



## **Water repellency in sprinkler- and subirrigated turfgrass root zones**

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Research was conducted at New Mexico State University in 2004 to investigate the effects of four turfgrass construction and irrigation systems on water repellency, soil moisture, and turfgrass quality in sand or sand amended greens type root zones. The study included 1) a sprinkler irrigated USGA (United States Golf Association) system, 2) a sprinkler irrigated California system, 3) a subirrigated ECS (Evaporative Control System) system and 4) a subsurface drip irrigated USGA system. California and ECS construction systems consist of straight sand as root zones and sand amended with peat is used in USGA construction systems. USGA style plots include a 300 mm deep stratified root zone overlaying a 100 mm deep gravel blanket. Sprinkler irrigated USGA plots and California plots have one pop-up sprinkler installed at every corner of the plot. The irrigation lines in the subsurface drip irrigated main plots are installed at a depth of 150 mm. The spacing between lines and emitters is 300 mm. California style greens have a 300 mm deep straight sand root zone layer with no gravel blanket underneath. The patented subirrigation and drainage system ECS is placed at a depth of 300 mm. Water movement into the root zone (irrigation) and from the root zone (drainage) is achieved only by capillary raise and by gravitation. Each of the main plots measures 17 m x 17 m, is replicated 3 times, and includes a 5% south facing slope. Drainage outflow from each plot was collected and measured weekly. Plots were watered daily with amounts calculated from potential evapotranspiration rates and adjusted for drainage losses. Visual quality ratings of the plots were taken bi-weekly on a scale of 1 to 9. Ratings are based on 9 being outstanding or ideal turf and 1 being poorest or dead. Volumetric soil moisture in the root zone was measured

by means of TDR (Time domain reflectometry) and total irrigation water use for each plot was determined by water meters installed in the water supply line to the plots.

From June 26 to September 29, 2004, water drop penetration tests (WDP) were conducted 6 times on cores taken from different locations of each plot. Cores from ECS subirrigated plots had the lowest water drop penetration times (10 seconds or less) on all sampling dates indicating no or very little water repellency for this construction and irrigation type. On 3 of the 6 sampling dates the difference between ECS and other construction types was significant. Additionally, ECS plots rated consistently highest for turfgrass quality. Sprinkler irrigation showed highest water drop penetration times on 5 of the 6 sampling dates. Comparisons of water repellency in the straight sand root zone (California system) and the peat amended sand (USGA system) were inconclusive. The USGA system showed higher WDP times on 4 of the six sampling dates, however on one sampling date WDP time for the California system was significantly higher (51 seconds) than the USGA system (36 seconds). WDP times for subsurface drip irrigated plots did not differ significantly from values for sprinkler irrigated plots. Volumetric soil moisture in the root zone was highest in ECS plots and lowest in California plots and the ECS plots required the least amount of irrigation of all systems tested. The results indicate that type of irrigation affects water repellency with subirrigation having the lowest incidence of hydrophobicity in the root zone.