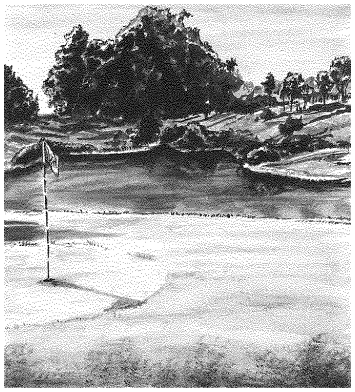

INCIDENCE AND CONTROL OF LOCALIZED DRY SPOT ON ARKANSAS PUTTING GREENS

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IMPACT STATEMENT

Localized dry spot (LDS) is a hydrophobic soil condition of unknown cause that affects putting green turf. Recently, it has become a significant management problem for golf course superintendents. Arkansas putting greens are particularly susceptible to LDS since they are typically established with cool-season turfgrasses and often experience high temperature and moisture stress extremes. A survey was conducted to assess the incidence and severity of LDS on Arkansas putting greens and to determine if LDS occurrence was correlated with putting green characteristics. In addition, a study was performed to determine if a commercially available wetting agent was effective in curing a putting green that was severely afflicted with LDS. Although survey data is still being collected, LDS appears to be a significant problem in the state of Arkansas as 69% of the respondents reported that they had experienced at least moderate LDS. Wetting agent treatments increased water infiltration, but had no effect on soil moisture. This was probably the result of the wetting agent binding to the thatch layer.

BACKGROUND

The United States Golf Association (USGA) developed a putting green construction method in the early 1960s that requires a 12 in. root zone composed predominantly of sand. Today, this is the most widely used method of constructing putting greens in the United States (USGA, 1993). The sandy root zone is resistant to compaction and provides adequate water infiltration, drainage, and exchange of atmospheric gases. However, a major disadvantage of sandy root-zone putting greens is the frequent occurrence of localized dry spot (Karnok et al., 1993).

Localized dry spot is a hydrophobic soil condition that can lead to major turf damage via moisture stress, and often results in dead patches of turf (Wilkinson and Miller, 1978). Prolonged periods of high temperature accompanied by little rainfall increase the likelihood of LDS on putting greens in the southern United States. Furthermore, the cause of LDS is not well understood and a consistent, dependable control for LDS on putting greens does not exist.

One objective of the following research was to evaluate the severity of LDS throughout Arkansas and to determine if LDS occurrence was correlated to putting green characteristics through a state-wide survey. A second objective was to determine the effects of a commercial wetting agent on a putting green that was severely afflicted with LDS.

RESEARCH DESCRIPTION

LDS Survey. An administered questionnaire was used to correlate the occurrence of LDS in Arkansas with several putting green characteristics. The survey was mailed to 96 golf course superintendents in Arkansas in an attempt to evaluate LDS severity and its relationship to putting green age, soil pH, depth of thatch layer, and sun exposure throughout the state. As of now only 16 superintendents have responded to the survey, but data collection is still in progress.

Wetting Agent Study. A wetting agent study was conducted at the University of Arkansas Agricultural Research and Extension Center (Fayetteville) on a 'Crenshaw' creeping bentgrass putting green built to USGA-specifications (USGA, 1993). The commercial wetting agent Aqueduct advertised as a curative treatment for LDS, was compared against control plots for its ability to remedy LDS patches on the experimental putting green. The first treatment of Aqueduct was applied at a rate of 8 oz/1000 ft^2 to five individual LDS patches on 2 Aug. 2000. An equal number of patches were left untreated for controls. Individual plot dimensions were 1 ft by 1 ft.

Soil moisture and water infiltration rates were periodically measured on all plots following Aqueduct application. Soil moisture was measured with portable time domain reflectometry (TDR) probes. Water infiltration times were measured by placing 5 ml of water on each dry patch with a syringe and recording how many seconds until the droplet had completely infiltrated the turf surface. Due to the relatively small size of the plots, a concern developed that the channels created by the TDR probes might have affected the infiltration times. To accommodate both soil moisture and infiltration time evaluations, the experiment was repeated using larger plot dimensions (2 ft by 2 ft). In the second run of the experiment, the same rate of Aqueduct was applied to four plots on 18 Aug. 2000 and again on the same plots on 31 Aug. 2000. An equal number of plots were left untreated as a control.

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FINDINGS

LDS Survey. Of the 16 golf course superintendents who returned the completed survey 38% rated LDS as a severe management problem, while 69% rated LDS as at least a moderate problem. The putting greens represented by the survey responses varied widely in age, soil pH, duration of sun exposure, and thatch accumulation. However, none of these characteristics were correlated to the incidence of LDS (Fig. 1). Similar LDS surveys conducted in Georgia (Tucker et al., 1990) and the United Kingdom (York, 1993) have also demonstrated no relationship between LDS severity and putting green characteristics. These results imply that the incidence of LDS may depend on the interaction of several environmental and putting green characteristics, making LDS occurrence difficult to predict and control. Several additional completed surveys are anticipated by the end of Spring 2001. As surveys are submitted, the entire survey data set will be re-analyzed.

Wetting Agent Study. In both runs of the experiment, wetting agent treatment had little effect on soil moisture (Figs. 1 and 2). However, water infiltration times were significantly improved by wetting agent treatment in both runs of the experiment (Figs. 1 and 2). In addition, some plots treated with Aqueduct seemed to improve in color a few days after treatment, but this was not consistently observed on all treated plots and color data were not recorded.

These results suggest that the wetting agent may have been mostly absorbed by the turfgrass thatch, resulting in little to no improvement in moisture content of the underlying soil. In this case, shorter infiltration times would be expected on plots treated with wetting agents since a sufficiently small volume of water was used in the evaluation (5 ml; small enough to be completely adsorbed by the thatch). This experiment will be repeated using a double ring infiltrometer that requires water to infiltrate through the thatch and into the underlying soil.

Localized dry spot appears to be a significant problem in Arkansas. The most commonly prescribed treatment for LDS, wetting agents, have been noted to yield inconsistent results, as was the case in this experiment. Research focusing on the precise placement of wetting agents, directly at the site of hydrophobic soil, may result in improved control of LDS in the future.

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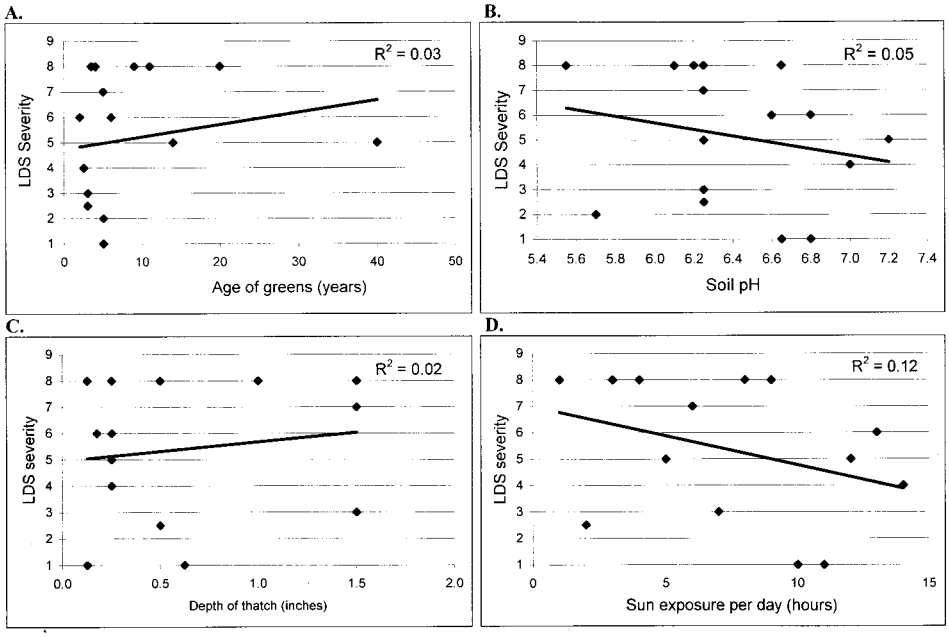

Fig. 1. Survey data correlating the relationship between LDS severity (1=none, 9=severe) and a) putting green age, b) soil pH, c) depth of thatch layer, and d) duration of sun exposure.

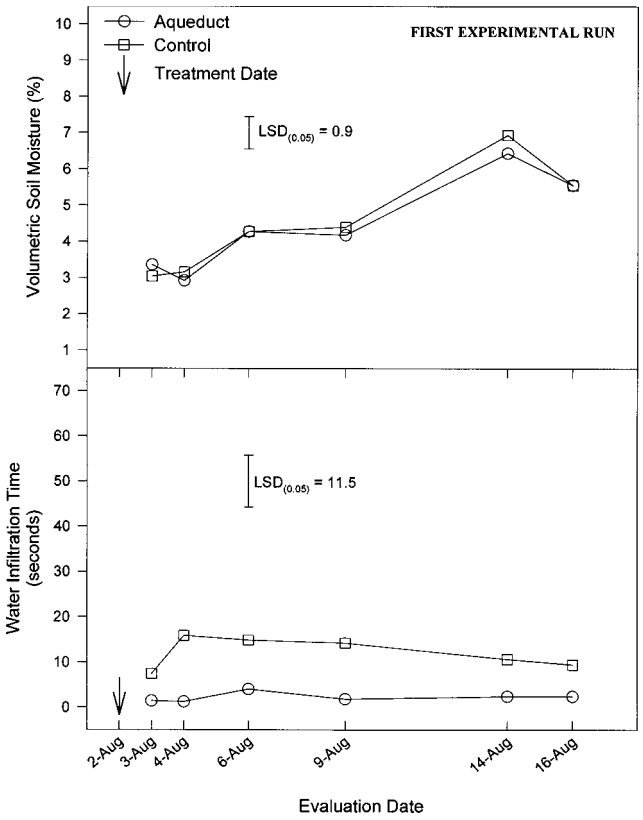

Fig. 2. Volumetric soil moisture and water infiltration times as affected by Aqueduct wetting agent. First run of experiment.

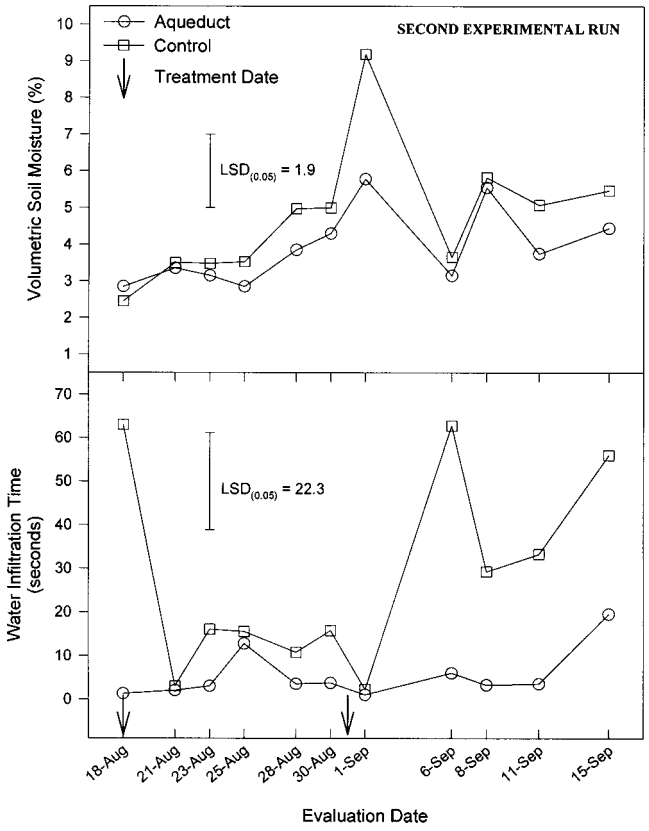

Fig. 3. Volumetric soil moisture and water infiltration times as affected by Aqueduct wetting agent. Second run of experiment.