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Topdressing Fairways: More is Better

The application rate has a greater impact than sand particle size distribution.

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For years, golf course superintendents in the Pacific Northwest have benefited from sand topdressing on wet and poorly drained fairway and rough areas. The sand applications, over time, firmed the wet surfaces for improved maintenance and playability. Other benefits observed from topdressing included a reduction in earthworm castings, improved rooting, earlier spring green-up, and a possible reduction in water use. Golf courses across North America have turned to fairway topdressing in hopes of achieving similar benefits. But as the program gains in popularity, there remain some unanswered questions, such as, what are the effects of sand type and application rates on the success of the program?

An ongoing field study funded by the USGA Grant-in-Aid Research Program and Tri-State Research Corporation at the University of Connecticut (UCONN) is starting to shed some light on the impact of sand type and application volumes on soil physical properties, turfgrass quality, earthworm castings, and turf disease. The project is being completed by Dr. Jason Henderson and Nathaniel Miller on creeping bentgrass fairway plots at the UCONN Plant Science Education and Research Facility in Storrs, Conn. The objectives of the experiment were to: 1) determine whether particle size distribution and/or application rate will affect color, turfgrass quality, turfgrass cover, disease incidence, and earthworm activity; 2) quantify the effects of particle size distribution and topdressing layer depth on moisture retention, soil temperature, and resistance to surface displacement (firmness); 3) use resultant data to make recommendations to improve the practice of fairway topdressing.

The experiment was initiated in July of 2007 when the initial sand treatments were applied. Sand treatments were applied on a monthly schedule through November of 2007. Treatments were reinitiated in May of 2008 and continued monthly through November of 2008. Coarse, medium, and fine-textured sands were included in the experiment with application rates at 4 ft^3 per 1,000 ft^2, 8 ft^3 per 1,000 ft^2, and 12 ft^3 per 1,000 ft^2 over the native sandy loam soils. A control plot that received no topdressing applications also was included. The plots were rated for turf quality and color. Percent cover was determined, along with soil moisture content, firmness, and temperature. Dollar spot incidence

The picture illustrates the depth of sand accumulating on the plots as a result of monthly topdressing over a three-year period. Application rates from right to left are 4 ft^3 per 1,000 ft^2 (6.5 yd^3 per acre), 8 ft^3 per 1,000 ft^2 (13 yd^3 per acre), and 12 ft^3 per 1,000 ft^2 (19 yd^3 per acre),

Monthly applications of three sands are applied from April through November at 4 ft^3 per 1,000 ft^2, 8 ft^3 per 1,000 ft^2, and 12 ft^3 per 1,000 ft^2 to compare the impacts of sand type and application rate in fairway topdressing.

and earthworm castings also were measured as they occurred. The data were collected weekly through the 2008 growing season and biweekly through the 2009 season. Data from the 2008 season will be discussed, as the 2009 data are currently being collected and analyzed.

TURF QUALITY, COLOR, AND COVER

The data analysis indicates that fairway topdressing positively influences turf quality, color, and cover. The increase in turfgrass quality appeared as an overall rate response, with plots receiving higher rates of topdressing generally getting higher quality ratings despite the type of sand applied. Topdressing rate also had the largest impact on turfgrass color throughout the season, but it was most noticeable during initial spring green-up. Plots receiving the most sand had the greatest color response during the 2008 season. Turf cover data were collected just prior to the next topdressing application. Greater turfgrass cover was observed on plots topdressed at higher application rates. Sand type showed no effect on turfgrass cover when the data were collected at the end of the month.

SOIL MOISTURE

Soil moisture content in the top two inches of the rootzone profile was impacted by both sand type and application rate. Generally, the coarser the sand, the less water was retained. Similarly, the higher the topdressing application rate, the less water was retained in the upper profile. The only exception to these trends was in September 2008 when moisture levels were very high and both the fine- and medium-textured sands retained more moisture than the coarse sand and control plots.

SURFACE FIRMNESS

A primary reason fairway topdressing programs are implemented is to firm the surfaces, improve playability, and minimize course closure following heavy rains. Surface firmness was measured in this study using a proving ring penetrometer. A sand type and application rate effect was observed in April and May. The rate effect showed that treatments receiving higher rates of topdressing were firmer than the lower rate and control treatments. The rate effect was not significant from June through October. The sand type effect continued into June, with the fine sand and USGA sands showing greater firmness than the coarse sand treatments. The sand type effect from July and August showed that the fine

Table 1
Particle size analyses of sand types

	Soil Separate %				% Retained					
Treatment	**Sand**	**Silt**	**Clay**	**No. 10 Gravel 2mm**	**No. 18 VCS 1mm**	**No. 35 CS 0.5mm**	**No. 60 MS 0.25mm**	**No. 100 FS 0.15mm**	**No. 140 VFS 0.10mm**	**No. 270 VFS 0.05mm**
Fine Sand (Desiato Mason)	97.3	1.3	0.6	0.8	4.4	11.0	31.6	31.1	12.1	7.1
Medium Sand (Holliston #40)	99.3	0.1	0.5	0.1	2.6	20.2	52.3	20.6	2.7	0.9
Coarse Sand (AA Will Mat. 2mm)	99.5	0.0	0.4	0.1	11.0	31.5	42.0	13.0	1.6	0.4
USGA Recommendations for Putting Green Construction		≤ 5%	≤ 3%	≤ 3% Gravel ≤ 10% Combined		≥ 60%		≤ 20%	≤ 5%	

USGA Recommendations for Putting Green Construction are included for reference only.

Analysis of 2008 data shows fairway topdressing treatments positively influence turf quality, color, and cover ratings. Plots receiving the highest volume of sand were generally rated the highest, regardless of the type of sand applied.

and USGA sands were not significantly different from the control. The coarse sand treatment was less firm than the control, fine sand, and USGA sand treatments from July through October.

EARTHWORM CASTINGS AND DOLLAR SPOT INCIDENCE

Sand topdressing did reduce earthworm castings on a measurement date in November 2008. Significant differences were observed based on application rates. The plots receiving the 8 ft^3 and 12 ft^3 per 1,000 ft^2 had significantly lower earthworm castings than plots receiving the low application rate and the control. Plots receiving the low application rate of 4 ft^3 per 1,000 ft^2 had significantly lower castings than the control.

Significant differences in dollar spot incidence were recorded on the plots in October 2007 and June 2008. The severity of the infection was reduced by sand topdressing. The highest application rate of 12 ft^3 per 1,000 ft^2 had significantly lower dollar spot counts than plots receiving the low and medium application rates and the control.

The results of this short two-year field study are preliminary, but nonetheless they are encouraging and support the benefits of fairway topdressing programs. Fairway topdressing is not for every golf course. It requires a long-term commitment and investment that, over time, can improve playing conditions. Dr. Henderson sums up the initial findings well in the following quote: "The good news is that the majority of responses appear to be related to application rate rather than sand type, which could result in a significant cost saving associated with sand purchases." Additional information regarding this study can be found at http://www.turf.uconn.edu and http://usgatero.msu.edu/.

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