VPI's Putting Greens Test Modified Soils

By
R. E. SCHMIDT
Assistant Professor of Agronomy
Virginia Polytechnic Institute
Blacksburg, Virginia

GOLF is attaining greater popularity. National TV viewing, championship play, and more leisure hours have helped it to become the country's number one participating sport. Attesting to this is the National Golf Foundation's estimate that women and junior golfers alone have increased over 40% since 1961. There is even a trend toward night golf under lights on regulation-length courses to accommodate the increased play.

Greens that once were satisfactory now produce poor turf under this increased traffic. Many greens were reconstructed by blending materials with putting green soils to help lessen the compaction of heavy and constant traffic. Modification of soil for putting greens was realized as a necessity quite early. Then, as today, soil modification appeared to be generally a hit-or-miss practice. In 1950, H. B. Musser* reported a survey showing that most superintendents were using modified soils with volume ratios of 1-1-1 or 2-1-1 of soil, sand, and organic matter. Neither type of soil, sand, or organic matter was identified.

*Musser, H. B. Turf Management. McGraw-Hill Book Co., Inc., N.Y., 2nd Ed.

Many superintendents have modified soils to match the soil of satisfactory putting greens in their area. This is a good method, provided similar management and traffic is applied. Duplicating soil mixtures from a completely foreign ecological environment may result in unsatisfactory putting greens.

Only recently has any experimental effort been made to evaluate different soil mixtures. A few colleges and universities now have studies underway. In 1964 the Weblite Corporation awarded V.P.I. a grant-in-aid to evaluate their graded expanded shale, Weblite, for turfgrass soil

Table 1. Results obtained after one season of compacted soils modified with various percentages of sand and Weblite.

% vol. mod.	Porosity		Moisture content	Percolation	Wilting resistance	Clipping wts.	Density	Color
	Cap.	Non-cap.						
				SAND				
24	high	low	good	fair	good	excellent	excellent	good
41	high	low	fair	fair	good	good	excellent	good
54	adequate	adequate	poor	good	fair	good	excellent	good
68	adequate	adequate	poor	good	poor	fair	fair	fair
86	low	excessive	very poor	excessive	very poor	fair	poor	fair
				WEBLITE				
24	high	low	excellent	good	excellent	excellent	excellent	good
41	high	low	good	good	good	excellent	excellent	good
54	adequate	good	good	good	good	excellent	excellent	good
68	adequate	high	poor	excessive	fair	fair	excellent	good

modification. We were looking for a modified soil that would have the following properties:

1. Resistance to compaction.
2. Adequate internal drainage and sufficient aeration after exposure to traffic.
3. Adequate moisture holding capacity.
4. Adequate nutrient holding capacity.
5. Adequate cation exchange capacity.
6. Firm, but resistant surface.
7. Economic feasibility of use.

Weblite is lightweight (bulk density 8.5), holds 15% of its weight in water, and can be uniformly graded so that 98% of the material will fall between the 10 and 60 mesh screens (medium to very coarse sand particle size). This material was evaluated in an experimental green by mixing it with various percentages of a Groseclose silt loam and 5% pinebark. The mixtures were then placed in 10 x 8 foot bins over a gravel and tile system, fumigated and seeded with Penncross bentgrass. Corresponding soil mixtures of a concrete sand with 90% of the particles between the 10 and 60 mesh screens were also incorporated into experimental greens.

A unique golfer with 15 spiked shoes, three hitting at a time, and weighing 450 pounds was employed in 1965 to compact greens. One trip was equivalent to ten golfers walking on the same surface.

After one season the following was observed:

1. Traffic reduced turf growth and quality on all mixtures.
2. Turf cover and color were satisfactory on all Weblite modified soils, but clippings, moisture capacity, and drought resistance were reduced when more than 54% Weblite was used.
3. On sand modified plots the density and color as well as clippings and wilt resistance were reduced when more than 54% sand was used.
4. Less Weblite than sand was needed to obtain similar results.
5. It appears that modified soils satisfactory for putting greens with heavy traffic should have the following physical properties:

Total porosity	40-45%
Capillary porosity	20-25%
Non-capillary porosity	18-22%
Percolation (in. per hour)	1-10

These physical properties are based on one season of field data and must not be considered absolute. Further evaluation is needed because, as workers at Penn State have indicated, after the second season of traffic their modified soils became increasingly compacted compared to the first season.

Construction of an experimental putting green at Virginia Polytechnic Institute for evaluating various soil mixtures adaptable to today's heavy golf traffic.