TURFGRASS TRENDS

SUBSURFACE DRIP IRRIGATION

Establishing Bentgrass Can Be Difficult With Subsurface Irrigation

By Justin Weeaks, Richard Zartman and Michael Maurer

Water limitations all across the Southwest have placed increased demands for water conservation on golf courses and other recreational fields. Most superintendents irrigate courses using over-the-top sprinklers. An alternate method to the over-the-top sprinkler irrigation could be using subsurface drip irrigation (SDI).

SDI can be more effective at irrigating difficult areas, areas of excessive slope and those areas prone to damage or vandalism. SDI has been investigated in native soils, but little is known about how it will perform in high-sand rootzones.

A series of greenhouse experiments were conducted at Texas Tech University to determine the ability of seeded bentgrass to establish using SDI in high-sand rootzone mixes. Several commercially available products were used as amendments, including two porous ceramics products (Profile and PermO2Pore), peat moss and Western Pozzolan.

Materials and methods

Golf sand from a local source was used to mix with the various additives. Products were mixed at different levels for the two studies. Each study used four rates (10, 20, 30 and 40 percent by volume) of each product. A second study had an additional treatment of native soil. It was mixed at 20, 40 and 60 percent by volume. A control of pure sand with a gravel layer was used. Products were mixed thoroughly to ensure adequate incorporation and uniformity.

Rootzone mixture was poured into a 5-gallon container with a 3-inch layer of gravel in the bottom. The 5-gallon container contained drainage holes to facilitate drainage. SDI tubing was buried 6-inches deep. Holes were drilled on the side of the containers, and the tubing was inserted. Tubing emitter was placed in the center of the container. SDI system was installed as a loop and grid design. The system was irrigated with Lubbock, Texas, municipal water.

Once rootzone mix had been added to containers, the containers were seeded with Dominant Plus bentgrass at 1.5 pounds per 1,000 square feet. The seeds were lightly watered from over the top to settle the rootzone mixture. After this initial hand watering, no additional over-the-top irrigation was applied. SDI ran for several cycles every day until germination began. Watering then was scaled back according to daily needs. Stand was allowed to grow for six weeks after seeding.

Weekly observations were taken on percentage coverage, and weekly water content using a theta probe to a depth of 8 inches was collected. At the conclusion of the

Continued on page 58

IN THIS ISSUE

- **Shade Tolerance** Researchers explore effects of shade on 42 bermudagrass varieties.....59
- **Topdressing Material** Existing soil profile means one size does not fit all.....66

OUR SPONSORS

Continued from page 57

six-week study, each treatment was harvested for biomass and sampled for root depth.

Results

In many of the treatments, bentgrass seeds failed to germinate during the study. Others treatments did produce a stand, but were quite low in percentage coverage and lacked a desirable uniformity. Table 1 shows data at the end of the study.

In Experiment 1, Western Pozzolan at 20 percent and peat moss at 40 percent had the best coverage compared to the control of only 19 percent. Peat moss at 40 percent clearly had the highest biomass at the end of the study, but most of the growth was centralized in the center of the container, directly over the emitter. This caused a lack of coverage from edge to edge of container. But Western Pozzolan at 20 percent had much greater total container coverage even though it had significantly less biomass accumulation.

In Experiment 2, Western Pozzolan at 40 percent and native soil at 60 percent had the greatest coverage at the end of six weeks. Control actually did better than any of the porous ceramic products. The only peat moss treatment that did exhibit any germination was 10 percent with a coverage of only 15 percent. There were no differences in rates in Western Pozzolan treatments, and the only difference in rates for native soil was in 60 percent.

Summary

Treatments such as the porous ceramic products and peat moss at low rates in these studies failed to exhibit any germination.

While many products did produce some germination, none achieved 100-percent coverage. Peat moss never achieved good germination. This could be in part that when the surface became dry, the SDI from below could never rewet the surface. During the course of the study it became apparent early on which treatments would most likely fail in germination due to a lack of continual wetting at the surface.

In the bentgrass seeded treatments that did germinate, it was often by using a very high rate of additive (e.g. peat moss, native soil). Using high levels of additives is not only undesirable but also financially impractical. The use of additives can increase the cost for construction significantly.

TABLE 1

Experiment Means at Six Weeks

Experiment 1		
Treatment	**Cover (%)**	**Biomass (g)**
WP 10	43.3	1.43
WP 20	50	1.63
WP 30	33.3	1.3
WP 40	13.3	0.73
GR 10	35.5	0.56
GR 20	5	0.1
GR 30	5	0.1
GR 40	5	0.1
PM 10	0.3	0.2
PM 20	40	2.7
PM 30	18.3	1.6
PM 40	50	5.6
Control	19	0.86
Experiment 2		
Treatment	**Cover (%)**	**Biomass (g)**
WP 10	53.3	0.16
WP 20	36.6	0.2
WP 30	40	0.2
WP 40	58.3	0.43
GR 10	12	0.1
GR 20	7	0.1
GR 30	4	0.13
GR 40	1	0.1
PP 10	16	0.1
PP 20	18	0.1
PP 30	11	0.1
PP 40	14	0.03
PM 10	15	0.07
PM 20	0	0
PM 30	0	0
PM 40	0	0
Native 20	11.6	0.13
Native 40	45	2.13
Native 60	65	0.93
Control	35	0.1

WP=Western Pozzolan, GR=Profile Green, PM=peat moss, PP=PermO2Pore, Control=pure sand, no additive.

Since this project, there have been other experiments conducted to enhance germination. At this point more research must be conducted to determine whether SDI is feasible to establish bentgrass on high-sand rootzones.

Justin Weeaks is a doctoral student at Texas Tech University majoring in turfgrass science. His master's degree concentrated on seeded bermudagrass establishment using subsurface drip irrigation.

Dr. Richard Zartman's research interests are in the areas of soil physics, environmental soils and root distribution.

Dr. Michael Maurer's research focuses on water use efficiency (subsurface drip irrigation), development of low-input turfgrasses and herbicide evaluation.