

2020 Research Protocol

Project Title: Salinity and Rapid Blight Management on Annual Bluegrass Putting Greens

Investigators: Mingying Xiang, mingying.xiang@ucr.edu, 405-762-2659
Pawel Petelewicz, pawel.petelewicz@ucr.edu, 951-300-8848
Pawel Orłinski, pawel.orlinski@ucr.edu, 951-275-2836
James H. Baird, jbaird@ucr.edu, 951-333-9052

Rationale for Research

In California, salinity stress and associated rapid blight disease caused by *Labyrinthula terrestris* are most critical on annual bluegrass putting greens. For the past seven years, UCR has been testing products to help alleviate these stressors on bermudagrass and annual bluegrass turf (turfgrass.ucr.edu). Results have pointed toward nutrients/biostimulants as playing an integral role in salinity management. In addition, new fungicide active ingredients have been identified for rapid blight management. The UCR Turfgrass Research Facility in Riverside is equipped with field plots for salinity management research where two 5,000-gallon tanks are used to irrigate with saline water composed of the same ion composition of the Colorado River and adjustable to desired electrical conductivity (EC). Riverside is a representative climate for regional water and salinity management issues, with nearly 60 inches of annual reference evapotranspiration (ET_o) and little or no natural precipitation from May thru October.

Objectives

Evaluate the efficacy of various products including macronutrients, micronutrients, biostimulants, wetting agents or fungicides for the management of irrigation salinity and rapid blight disease on an annual bluegrass putting green.

Materials and Methods

Research Putting Green

In 2018-2019, a new 5,400 ft² research putting green was constructed according to USGA recommendations at the UCR Turfgrass Research Facility in Riverside, CA. Root zone (85% sand/15% organic matter) was seeded with *Poa annua* var. *reptans* 'Two Putt' in spring 2019. The green was overseeded with 'Two Putt' in March 2020 to re-establish turf density following salinity research in 2019.

Culture

From April thru November 2020, the green will be mowed at 0.125 inches 5 times/wk using a walking greens mower. The green will receive sand topdressing every 2 wks and monthly aeration with ¼-in solid tines. Trinexapac-ethyl (Primo Maxx) will be

applied at 0.125 oz/1,000 ft²/2 wks and ammonium sulfate (21-0-0) at 0.125 lbs N/1,000 ft²/wk (except aeration) using a sprayer calibrated to deliver 2 gal/1000 ft² spray volume. An additional 0.25 lbs N/1,000 ft² will be applied each month following aeration using BEST (J.R. Simplot Co.) Micro Green 15 (15-5-8 5% Fe) granular fertilizer. Total N/1,000 ft²/month = 0.625 lbs. Periodic applications of fungicides with demonstrated lack of efficacy for rapid blight will be made for preventative control of *Pythium*, anthracnose, and summer patch diseases.

Irrigation

The irrigation system consists of 30-ft sprinkler spacing using Toro 300 series pop-up stream sprinklers. To minimize drought injury and maximize uniformity, the study area will be irrigated daily with a total of 120% ET_o based on the previous day collected from a CIMIS station within 100 ft of the green, with ca. 60% ET_o using the irrigation system in early mornings and 60% ET_o by hand watering in afternoons using a hose calibrated to deliver a known amount of water. Hand watering will serve to normalize irrigation distribution uniformity and syringe turf during hot weather.

Two 5,000-gallon storage tanks (Snyder Industries, Inc., Lincoln, NE) with submersible pumps for mixing and agitation are available next to the putting green to provide saline water. During the study period, saline water will be provided as the sole irrigation source. The saline irrigation water (EC ≈ 2 dS/m) will be mixed based on Colorado River ion composition containing salts of Na⁺, Cl⁻, Mg²⁺, Ca²⁺, K⁺ and SO₄²⁻ to simulate realistic water quality conditions for turf in California. Bicarbonate (HCO₃⁻) is not a concern in this irrigation water.

Treatments and Experimental Design

The study area will allow for a comparison of 24 treatments plus an untreated control. All liquid treatments will be applied with a CO₂-powered backpack research boom sprayer calibrated to deliver 2 gal/1000 ft² of spray solution. Treatments (individual products or combinations) will be applied every 1 or 2 wks or monthly based on company recommendations starting on May 19 and ending on October 20 for a total of 24, 12, or 6 applications, respectively. The experimental design will be a randomized completed block with six replications of each treatment. Plot size will be 4 ft by 6 ft. The study duration will be from May 19 to November 3, 2020.

Data Collection

Plots will be evaluated bi-weekly for visual turf quality (1-9 scale, 9=best), visual turf color (1-9 scale, 9=best), phytotoxicity (0-100%), visual percent green cover (0-100%), Normalized Difference Vegetation Index (NDVI) using the GreenSeeker instrument, and volumetric soil water content (VWC) and soil salinity level (EC_e) using the POGO Pro soil sensor.

Tissue samples and soil samples will be collected and analyzed by AgSource Labs (Lincoln, NE) just prior and following the study in May and early November. Clippings

will be collected 48 h after application of treatments to evaluate nutrient uptake. Soil samples will be collected to assess complete nutrient and salinity accumulation in the root zone. During the peak disease season, samples will be collected and sent to the University of Florida Rapid Turfgrass Diagnostic Service for rapid blight verification.

Data Analysis and Reports

Data will be subjected to analysis of variance (ANOVA). When necessary, multiple comparisons of means will be performed using Fisher's protected least significant difference test at the 0.05 probability level. Preliminary results will be published and presented at the UCR Turfgrass & Landscape Research Field Day on September 17, 2020 and a final report will be published by January 15, 2021.

Cost

Individual treatments (one product or combination of several products) applied to the same plots over time will cost \$3,000, which includes 6 monthly, 12 bi-weekly, or 24 weekly applications, preliminary Field Day report (September 17, 2020, and final written report (on or before January 15, 2021). Companies may submit more than one treatment, if space allows. Experimental (coded) treatments will be allowed, but preference will be given to commercial products for the sake of providing readily available research information to the California Turfgrass industry. Please contact us before finalizing your treatment list to ensure that space is available in the study.

Payment is due in full by May 15, 2020. Please make checks payable to "UC Regents" and include a brief letter as follows:

James H. Baird, Ph.D.
Turfgrass Specialist
University of California, Riverside
Department of Botany & Plant Sciences
Riverside, CA 92521

Dear Dr. Baird:

Enclosed is a check in the amount of \$xxxx.xx. This is an unrestricted gift in support of your turfgrass research and extension programs.

Sincerely,