

TIMELY TURF TOPICS

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UNITED STATES GOLF ASSOCIATION GREEN SECTION

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SCARIFICATION ADVISABLE BEFORE HOT WEATHER: Where curtailed maintenance programs involve less frequent and higher cutting of greens the problem of mat formation on creeping bent and Bermuda grass greens becomes increasingly serious. The accumulation of this mat of stolons and organic debris not only adversely affects the putting surface of the greens but encourages severe disease attacks which are difficult to control even when sufficient competent help is available for necessary frequent treatments with fungicides. Labor and time therefore may well be spent now in removing the mat before the unfavorable hot humid conditions of midsummer. To do this the grass should be vigorously raked and cut, carrying on both operations in one direction first and then repeating both operations in a direction at right angles to the first. This apparently harsh treatment should be followed at once by a generous topdressing with sandy loam containing some nitrogen. For the benefit of both the grass and the putting surface the topdressing should be worked into the turf by means of a brush, a mat, or, where midsummer difficulties with drying out were experienced last year, by spiking.

If this can be done before hot weather comes to stay and while growing conditions are favorable for the putting green grasses, recovery from the harsh treatment will be prompt, the putting qualities of the greens will be improved, and the likelihood of severe attacks of the summer diseases materially reduced.

SPORES OF MILKY WHITE DISEASE AVAILABLE COMMERCIALY IN JAPANESE BEETLE CONTROL: The milky white disease which was discussed in the November, 1942, issue of TIMELY TURF TOPICS is probably the most enduring method yet developed for combating the grubs of the Japanese beetle. The disease is caused by bacteria which reproduce in the blood stream of living grubs, producing as many as 3 to 9 billion spores in a single grub. When the diseased grubs die the bacterial spores are released in the soil, where they remain living for many years, being resistant to extremes in both temperature and moisture. Inoculation of the soil with the spores has been demonstrated to reduce the Japanese beetle grub population from as many as 120 to a square foot in July to 6 to a square foot in September of the same season. Obviously, however, one relatively heavy infestation of grubs is necessary to disseminate the organisms throughout the soil.

Soils may be inoculated with the bacteria which causes the milky white disease by the application of a dust which is impregnated with living bacterial spores. The spore dust which is available commercially is composed of approximately 90 percent talc and 10 percent calcium carbonate, impregnated with living spores at the rate of not less than 100 million to a gram. Since the spores specifically affect Japanese beetle grubs they are harmless to plants, human beings, and domestic animals when used according to directions. The milky white disease can be established in the soil by spot treating the turf with a teaspoonful of the spore dust at 5-foot intervals in rows 5 feet apart. According to the manufacturer, 1 pound of the spore dust will treat 4,000 square feet of turf, when applied at the above rate. When turf is infested with grubs one application should probably be sufficient to insure the development and spread of the disease throughout the area treated. The spore dust is harmless to humans and domestic animals, odorless and easy to apply and therefore may be used safely even by inexperienced help. Since the spores remain living for long periods of time in dry condition the spore dust will not lose its virulence in the package for many years.

The manufacturer has not yet produced his product in sufficient quantities to permit wide distribution although he hopes to produce several tons of the spore dust this year, with even a greater production in 1945. If information is desired as to where it can be obtained the Green Section will be happy to receive and answer such inquiries.

FOUR-YEAR SUMMARY OF RATINGS OF CREEPING BENTS ON EXPERIMENTAL GREENS

Data from the experimental greens established in 1939 and 1940 by the Green Section in many parts of the country have been summarized during the past winter. Since the summaries reveal much of interest to those responsible for putting greens now and in the postwar period it seems advisable at this time to publish some of the inescapable conclusions.

Forty of these experimental greens were established, it will be remembered, in cooperation with various clubs from Massachusetts to California and from Georgia to Washington and Oregon. As is inevitable in such a cooperative program, it apparently was not practical for some of the cooperating clubs to submit ratings of the grasses to the Green Section office at intervals throughout the growing season even in the years before the United States entered the present world-wide conflagration.

Other clubs submitted ratings for only 1 or 2 seasons immediately following the establishment of the greens. Although these early ratings would not of themselves necessarily be significant, it is an interesting fact that in general they are in alignment with the results which have been gleaned from ratings submitted faithfully by other clubs at frequent intervals throughout the entire existence of the greens. Therefore all ratings, no matter how sparse, have been included in the general summary.

It is to be hoped that regardless of whether or not data were submitted to the Green Section office the greens may have been of real and inestimable value locally in arousing interest on the part of the golfing public in general and of green committee chairmen and greenkeepers in particular to the possibilities which some of the Green Section selections of creeping bent may have under any particular set of local conditions.

The Green Section takes this opportunity of expressing its appreciation to each and every cooperating club for the part it has played in this program. Especial thanks are due those who, through the entire period, have never lost sight of the Green Section's interest in these experimental greens and have faithfully submitted ratings at regular intervals throughout each of the growing seasons since the establishment of their greens. Without these faithful few who fortunately for the good of the program have been well distributed geographically, the significance of the occasional ratings in an over-all national picture would be open to serious question. In one instance it was only because of personal interest on the part of one of our Green Section Committee members to the extent of incurring personal sizable expenditures that the maintenance and regular rating of the grasses on one of our greens under geographical conditions in which we were specifically interested but for which little information was available concerning the behavior of creeping bent strains, were made possible.

On page 2 in the June, 1940, issue of TIMELY TURF TOPICS is published a map of the United States indicating the location of the 40 experimental greens which were planted vegetatively. Space does not permit the republication of this map but a copy of it or a list of the cooperating clubs will be sent to any of our readers upon receipt of a request for the same.

For those who are not acquainted with these experimental greens it may be stated that the typical green is composed of 12 wedge-shaped sections, each planted with a single strain of creeping bent. So far as possible the greens were used throughout the test period as regular or practice greens so as to expose each of the grasses to the customary wear and tear of play. For comparison purposes each green contained wedges of one or more of the 3 commercially available vegetative strains - Washington bent (C 50), Metropolitan bent (C 51), and Old Orchard bent (C 52). In addition, sectors were planted with one or more of the following commercially available seed: seaside creeping bent (C 60), Astoria Colonial bent (C 61), and Highland Colonial bent (C 65). The remaining sectors were planted vegetatively with strains of creeping bent which had been assembled by the Green Section from various parts of the country and had proven most promising in the tests over a period of years in plots maintained under putting green conditions in the trying climatic conditions on the turf garden at Arlington, Va. Usually only 6 or 7 of these strains were included on any one green. In all 19 strains were tried on one or more of these experimental greens. These strains together with their origin were listed on page 3 of the December, 1943, issue of TIMELY TURF TOPICS, copies of which may be obtained upon request.

It will be recalled that at the request of the Green Section the grasses were rated in order of preference, - all characteristics, both favorable and unfavorable, being considered. The most desirable grass was rated as 1 and the least desirable as 12 (when, as was usually the case, 12 grasses were under test on the green). It was hoped that the ratings would be made at intervals throughout the growing season in order that progressive seasonal changes in the relative ratings of the grasses might be followed over a period of years. In order to summarize the results, all of the ratings for each climatic season during which the grasses were actually growing (spring, summer and fall) were averaged for each green. Consequently a green which was established in the spring of 1939 had a possibility of 14 seasonal averages through the fall of 1943. It is noteworthy that of the 23 greens established in that year only 1 experimental green enjoys the distinction of having that number of seasonal ratings to its credit. Also only one of the remaining greens which were established either in the fall of 1939 or spring of 1940 has a perfect record since it was established. However, in spite of these facts, for some of the strains such as C 52 and C 19, which were established on 36 and 35 of the experimental greens, respectively, we have as many as 173 seasonal averages from which to draw conclusions.

Of the total number of 19 strains included on the experimental greens, 5 of them were tested along with the commercially available vegetatively propagated strains (Washington, Metropolitan, and Old Orchard) on 32 or more of the greens. Therefore between 150 and 175 seasonal averages have been obtained for these grasses. Comparable number of seasonal averages were also obtained for the seed-propagated bents - seaside creeping bent and Astoria and Highland Colonial bents. For two other Green Section strains there were as many as 73 seasonal averages, whereas for most of the others not more than 20 are available. Since the results from so few ratings could scarcely be considered significant, only those strains for which 70 or more seasonal averages are available are included in the accompanying summary. If any of our readers are specifically interested in some of the strains which are not included in this summary the Green Section will be delighted to supply available statistics upon request for such information.

In order to arrive at a satisfactory basis for comparing the relative merits of these strains, summaries were made for each season for each of the experimental greens. From these summaries it was easy to determine how many seasons on each green each strain took 1st, 2nd, 3rd or 4th place, respectively. It was believed that it might be unfair to the strains to limit the summaries to the number of times the grasses fell in 1st place since so much of personal prejudice is inevitable in the selection of the best of the superior strains. For this reason in the accompanying summary the grasses are arranged in order of the percentage of seasons in which they fell in any of the first 4 places. Figures also are included, however, which indicate the frequency with which each strain was given 1st, 2nd, 3rd or 4th choice, respectively.

<u>Strain</u>	<u>No. of Seasonal Averages</u>	<u>Percentage of Seasonal Averages in Which Each Strain Falls in</u>				
		<u>1st 4 Places</u>	<u>1st Place</u>	<u>2nd Place</u>	<u>3rd Place</u>	<u>4th Place</u>
C-7	155	61.9	12.9	16.1	14.2	18.7
C-19	173	60.7	20.2	16.8	15.0	8.7
C-36	73	58.9	12.3	26.3	11.0	9.6
C-15	162	58.0	27.2	10.5	11.1	9.2
Old Orchard (C-52)	173	45.1	15.0	6.9	15.0	8.1
C-17	155	38.7	4.5	9.0	9.0	16.1
C-28	73	37.0	5.5	9.6	11.0	11.0
Washington (C-50)	165	36.4	2.4	11.5	13.3	9.1
C-1	162	30.9	8.0	12.4	6.2	4.3
Metropolitan (C-51)	167	19.2	3.0	4.8	4.8	6.6
Seaside (C-60)	153	17.0	0.7	2.6	3.3	10.5
Astoria (C-61)	153	10.5	1.3	1.3	5.9	2.0
Highland (C-65)	147	9.5	0.7	2.7	3.4	2.7

A study of the table will show that the first 5 grasses are the superior strains regardless of whether one considers their occurrence in 1st place only or in the first 4 places. However, the relative standing of these 5 superior strains is significantly different, depending on the basis of comparison. C 15 and C 7 exchange places when first place only is considered instead of the present arrangement. C 19 remains in the same relative position by either method of comparison, whereas Old Orchard would move up to 3rd place instead of 5th place if compared with the other strains on the basis of 1st choice only. C 1, although 9th in order under the present arrangement would fall in 6th place if only first choices were considered. It is obvious that in general the Washington and Metropolitan strains have been the least desirable of the vegetatively propagated creeping bent strains under test in this series of experimental greens. The seeded bents conspicuously are in a class by themselves at the foot of the list, although they did show possibilities in Pittsburgh, Tulsa, and Portland.

It should be remembered that the figures given here represent the average behavior of the grasses in greens distributed over all parts of the country and under many types of maintenance programs. Therefore although a strain may rate at the bottom of the list it is not surprising to find that in specific limited situations it may be a superior grass. Consequently in another attempt to summarize the results each green was considered separately and the first 4 choices for the entire experimental period determined and tabulated as follows:

Strain	No. of Greens	Percentage of Greens in Which in Total Ratings Each Strain Falls in				
		1st 4 Places	1st Place	2nd Place	3rd Place	4th Place
C-7	32	78	16	9	41	12
C-15	33	66	39	9	15	3
C-19	35	63	26	14	9	14
C-36	17	47	--	41	-	6
C-52	36	44	8	19	11	6
C-50	33	39	6	3	15	15
C-17	34	36	3	15	6	12
C-1	33	33	15	12	-	6
C-28	14	21	7	7	-	7
C-51	35	12	3	-	6	3
C-60	34	9	-	6	-	3
C-61	34	6	-	-	-	6
C-65	32	6	-	3	-	3

It is noteworthy that here again C 7 heads the list as the strain which was rated as one of the four best grasses for the entire experimental period on the largest percentage of greens on which it was tested. C 15, C 19, C 36 and Old Orchard follow in the order named. If first choice alone is considered, however, C 15 again takes first place with C 19, C 7, and C 1 arranging themselves in the order named.

It appears significant that these five superior strains have excelled in diverse parts of the United States. To indicate the widely distributed geographical areas in which these grasses produce superior turf, C 7 may be cited as being one of the first four choices for the entire test period on experimental greens in the following districts: 2 out of 4 in the District of Columbia; 1 in Virginia; 1 in Massachusetts; 1 in Ontario; 2 in upper New York state; 1 out of 3 in the Metropolitan area; 2 in Pennsylvania; 3 in Ohio; 1 in Indiana; 2 out of 3 in Missouri; 1 in Detroit; 4 out of 5 in Chicago; 1 in Omaha; 1 in Tulsa; and 2 out of 3 in California. These figures illustrate the fact that although these grasses are generally superior in many parts of the country they do not necessarily lead in ratings on all of the greens in any one area. It would therefore seem advisable before deciding to use any single or several strains which have been superior on one or more experimental greens in your vicinity to try the grasses under your specific conditions and maintenance program.

It is an interesting fact that C 1 which, because of its outstanding resistance to wear and to disease gave such promise in the early stages of the test, rates in general along with Washington bent when the national picture is considered. It is entirely possible that the solution to the problem of which is the most desirable strain under any given set of conditions may lie in the use of a uniform mixture of stolons of two or more strains, the general appearance of which will permit their blending. For instance: in the fall of 1941 several greens on the Fairfax Country Club in the vicinity of Washington were planted with mixtures which have to date proved to be outstandingly successful. The combinations tried were C 1 and C 19, C 1 and C 27, and a mixture of all three of these strains. It remains to be seen how these greens will appear after ten or more years but to date the combinations have furnished unusually attractive greens with excellent putting surfaces.

Since none of the five top ranking strains except Old Orchard are available commercially the Green Section is this year increasing its stock of available stolons of these strains in order that interested member clubs may obtain enough vegetative material this fall from which to begin propagation for the postwar period. In addition to increasing its supply of available stolons of the four top ranking Green Section strains, C 1, C 17 and C 28 are also being increased. Since the amount of available stolons will necessarily be limited by current labor shortage it would be advisable for member clubs to inform the Green Section as soon as possible of any requests which they may be planning to make in the fall. The early receipt of such requests will enable the Green Section to budget the amount of stolon material available.

NOTIFICATION OF MEMBERS ADVISABLE WHEN SEVERE TREATMENTS ARE ANTICIPATED: When treatments which are likely to temporarily discolor greens or fairways are anticipated it might be wise to send out notices to all members in advance in order to avoid criticism of members and players on the course. Such a notice, asking for the patience and indulgence of the players and at the same time explaining to them the plan and purpose of the treatments, will probably not only satisfy them but arouse their active interest in the turf problems on the course.

EARLY DOLLARSPOT ATTACKS: The first attacks of dollarspot on bent turf usually appear during May and early June. Too often these early attacks are overlooked or neglected with the result that more severe infestations occur in the same areas later in the season. Now that the War Production Board order restricting the use of mercury fungicides for turf has been rescinded, undoubtedly much time and labor will be saved if preventive measures are used early in the season. If turf is treated with heavy applications of mercury fungicides as soon as these first and usually mild attacks appear, the chances of serious damage from subsequent infestations of both dollarspot and brownpatch will be materially reduced. The fungicidal effects of calomel are more lasting than corrosive sublimate and others of the more soluble mercury preparations and therefore it is recommended for use at this time of year. Before hot humid weather arrives, calomel or a mixture of calomel and bichloride of mercury may be applied at the rate of 3 ounces to 1,000 square feet without danger of seriously burning grass. In hot humid weather, however, this rate must be reduced to 1 or even 1/2-ounce to 1,000 square feet.

No doubt many clubs will now use calomel or a calomel-bichloride of mercury mixture in spring and fall when danger of burning the turf is at a minimum, but will use during the hot humid days of summer Thiosan, which can be so much more easily applied without danger of burning. With incompetent and inexperienced help such as many golf courses will be forced to employ, Thiosan applications, where they have proved to be effective, will be safer and hence more satisfactory. Many clubs have found that they must apply the Thiosan at as much as twice the rate recommended by its manufacturers to get satisfactory control. This is perfectly safe, however, because there is practically no danger of burning the grass with it nor has it been shown to leave any toxic effect in the soil.

MAY AND JUNE BEETLES PREVALENT THIS YEAR: The common white grubs, which in some years seriously damage turf, are the larvae of the May and June beetles of which more than 100 species occur in an area bounded roughly by northern Kentucky on the south, southern Minnesota on the north, South Dakota on the west, and Connecticut on the east.

Usually the life cycle of these beetles covers a three-year period and they are known to occur in definite broods. The adult beetles appear in May and June. The different species vary in their food preferences but in general the adult beetles may be found feeding on bur oak, ash, hickory, poplar, elm, willow, locust, hackberry or walnut trees. In some cases, particularly in the more southern areas, they are known to prefer pines. They are largely nocturnal insects, swarming to the trees at dusk, where they spend the nights feeding and mating. Just before dawn they return to the soil, where they lay their eggs. It is important to understand their egg-laying habits in order to intelligently control the grubs and thereby prevent serious injury to turf the following year. The beetles prefer to lay their eggs in ground covered with vegetation, short dense turf offering them the most favorable conditions for egg laying. Usually they will choose the more elevated areas; therefore it may be expected that the eggs will be laid in turf on high ground in the close proximity of trees around which the beetles have been found swarming.

The eggs which are deposited at depths ranging from 1 to 8 inches hatch within 3 or 4 weeks into young grubs which usually feed for the remainder of the season on decaying vegetable matter in the soil. If they are present in extensive numbers, however, they may begin feeding on living grass roots before the first season is over.

In the fall these young grubs burrow down into the ground for winter hibernation. In the following spring they come back up near the surface, where they feed on all available roots. During this entire second year they do their maximum damage to turf and other crops. When they are present in large numbers they may so completely cut off the roots of turf that it dies and can be rolled back as a carpet. At the end of the second summer they again burrow well down into the soil for hibernation, returning to the surface with warm weather in the spring. They may or may not feed during the late spring and early summer of the third year but by June they pupate, become inactive and usually remain in the pupal cells until the next spring, at which time they hatch into adult beetles, mate, and again lay their eggs. It is therefore obvious that, to prevent grub injury to turf the areas around which the beetles are found swarming in late spring and early summer should be treated at once with arsenate of lead. An application at the rate of 5 pounds to 1,000 square feet should, except in very sandy soils, last for several years. The arsenate of lead will not only kill the white grubs but also other insect pests which, because of their feeding habits, are subject to control with stomach poisons.

The habits of the May and June beetles have been followed since the summer of 1908, when the beetles were found to be unusually abundant and were followed by severe grub infestations in 1909. It has been found by the entomologists in the Department of Agriculture and various state experiment stations that the beetles occur in definite broods. The term "Brood A" has been applied to those grubs which occurred in 1909 and every third year since that time. The term "Brood B" is applied to those which occurred in 1910 and every third year since; the term "Brood C", for those which occurred in 1911 and every third year thereafter. "Brood B" and "Brood C" are relatively unimportant when the country as a whole is considered. "Brood A" is the most wide spread and most abundant brood, and grub injury from this brood has been most extensive.

Calculations show that 1944 is the year when the beetles should appear for the 1945 attack of the "Brood A" grubs. Notices have already reached the Green Section office of severe infestations of the beetles this year as far south as Little Rock, Arkansas. It will be wise, therefore, for all clubs, even though they may be somewhat out of the geographical limits listed above, to be on the lookout for attacks of the May and June beetles this year and to treat their turf immediately with arsenate of lead. Such preventive measures are particularly important in view of the shortage of labor which would be required to replace turf destroyed by grubs next year. It should be remembered, however, that applications are only recommended where the beetles are found swarming in sizable numbers. Conservation is still the order of the day and therefore it would be unwise to use unnecessary amounts of arsenate of lead, the supplies of which are necessarily limited as a result of the war.