Drift and Speed of Putted Ball on Bents as Determined by Mechanical Putter

By Fred V. Grau

During the many years that have elapsed since bent grasses were first planted on putting greens by the stolon method there has been constant argument as to the merits of the different types of bents for producing good putting surfaces. Many good players have maintained that good putting surfaces can not be obtained from bent planted with stolons. Equally good players, on the other hand, have contended, and have fully demonstrated in play, that bents planted with stolons can provide good putting turf. Those who have judged the grasses in an impartial way have called attention to the fact that neither the critics nor the supporters of stolon-planted greens have been able to observe any noticeable difference in the scoring of a large group of good players in important tournaments when the putting greens had been planted either with seed or with stolons. It is argued that if either the seeded or the stolon-planted greens were as unsatisfactory as their respective enemies claim them to be, it would be only reasonable to expect that scoring would be generally higher in tournaments held on courses with such faulty putting greens.

The arguments concerning the newer type of bent putting greens soon brought forth some interesting theories and many definite claims based wholly on guesswork. As an example, it has been claimed that stolons should not be planted on any slopes with more than a 2-percent grade, for the reason that a ball could not be stopped on a stolon-planted turf when the grade exceeded 2 per cent. This claim was rather widely accepted without making a test to determine whether such was the case.

The conflicting claims and evidence as to the relative merits of the different types of grasses for putting greens naturally led to the important question as to how much of the criticism directed toward the various grasses should actually be charged against the grasses and how much against the methods used in their maintenance. If a club makes the mistake of planting an undesirable type of grass on all of its putting greens, it will find that the correction of this mistake is a slow and expensive procedure. On the other hand, mistakes in maintenance can often be completely corrected in a short period of time and at little expense. It is therefore evident that it is of much importance to clubs to determine how much of the members' objections to its putting greens are due to a poor type of grass and how much to the maintenance methods in use.

It is well known that the putting qualities of a green can be decidedly altered by changes in mowing, fertilizing, watering, or other routine maintenance practices. Therefore in determining as a wholly separate question the influence of the type of grass on putting qualities, it is important to make due allowance for differences in maintenance methods. This allowance can not easily be made in comparing putting greens on different golf courses receiving entirely different care.

In order to give a fair test of the influence of the type of grass on the putting qualities of turf, a series of large plots of representa-

tive putting green grasses were planted on the Arlington turf garden, at Washington, D. C., and the Mid-West turf garden, at Everett, Ill. In the latter garden there is a uniform slope to all plots. In the Arlington turf garden, however, each of the plots is divided into three equal strips; the lower third of each having a grade of 1 per cent, the middle third a grade of 3 per cent, and the upper third a grade of 6 per cent. In preparing these plots for planting and in topdressing them later they were all checked with a surveyor's transit to assure the correct grades.

Johnny Farrell, of the Quaker Ridge Golf Club, Mamaroneck, N. Y., National Open Champion in 1928, tests the putting qualities of one of the grasses at the Arlington turf garden, Arlington, Va. The mechanical putter used to eliminate the personal factors in making the tests of drift and speed of the grasses is also shown.

The grasses in this series of plots are kept in as good condition as modern cultural methods will permit. They are all cut at the same time with the mower set to cut at 3/16 of an inch. A large number of good players have putted on these plots within the past few years and have expressed decided preferences for some grasses. Recently it was decided to ask players to definitely rate the grasses on the plots at the Arlington turf garden, and the first summary of such ratings was published on page 224 of the December, 1932, number of the Bulletin.

In order to determine accurately and impartially the relative putting speed of the different grasses, the plots at Arlington were tested at intervals during the season with the Arnott mechanical putter. This device will be found described in the article on page 3 of the Bulletin for January, 1929. By the use of the mechanical putter in

tests such as these there are eliminated the variable factors which necessarily attend the human putter, such as distraction of attention, fatigue, lapse of control, and prejudice.

In the course of the season the plots were tested 13 different times in order to compare the grasses under different seasonal conditions, since the response of the different grasses to different seasonal conditions varies markedly. All readings in each test were made on the same day in order to give comparable figures. The tests were made immediately after mowing, except in the case where the influence of grasses on putting was to be compared before and after mowing. All the tests were made on a 6-per-cent slope. In setting the putter for the tests great care was taken to have it set exactly the same for all plots so that the results would be strictly comparable on the basis of the entire season's results. A description of the method follows.

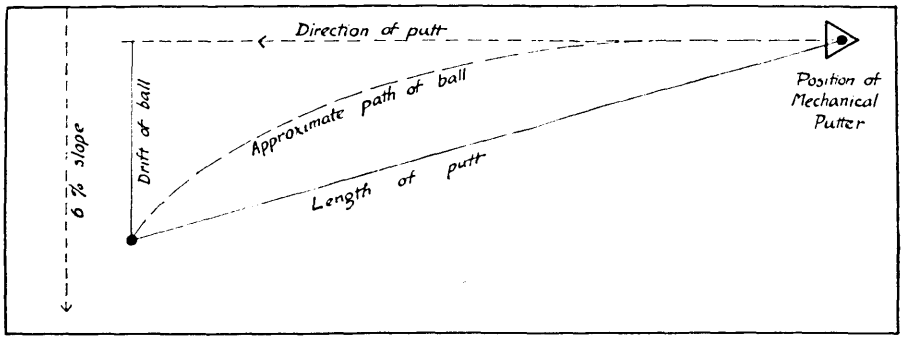

Diagram 1—Plan adopted for measuring the drift of a putted ball and the length of putt across a known slope.

A string was stretched across the upper side of the plot at right angles to the direction of the slope (see Diagram 1). The putter was set securely in position and so placed that a putted ball began its course along the stretched string on a dead level. Since the putt was across a 6-per-cent slope, however, the ball began to drift away from the direction of the putt and came to rest at a point below the stretched string and at a distance from the point where it was struck. Five balls were putted from the same point and an average reading taken of the five.

The location of the point where a ball came to rest was determined by two measurements—(1) in a direct line from the point of impact (giving the length of putt), and (2) in a direct line from and at right angles to the stretched string (giving the drift of the ball). In this way it was possible to evaluate the relative "speed" of the putting surface and the resistance of the grass to the roll of the ball. Inasmuch as the slope on each grass was determined at intervals by a surveyor's transit to be true to grade within 1/100 of a foot, the data obtained have been treated as strictly comparable. Each grass was treated throughout the season according to its requirements in order to maintain it in the best possible putting condition.

TABLE 1.—AVERAGE DRIFT OF BALL AND LENGTH OF PUTT ACROSS A 6-PER-CENT SLOPE FOR EIGHT BENT GRASSES DURING THE SEASON OF 1932 AT THE ARLINGTON TURF GARDEN

	Average drift from line of putt	Average length of putt
	Feet	*Feet*
Seaside creeping (seeded)	3.9	13.8
Velvet (stolons)	4.0	13.6
Colonial (seeded)	4.2	13.9
German mixed (seeded)	4.4	14.6
Washington creeping (stolons)	4.7	14.8
Metropolitan creeping (stolons)	5.0	15.2
Virginia creeping (stolons)	5.7	15.6
Columbia creeping (stolons)	6.0	16.5
Average	4.73	14.75

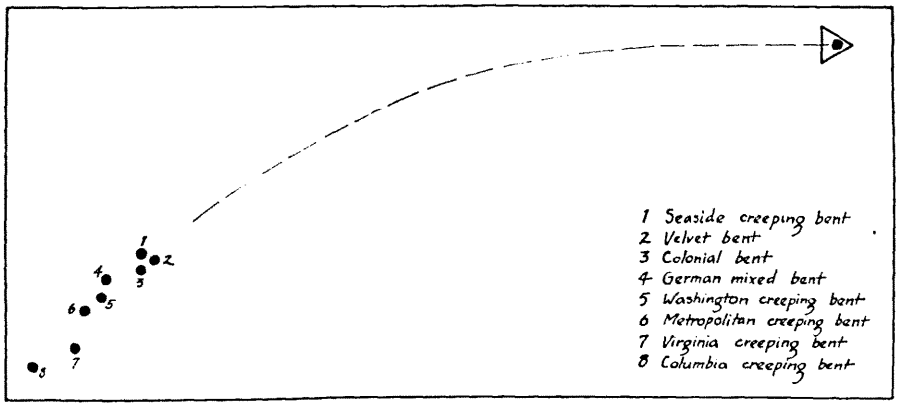

Diagram 2—Pictorial representation, drawn to scale, of comparative drift of ball and length of putt for eight different bent grasses, putted over a 6-per-cent slope with a mechanical putter. The drawing is prepared from the data in Table 1.

An additional precaution in placing the putter so that comparable data would be obtained was to establish a uniform distance, by measurement, from the point where the putter arm was held by the hook preparatory to being released, to the point where the ball rested on the turf before being struck. This distance was held constant throughout the tests, with the result that a uniform impulse was imparted to each ball upon the release of the putting arm. Furthermore, several tests were made upon turf which presented no slope, to check upon the accuracy of the method of setting the putter so that a uniform direction might be given to each ball. The results of all these precautions showed that the method was reasonably accurate and justified a comparison of the data upon the proposed basis.

Plots were prepared for testing eight bent grasses as well as fescue and annual bluegrass. Due to summer injuries to the fescue and annual bluegrass plots, however, it was found that their condition would not justify their inclusion in tests on a comparable basis with the bent grasses. The data here presented, therefore, include only figures pertaining to the eight bent grasses, five planted with

stolons (velvet, Washington creeping, Metropolitan creeping, Columbia creeping, and Virginia creeping), and three planted with seed (seaside creeping, German mixed, and colonial).

Averaged figures on the extent of drift and length of putt obtained with the mechanical putter on the eight bent grasses at the Arlington turf garden in 1932 across a 6-per-cent slope are presented in the accompanying tables. The length of the putts were longer or shorter than 15 feet, as seen from the actual readings averaged in Table 1, but by calculation the amount of drift was made to correspond to a 15-foot putt. This was found to be permissible since by so doing the relative ratings of the grasses remained unchanged and it has been possible to make a more direct comparison among the grasses on this basis. A pictorial representation of the comparative drift and length of putt given in Table 1 is presented in Diagram 2. While the largest extent of drift in a 15-foot putt, as occurred on stolon-planted Columbia creeping bent, was 5.48 feet, as will be seen from Table 2, due recognition must be given to the fact that a putted ball will, in fact, come to a stop on stolon-planted turf across a 6-per-cent slope, despite the claim that has been made that stolons should not be used on any slope exceeding 2 per cent. The figures in this table show that this extreme drift for Columbia creeping bent in a 15-foot putt on a 6-per-cent slope is 15.0 inches in excess of the minimum drift obtained—namely, that for seaside creeping bent.

TABLE 2.—DRIFT OF BALL IN A 15-FOOT PUTT ACROSS A 6-PER-CENT SLOPE FOR EIGHT BENT GRASSES (AVERAGE OF ALL PUTTS DURING THE SEASON OF 1932 AT THE ARLINGTON TURF GARDEN)

	Average drift from line of putt	Excess of drift over that of seaside creeping as zero
	Feet	*Inches*
Seaside creeping (seeded)	4.23	0
Velvet (stolons)	4.41	2.16
Colonial (seeded)	4.52	3.48
German mixed (seeded)	4.53	3.60
Washington creeping (stolons)	4.76	6.36
Metropolitan creeping (stolons)	5.00	9.24
Virginia creeping (stolons)	5.45	14.64
Columbia creeping (stolons)	5.48	15.0

As regards ratings of the speed of the various bents, as presented in Table 2, these ratings have been compared in several different ways, and have been found in each case to be practically identical. The close agreement of the speed ratings, within the limits of experimental error, indicates that the specific nature of the turf itself has caused the differences. This can be stated with certainty, since every reasonable precaution had been taken to permit no variations in the method of experimental procedure.

The results of these tests clearly indicate that the variety and type of grass exert no such influence on the speed of turf as they are popularly supposed to have. In these tests were included all the popular types of bent grass that are used on American golf courses. It is not

uncommon to hear a golfer remark that a certain grass is twice as fast as another. The putting tests reported in Table 1 show a difference of only 2.9 feet between the shortest and the longest putt. This distance represents only 20 per cent of the average length of the putts. Therefore it is apparent that the extreme differences reported by golfers are due either to overestimation or to variation in cultural practices more than to the inherent nature of the grass.

Since Virginia creeping bent and Columbia creeping bent are not recommended by the Green Section as putting green grasses, a comparison of the six remaining grasses should be made on the same basis as reported in Table 1. On the basis of the eight grasses the average falls near the position held by Washington creeping bent; on the basis of the six grasses the average for both drift and speed falls midway between the positions held by colonial bent and German mixed bent, thus presenting an entirely different conception of the average grass as regards drift and speed. Likewise, when the two grasses which are not recommended are disregarded, Metropolitan creeping bent is found to be the fastest grass of the remaining group of six.

TABLE 3.—DRIFT OF BALL AND LENGTH OF PUTT (AVERAGE OF TWO READINGS) ACROSS A 6-PER-CENT SLOPE FOR EIGHT BENT GRASSES AT THE ARLINGTON TURF GARDEN ON OCTOBER 31, 1932, AS AFFECTED BY MOWING. TESTS WERE MADE THE SAME DAY FOR EACH GRASS UNDER TWO DIFFERENT CONDITIONS—(1) NOT MOWED FOR TWO DAYS, AND (2) IMMEDIATELY AFTER MOWING

	Average drift from line of putt		Average length of putt	
	Before mowing	After mowing	Before mowing	After mowing
	Feet	*Feet*	*Feet*	*Feet*
Seaside creeping (seeded)	3.83	5.0	13.75	15.0
Velvet (stolons)	3.38	4.75	11.91	13.95
Colonial (seeded)	3.75	5.0	13.04	14.75
German mixed (seeded)	3.46	5.21	12.12	14.37
Washington creeping (stolons)	4.25	5.21	13.04	14.41
Metropolitan creeping (stolons)	4.25	5.42	13.75	15.59
Virginia creeping (stolons)	5.0	6.42	13.84	16.2
Columbia creeping (stolons)	5.5	6.25	16.0	17.0
Average	4.17	5.41	13.43	15.16

It is well known that cultural practices decidedly modify the putting speed of any grass. Table 3 shows the effect of mowing on the drift of the ball and the length of putts with the same stroke. A pictorial representation of the comparative drift and length of putt for the various bents, before and after mowing, based on the figures in Table 3, is presented in Diagram 3. In this case the grass had not been cut for two days; but since the season of year involved was the end of October, there was much less growth of grass within the interval following the mowing than is usual at other seasons between daily mowings. Neglect of mowing for a longer period would have yielded greater differences in the relative speed of the grasses before and after mowing than are shown in this table. Changes in the height at which the mower is set, and changes in topdressing, watering, raking or brushing, and fertilizing, and changes in other maintenance

practices largely determine the speed of the putting surface. It is clearly recognized that some grasses, particularly some of the creeping bents planted with stolons, are much more likely to become troublesome if neglected than are some of the other grasses, such as colonial bent. Likewise colonial bent itself is more likely to be injured by brownpatch, resulting in thinner and faster turf, than are such creeping bents as the Washington strain. The ease or difficulty of maintaining different grasses is often the determining factor in deciding which are the most suitable for putting greens regardless of the speed indicated in these tests. The tests clearly show, however, that if grasses are properly cared for they do not present as much variation in speed of putting as is so commonly attributed to them.

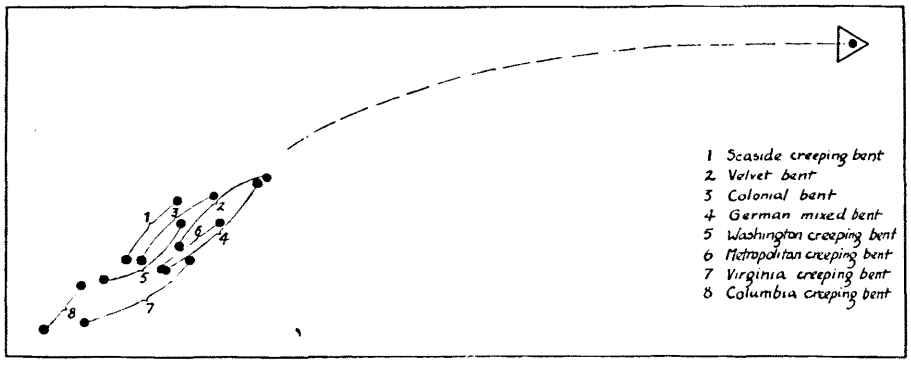

Diagram 3—Pictorial representation, drawn to scale, of comparative drift of ball and length of putt for eight different bent grasses, putted over a 6-per-cent slope with a mechanical putter, both before and after mowing of the turf. The positions for each grass before and after mowing are connected by lines. The greatest drift and length of putt in each case is after the turf is mowed. The drawing is prepared from the data in Table 3.

It would appear from the tests also that velvet bent planted with stolons possesses much the same putting qualities as a seeded bent, a fact which doubtless explains many of the erroneous conceptions regarding velvet bent and also its selection as first choice as regards putting qualities in the test by professionals described in the article on page 224 of the Bulletin for December, 1932. In our tests with the mechanical putter, however, while the differences are but slight, velvet bent has not been shown to have less drift than seaside creeping bent. What apparently won it first place in the estimation of the professionals was its general condition and appearance. Seaside creeping bent offered more resistance to the ball, and the two other seeded bents almost as much, yet they were rated far lower by the professionals because they did not have the perfect, velvety, smooth appearance of the velvet bent. The mechanical putter did not "see" the qualities of the velvet bent which have so captivated the imagination of so many who follow the game. As an inanimate machine it faithfully performed what was required of it and no more. The putter arm was propelled by a definite force, which was held constant. The direction of the putt was held constant on a definite slope. The point

at which the putted balls came to rest was dependent upon all these factors. But, since these forces or factors were held constant for each plot, it is plain that the differences in the putting qualities of the grasses, on a comparative basis, are contributed by forces or factors outside the mechanical ones contained in the putter. The element of error arising from the human factor, since some one was essential to operate it, may be disregarded, since that error may, for all practical purposes, be considered to be compensating among the different grasses. Since the operator had no preference among the grasses, and since the same operator conducted each and every test, we are further justified in ignoring the personal error.

That differences in the drift of a putted ball on bent grasses are due in larger measure to differences in cultural practices than to whether the turf is stolon-planted or seeded is apparent from a comparative study of figures presented in Tables 2 and 3. The average drift for the five stolon-planted bents in Table 2 is 5.02 feet and for the three seeded bents 4.42 feet, which gives an excess of average drift for the stolon-planted over the seeded amounting to .6 foot. The average drift for the eight bents in Table 3 is 4.17 feet before mowing and 5.41 feet after mowing, which gives an excess of average drift for the bents after mowing over the bents before mowing amounting to 1.24 feet. There is found therefore practically twice as much variation in drift occasioned by variation in height of cut as by difference in method of producing the turf.

The results of the tests made by the professionals, reported in the December, 1932, number of the Bulletin, were obtained ten days after the tests reported in Table 3. The grasses on these two dates were comparable in every respect, yet there was little if any correlation between the choice of the professionals and the speed of the grasses. The second slowest of eight grasses received first place, while the next two places were given to grasses which rated among the four fastest, indicating that the putting qualities alone were not the deciding factors in the choice of the professionals.

In presenting these comparisons it has not been the purpose of the Green Section to attempt to influence the preferences of any set of golfers or of any club for any kind of grass for use for putting purposes. The purpose has been merely to assist golf clubs, confronted with a difference of opinion as to the putting qualities of various kinds of bent turf, in reaching a conclusion based on tests in which personal opinion or prejudice may be considered to have been eliminated by the use of a mechanical putter.

Strange is the manner in which insects are sometimes killed by poison. The striped blister beetle, which destroys soy-bean fields, particularly in Louisiana, will not eat foliage treated with insecticidal dusts. However, when the beetles crawl over foliage on which fluosilicate of soda has been dusted, this chemical seems to irritate their feet, with the result that they draw their feet through the mouth evidently to allay the irritation. In this way they get the poison, and are thus effectively controlled when that particular chemical is used. They also have the habit of swarming on only a small area of a field at a time, which peculiarity also aids greatly in their control.