Evaluating sand capping depth and subsoil influence on fairway performance, irrigation requirements and drought resistance

B. Wherley, K. McInnes, W. Dyer, C. Reynolds, and J. Thomas
Texas A&M University

Start Date: 2014
Project Duration: 3 years
Total Funding: $78,368

Turfgrass and Environmental Research Online
Volume 14, Number 2 | March—April 2015

Objectives:

1. *Assess season-long turf quality and root distribution of Tifway bermudagrass fairway turf constructed at various depths of sand capping atop both fine sandy loam and clay subsoils.*
2. *Determine how sand capping x subsoil combinations influence root zone soil moisture and irrigation frequency requirements.*
3. *Determine the temporal and spatial dynamics of salts (EC) through measurement of electrical conductivity at multiple depths within the sand cap and monitor development of subsoil sodicity (SAR) in response to sand-capping x subsoil x irrigation treatments.*
4. *Initiate a summer dry-down in year 3 to evaluate how sand cap x subsoil treatments affect turf's ability to tolerate and survive 60-days with no supplemental irrigation.*

In July 2014, construction of a 20,000 sq. ft. (50 ft. x 400 ft.) research fairway was initiated at the Texas A&M Turfgrass Ecology Field Laboratory in College Station, TX. In order to evaluate the effects of subsoil texture on sandcap performance, the site was divided into fine sandy loam and clay subsoil halves. The clay subsoil study was excavated and backfilled with strongly aggregated, clay textured subsoil imported from off -site. A native Boonville fine sandy loam was used for the subsoil on the other study. Subsoils were graded and firmed to produce a final 2% sloping turtleback spanning the entire length of the fairway. Twelve irrigation zones were installed for testing effects of irrigation frequency x sandcap x subsoil interactions on various parameters during the project period. A washed brown concrete sand produced by a local sand company was selected for construction of sandcaps. Particle size distribution analysis indicated the sand possessed 24.8% fine gravel, 18.5% very coarse sand, 17.1% coarse sand, 23.5% medium sand, 10.3% fine sand and 2.7% very fine sand. Total silt plus clay within the sand was less than 3%. Given the textural properties of this sand, an 8" sandcap would typically be recommended to allow for ideal gas/water filled porosity. Sandcap treatments (50 ft. x 12 ft.) were constructed to 0", 2", 4", and 8" final depths and firmed using a mechanical tamper. A 4 ft. buffer was provided between plots to accommodate differences in sandcapping depths of adjacent plots. Plastic liner was also inserted along plot borders to prevent lateral

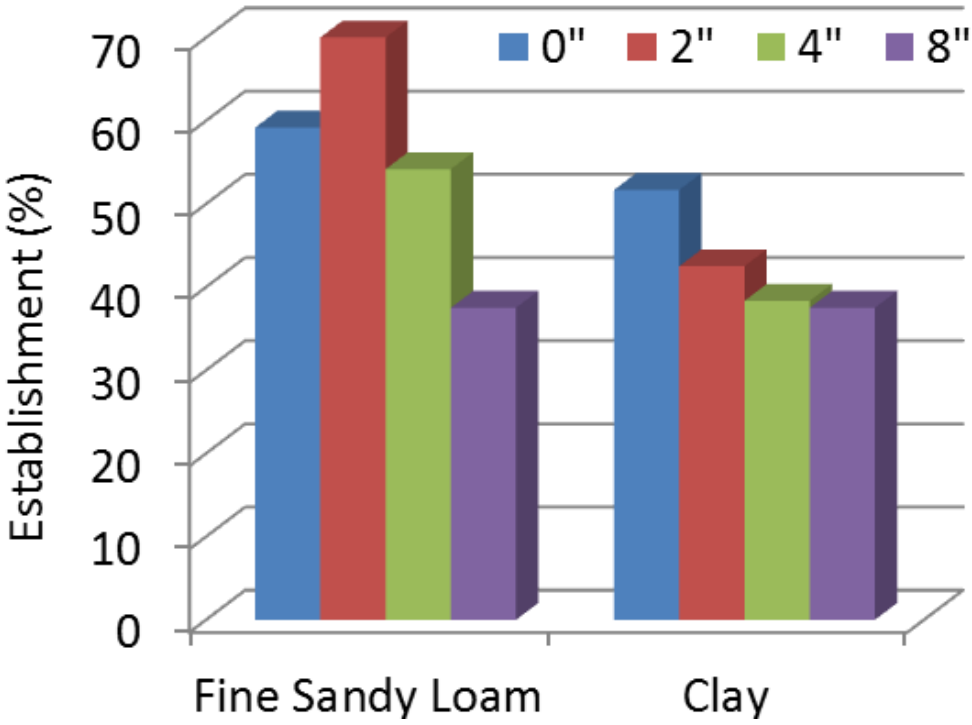

Figure 1. Percent visual establishment of Tifway bermudagrass fairway plots as influenced by sand capping depth (0", 2", 4", and 8") and subsoil type.

Figure 2. Construction of sandcap treatments for the project.

Figure 4. Initial establishment of the sandcapping research site. The subsoil was graded to provide a uniform 2% turtleback up through the center of the site facilitating subsoil drainage of excess water to the

Figure 3. Hand sprigging of sandcapped plots with Tifway bermudagrass on September 2, 2014

Figure 5. Recent image of the research site, taken in early October, 2014. Plots have attained between 60 to 80% coverage as of the time of this report.

movement of water between plots. On September 2, the study site was hand-sprigged with Tifway bermudagrass at 45 bushels per 1000 sq. ft., heavily topdressed, and rolled. During the initial 6 weeks of establishment, plots received bi-weekly applications of a 17-17-17 plus micronutrients to encourage establishment of plots. One month after sprigging, volumetric water content at the 0 to 2" depth was determined at multiple points along the slope in each plot. Percent establishment was quantified both visually as well as through light box imaging (Figure 1). Initial data indicate the more rapid establishment is occurring within shallower sandcap depths, likely due higher volumetric water content and less intermittent drying at the soil surface.

Summary Points

- A sandcapping fairway research site has been constructed and is under establishment at Texas A&M University
- Sandcapping depths ranging from 0" (topdressed only) to 8" are being evaluated atop varying subsoil textures
- Initial bermudagrass establishment has been delayed within the deeper sandcapped plots, likely due to more frequent drying and greater tension at the surface, relative to shallower plots
- Establishment and soil moisture data will continue to be monitored into late fall, with the goal of attaining full establishment by spring of 2015