactory. The apparatus fits on the end of the hose and applies the fertilizer in solution at whatever dilution is desired. We have never had a case of burning while using it, and the simplicity of its operation makes it especially adaptable for use on ordinary lawns as well as on greens.

For the extermination of earthworms we have found applications of corrosive sublimate to be quite effective under our soil and climatic conditions at Ottawa.

In addition to this review of the experimental work under the supervision of the division of forage plants of the Central Experimental Farm I should like to mention some of the accomplishments of our two cooperators, Dr. M. O. Malte and the Dominion Seed Branch. Dr. Malte, who is the chief botanist of the National Museum, has been of outstanding service to Canadian golfers in locating

areas of creeping bent, Rhode Island bent, and velvet bent where quantities of both stolons and seed could be obtained. To golfers of Canada as well as the United States he has made an additional contribution in the form of a publication which should serve the purpose of clarifying the confused condition regarding the nomenclature of the various species of *Agrostis*. The Dominion Seed Branch has succeeded in organizing a seed center in Prince Edward Island for the production of seed of the bent grasses. Surveys made in cooperation with Dr. Malte revealed the fact that there are extensive areas on the island where the different species of bent occurred in remarkable purity. The Prince Edward Island Grass Seed Growers' Association, with headquarters at Charlottetown, has been organized to handle the turf grass seed of the island. The seed crops are inspected in the field by a Dominion seed inspector, and the cleaned seed is sealed in sacks over official inspection certificates. The seed is also selected and cleaned to a high degree of germination and purity. We are informed that the 1929 crop is expected to furnish about 30,000 pounds of good seed. Aside from the stimulation of seed production in the maritime provinces an effort is being made to establish a seed-producing center for velvet bent and creeping red fescue in the central part of the Province of Alberta. In 1927 an excellent crop of seed was obtained from that region, but in 1928 the climatic conditions were less favorable and the seed crop not satisfactory.

In closing I wish to say that it is the desire of those in charge of turf grass improvement in Canada to cooperate as closely as possible with the United States Golf Association Green Section. We are grateful for the help we have received in the past and we are looking forward to the time when we may be able in some small measure to return the favors so cheerfully extended to us.

The acquisition of land for the Upper Mississippi River wild life and fish refuge is continuing, according to the annual report of the United States Biological Survey, and as a better price per acre has been authorized by Congress, future purchases will be facilitated. The Government has also been authorized to accept as part of the refuge a tract of 488 acres near the city of McGregor, Iowa, donated by James Buell Munn, of New York City. This land is valued between \$30,000 and \$40,000.

This refuge is proving to be a great benefit to many species of wild life. Among those quick to realize the protection afforded are the migratory birds. Ducks, geese, and coots have sought out the protected areas and in the fall remain until the freeze-up. As a result of the security enjoyed by the birds on the protected portions of the refuge, many remain to nest during the summer when normally they might have gone farther northwest. Local birds are fairly abundant in the fall, but at times the high water enables them to get into large inaccessible districts, making hunting rather difficult. When the northern ducks arrive they find more closed areas or sanctuaries than formerly.

In addition to the sanctuaries and rather intensive patrol and protection through the enforcement of state laws and Federal regulations along the river, the Biological Survey is building up the wild fowl on the Mississippi by trapping and placing on Lake Winona a number of wild ducks and geese. The ducks released are banded with a view to obtaining information as to their routes of flight.

Green Section Extension Work

By Kenneth Welton

Scientific discoveries and results of research work do not become of full value until they are placed in the hands of the practical men, the men who are to make use of them. Scientific information is frequently brought out in a most technical form and can not be understood by the layman. It often happens that a discovery in one branch of science may have an important bearing on a wholly unrelated field and may be overlooked unless there is some means for bringing such findings to the attention of all who may be affected. In the case of the Green Section we are particularly interested in keeping up to date on scientific work which may become of some service in golf course maintenance.

There are four ways in which the Green Section does extension work—by the Bulletin, by correspondence, by personal contact and meetings, and by demonstration plots.

The Bulletin has been published since 1921, and its popularity is shown by the fact that on our shelves at Washington we have only a few hundred Bulletins published previous to 1928. All the remainder of these thousands of copies have been sent out on application. A great many of the issues have long since been depleted. These were issues which dealt with subjects of particular value at the time. We have tried to guard against that eventuality in the future by increasing the publication by some 1,500 copies a month, which brings the total issue of the Bulletin to 60,000 copies a year.

The Bulletin is read by men who are interested in turf culture and is quoted in various manners. Its information is not only distributed by word of mouth, but it is interesting to note that several of the golf publications which have previously devoted their columns only to the game are now running columns on golf course maintenance and construction. That fact is particularly gratifying, since it shows that the golfer is beginning to realize the importance of the turf on the course and the problems which face the greenkeeper.

This last year you have probably noticed that we have run a new Bulletin series. We have attempted to bring up to date all past information on particular subjects; problems such as fairway fertilizing, putting green maintenance, golf course construction, water systems, and golf course accounting have been covered so far, and we shall deal with others in the future.

We have taken information from the past that still holds good, and put it all in one Bulletin, together with the most up-to-date information. Reading such a Bulletin may not be of particular interest to those who read the Bulletin only casually or to those who have no particular problem on their course and are only after general information. We have, however, received many expressions of appreciation from those who have been confronted with a particular problem that has been dealt with in this style. Readers find it convenient to have the information they require put out in one copy.

Our correspondence is a big item with our limited staff. We have estimated that over 500 letters a month are sent out from the Green Section. Forty per cent of these might be called routine, 20 per cent administrative, and 40 per cent are on queries regarding golf course maintenance problems. Of this latter 40 per cent, a large pro-

portion might be called problem letters. They are letters that show a real need for information on some vital problem of a course.

There are problems that we can not answer offhand, and we do not attempt to do so. We are fortunate, due to our close affiliation with the Department of Agriculture, in having available the best scientific information on various phases of plant growth. As an example of this, some club having difficulty with its turf may send samples of soil for examination. The sender suggests that the soil may have become poisoned by using the wrong fertilizer or chemical. The cultural methods used on the course are outlined and we are asked whether anything in the maintenance program is at fault. If it is logically a soil chemist's problem we go to the Bureau of Chemistry and Soils and get such experts as Dr. Schreiner, Mr. Brown, Dr. Skinner, and Dr. Fletcher, men who are studying soil fertility year in and year out, to assist us, and very often they are able to give us offhand the information we require. In any event, they are usually able to advise means by which a possible solution of the problem might be worked out.

If samples of seed are sent in we can have germination and purity tests made by the Department's seed laboratory, and when it comes to seed identification the expert advice of specialists such as Mr. Hillman, Miss Henry, and Miss Sirrine is most valuable. Mr. Hillman is an authority on seed of species of *Agrostis*, and his services are particularly valuable at this time, since there are so many different kinds of bents on the market. Mr. Lapham, of the office of soil survey, has been very obliging in making determinations of organic matter and soluble salts in soil samples. Our work with insect pests has been done by Mr. Leach, of the Bureau of Entomology. His work in controlling the grubs of the Japanese beetle, the June beetle, and other insects which seriously damage turf on some courses needs no further mention here. The identification of the fungi which cause diseases of grass, and the means of controlling them, were worked out by Dr. Monteith while employed by the Department of Agriculture.

I shall now mention a manner of doing extension work which is most satisfactory—namely, by personal contact. The Green Section staff is not wholly limited to Arlington, which is a good thing. Contrary to the opinion of some, we have an opportunity to observe turf culture and the results of various cultural methods over a large area.

This last year our limited staff—Mr. Westover, Dr. Monteith and myself—visited over 185 golf courses. These visits were for the purpose of conferring with the committees or greenkeepers, and we went as intimately into their problems as possible. These courses were to a large extent in areas of golf club concentration, but golf courses in such distant areas as Florida, Oregon, New Mexico, North Dakota, the State of Washington, Nebraska, Kansas, and even the British Colony of Bermuda were visited. Frequently information obtained on one course is of great value to another. I mention this because it shows not only that the Green Section service through personal contact includes a wide territory but also that we have an opportunity to make observations in widely separated territories.

The demonstration plots are the latest extension development. Apart from their experimental value, which has been referred to by previous speakers, they are decidedly useful from an extension standpoint. They are a most convenient place to hold meetings. Wherever

meetings are called for a certain district, the demonstration plots we hope will provide an opportunity for the gathering actually to see the turf from different grasses and to become familiar with their characteristics. Also opportunity is afforded to compare the results from different methods of culture.

The demonstration plots assist us with our correspondence and help in our extension work. For example, we frequently get letters asking such questions as the following: "We are about to re-turf our greens. What shall we put on them?" "Do you think that Washington or Metropolitan bent are the only grasses for putting greens?" "What is 'Cocoos' bent?" We can not take the responsibility of answering or advising a course to put a certain grass on the greens when there are a number which may prove satisfactory, but with the demonstration plots in different areas, planted on various soil types and under different climatic conditions, we can advise committees to visit the demonstration plot which is planted on a similar soil type and under similar climatic conditions to that of their property, and determine for themselves which grass they like best. Perhaps they might think German mixed bent would be the best, or perhaps they might prefer the Metropolitan strain of creeping bent. It is up to them to decide. They are representing their playing members. We hope that in the near future these demonstration plots will aid us in a similar manner on questions of fertilizers, weed control, and other turf problems.

Only this past season, although the plots have just been planted and we did not expect them to be of much use last fall, the arsenate of lead has shown results. People write in and ask, "Where can we see an example of arsenate of lead keeping worms out of greens?" Several of the men in charge of these plots have written in and told us it is wonderful how the arsenate of lead plots have kept out the worms. Worms may crawl in on the poisoned area and do damage before they are poisoned; but at the same time the control has been noticeable. This control with arsenate of lead has shown up most clearly on certain types of soil. Also we get questions on the possible toxicity of arsenate of lead to certain grasses. Clubs ask: "Do you think it would prove toxic?" "Are you sure that it would not injure our greens?" This work has not been carried on for a sufficient length of time on the demonstration plots for one to draw final conclusions; but it can be seen that the seed of various grasses has germinated and the seedlings are now vigorous on arsenate of lead plots. I do not wish to cause or create any impression that we expect that arsenate of lead will be toxic to any grasses. Mr. Leach's work is of long standing; but still there is doubt in some people's minds, and the demonstration plots will prove convincing. After seeing results of treatments of which they have been doubtful those in charge of golf courses will not be timid about applying like treatments on their courses.

I believe, in conclusion, that there are unlimited possibilities for further extension work by means of the demonstration plots, and wish to advise that those who are most keenly interested get in touch with their local demonstration plots. We have endeavored to place plots on several soil types in districts where more than one soil type exists, so any differences due to environment may be better taken care of.

QUESTIONS AND ANSWERS

All questions sent to the Green Section 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. 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 Section.

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.

Lime and fertilizers for Kentucky bluegrass.—Is sulphate of ammonia a good fertilizer for a bluegrass fairway? (Ohio.)

ANSWER.—We do not recommend the continued use of sulphate of ammonia on Kentucky bluegrass. Sulphate of ammonia will in time acidify the soil. Acid soil seems to be suitable for bents and fescues but tests indicate that bluegrass thrives much better on soils that are derived from limestone or are supplied with ample calcium carbonate (lime). Lime is alkaline in character, and although it may not be present in the soil in sufficient quantities to make the soil alkaline it is nevertheless necessary for bluegrass. Sulphate of ammonia and lime act in a contrary manner in their effect on the soil, and better results have been obtained with bluegrass when sulphate has not been used too frequently. Lime is not a fertilizer and hence plant food must be supplied in addition from time to time. Organic fertilizers, such as well-rotted manure, bone meal, poultry manure, cottonseed meal, and sewage sludge, have given very favorable results on Kentucky bluegrass turf.

Relative availability of the nitrogen in sulphate of ammonia and nitrate of soda.—On page 196 of the Bulletin for September, 1926, the following statement appears with regard to the nitrogen in poultry manure: "As the nitrogen is usually in the form of an ammonium compound it is a quickly acting fertilizer." We have been under the impression that the nitrogen in a nitrate compound was a quickly acting fertilizer, while in an ammonium compound it was slower in action. (Alabama.)

ANSWER.—While the nitrogen in an ammonium compound, such as sulphate of ammonia, is conceded to be a trifle more slowly available than the nitrogen in nitrate salts, such as nitrate of soda, there is really little difference. If we were to put nitrate of soda, in terms of relative availability, at 100, then sulphate of ammonia would rank from 90 to 95. In general fertilizer practice, nitrate of soda and sulphate of ammonia are considered equally desirable, other things being equal.

The principal factors entering into the cost of constructing a golf course.—In order to assist us in placing a fair estimate on what it should cost to construct a new course we should appreciate any figures you can supply on costs of constructing a number of golf courses in various locations. (Alabama.)

ANSWER.—The Green Section has not attempted to collect costs of constructing golf courses throughout the country; so many factors are involved that it would be almost impossible to apply the figures

from one course to another. In the first place, the personal factor introduced by the architect himself greatly influences the cost of construction. Some architects will choose every difficult situation on a course and will thus incur a large expense in efforts to overcome natural difficulties. Others will lay much emphasis on artificial work, thus incurring a large expense for moving dirt and similar operations. On the other hand there are architects who, realizing that the club expects a well planned golf course without indulging in too much artificial landscaping, will endeavor to take advantage of the lay of the land and on some properties will be able to plan a course which will require very little drainage, filling, or grading. Apart from the architect's plans, another personal element is involved in the construction superintendent chosen. No matter who the contractor may be, a great deal depends on the superintendent in charge of the work. No two men can work alike in landscaping, a feature which can not be as definitely provided for in specifications as can the construction of roads or buildings.

In our opinion the following figures may serve as a rough guide in estimating construction costs:

If the property is free from stone and rock and needs no clearing of timber, stones, or other obstructions, \$1,500 a hole, including tee, fairway, green, traps, and rough, should be sufficient.

In addition, the water system on a course that does not require fairway irrigation, should cost in the neighborhood of \$12,000.

Another additional cost would be involved in clearing of timber, which on the basis of 100 trees to the acre, should amount to roughly \$500 an acre. With less trees to the acre, or on old stump or brush land, the cost would be somewhat less.

Picking and removing stones from stony land, \$100 an acre and up.

Extensive property drainage problems, as well as the improving of poor soils by the addition of large quantities of manure, humus, clay, sand, or fertilizer, would need to be figured extra.

These figures are applicable only to courses laid out so that no extensive filling is required and the natural lay of the land is utilized.

For details of construction work attention is invited to the issues of the Bulletin for March, July, and August, 1928.

Improving turf on shaded areas.—On the two sides of my house where there are no trees I have developed as fine a Kentucky bluegrass lawn as one will find anywhere, but on the two sides shaded by numerous trees I can not get bluegrass to thrive. Can you give me any information that might help me to establish a turf on this shaded area? (Wisconsin.)

ANSWER.—Wherever grass grows under or near trees there is competition between the trees and the grass. Not only does the shade hold the grass back, but the roots of shallow-rooted trees and shrubs will rob the grass of much plant food and moisture. Although soil in a shady place may look cool and damp, this does not necessarily mean that it has plenty of moisture. The moisture in shady places is often not free water and hence is not available to the plants. Certain grasses thrive better than others in shady places. For your locality we would recommend a mixture of one part redtop, two parts red fescue, and three parts rough-stalked bluegrass (*Poa trivialis*), sown at the rate of 7 pounds to 1,000 square feet. If your lawn in

the shady place has been established for some time, it would be well to open up the soil by spading and raking. If necessary, the physical structure of the soil should be improved by the addition of organic material, such as well-rotted manure. Sand mixed with clay soil will also tend to make the clay more porous. Clay mixed with sandy soil will increase its capacity for retaining moisture and plant food. Such fertilizers as cottonseed meal, pulverized poultry manure, and sewage sludge can be used to advantage on established lawns, while bone meal gives splendid results when mixed in the surface soil at the time of seeding. A shady lawn that is robbed of food and moisture by trees and shrubs is usually greatly improved when watered as frequently as one waters lawns in sunny places. Turf under trees will also be greatly encouraged by spring and fall fertilizing, whereas the lawn in the sun can do nicely with only one application of fertilizer a year, preferably early in the fall.

Creeping bent in comparison with other grasses for greens; grass for tees.—We are planning to put in some more bent greens on our course. We now have a strain of creeping bent purchased from a nursery and it has proved quite satisfactory. We are advised, however, that you do not recommend bent greens any more as they have not proved satisfactory. It has also been recommended to us that we buy some German bent and start a garden for use on our tees. Is that the best bent for tees in this locality? (Illinois.)

ANSWER.—We still recommend creeping bent stolons for producing putting green turf where climatic conditions are not unfavorable, because we know of hundreds of such greens throughout the country which are entirely satisfactory. We do not claim, however, that creeping bent stolons make the only good turf for putting greens. If you have a strain on your greens which has given satisfaction, we can see no reason why you should change it. In regard to a grass for tees, we find that, as a rule, bluegrass is preferred for tees in your section of the country. The addition of a little bent frequently greatly improves the turf for that purpose, but bent alone on tees often leads to disappointment. If you wish to try German bent tees, we suggest that you change perhaps two tees to this grass and compare them with the mixture of bluegrass and bent for a couple of years before going to the expense of changing all the tees at once.

Fairway turf and acid soils.—Have you any information on the proper acidity or alkalinity for fairway soils? Do you recommend the application of lime on sour soils? (Delaware.)

ANSWER.—The degree of acidity most suitable for fairway grasses is as yet unknown. It is, however, well established that certain grasses can thrive on soils which are more acid than is desirable for other grasses. A fairway which consists chiefly of bent grass can usually be allowed to remain more acid than one in which bluegrass predominates. If you could send us a few samples of soil from various locations on your fairways and inform us as to the grasses most prevalent on your fairways, we could test the samples for acidity and might be in a position to give specific recommendations. We do not recommend the indiscriminate application of lime on so-called sour fairways. Often the so-called sour areas can be attributed to defective drainage rather than to excessive acidity.

“It is important for the public to understand that scientific progress is not a mere series of the lucky accidents and happy inspirations of a few favored individuals, but a long and toilsome process of investigation, hypothecation, and verification on the part of many workers who often follow fallacious theories and turn into blind alleys from which they have to find their way back to the highway leading toward truth.”

—OTIS W. CALDWELL.