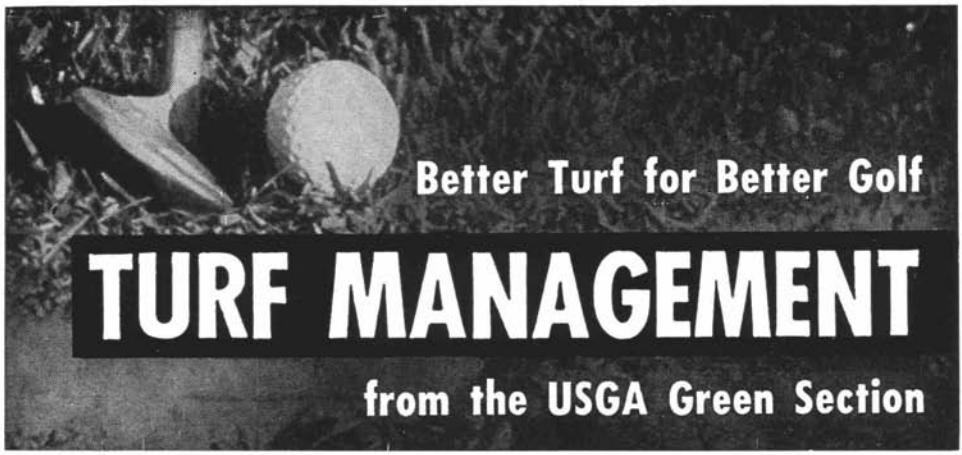

Effects Of Golf-Shoe Soles On Putting Green Turf

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Golf shoes with ripple soles leave a characteristic mark on putting greens. When these shoes began to find favor, many golfers were concerned about their effects upon putting-green turf. On some golf courses, players were not permitted to wear shoes with this type of sole.

Because of the need for accurate information pertaining to the damage to be expected from shoes of various types, a series of tests were inaugurated at Texas A. & M. College. These tests were conducted by Carlton E. Gipson and Richard K. Potts, undergraduate students in the Department of Agronomy and recipients of Trans-Mississippi Golf Association turf scholarships. This study had two objectives:

1. To determine the extent of damage which might result from heavy traffic imposed by the soles in question.
2. To determine the effect of surface marks left by the ripple sole shoe on the course of a rolling golf ball.

Procedure

Tests were conducted at College Station, Texas, on a turf of seaside bentgrass. The first objective was to study the effect of traffic imposed by the various sole types.

The tests consisted of three treatments and a check (untreated) strip. Tests were conducted in quadruplicate. Each individual plot was one foot wide and 30 feet long.

The plots were traversed daily, with the two men exchanging plots on alternate days. One man weighed 160 pounds and wore a size 9½ shoe. The other weighed 180 pounds and wore a size 11 shoe.

Walking began on April 29 at 15 traverses per day and continued at this rate until May 13. At this time the traffic was increased to 20 traverses per day. This daily amount of traffic was continued until June 3. Each of the plots receiving traffic was subjected to 630 traverses during this period of time.

Visual ratings of turf density were made on May 13, 20, 27 and June 3. In these numerical ratings, the check plot, which was undamaged, was accorded a rating of 10. The traffic damaged plots were given lower numerical ratings depending upon the extent of damage. Ratings were made individually by the two investigators and the weekly ratings were averaged. Results of these ratings are shown in Table I.

Another evaluation method employed is the double quadrat (DQ) method devised by Nutter, Sumrell and White. In this method a one-square-foot grid is used. The grid is divided into 100 squares. It is placed at random on the turf a predetermined number of times, and two counts are made. In the first count is in-

	May 13			May 20			May 27			June 3		
	Man No. 1	Man No. 2	Average	Man No. 1	Man No. 2	Average	Man No. 1	Man No. 2	Average	Man No. 1	Man No. 2	Average
Rep I												
Spike	4.5	5.0	4.5	0.5	0.5	0.5	0.5	0.5	0.5	0	0.5	0.3
Rubber Cleated	7.0	8.0	7.5	5.0	5.0	5.0	4.0	3.5	3.8	3.5	3.0	3.3
Ripple Sole	8.0	8.0	8.0	7.5	7.5	7.5	7.0	7.0	7.0	5.5	6.0	5.75
Check	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Rep II												
Spike	5.0	5.0	5.0	0.5	0.5	0.5	0.5	0.5	0.5	0	0.5	0.3
Rubber Cleated	8.0	7.0	7.5	4.5	4.5	4.5	4.0	4.5	4.3	3.5	3.0	3.3
Ripple Sole	8.5	8.0	8.3	7.5	7.5	7.5	6.5	7.0	6.8	6.0	6.0	6.0
Check	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Rep III												
Spike	4.5	4.0	4.3	0.5	0.5	0.5	0.5	0.5	0.5	0	0.5	0.3
Rubber Cleated	5.5	6.0	5.8	4.5	4.5	4.8	3.5	4.0	3.8	3.0	4.0	3.5
Ripple Sole	6.5	7.0	6.8	6.5	7.0	6.8	6.0	7.0	6.5	6.0	6.0	6.0
Check	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Rep IV												
Spike	4.0	4.0	4.0	0.5	0.5	0.5	0.5	0.5	0.5	0	0.5	0.3
Rubber Cleated	7.0	6.0	6.5	4.5	4.5	4.5	3.0	4.0	3.5	3.5	4.0	3.8
Ripple Sole	7.5	7.0	7.3	6.5	7.0	6.8	5.5	6.0	5.8	5.5	6.0	5.8
Check	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Average for Week												
Spike			4.5			0.5			0.5			0.25
Rubber Cleated			6.81			4.8			3.8			3.44
Ripple Sole			7.56			7.1			6.5			5.87
Check			10.0			10.0			10.0			10.0

Table I. Visual density rating using a one to ten system with ten being the check turf.

cluded all the squares in which there is some turf. The second count is of those squares completely covered with turf. In this experiment counts were made in six random locations on each plot and the counts were averaged. Data received from this method are presented in Table II.

Another measurement of damage was

	Spikes			Cleats			Ripple Soles		
Replication	D Q 1	D Q 2	Av.	D Q 1	D Q 2	Av.	D Q 1	D Q 2	Av.
I	81	39.3	60.15	97.0	51.0	74.0	100	71.7	85.85
II	83	40.1	61.55	98.6	50.8	74.7	100	74.5	87.25
III	81.3	37.5	59.4	99.2	51.5	75.35	100	85.6	92.8
IV	86.5	41.8	64.15	98.8	43.6	71.2	100	68.0	84.0
Average	82.96	38.48	60.72	98.42	49.25	73.83	100	75.0	87.5

Table II. Ratings of damage to turf inflicted by three types of shoes. The D Q method described in the text was used to estimate the degree of turf injury.

considered to be the amount of compaction or surface deformation that occurred in each path. A straight edge was placed across each path and the curvature of the surface was plotted.

The second objective of the experiment was to determine the effect of the ripple sole footprint upon the course of a rolling golf ball.

A ball was rolled from a curved aluminum tube and released from a constant height. The point at which the ball came to rest was marked and later plotted to scale. This test was conducted on a slight slope and under the following conditions: (1) unblemished turf, (2) one deep ripple sole footprint 3 feet from the end of the tube in the path of the ball, (3) one deep ripple sole footprint 6.7 feet from the end of the tube in the path of the ball.

Conclusions

The visual density ratings shown in Table I show the rate of progression of the turf injury as the experiment continued. These ratings also show that the replications behave uniformly and that the individual ratings of the two investigators were in close agreement.

There was a gradual decline in the turf subjected to traffic until May 13. During the week of May 13 to May 20 there was a rapid decline of plots traversed by spike shoes and rubber cleats. The plots traversed by ripple soles continued to decline gradually.

These ratings indicate that all types of traffic produced some injury. They further indicate that the least damage resulted from use of ripple soles, the most severe damage was produced by spikes and an intermediate degree of damage was produced by rubber cleats. It is considered that turf with any rating below 5.0 in this evaluation would be completely unsatisfactory for putting.

The method of evaluation wherein the double quadrat reading (DQ index) is obtained gives scores which are in fairly close agreement with those obtained by the visual method. These scores are presented in Table II. Undamaged turf is given a DQ Index of 100. The average DQ Index for ripple soles is 87.5; for rubber cleats, 73.83; and for spikes 60.72.

The third criterion of damage that was used is a measurement of compaction or deformation of the putting surface. In each replication, the ripple-sole shoes made a slightly wider path and spike shoes made a slightly deeper path.

From these ratings and measurements it is concluded that spikes wear out turf quicker and more completely than the other shoes in the test and that the ripple sole shoes produce the least damage on turf.

The second part of the experiment involved measuring the effect of ripple sole footprints on the direction of travel of a rolling golf ball. Diagrams of the results indicate that these footprints produce no appreciable effect upon a rolling golf ball. The result is the same whether the footprint is near the point of release or near the point where the ball stops rolling.

There is an interesting sidelight to this portion of the experiment. It was found that to attain uniformity in direction and distance of roll, the ball must be released in precisely the same manner each time. If the ball is released in such a way that it has a slight sidespin (detected by a stripe around the ball) its path is unpredictable. On the other hand when the ball is released in such a manner that it rolls straight over, it is not easily deflected even by serious defects in the putting surface. The balls roll so certainly that it is possible to place 23 of 25 balls in a cup from a distance of 8 feet even when the balls passed over a very deep footprint.

The results of this experiment indicate that, according to these techniques and under these conditions, there is no basis for discriminating against ripple sole shoes.

COMING EVENTS

December 8-10
13th Annual Texas Turfgrass Conference
Texas A. & M. College
College Station, Texas
Dr. Ethan C. Holt

1959

January 8-9
Mid-Atlantic Turfgrass Conference
University of Maryland
College Park, Md.
Dr. George S. Langford

January 12-15
Rutgers Four-Day Turfgrass School
Rutgers University
New Brunswick, N. J.
Dr. Ralph E. Engel

January 25-30
30th National Turfgrass Conference and Show
Sherman Hotel
Chicago, Ill.
Agar M. Brown

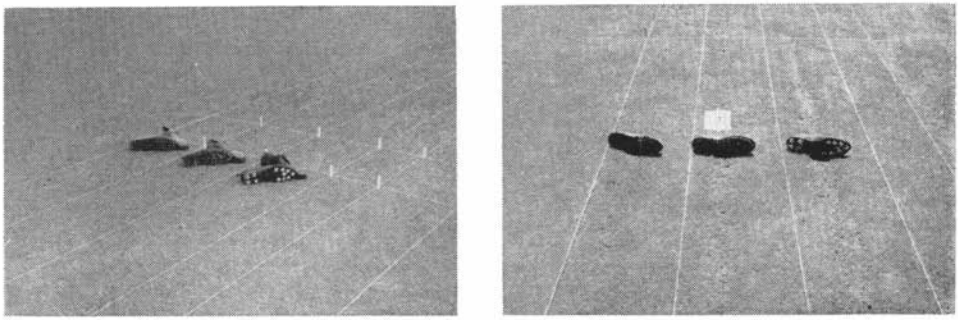
January 30
USGA Green Section Educational Program
Vanderbilt Hotel
New York, N. Y.

February 16-19
Penn State Turfgrass Conference
Nittany Lion Inn
University Park, Pa.
Prof. H. B. Musser

February 23-24
Southern Turfgrass Association Conference
(tentative)

March 5-6
Annual Turfgrass Conference
University of Massachusetts
Amherst, Mass.
Dr. Eliot C. Roberts

EFFECTS OF TRAFFIC DAMAGE FROM THREE TYPES OF SOLES



On the left is an expanse of Seaside bentgrass turf at the beginning of the traffic damage study. The three types of soles used were ripple, lug and spiked. On the right is the same expanse of turf after five weeks of traffic. The shoes are placed on the respective paths over which they have passed 630 times.