Irrigating turf areas with saline and potable water from a subsurface drip system

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Abstract

Research was conducted at New Mexico State University from 2004 to 2012 to investigate the effect of saline and potable water applied from subsurface drip irrigation (SDI) systems on establishment, quality, soil moisture uniformity, and rootzone salinity of warm and cool season turfgrasses. Results for seeded warm season grasses indicate that drip irrigated plots established more slowly than sprinkler irrigated ones but grasses could be successfully established with SDI if seeded early. Irrigation system had no effect on bermudagrass summer or fall turf quality regardless of which fertilizer treatment was applied. Results indicate that warm and cool season grasses can be successfully maintained at acceptable quality over several years in arid regions using subsurface irrigation. Furthermore, the combination of saline water and SDI had no negative effect on warm season grasses or cool season tall fescue.

Subsurface drip irrigation (SDI) systems have been promoted for the use on turf because they irrigate more efficiently as they apply water from emitters placed within the rootzone. Advantages of SDI include the uninterrupted use of the turf area during irrigation, energy savings as a result of lower operating water pressure, no human exposure to irrigation water, reduced disease pressure, and potential water savings because irrigation is limited to the turf area and is not affected by wind drift or evaporation. Arguments against the use of SDI include high installation costs, difficulty in determining spacing and depth of pipes or emitters, a perceived inability to establish turf from seed or sod when using SDI, a perceived interference with regular maintenance, and a perceived inability to leach salts.

Research conducted at New Mexico State University has shown that turf irrigated from a SDI system can be fertilized with granular fertilizer without a loss in color or quality. If sufficient soil water is present, nutrients from the granule will become plant available regardless of whether water is applied from the surface or subsurface. However, most large turf areas with an SDI system have an injection system and apply liquid fertilizer. Home lawns can also be fertilized with a hose-end foliar/liquid fertilization system. If granular pesticide applications require watering-in from the surface either hand watering or a temporary surface irrigation system may have to be used. However, most turf pests can also be controlled by foliar pesticide applications. Core aeration can be applied if the drip lines are installed below the penetration depth of the core aerator. Deep tine aerification cannot be conducted on turf with SDI.

Several research reports have documented that SDI sytems are less effective than sprinkler systems at leaching salts from soils in the absence of adequate rainfall, particularly for rootzone depths above the drip lines. Nonetheless, warm season grasses seashore paspalum, bermudagrass, and inland saltgrass, and cool season tall fescue did not exhibit a decline in summer quality despite salinity fluctuations in the rootzone.

A study investigating soil moisture uniformity on sprinkler and subsurface drip irrigated turf plots revealed that sprinkler irrigation generally resulted in more uniform soil moisture distribution (lower standard deviation values) when compared to drip irrigation. However, the

research scenario, perfectly square plots with sprinklers heads placed precisely in each of the 4 corners, is commonly used in turfgrass field experiments, but does not necessarily represent a real-world situation. More research is necessary to investigate if applying water directly to the root zone results in fewer losses and in more efficient irrigation when plots are irregularly shaped, similar to turf areas in a typical landscape.