

2016-34-604

## **Identification of Bermudagrass and Zoysiagrass with Green Color Retention at Low Temperature**

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Project Objective(s):

- 1) Screen germplasm of Bermuda grass and zoysiagrass for green color retention when exposed to cool temperature growth.
- 2) Identify germplasm sources for ongoing selection for increased color retention under cool temperatures.

Start Date: 2017

Project Duration: 5 years

Total Funding: \$225,000

Warm-season grasses thrive under hot temperatures and require lower inputs of irrigation water than many cool-season grasses. Because of these benefits, warm regions of the U.S. now rely on warm-season grasses for many turfgrass settings. Several breeding programs have released and continue to develop improved warm-season grass species that possess higher turf quality and resistance to abiotic and biotic stresses.

Unfortunately, the adaptation of warm-season grasses limits their utility when grown in lower temperature conditions. For example, warm-season grasses provide excellent turfgrass in the desert Southwest during the hotter periods of spring, summer, and fall. Yet, cool temperatures in late fall, winter, and early spring cause these grasses to enter dormancy and lose green color. In response, turfgrass managers frequently over-seed warm-season grasses with cool-season grasses, such as perennial ryegrass, to maintain high turf quality during colder times of the year. This allows for high winter turfgrass quality, but requires higher levels of inputs, including irrigation during the winter months. Therefore, to increase the sustainability of warm-season turfgrass production in warmer regions of the U.S. there is a need to develop cultivars with improved color retention during cool temperature periods.

In conjunction with the USGA, the University of Florida (Gainesville), Oklahoma State University (Stillwater), and Texas A&M University (Dallas), we (USDA) developed an experiment to characterize germplasm sources of Bermuda grass and zoysiagrass for cool temperature color retention. Protected by material transfer agreements, these three universities provided the USDA (Logan) with approximately 900 germplasms of Bermuda grass and zoysiagrass for the purposes of this study. We (USDA) have received the germplasms and have begun to clone them prior to beginning the cool temperature evaluations.

Beginning in 2018, we will screen the germplasms using growth chambers and digital imagery. Once plants have been acclimatized to the growth chamber conditions during a two week phase, we will

begin lowering growth chamber temperatures. Beginning at 16 °C, we will expose the plants to lowering temperatures for two week periods. Digital imagery will be used to characterize the color of the plants on a weekly basis during the study. At the end of each two week period, we will lower the chamber temperature by 3 °C. This will continue until all plants in the study have entered dormancy based on the green color evaluation. Using this data, we will calculate a temperature at which a given germplasm is expected to enter dormancy. The study will be replicated with the use of multiple growth chambers and by running the entire experiment at least twice for each germplasm. We plan to conduct and complete the evaluations in 2018.

We expect to find variation for green color retention under cool temperatures in both Bermuda grass and zoysiagrass germplasms. We will publish the results of the study in a peer-reviewed scientific journal and provide the identification of germplasms with highest color retention to the corresponding universities. This information will allow to them to select appropriate parent plants for the development of warm-season turfgrass populations with higher green color retention under cool temperature growth.

- Received approximately 900 germplasm sources of Bermuda grass and zoysiagrass from three participating universities.
- Acclimatized plants to greenhouse conditions in Utah.
- Began cloning of Bermuda grass and zoysiagrass plants prior to study initiation.