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.