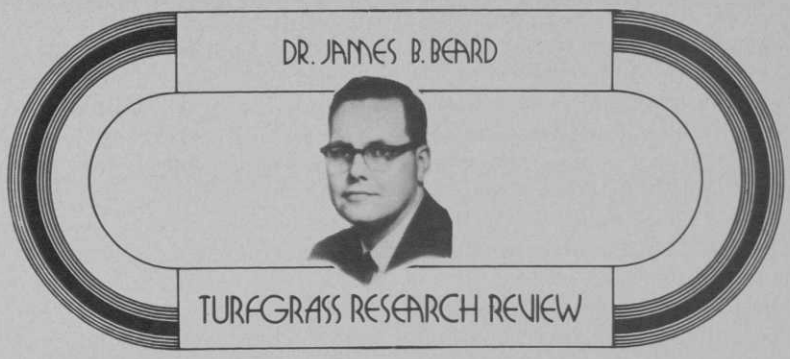

Rooting ability of sod grown on two soil types

Rooting ability of Merion Kentucky bluegrass sod grown on mineral and muck soil. *J.H. Dunn and R.E. Engel. 1970. Agronomy Journal. 62(4):517-520. (from the Department of Soils and Crops, Rutgers-The State University, New Brunswick, N.J. 08903).*

The objective of this study was to compare the shear strength and rooting ability of Merion Kentucky bluegrass sods grown on organic and mineral soils in various regions of the Northeastern and midwestern sections of the United States.

The shear strength of transplanted sod was determined by utilizing an eight-inch by eight-inch hooked-nail board that was hooked into the sod and then attached to a scale which in turn was connected to a small boat winch. The sod piece under the hooked-nail board was cut free from the surrounding turf with a knife and then sheared from the underlying soil surface by a slow steady horizontal pull from the boat winch. The maximum weight recorded on the scale as the sod broke loose from the soil was used as a measure of the shear strength.

Rooting ability of the transplanted sod was determined by placing a sod piece in a root observation box that was eight inches square by 20 inches deep with one plexiglass side to permit viewing of root growth. Measurements taken from the root observation box study included number of roots appearing, rate of vertical root penetration and total quantity of roots produced during a 22-day period following sod transplanting. The carbohydrate content of the roots was also determined.

Three experiments were conducted during the growing season. In the case of the shear strength experiments the sod pieces from various sources were cut mechanically and placed onto a loam soil that had been fertilized with 50 pounds per 1,000 square feet of 5-10-5 prior to transplanting. The experiments were arranged in a randomized block design of either three or four replications according to the specific test.

In the root observation box experiment, a sandy loam soil having a pH of 7.3 and adequate phosphorus and potassium levels was utilized. The root observation containers were placed in an unshaded outdoor site that had good air circulation. Three replications were utilized. The sods in all experiments were irrigated

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regularly to prevent drying during the establishment period.

Sods from Eastern sources, two grown on mineral soil and two on organic soil, were utilized in the June 3d experiment. The sod pieces were cut to a thickness of 1.9 inches. Nitrogen applications were incorporated into the upper inch of soil at rates of 0.75, 1.25 and 2.25 pounds per 1,000 square feet. There were four replications. Shear tests were conducted on the 26th and 40th days following transplanting.

In the July 30th experiment, 10 sods grown on organic soil and seven grown on mineral soil were cut to a thickness of 1.9 inches and transplanted on the site previously described using three replications. Shear strength tests were conducted after 14 and 96 days of rooting.

The July 28th experiment was conducted utilizing 10 Eastern and midwestern sod sources grown on organic soil and seven Eastern sod sources grown on mineral soil. The sods were cut at 0.75 and 1.5 inch thickness prior to transplanting. Three replications were included. Shear strength tests were made at 11, 82 and 196 days following transplanting.

Results: Shear strength comparisons revealed that most of the variability associated with the rooting component of shear strength was attributed to the individual sod source rather than whether the sod was grown on an organic or mineral type soil. This variability among individual sod sources was associated with (a) varying ages of sod ranging from 11 to 32 months and (b) the specific cultural practices during production, particularly the cutting height and frequency as well as the nitrogen fertility level.

Variability according to individual sod sources was also observed in terms of total root production in the root observation box experiment. No specific trends in root production could be found when comparing sod grown on organic versus mineral soil. In addition, root dry weight production in the boxes was not necessarily correlated with the shear strength measurements on the corresponding transplanted sods. Also, rooting ability was not correlated with the carbohydrate content in the shoots and roots of sods grown in the root observation boxes for 22 days.

Shear strength studies where various sod cutting thicknesses were compared revealed that sods cut 0.75 inches thick had consistently higher shear strength values following transplanting than sods cut 1.5 inches thick. Soil nitrogen application rates of 0.75, 1.25 and 2.25 pounds per 1,000 square feet had no affect on the shear strength values obtained in these experiments. Measurements of total rhizome length revealed that shear strength was negatively correlated with the total rhizome length regardless of the sod source.

Comments: The shear strength measurement technique developed by these authors measures a combination of the rooting ability of the transplanted sod to shear or separate from the underlying soil when subjected to a horizontal pressure. This shear plane effect is sometimes noted in the case of divots taken by a golf club, particularly on tees that are reestablished with sod containing a distinctly different soil particle size than the underlying soil.

This study confirms earlier ex-

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pro shop is to bring back the buying traffic flow to the shop where it belongs, to make available and sell to the potential.

We know that at the extreme low-end, including substantial quantities of imported Japanese balls, the stores have some bargain special advantages that pro shops cannot match. It is inaccurate, however, to assume that all the ball business is confined to low-end. Our recent market study of dealer sales indicated that over 40 per cent occurred in the $1 to $1.25 each price range. This is normally the professional's backyard. Although one can concede a small portion of the rock-bottom ball grade to the stores, in the majority of the ball ranges the stores and the pro shops are competing directly with one another.

"How much golf ball business should I do in my shop?" is often asked and is hard to answer. What is the golf ball potential of a shop? The answer can be found in the number of rounds-of-play at the course. One thing is an absolute: A person can play golf in his bare feet, but he cannot play without a ball. We also know that the average golfer uses more than one ball a round. So a simple equation can be constructed: One round-of-play equals one ball purchased (minimum). A course with 30,000 rounds a season will have had at least 2,500 dozen balls purchased to play those rounds. Averaging the selling price of the shop's balls might result in an average selling price of $1 a ball. The potential, therefore, if the professional participated in 100 per cent of the base potential, would be $30,000 worth of golf ball sales! I have asked numerous professionals to use this formula against their ball sales. In almost every case they come out on the short end of the potential stick. As a matter of fact, they generally are in line with GOLFDOM's findings, *i.e.*, they sell 50 per cent or significantly less of their available players.

Therefore, compared by volume to its competition and by potential to its market, the room in which pro shop business can grow is large. This growth can best be enhanced by strong merchandising and displaying of the shop's fast turnover products, especially the golf ball.

It is time for the golf professional to take a deep breath, hitch up his pants and start to fight back. The battle ground is the shop with all its weapons—quality, value, convenience, service and the most knowledgeable man in golf—there is no reason why it should not take the high ground.

David R. Branon, Sales Manager
Golf Ball Div.
Acushnet Sales Company
New Bedford, Mass.

Editor's note: We do not, nor can we, quarrel with the figures which Mr. Brannon cites from the National Sporting Goods Assn. Only if we carried out a similar survey of the "downtown" stores might we justifiably do so. We also agree with Mr. Brannon that golf ball sales are indeed important to the financial health of a pro shop. However, he implies that professionals should de-emphasize sales of three-packs of balls and put the emphasis on dozen boxes. We feel this conflicts with efforts to increase traffic in the pro shop. The golfer who purchases balls by three's has to visit the shop four times to make up that dozen. He still ultimately is purchasing a dozen, so golf ball sales are not affected, and the professional has four opportunities to sell him other merchandise as opposed to one such opportunity. But this is a small difference of opinion when compared to the major issue that requires great attention and concerted effort by everyone in the industry. We believe that presently 25 per cent of the golfers account for 75 per cent of pro shop sales, another 25 per cent account for the remaining 25 per cent of the sales, and 50 per cent of the golfers buy virtually nothing at their pro shops and shop at "downtown" stores. The job at hand—and on this we all agree—is to convert 75 per cent of the golfers into solid pro shop customers.

USGA to move from NYC

A stately mansion on 62 acres of land in northern New Jersey has been purchased by the United States Golf Assn. for its new home. It was built by John Russell Pope, the architect of the Library of Congress, and the Jefferson Memorial.

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periments reported by Beard and King that the rooting ability of transplanted sods per se is not affected significantly by whether it is grown on a mineral or an organic type soil. An organic soil is classified as one that contains more than 20 per cent organic matter whereas a mineral soil is one that contains less than 20 per cent organic matter.

Far more variability in the rooting ability of sods is attributed to the specific sod source and the associated cultural conditions under which it has been grown than to whether it is grown on organic or mineral soil. Cultural factors affecting the sod rooting ability include the cutting height, nitrogen fertility level, age of sod at harvest and environmental conditions during sod shipment.

The shear strength factor measured in these experiments is of particular concern on tees and greens that are likely to be sodded occasionally. If at all possible, the sod utilized on these sites should be of a soil texture similar to the underlying soil. This consideration does not affect the rooting ability of the sod but will affect the proneness to shearing caused by an interface of distinctly different soil particle sizes. If sod having the proper soil texture is not available locally, it is usually wise for the golf course superintendent to maintain a nursery area of turf for transplanting onto tees and greens should unexpected loss of turf occur. In the case of tees where the soil has not been modified, it is simply a matter of locating a convenient site on the golf course where the soil texture is comparable to that representative of the tees. In the case of greens where soil modification has been practiced, the nursery area selected should also have the soil modified to a texture comparable to that of the greens.

The affect of sod cutting thickness on relative rooting ability should also be noted. The initiation and development of new roots from the transplanted sod into the underlying soil occur from the meristematic nodes on rhizomes, stolons, and crown tissue rather than older roots. Harvesting sod at thinner thicknesses severs more of the structure associated with these meristematic areas and enhances new root initiation compared to cutting at greater thicknesses. □