2015-35-550

PROJECT TITLE:

National Evaluation of Turfgrass Water Use and Drought Resistance

PROJECT LEADER:

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START DATE:

2016

PROJECT DURATION:

Four years

TOTAL FUNDING:

$400,000

SUMMARY TEXT:

With water restrictions becoming more commonplace, and with turfgrass being scrutinized for its water use, there is great need to highlight those cool and warm-season turf cultivars that use less water and are appropriate for golf course fairways, tees, roughs and other turf areas. Therefore, this project addresses that need to identify turfgrass cultivars that deliver high quality turf while using significantly less water. This trial, established at multiple locations nationwide, does the following: 1) measures the actual amount of water required to maintain a prescribed level of quality or green cover, and 2) documents the performance of cultivars under varying levels of reduced evapotransporation (ET_o) levels.

Rain exclusion shelters are used to simulate 100-day drought periods in higher rainfall regions. Under the rain exclusion shelters we measure the amount of water needed to maintain 50% green cover, rate turfgrass quality as well as evaluate recovery from drought when irrigation is resumed.

The drier climate ET_o-based sites evaluate performance at three deficit irrigation levels for 100-120 day periods. Data recorded includes percent green cover over time, turfgrass quality and recovery rate after sufficient irrigation is applied. The ET_o-based locations allow us to determine the minimum level of deficit irrigation appropriate for, and thus the water savings from each entry.

In separate trials, we will collect three years of data on cool-season and warm-season turfgrass entries at 8-10 trial locations each. This data will be used to develop and apply U.S. EPA WaterSense (http://www3.epa.gov/watersense/) certification (or another certification organization) label to grasses that qualify.

The cool-season trial entries submitted include nineteen tall fescues, fifteen Kentucky bluegrasses and one perennial ryegrass. In fall 2016 and spring 2017, these entries were established at ten locations, with five sites in higher rainfall regions utilizing a rain exclusion shelter, and five sites in low rainfall regions where irrigation is applied based on varying degrees of deficit ET replacement. Difficulties and delays in obtaining rain exclusion shelters, as well as developing irrigation infrastructure resulted in delayed plantings at some locations.

Of the ten locations planted, six were able to collect at least some data on drought response and recovery in 2017 (we agreed that the remaining four locations did not have test plots that were fully mature, and therefore not ready to apply drought stress). The locations that did not simulate drought in 2017 (Logan, UT; St. Paul, MN; Ft. Collins, CO; Amherst, MA), will initiate drought treatments in 2018.

The six cool-season trial locations that did initiate drought treatments in 2017 include Fayetteville, AR, College Park, MD, Griffin, GA and West Lafayette, IN (rain exclusion shelter sites); and Riverside, CA and Las Cruces, NM (deficit ET_o replacement sites). We are still receiving data from of these sites and thus far, have not produced 2017 results. However, we can make some inferences from the data we have received to date.

The ET_o-based site at Riverside, CA saw >95% grass loss in the 40% ET_o replacement treatment. We will evaluate these plots over the winter and spring to gauge if sufficient recovery occurs to warrant continuing the 40% ET_o replacement at this location. The 60% ET_o replacement level also saw some significant grass loss, and it will be interesting to see plant recovery, as well as each entry's ability to withstand this level of deficit irrigation in 2018.

At the Las Cruces, NM site, significant differences in drought resistance were noted among entries, as well as differences in recovery from drought. The 2017 data collected from rain exclusion shelter sites has not yet been analyzed, but our research cooperators indicate significant differences were noted in water needed to maintain green and consistent growth.

The warm-season version of this trial is currently in the planning stages, with ten trial locations identified, testing parameters being decided upon and establishment scheduled for late spring/summer 2018. Rain exclusion shelters and deficit irrigation infrastructure will be installed in 2018 with drought treatments initiating in 2019.

SUMMARY POINTS:

- Thirty-five total entries in the Cool-Season Water Use and Drought Resistance trial were planted at ten locations in fall 2016/spring 2017.
- Five locations, located in high rainfall regions, induce drought via a rain exclusion shelter, while the other five locations, located in low rainfall regions, induce drought by restricting ET_o replacement.
- Delays in obtaining and/or installing the needed infrastructure (either rain exclusion shelters or irrigation systems) prohibited the initiation of drought treatments at four locations.
- Drought treatments were initiated at six of the ten locations in 2017, with significant drought responses being noted among entries.
- The 40% ET_o replacement level resulted in >95% grass kill at the Riverside, CA location.
- A warm-season water use/drought trial is now being developed, with planting in spring or summer 2018 at ten trial sites.

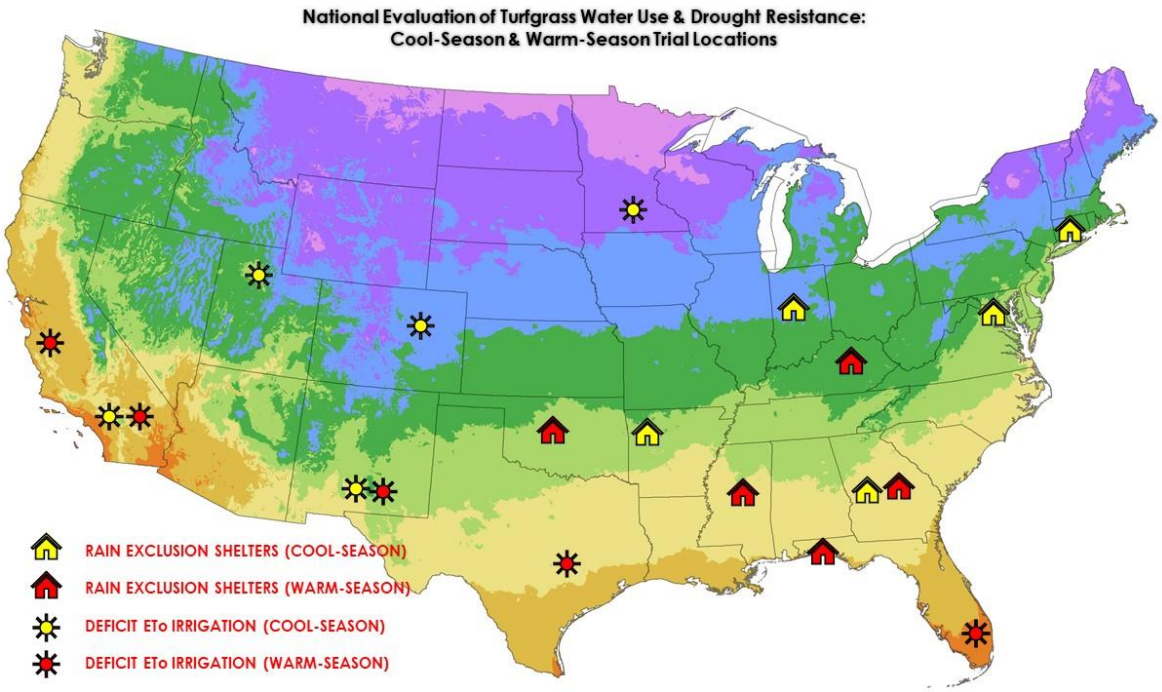

Figure 1. This trial is established at multiple locations nationwide to determine the actual amount of water required to maintain a prescribed level of turfgrass quality by documenting the performance of cultivars under various irrigation levels.

Figure 2. Rain-exclusion shelters are used to simulate 100-day drought periods in higher rainfall regions.