NUTRIENT EFFICIENCY, POLLUTION, AND CONSERVATION OBJECTIVES AT THE BYU ENVIRONMENTAL BIOPHYSICAL CHEMISTRY LAB

Syringing Kentucky Bluegrass: Frequency Impacts Canopy Temperature and Growth.

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STUDY OBJECTIVES

- ALLOW FOR AESTHETICS AND FUNCTIONALITY OF URBAN TURFGRASS SYSTEMS
- SUSTAIN SOIL HEALTH AND CARBON SEQUESTRATION
- CONSERVE WATER
- IMPROVE PLANT HEALTH AND INCREASE SUSTAINABILITY IN DROUGHT CONDITIONS

ABSTRACT

Conserving water is increasingly important in turfgrass management. Heat-stressed turf uses water less efficiently, but maintaining lower canopy temperatures can improve water efficiency and grass health. Kentucky bluegrass (*Poa pratensis* L.) is the most commonly planted turfgrass species. Unfortunately, it is susceptible to heat and water stress. This species thrives at about 22°C, but summer temperatures often exceed 32°C in a majority of the cool season climate in which this species is grown. When temperatures are excessively high, syringing with water is a known method to cool the canopy. The purpose of this experiment is to develop improved management practices by determining how temperatures decrease with syringing and how long they remain depressed. A growth chamber study was conducted with Kentucky bluegrass comparing an untreated control with two syringing rates (1.6 and 3.2 mm) applied once (4 pm), twice (2 and 4 pm), or three (12, 2 and 4 pm) times daily for three days. Canopy temperatures were measured every five minutes. Average, peak maximum, and overnight minimum temperatures were significantly decreased with syringing, especially with multiple events. The temperature drop lasted 110 minutes with temperature drops of approximately 10 °C. Further study is underway to evaluate impacts on shoot and root biomass, verdure, NDVI, and water use efficiency.

INTRODUCTION

- Kentucky bluegrass most common turfgrass variety—excellent wear, drought resistance, etc., but susceptible to heat and water stress
- Thrives at 22°C but often grown in summer temperatures greater than 32°C
- Syringing (irrigating for a short amount of time) known to cool canopy temperatures
- Many known benefits of Kentucky bluegrass, but limited information on best water management practices

MATERIALS AND METHODS

- Cut sod established on calcined clay (Turface)
- Grown in an environmentally controlled growth chamber
- Randomized complete block design with three replications
- Pots kept at saturation during all syringing events
- Syringed in a watering chamber (Fig. 1)
- Treatments: control compared to two syringing rates (1.6, and 3.2 mm) applied one (4 pm), two (2 and 4 pm), or three (12, 2, and 4 pm) times
- Temperatures recorded every five minutes

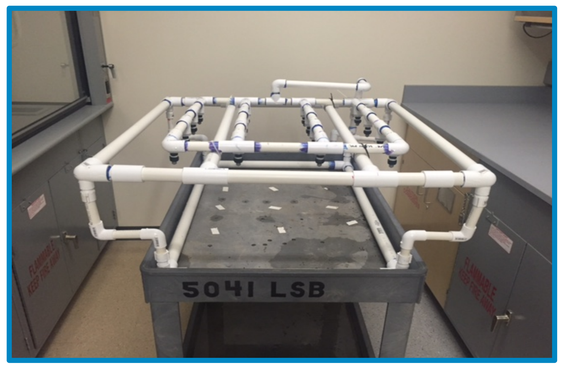

Fig. 1. Watering chamber used for syringing events.

RESULTS

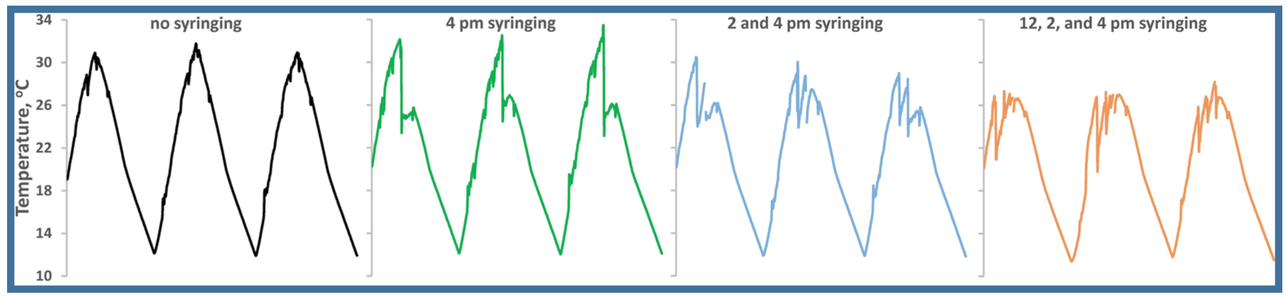

Fig. 2. Kentucky bluegrass canopy temperatures taken every five minutes over three days with syringing treatments with 1.6-3.2 mm water applied 0, 1, 2, or 3 times per day at 4; 2 and 4; or 12, 2, and 4 pm, respectively. (note: syringing rate of 1.6 or 3.2 mm water was not significantly different and, thus, were averaged for analysis and graphics)

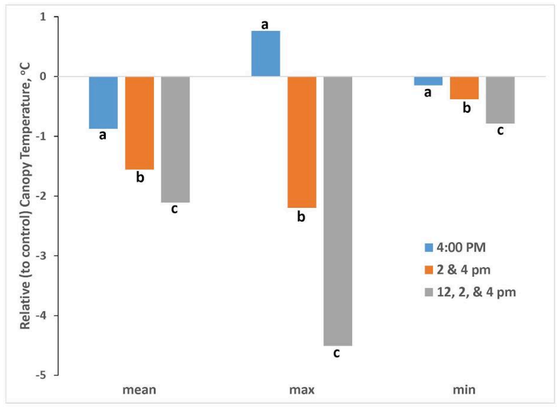

Fig. 3. Average change relative to an untreated control for Kentucky bluegrass canopy temperatures with syringing treatments with 1.6-3.2 mm water applied 0, 1, 2, or 3 times per day at 4; 2 and 4; or 12, 2, and 4 pm, respectively. Data bars grouped together were compared statistically and those with differing letters are significantly different from one another (alpha level of 0.05).

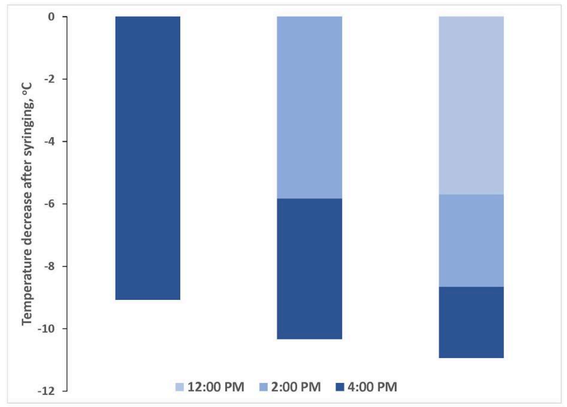

Fig. 4. Average decrease relative to an untreated control for Kentucky bluegrass canopy temperatures with syringing treatments with 1.6-3.2 mm water applied 0, 1, 2, or 3 times per day at 4; 2 and 4; or 12, 2, and 4 pm, respectively. Stacked bars show cumulative daily temperature drop.

CONCLUSIONS

Syringing is an effective means of maintaining lower canopy temperatures. Each syringing event reduced temperatures for approximately two hours, while increased syringing frequency led to greater reductions in temperature. Temperature decreased equally with both syringing rates. Further study is needed to elucidate the optimal syringing frequency and to determine the impacts on plant health and water use efficiency.

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