Effect of Irrigation Type, Rootzone Material, and Rootzone Depth on Irrigation Efficiency and Water Use on Putting Greens in the Southwest

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Objectives:

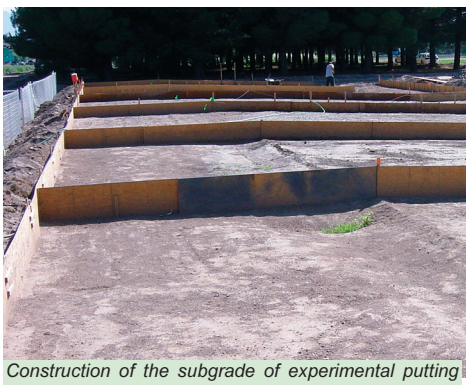
1. To study the effects of different irrigation systems on turf quality, drought resistance, and irrigation efficiency in greens with a sloping design.
2. To study the effects of rootzone materials (sand, sand-peat mix, and sand- urea-formaldehyde polymer mix) on creeping bentgrass establishment, turf quality, and soil moisture retention in a sloped putting green.

Start Date: 2002
Project Duration: 3 years
Total Funding: $90,000

Studies at New Mexico State University are testing the feasibility of subsurface irrigation for putting greens.

Sprinkler irrigation has been the accepted practice for irrigating lawns since Joseph Smith patented the first swiveling lawn sprinkler in 1894. Sprinkler overlap, wind drift, and evaporation losses during the irrigation process all contribute to water losses that increase overall water consumption and/or decrease turf quality.

Subirrigation systems that apply water laterally to the rootzone from perforated tiles or emitters buried either close to the surface or just below the normal root penetration from beneath the surface (subsurface drip irrigation or subground irrigation) have been proven to potentially save substantial quantities of irrigation water compared to sprinkler systems. Although the benefits of subsurface irrigation have been extensively studied in agriculture, subsurface irrigation has received very little acceptance for turf irrigation. In addition to water savings, other advantages of subirrigation systems include the improved distribution uniformity (no runoff or puddling), uninterrupted use of the turf area during irrigation, and energy savings due to a lower operating pressure.



Construction of the subgrade of experimental putting greens at the Fabian Garcia Research Center at NMSU.

Highly trafficked and low-cut turfs, which include athletic fields and greens and tees on golf courses, are usually built with either sand alone (California style) or with a sandy rootzone mix (USGA style). Because of this coarse texture, these rootzones resist compaction, provide high air filled porosity, but lack in adequate water retention. To increase water-holding capacity, USGA rootzones are usually amended with peat.

Urea formaldehyde polymers have been used as amendments for potting soil in greenhouse plants for decades and, to date, no negative side effects have been reported. The increase in water retention in a sand mixed with urea-formaldehyde polymer is comparable to a sand and peat mix, which is considered a standard in rootzone construction.

A 4000 m^2 (43,000 ft^2) research area, built in 2002 at the Fabian Garcia Research Center at New Mexico State University, is being used to study the impact of irrigation type (sprinkler vs. subsurface drip irrigation vs. subground irrigation) and type of rootzone mix (straight sand vs. sand mixed with peat vs. sand mixed with urea-formaldehyde polymer) on irrigation efficiency and turfgrass performance of creeping bentgrass. Each of the 12 research greens measure 17 m x 17 m (55' x 55') and include a 5% south-facing slope.

Turfgrass quality, irrigation efficiency, soil moisture and soil gas composition will be measured at different depths and at different locations of three rootzone mixes in differently irrigated portions of the green. Furthermore, the effect of irrigation type and type of rootzone material on turf drought stress, turf quality, and water consumption will be investigated.

Summary Points

- Studies are underway at New Mexico State University to compare sprinkler versus subsurface drip versus subground irrigation for putting greens.
- Studies are also comparing type of rootzone mix (straight sand versus sand mixed with peat versus sand mixed with urea-formaldehyde polymer) on irrigation efficiency.