2006

Low-Input Sustainable Turfgrass: A Regional Cooperative Research Project

Shui-zhang Fei
Iowa State University

Christopher Blume
Iowa State University

David D. Minner
Iowa State University, dminner@iastate.edu

Nick E. Christians
Iowa State University, nchris@iastate.edu

Low-Input Sustainable Turfgrass: A Regional Cooperative Research Project

Abstract
I

rrigation, fertilization, and application of pesticides are needed to maintain healthy turfgrass. Due to dwindling water resources and increased environmental concerns over the use of fertilizers and pesticides on turfgrass, there is an increasing need to minimize the inputs to maintaining them. Most of the turfgrass species that are currently in use require a relatively high level of input to maintain acceptable turf quality; however, efforts to develop turfgrass cultivars with enhanced biotic and abiotic stress tolerance can lead to reduced irrigation and fewer chemical applications. An alternative approach to this problem is to search and find existing grass species that require minimum input yet can maintain acceptable turf quality. Indeed, great genetic variability of drought resistance, nitrogen needs, disease or insect resistance exists among different grass species.

Keywords
Horticulture

Disciplines
Agricultural Science | Agriculture | Horticulture

Low-Input Sustainable Turfgrass: A Regional Cooperative Research Project

Shui-zhang Fei, assistant professor
Chris Blume, graduate research assistant
David D. Minner, professor
Nick E. Christians, professor
Department of Horticulture

Introduction

Irrigation, fertilization, and application of pesticides are needed to maintain healthy turfgrass. Due to dwindling water resources and increased environmental concerns over the use of fertilizers and pesticides on turfgrass, there is an increasing need to minimize the inputs to maintaining them. Most of the turfgrass species that are currently in use require a relatively high level of input to maintain acceptable turf quality; however, efforts to develop turfgrass cultivars with enhanced biotic and abiotic stress tolerance can lead to reduced irrigation and fewer chemical applications. An alternative approach to this problem is to search and find existing grass species that require minimum input yet can maintain acceptable turf quality. Indeed, great genetic variability of drought resistance, nitrogen needs, disease or insect resistance exists among different grass species.

The objectives of this project is to identify alternative grass species that can be adapted to this region with minimum input and to obtain information on best management practice for each species identified. This project is part of a regional effort involving 11 midwest land-grant universities.

Materials and Methods

A total of 13 species are used for this project. The cultivar name, species name, and seeding rates are described in Table 1. Field plots were established on September 7, 2004, with an entry plot size of 3 ft × 5 ft. Efforts were made to ensure successful establishment including the use of a starter fertilizer (P_2O_5 at 87 lb/acre and 43 lb N/acre) and irrigation. Trimec® Classic was applied in April 2005 to control broadleaf weeds. No preemergence herbicides were applied. Three mowing heights of no mowing, 2 in, and 3.5 in. are applied to each species. Plots were mowed every month during the growing season except for the no-mowing treatment. The experiment is a randomized complete block design with three replications.

Results and Discussion

Quality data were taken in the months of May, July, and September of 2005 by using a scale of 1–10. Table 2 shows the quality data for all 13 species under three mowing regimes. Tall fescue, meadow fescue, hard fescue, as well as sheep fescue consistently performed well under all three mowing regimes from May to September. Colonial bentgrass's quality and coverage improved considerably from May to September under all three mowing regimes. Tufted hairgrass also performed well, particularly when mown at 3.5 in. Data from 2006 and other participating universities will enable us to make recommendations on alternative species that can be grown in our region with minimum input.

Table 1. List of 13 grasses used to identify input requirements and preferred management practices.

	Cultivar name	Species name	Seeding rate
1	Road Crest	Crested wheatgrass	5 lb/1,000 ft^2
2	LMC-1122	Meadow fescue (*Festuca elatior*)	7 lb/1,000 ft^2
3	Spike	Tufted hairgrass (*Deschampsia caespitosa*)	1 lb/1,000 ft^2
4	Blacksheep	Sheep fescue (*Festuca ovina*)	7 lb/1,000 ft^2
5	Berkshire	Hard fescue (*Festuca longifolia*)	6 lb/1,000 ft^2
6	LMC-5000	Praire junegrass (*Koeleria cristata*)	2 lb/1,000 ft^2
7	Fults	Alkaligrass (*Puccinellia distans*)	1.5 lb/1,000 ft^2
8	HB 342	Hybrid bluegrass (Kentucky bluegrass _ Texas bluegrass)	2 lb/1,000 ft^2
9	Dura Blue	Hybrid bluegrass (Kentucky bluegrass _ Texas bluegrass)	2 lb/1,000 ft^2
10	Shade Star	Crested dog's tail (*Cynosurus cristatus*)	1.0 lb/1,000 ft^2
11	Bad River	Blue grama	3 lb/1,000 ft^2
12	SR7150	Colonial bentgrass	1.0 lb/1,000 ft^2
13	Grande II	Tall fescue	7 lb/1,000 ft^2

Table 2. Visual quality of 13 grass species in May, July, and September with no mowing or mowed at 2 in. or 3.5 in. mowing height once a month.

	No mowing			2 in.			3.5 in.		
	May	July	Sept	May	July	Sept	May	July	Sept
	Turfgrass quality								
Crested wheatgrass	6.0	5.3	4.7	6.0	5.0	4.3	7.7	5.3	3.3
Tall fescue	8.3	9.0	8.0	8.3	8.7	8.0	8.7	8.7	8.0
Tufted hairgrass	5.0	6.3	5.0	6.0	6.0	7.0	6.3	8.0	7.3
Junegrass	4.7	4.0	6.0	5.9	5.3	5.7	4.7	4.7	6.0
Hard fescue	7.0	8.7	6.7	8.5	9.0	8.0	8.3	8.3	8.0
Sheep fescue	8.0	9.0	7.7	8.8	8.7	8.0	8.7	8.3	8.0
Alkaligrass	5.7	4.3	5.3	6.2	5.3	5.3	4.7	3.3	5.0
HB342	3.3	2.3	5.0	4.3	1.7	5.3	3.7	2.0	5.0
Dura Blue	2.7	3.3	4.0	3.2	4.3	5.7	3.0	3.3	4.7
Blue grama	2.7	1.7	3.0	2.4	1.0	2.3	2.3	1.0	2.0
Dog's tail	3.7	4.3	4.3	3.4	4.0	4.7	3.7	4.7	6.7
Colonial bentgrass	4.0	8.0	7.7	5.5	7.3	8.3	4.0	7.3	7.7
Meadow fescue	9.0	8.7	7.7	7.8	5.7	7.3	9.0	8.0	7.3