

# THE BULLETIN

of the

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## **Demonstration Turf Garden Reports**

### **Summary of Reports from Fourteen Gardens for 1930**

By John Monteith, Jr., and Kenneth Welton

During the past three years the Green Section has established a number of demonstration turf gardens in different sections of the country in cooperation with local golf organizations. These gardens are to provide stations for testing various grasses, fertilizers, and cultural methods used on golf courses under a large number of soil and climatic conditions. They also serve as outposts for Green Section work for presenting actual exhibits of the elementary principles of scientific turf culture at which those who are interested in golf course maintenance may observe them in their immediate localities. The first gardens were planted in 1928. Additional gardens were planted in 1929 and 1930. Some of the gardens unfortunately had to be abandoned due to lack of adequate care, for financial or other reasons. The purpose and locations of the original demonstration gardens were set forth in the Bulletin for December, 1928, and the summary of the first season's observations was outlined in the Bulletin for December, 1929. The reader is referred to these two numbers for some of the detailed information, which is omitted from this report to avoid duplication. In the present summary some of the explanations essential for an understanding of the reports are repeated to save readers the inconvenience of referring to previous numbers.

The demonstration gardens are divided into series of plots 10 feet square, as shown in the accompanying plan of the gardens. The plots are divided into groups for making certain tests, thus the group in rows 2 and 3 is for a test of different grasses maintained as putting green turf, whereas the group in rows 4, 5, and 6 is for tests of fertilizers for turf used on putting greens. Seed, stolons, and fertilizers for the gardens are furnished by the Green Section. Certain standard directions for the general care of the gardens are given to those who are charged with their maintenance, but details of maintenance are left to the individual greenkeepers. In general the instructions are to maintain the turf in rows 2, 3, 6, and 7 as turf for a similar purpose would be maintained on the golf courses where the gardens are located. The plots in the fertilizer series do not receive the dressings of compost that are commonly used on golf courses. This is because compost contains elements of plant food to supply which fertilizers are ordinarily applied to turf, and applications of compost would accordingly complicate the results to be obtained from the fertilizer tests. Fertilizers are applied at regular intervals according to the chart. In addition to the differences due to soil and climate there are differences in the care of the several gardens due to variations in the individual maintenance methods practiced on the courses where they are located. As a result of this variation the plots that have the highest ratings in the accompanying tables indicate the ability of the particular grass or treatment to produce good turf under a great variety of soil, climatic, and cultural conditions.

The gardens continued to prove a source of interest to greenkeepers and members of green committees in their neighborhoods. Several meetings were held at a number of these gardens during the season at which the various tests were explained in detail to the vis-

## PLAN OF DEMONSTRATION TURF GARDENS

	A	B	C	D	E		
1						Optional.	
2	Red fescue Chewings' fescue	Washington Metropoitan	Colonial, western Colonial, N. Zealand	Colonial bent, R. I.	Velvet bent seed		Trial plots of putting green grasses.
3	Annual bluegrass	Virginia Columbia	Seaside bent	German mixed bent	Highland velvet No. 14276 velvet		
4	Sewage sludge	Poultry manure tankage	Check	Sulphate of ammonia	Compost and sulphate of ammonia	Fertilizer experiments on putting green grass (seeded German mixed bent).	
5	Check	Nitrate of soda	Urea	Ammonium phosphate	Check		
6	Complete fertilizer 6-12-4	Complete fertilizer 12-6-4	Check	Lime and sulphate of ammonia	Bone meal		
7	* German mixed bent	German mixed bent	German mixed bent	Metro. bent stolons	Chewings' fescue	Putting green length.	Cutting experiments.
8	* Ky. blue and redtop	Ky. blue and redtop	Ky. blue, redtop and Ger. mixed bent	Ky. blue and redtop	Chewings' fescue and Ger. mixed bent		
9	Ky. blue redtop and Chewings' fescue	Ky. blue and redtop	Ky. blue, redtop and Ger. mixed bent	Colonial bent	Chewings' fescue and Ger. mixed bent	Trial plots of fairway grasses.	
10	Bone meal	Lime	Check	Sulphate of ammonia	Sewage sludge		Fertilizer experiments on fairway grasses (Kentucky bluegrass and redtop mixture).
11	Check	Manure	Complete fertilizer 6-12-4	Complete fertilizer 12-6-4	Check		

\* Soil in plots 7A and 8A poisoned with arsenate of lead before seeding.

itors. In addition to the visitors at the time of these regular meetings, a large number of persons, singly or in small groups, have gone over the gardens with the greenkeepers or others familiar with the plans. The clubs on whose grounds the gardens are located have willingly made the gardens accessible to visitors at all times.

#### DEMONSTRATION TURF GARDENS COOPERATING WITH THE GREEN SECTION

Allegheny Country Club.....	Pittsburgh
John Pressler and Lois Miller	
Century Country Club.....	Metropolitan District
Henry Shakeshaft and G. W. Milnes	
Charles River Country Club.....	Boston
F. H. Wilson, Jr.	
Country Club of Virginia.....	Richmond
Douglas Call and Dominic Larusso	
Detroit Golf Club.....	Detroit
Alex McPherson and M. Milenow	
Indian Trail Golf Course.....	Grand Rapids
Floyd Metcalf, Carl Fiedler, and Robert Cullin	
Interlachen Country Club.....	Minneapolis
E. W. Pahl and Harold Stodola	
Lochmoor Club.....	Detroit
W. F. Beaupre	
Massachusetts Agricultural College.....	Amherst
W. E. Robison, Jr., and L. S. Dickinson	
Meadowbrook Country Club.....	Detroit
Thomas Slessor	
Niagara Falls Municipal Golf Course.....	Niagara Falls
Frank Bulges and Albert Bulges	
Oakmont Country Club.....	Pittsburgh
Emil Loeffler and Lois Miller	
Upper Montclair Country Club.....	Metropolitan District
George Robertson and G. W. Milnes	
Wheatley Hills Golf Club.....	Metropolitan District
Frank Krause and G. W. Milnes	

Monthly reports on the condition of turf on the various plots are made out in duplicate, one copy being sent to the Green Section office in Washington and the other retained for home reference. These reports are made out from May to October. In most cases the notes have been made by two persons in order to give the results the advantage of combined opinions, thereby reducing the likelihood of overlooking some points of interest. During the season of 1930 continuous reports were made from 14 of these gardens. Where reports were made for only part of the season or where there was evidence of carelessness or indifference in their preparation, reports from these gardens have not been included in the summary given in this number of the Bulletin. Occasionally the report was omitted for one month due to some unusual rush of work which prevented its preparation or due to the fact that no change had occurred in the previous ratings of the plots. In order that the summary might not lack the benefit of these otherwise complete and well-prepared reports, they have been included. The omission of one report in the season has not affected the tables, since the consolidation of the season's reports for 1929 and 1930 has been made on the basis of three groups of two months each. Where reports for any garden are missing for two consecutive months the garden is not mentioned in this summary. In preparing the tables the average of the reports for two months of each period is taken, and in occasional instances where a report has

been missing for one month the report for the other month in that period is used. Anyone who has taken careful notes on a series of tests such as these will appreciate the fact that it is a tedious and somewhat monotonous task. The names of those who have cooperated to the extent of performing this task conscientiously throughout the season are given in the accompanying list of the demonstration turf gardens cooperating with the Green Section. Readers should bear in mind that without the help of these cooperators no such interesting summary as is given in this number of the Bulletin could be possible.

In order to simplify the taking of notes it was decided to standardize the details as much as was practical. Accordingly blank forms were provided to be filled in with a few simple markings. The turf on each plot was rated as excellent, good, fair, or poor. In determining this rating of the turf it was specified that consideration be given its density, vigor, color, fineness, freedom from nap, and any other factor that would affect its quality for golf turf purposes.

No effort was made to establish any one standard of excellence by devising a score card. The ratings are therefore to be regarded as merely relative. In the series of plots of different grasses for putting greens, for instance, a report from one club might indicate that a certain grass was good whereas the report from another club might rate the same grass as fair. As an actual fact the turf in the latter case might be fully the equal of the former, but the person or persons making the report in the latter case were probably more critical and exacting than those making the report from the club where the grass was given a rating of good. However, the person who was more exacting and held higher standards would naturally scale down all the ratings in the same degree. Since the purpose of the reports was to compare the grasses side by side rather than to compare the ratings of different sections, all reports that were made with care and fairness were equally valuable. It will be noted in the foregoing list that in the majority of cases the notes were made by two persons, which of course helped to avoid oversights.

Many who are interested in these gardens have wondered just how these records could be of value without a definite standard to guide in making the ratings. To make this clear we use a single example. Reports were received from three gardens which for convenience will be referred to as reports No. 1, No. 2, and No. 3. In report No. 1, Metropolitan bent is rated as excellent and Virginia bent as good; in report No. 2, Metropolitan is rated as good and Virginia as fair; in report No. 3, Metropolitan is rated as fair and Virginia as poor. This might be interpreted as meaning that in garden No. 1 the Metropolitan was much superior to the Metropolitan in either of the two other gardens, and that the Virginia in garden No. 1 was superior to the Metropolitan in garden No. 3. Such a conclusion is unwarranted, for these differences may merely mean that those who made out report No. 3 used a much higher standard of excellence than those who made out No. 1. Such comparisons between different course reports may or may not have some significance other than the personal factor. The important point in the three reports is that the Metropolitan proved superior to the Virginia in each instance regardless of differences in soil and climate.

From some of the gardens the reports for the entire year did not

include a single rating of excellent even though the turf was well cared for and many of the plots in these particular gardens had turf which would have been a credit to most courses of that neighborhood. This merely indicates that those who prepared the notes in many instances were extremely critical and were inclined to underrate the turf rather than to assign any flattering ratings. This tendency makes the accompanying tables more interesting than would have been the case had the tendency been the other way, with ratings universally higher. No attempt has been made in the summaries of 1929 and 1930, nor will any such attempt be made in the future, to publish comparative ratings of the different gardens, for such a comparison would serve no useful purpose and might tend to encourage less critical rating if the person or persons making the notes felt that low ratings would bring discredit to those caring for the garden being rated. The Green Section wishes to encourage a critical attitude toward these gardens, and it is hoped that the standards of excellence will be raised even higher as the turf becomes older.

The reports on fertilizers and grasses are condensed to tables, while the points of greatest interest are emphasized in the text. The reports cover a period of six months, May to October inclusive, but in order to simplify the tables they are arranged in three periods of two months each, representing early summer, mid-summer, and late summer or early fall. In the tables the two columns at the right give the totals of these three bimonthly summaries. The ratings excellent and good, as well as fair and poor, have been combined to further simplify the tables. All of the gardens that are included in this report were planted in 1928 with the exception of the one on the Niagara Falls Municipal Golf Course, which was planted in 1929; therefore the tables essentially give the results on turf two years old.

The gardens contained other tests besides the tests of grasses and fertilizers. In a general way the reports on these other tests were similar to those of 1929, and the reader is referred to the notes which were made on the 1929 reports, which may be found in the summary for 1929 appearing in the Bulletin for December of that year. Many of the reports for 1930 contained interesting information concerning these other tests. A summary of these reports will however be left for a later number of the Bulletin, when the results over a number of years can be brought together, thereby giving more convincing figures than are available for a discussion of reports of a single season.

#### PUTTING GREEN FERTILIZER RATINGS

The putting green fertilizer tests were made on German mixed bent turf, with the exception of the garden on the course of the Country Club of Virginia, where Metropolitan creeping bent was used. There are 15 plots in the series, 11 receiving different fertilizers and 4 being check plots receiving no fertilizer. The check plots are so arranged that every fertilized plot is beside one which is not fertilized. The fertilizers were applied each month from May to October. The rates of application were figured on a nitrogen basis. The quantities used for a full-strength application contained 1/10 pound of nitrogen to a plot of 100 square feet. This is at the rate of 1 pound of nitrogen to 1,000 square feet, which is the amount carried in 5 pounds of sulphate of ammonia, in 16 2/3 pounds of the complete fertilizer with

an analysis of 6-12-4, or in 33 1/3 pounds of bone meal analyzing 3 per cent of nitrogen. During July and August the rates of applications were cut in half to reduce the danger from burning. Therefore in the six applications during the year each fertilized plot received 1/2 pound of nitrogen. Knowledge of the relative effects of different fertilizers when compared on the nitrogen basis enables anyone to determine by simple arithmetic the values of fertilizers according to his local quotations. In the accompanying table and chart of putting green fertilizer ratings, the fertilizers which received the largest number of ratings of excellent or good during the season have been placed at the head of the list, while the check plots, which received no fertilizers, are at the bottom, since they were given the fewest excellent or good ratings.



In order to lessen the chance of applying the wrong fertilizer to a plot, the applications for each plot are distributed on the garden before the bags are opened. Each bag of fertilizer is placed on a small board to prevent the fertilizer's burning the grass. A wooden frame is placed over the edges of a plot before the fertilizer is spread, to keep it from scattering beyond the limits of the plot. This frame is moved from plot to plot as the operation proceeds. Photograph taken on the turf garden at the Country Club of Virginia

The two complete mixed fertilizers, as in the 1929 summary, headed the list, but the order of the two was reversed. These complete mixed fertilizers were prepared by mixing sulphate of ammonia, ammonium phosphate, superphosphate, muriate of potash, and sand. No organic material was used in their preparation. The sand was used as an inert filler to add weight to make up the desired proportions. If the strength of a 12-6-4 fertilizer is reduced by the addition of an equal amount of inert material, such as sand, it gives double its weight of a 6-3-2 fertilizer. Since all the fertilizers were applied on a nitrogen basis only half the quantity was used of the 12-6-4 as of the 6-12-4 fertilizer. Therefore this quantity would carry as much fertilizer as would have been carried in a 6-3-2 applied at the same rate as the 6-12-4. The difference in the fertilizers applied to these two plots is therefore merely a difference in proportions of phosphoric acid and potash. The 12-6-4 formula was used on the plots in pref-

erence to the diluted 6-3-2 formula merely because the modern trend of fertilizer formulas is in favor of the more concentrated mixtures to save freight charges on inert materials.

PUTTING GREEN FERTILIZER RATINGS, ON GERMAN MIXED BENT TURF, FROM 14  
DEMONSTRATION GARDENS DURING 1930

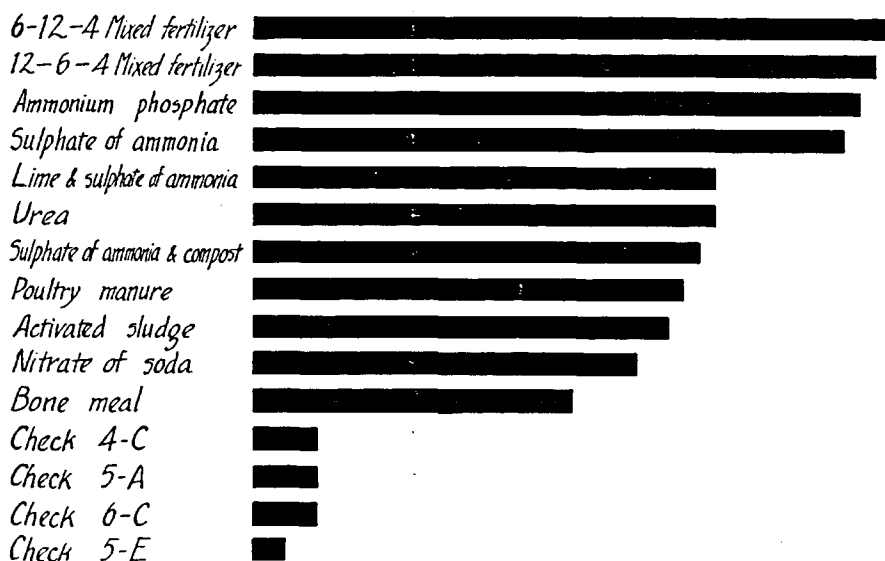
(The order given is from highest to lowest rating for the year)

	May and June		July and August		September and October		Entire season (totals)	
	Excel- lent Good	Fair Poor	Excel- lent Good	Fair Poor	Excel- lent Good	Fair Poor	Excel- lent Good	Fair Poor
6-12-4 .....	14	0	13	1	13	1	40	2
12-6-4 .....	13	1	12	2	14	0	39	3
Ammonium phosphate .....	12	2	12	2	14	0	38	4
Sulphate of ammonia .....	13	1	12	2	12	2	37	5
Lime and sulphate of ammonia .....	11	3	10	4	8	6	29	13
Urea .....	9	5	10	4	10	4	29	13
Sulphate of ammonia and compost .....	12	2	9	5	7	7	28	14
Poultry manure .....	10	4	8	6	9	5	27	15
Activated sludge .....	9	5	8	6	9	5	26	16
Nitrate of soda .....	8	6	7	7	9	5	24	18
Bone meal .....	5	9	9	5	6	8	20	22
Check 4-C (no fertilizer) ...	1	13	1	13	2	12	4	38
Check 5-A (no fertilizer) ...	1	13	1	13	2	12	4	38
Check 6-C (no fertilizer) ...	0	14	1	13	3	11	4	38
Check 5-E (no fertilizer) ...	0	14	1	13	1	13	2	40

It will be noted that there is little difference in the ratings of the four leading plots in the table and in the chart. It should be noted also that these four leading plots all received inorganic fertilizers and that these same plots were the four leaders in the table for 1929. The plot receiving lime and sulphate of ammonia rated fifth in 1930 as compared with ninth in 1929. A heavier application of lime was used in 1929 than in 1930. Some of the unfavorable reports of 1929 were due to burning as the result of the heavy application of lime and sulphate of ammonia early in the season. On this plot in 1930 only enough lime was applied to neutralize the acid residue of the sulphate of ammonia used on the plot. The plot receiving urea rated sixth, which is the same position it held in the table last year. It holds the middle point in the table of the plots receiving fertilizer. The plot receiving sulphate of ammonia and compost had practically the same relative position in the table as it had last year. This plot receives half of its nitrogen from sulphate of ammonia whereas the other half is furnished by the compost. The results indicate that the nitrogen in the compost was not sufficiently available to give results comparable with those obtained with the same amount of nitrogen applied entirely in sulphate of ammonia. The position of the two plots which received the organic fertilizers, poultry manure tankage and sewage sludge, moved down from fifth and seventh places respectively in 1929, to eighth and ninth places in 1930. The ratings of activated sludge and bone meal in this table for putting greens made an interesting comparison with their ratings as fairway fer-



tilizers. The nitrate of soda and bone meal in both seasons held the same positions in the table, namely tenth and eleventh respectively, which were the lowest ratings of any plots receiving fertilizer. It will be noticed that the four check plots, which received no fertilizer, received an unfavorable rating throughout the season, which shows that the soil on which these gardens are planted is invariably poor and in need of fertilizers. The uniformity of reports on these various check plots indicates that there is little irregularity in the soil throughout the series and shows that the ratings of the different fertilizers can in a general way be depended on regardless of the locations of the plots.



Graph showing the relative ratings of the putting green fertilizers for the entire season

This table is the consolidation of reports of the second season in the case of 13 gardens, and the first season in the case of the garden of the Niagara Falls Municipal Golf Course. The important test of a fertilizer is its ability to produce results over a period of years, and the table must therefore not be regarded as final in any sense. The rearrangement of the order of ratings for the season of 1930 as compared with the order for 1929 brings out the variations in results obtained from the use of fertilizers in two consecutive seasons. The rainfall and general climatic conditions prevailing where these gardens are located were quite different in the seasons of 1929 and 1930, and such variations are known to have an important effect on the results obtained from various types of fertilizers. In spite of these variations there have already been results in this fertilizer series of much significance. A comparison of the two complete mixed fertilizers with such fertilizers as nitrate of soda and bone meal in both seasons should furnish those in charge of golf courses with something to think about before they purchase fertilizers for their putting greens.

In recent years there has been much adverse criticism of experimental turf work on the grounds that results obtained in one section do not necessarily apply under an entirely different state of soil and climatic conditions. For the first time these reports of the demonstration gardens however represent a consolidation of reports from gardens with entirely different soil and climatic conditions. The fairly consistent ratings that come from the various gardens indicate that the matter of difference in local conditions has been somewhat over-emphasized.

#### FAIRWAY FERTILIZER RATINGS

The fairway fertilizer series consisted of 10 plots planted with a mixture of 80 per cent of Kentucky bluegrass and 20 per cent of red-top. Three of the plots were not fertilized, to serve as checks against the seven fertilized plots. As in the putting green series, the nitrogen fertilizers were applied to give the same quantity of nitrogen for each plot. The total application of nitrogen for the season on the fairway plots was just half the rates used on the putting greens. The applications were made in spring and early fall.

#### FAIRWAY FERTILIZER RATINGS ON MIXED TURF OF KENTUCKY BLUEGRASS AND REDTOP FROM 14 DEMONSTRATION GARDENS DURING 1930

*(The order given is from highest to lowest rating for the year)*

	May and June		July and August		September and October		Entire season (totals)	
	<i>Excel- lent Good</i>	<i>Fair Poor</i>	<i>Excel- lent Good</i>	<i>Fair Poor</i>	<i>Excel- lent Good</i>	<i>Fair Poor</i>	<i>Excel- lent Good</i>	<i>Fair Poor</i>
6-12-4 .....	10	4	9	5	9	5	28	14
Bone meal .....	8	6	9	5	6	8	23	19
Activated sludge .....	9	5	9	5	5	9	23	19
12-6-4 .....	10	4	5	9	5	9	20	22
Sulphate of ammonia .....	8	6	6	8	4	10	18	24
Lime .....	3	11	5	9	5	9	13	29
Manure .....	3	11	5	9	4	10	12	30
Check 10-C (no fertilizer) ..	3	11	3	11	3	11	9	33
Check 11-A (no fertilizer) ..	1	13	3	11	2	12	6	36
Check 11-E (no fertilizer) ..	1	13	2	12	2	12	5	37

The same mixed complete fertilizer which headed the list in the putting green fertilizer series also gave the best performance in the fairway series. This fertilizer also headed the list in 1929, and the other complete mixed fertilizer which in 1929 rated second moved to fourth place in 1930. Bone meal, which in 1929 rated fifth, took second place in 1930. Activated sludge moved from fourth place in 1929 to third place in 1930. These two organic fertilizers which gave such favorable results in the fairway series had relatively poor ratings in the putting green fertilizer series. The rating of sulphate of ammonia changed from third to fifth place in the two years. The manure and lime plots in both seasons rated fairly closely together, but their order was just reversed in the two years. Neither of these plots showed much improvement over the check plots, which were nearest to them. In the table for 1929 the three check plots were consolidated to reduce the size of the table but in the table for 1930

the check plots have been given individually in order to show the small amount of variation that occurs in the different check plots. The change in the rating of bone meal was one of the interesting developments of observations in the season's reports. The dry season of 1930 apparently was more favorable for the use of bone meal on the fairway plots than was the season of 1929; however this difference did not apply in the putting green series, where the bone meal held the same place in 1930 as it did in 1929. One of the gardens which was abandoned and merely kept mowed showed a decidedly superior turf in the bone meal fertilizer plot as compared with all of the other plots. No fertilizer was applied to any of the plots in this abandoned garden in 1930, and therefore the benefit of the bone meal at the end of the season showed that all of the 1929 application of bone meal was not used that year but remained in the soil to encourage the growth of turf in the dry season of 1930. Manure in both 1929 and 1930 produced the poorest turf of any of the fertilizers containing nitrogen.

#### PUTTING GREEN GRASS RATINGS

In the table of putting green grass ratings the grasses tested at the turf gardens are grouped according to botanical relationship, and within the groups are listed in order of favorable ratings.

PUTTING GREEN GRASS RATINGS FROM 14 DEMONSTRATION GARDENS DURING 1930

	May and June		July and August		September and October		Entire season (totals)	
	<i>Excel- lent</i>		<i>Excel- lent</i>		<i>Excel- lent</i>		<i>Excel- lent</i>	
	<i>Good</i>	<i>Poor</i>	<i>Good</i>	<i>Poor</i>	<i>Good</i>	<i>Poor</i>	<i>Good</i>	<i>Poor</i>
Colonial bent								
New Zealand grown*.....	11	2	10	3	11	2	32	7
Western grown.....	11	3	10	4	11	3	32	10
Rhode Island grown.....	10	4	9	5	10	4	29	13
Creeping bent								
Metropolitan (stolons)....	12	2	14	0	12	2	38	4
Seaside (seed).....	13	1	12	2	12	2	37	5
Washington (stolons)....	12	2	13	1	11	3	36	6
Columbia (stolons).....	3	11	7	7	8	6	18	24
Virginia (stolons).....	5	9	4	10	5	9	14	28
Velvet bent								
No. 14276 (stolons).....	9	5	11	3	11	3	31	11
Highland (stolons).....	8	6	8	6	10	4	26	16
Seeded*.....	3	6	4	5	4	5	11	16
Mixed bent (German).....	11	3	10	4	11	3	32	10
Fescue								
Chewings'.....	6	8	3	11	3	11	12	30
Red.....	1	13	1	13	2	12	4	38
Annual bluegrass*.....	5	8	4	9	6	7	15	24

\* Not reported from all 14 gardens.

Colonial bent (commonly known as Rhode Island bent or brown-top bent) was grown from seed which came from three different sources. The reports in 1930, as in 1929, indicate that there is little difference in the turf produced by this species of grass regardless of the origin of seed. In 1929 the seed grown in Rhode Island proved superior to that from the two other sources, but in 1930 the results

in this respect were reversed. The differences in both years in either case however were only minor.

In the group of creeping bents are four strains planted with stolons and one planted with seed. The only change in the relative ratings of the two years was the reversal of the positions of the seaside and the Washington, but the differences in ratings were only slight in both years. The relative positions of the five creeping bents are practically the same as in 1929—that is, the Metropolitan, seaside, and Washington strains have similar high ratings, whereas the Columbia and Virginia strains have extremely low ratings. The continued difference in the ratings of these creeping bents gives further evidence to support the contention of the Green Section for a number of years that creeping bents for putting green turf can not be rated as a whole group but must be considered according to the merits of the individual strains.

The mixed bent seed used in this series was the same as in the putting green fertilizer series. It was purchased in open market as a representative of the German mixed bent of the trade. Seed sold under this name is chiefly colonial bent but with a varying percentage of velvet bent and creeping bent as well as different amounts of red-top. The results on the gardens indicate that this mixture produced a turf with a rating about the same as the average rating of colonial bent.

The velvet bents planted by the stolon method showed a decided improvement in 1930 over the ratings of 1929. The low ratings of 1929 were due largely to the poor stands obtained in the different gardens and also to the fact that velvet bent stolons are invariably much slower in producing a well-matted turf than are the other putting green grasses. Velvet bent turf grown from seed rated lower in 1930 than in 1929.

Both of the fescues, which had a low rating in 1929, received even lower ratings in 1930. The difference in the two lots of fescue seed again showed that the Chewings' fescue was somewhat superior to the common red fescue.

The plot of annual bluegrass (*Poa annua*) was planted with seed of mixed bluegrasses of which a little over 50 per cent was the annual bluegrass. This was the best seed of this grass available on the market, and, although the turf produced was by no means truly representative of the annual bluegrass turf on many putting greens in the United States, it was considered likely that the proportion of annual bluegrass would increase in the plots if the grass reseeded and crowded out the other bluegrasses. The ratings for this grass in 1930 were somewhat lower than in 1929, and even though some of the other mixed grasses were not as much in evidence the annual bluegrass also failed to thicken the turf decidedly.

The comparison of the table ratings for the 1930 season shows that when arranged in the order of the best ratings regardless of species the four leading grasses are Metropolitan creeping bent, seaside creeping bent, Washington creeping bent, and New Zealand grown colonial bent, and that the poorest grass was ordinary red fescue, the next poorest was Chewings' fescue, and the next poorest was Virginia creeping bent. The placing of strains of creeping bent as the three highest in the whole group as well as one of the three

lowest of the grasses shows that the same care should be exercised in making a selection from the various strains of creeping bent as is used in making a selection from the different grasses of any species that is available for use on putting greens.

### FAIRWAY GRASS RATINGS

FAIRWAY GRASS RATINGS FROM 14 DEMONSTRATION GARDENS DURING 1930								
	May and June		July and August		September and October		Entire season (totals)	
	<i>Excel- lent Good</i>	<i>Fair Poor</i>	<i>Excel- lent Good</i>	<i>Fair Poor</i>	<i>Excel- lent Good</i>	<i>Fair Poor</i>	<i>Excel- lent Good</i>	<i>Fair Poor</i>
Chewings' fescue and German mixed bent.....	12	2	10	4	10	4	32	10
Colonial bent*.....	7	4	7	4	5	6	19	14
Kentucky bluegrass, redtop, and German mixed bent..	7	7	9	5	8	6	24	18
Kentucky bluegrass, redtop, and Chewings' fescue....	8	6	8	6	6	8	22	20
Kentucky bluegrass and redtop* .....	4	9	6	7	4	9	14	25

\* Not reported from all 14 gardens.

The plots in the fairway grass series in 1930 retained the same relative positions as in 1929 with the exception that the mixture of Chewings' fescue and German mixed bent changed from third place to first place. The lowest was the mixture of Kentucky bluegrass and redtop, which is the mixture most commonly used on fairways, largely because it costs less than the other mixtures. The addition of either mixed bent or fescue raised its rating above the bluegrass-redtop combination. In fairness, however, to the Kentucky bluegrass, which is the old standard fairway grass used on golf courses in the northern half of the United States, it should be recalled that the seasons of 1929 and 1930 were particularly unfavorable for the growth of Kentucky bluegrass in many places where these demonstration gardens are located.

### 1931 Official Edition of the Rules of Golf

The United States Golf Association announces the publication of the 1931 Official Edition of the Rules of Golf. The booklet contains recommendations, form and make of golf clubs, etiquette; special rules for match play competitions; rules for three-ball, best ball, and four-ball matches; special rules for stroke competitions; rules for par and bogey competitions; together with interpretations as passed by the Royal and Ancient Golf Club of St. Andrews and the United States Golf Association.

In quantities of 25 booklets, or less, the price is 10 cents each, but in larger orders the price is scaled down to 6 cents for 1,000 copies or more. On orders of 200 or more copies the club name will be printed on the cover. Wall cards containing complete Rules of Golf are available at 50 cents each. Orders may be sent to United States Golf Association, 110 East 42d Street, New York, N. Y.

## QUESTIONS AND ANSWERS

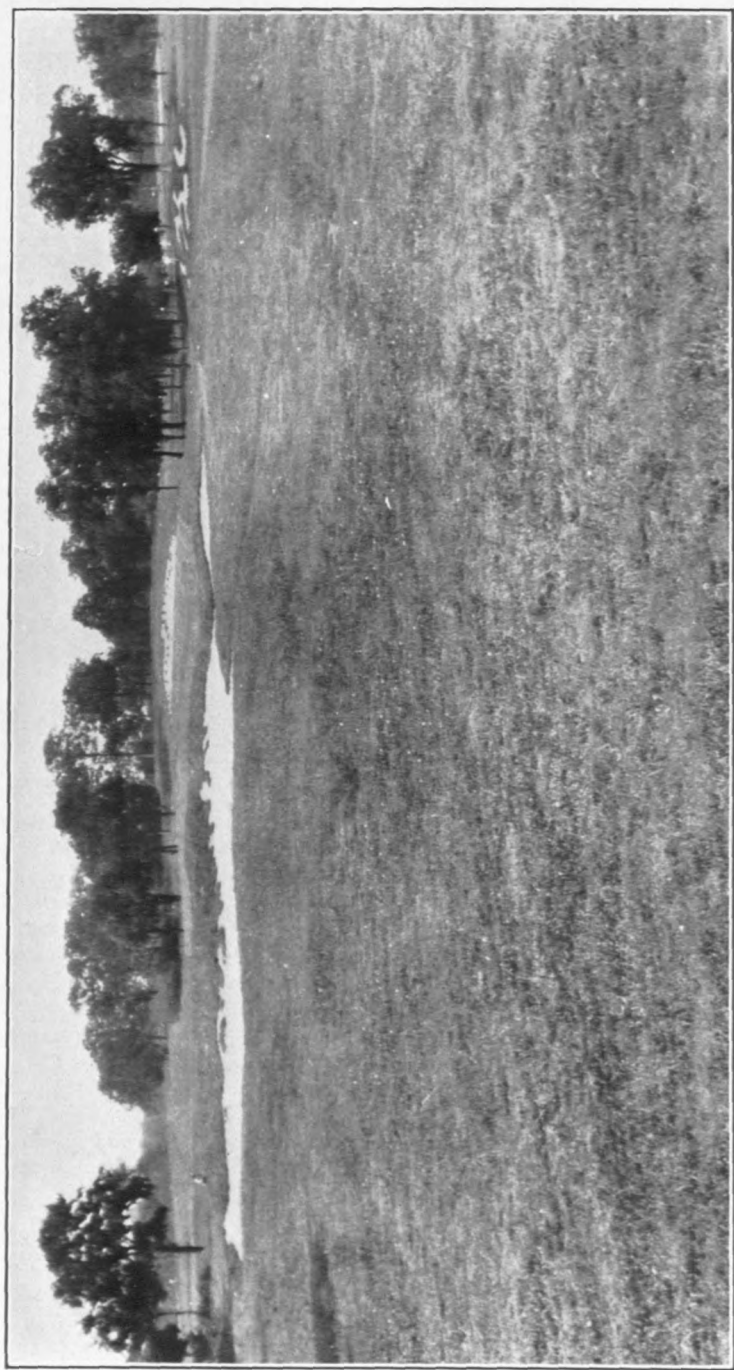
All questions sent to the Green Section will be answered in a letter to the writer as promptly as possible. The more interesting of these questions, with concise answers, will appear in this column. If your experience leads you to disagree with any answer here given it is your privilege and duty to write to the Green Section. While most of the answers are of general application, it must be borne in mind that each recommendation is intended specifically for the locality designated at the end of the question.

**Selecting a grass for new putting greens.**—We are now ready to plant the putting greens on our new course and naturally want to select the grass that will give us greens of the best quality. The course has been provided with excellent drainage. (Indiana)

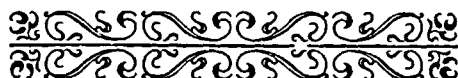
**ANSWER.**—After many years of testing and observing putting green grasses we have been unable to find any best grass suitable for the purpose. For your locality either creeping bent planted with the stolons or bent planted with seed should be satisfactory. There is much discussion among golfers as to which of these two kinds of turf is preferable. The matter is doubtless very largely one of personal preference. Some grasses which produce very attractive putting green turf are very difficult to maintain, and for that reason are frequently considered undesirable. You will find a rating of putting green grasses from 12 demonstration turf gardens, based on observations during the season of 1929, on page 218 of the Bulletin for December, 1929, and the ratings there given are very much like ratings we have received from other turf gardens over a period of years. Grasses we regard as satisfactory are the Washington and Metropolitan strains of creeping bent planted by the stolon method, and seaside creeping bent, German mixed bent, or colonial bent planted from seed. German bent is very largely colonial bent but with a trace of velvet bent, which adds to its attractiveness for putting greens. Our recommendation to those contemplating planting putting greens is that they visit their nearest demonstration turf garden cooperating with the Green Section, where they may examine the various putting green grasses growing side by side under putting green conditions and thus draw their own conclusions. A list of these demonstration turf gardens is given on page 213 of the Bulletin for December, 1929. There are also available for this purpose the demonstration plots on the experimental turf gardens maintained directly by the Green Section, namely the Arlington turf garden at Washington, D. C., and our Mid-West turf garden at Everett, Ill., near Chicago.

**Winter top-dressing for putting greens.**—Will a mixture of equal parts of mushroom soil, sand, and good topsoil or earth be satisfactory as a winter top-dressing for our putting greens? (Delaware)

**ANSWER.**—The same top-dressing material should be used on putting greens in winter as in the growing season. The mixture you describe should be entirely satisfactory. Since you probably use your greens throughout the winter care should be taken to see that too much top-dressing is not applied. There is no need of covering greens with heavy top-dressing in winter except for giving a true putting surface.



Looking from the tee, eighth hole (390 yards), Old Elm Club, Fort Sheridan, Ill.



We must learn that any person who will not accept what he knows to be true, for the very love of truth alone, is very definitely undermining his mental integrity. It will be observed that the mind of such a person gradually stops growing, for, being constantly hedged in and cropped here and there, it soon learns to respect artificial fences more than freedom for growth.

Luther Burbank

