Awards issued prior to January 20, 2025, were funded under previous Administrations and may not reflect the priorities and policies of the current Administration.

United States Department of Agriculture
Project Initiation

Project Data for Accession Number 1027404

Project Title

Mobile Remote Sensing and Artificial Intelligence-Guided Precision Management Program for Turfgrass Water Conservation

Project Details

Sponsoring Institution National Institute of Food and Agriculture	**Project Status** ACTIVE
Funding Source NIFA Non Formula	**Grant Year** 2021
Grant No. 2021-51181-35855	**Cumulative Award Amt.** $3,999,741.00
Proposal No. 2021-07743	**Multistate No.** (N/A)
Project Start Date Sep 01, 2021	**Project End Date** Aug 31, 2027
Program Code [SCRI] Specialty Crop Research Initiative	

Project Director

Huang, B.

Recipient Organization

RUTGERS, THE STATE UNIVERSITY

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NEW BRUNSWICK, NEW JERSEY 089018559

Performing Department

Plant Biology

Non Technical Summary

This project (SREP) addresses three legislative focus topics:(i) new innovations and technology, including decision support systems driven by phenology and environmental factors,(ii) efforts to improve production efficiency, productivity, and profitability, and(iii) research in plant breeding and other methods to improve crop characteristics for environmental responses and tolerance.The project focuses on turfgrass stakeholder needs for efficient and water-saving, precision irrigation management (PIM) programs and improving drought resistance of turfgrasses with the goal to develop site-specific PIM programs targeting for water conservation applicable to both cool- and warm-season turfgrasses in a wide range of landscapes (lawns, golf courses, and sod/seed farms) in a broad range of climate conditions in arid/warm regions (e.g. California), humid/warm regions (e.g. GA), and cool/semi-arid regions (e.g. New Jersey). The project will be conducted by a transdisciplinary team, including turfgrass scientists and breeders,

mechanical/ automation/artificial intelligence engineers, social scientists, economists, and extension specialists. The long-term goal is to improve profitability and reduce water consumption for a sustainable turfgrass industry.

Animal Health Component

Animal Health Component: 0%

Research Effort Categories

Basic	10%
Applied	50%
Developmental	40%

Classification

Knowledge Area (KA)	Subject of Investigation (SOI)	Field of Science (FOS)	Percent
203	2130	2020	50%
102	2130	1020	40%
111	2130	1081	10%

Knowledge Area

[203] Plant Biological Efficiency and Abiotic Stresses Affecting Plants

[102] Soil, Plant, Water, Nutrient Relationships

[111] Conservation and Efficient Use of Water

Subject Of Investigation

[2130] Turf (includes bentgrass, bermudagrass, bluegrass, dichondra, fescue, ryegrass,zoysia)

Field Of Science

[2020] Engineering

[1020] Physiology

[1081] Breeding

Keywords

decision support system, water conservation, precision irrigation management

Goals / Objectives

The project focuses on turfgrass stakeholder needs for efficient and water-saving, precision irrigation management (PIM) programs and improving drought resistance of turfgrasses. Our goal is to develop site-specific PIM programs targeting for water conservation applicable to both cool- and warm-season turfgrasses in a wide range of landscapes (lawns, golf courses, and sod/seed farms) in a broad range of climate conditions in arid/warm regions (e.g. California), humid/warm regions (e.g. GA), and cool/semi-arid regions (e.g. New Jersey). This goal will be achieved through a

systems-based approach and the integration of cutting-edge research and new concepts and technologies by developing and deploying mobile remote-sensing platforms and decision support systems (DSS) driven by plant phenology, soil and environmental factors that can guide turfgrass practitioners for efficient water use and precision irrigation.

Project Methods

The project will be conducted through a systems-based approach and the integration of cutting-edge research and new concepts and technologies by developing and deploying mobile remote-sensing platforms and decision support systems (DSS) driven by plant phenology, soil and environmental factors that can guide turfgrass practitioners for efficient water use and precision irrigation. TheDSS will be developed through machine learning using remote sensing information of plant, soil, and environmental parameters that affect water use and irrigation requirements by deploying mobile remote-sensing platforms (ground robot and unmanned aerial vehicle with multiple sensors). DSS-guided, site-specific PIM will be tested on different turfgrass landscapes. Social and economic analysis of DSS-guided PIM for water savings and cost-benefits will be conducted and the information will be delivered to the turfgrass industry through extension activities.