Evaluation of a Drought Tolerance Native Grass: *Cleistogenes songorica* for the Turf Use Purpose

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Introduction

Water deficit is one of the most important factors to restrict growth of turf grass, especially in northwest China where water available for landscape irrigation is increasingly limited. Use of drought-tolerant turfgrass species or cultivars is one of the strategies used to reduce water utilization and irrigation requirement (Nielsen and Stewart 1990). Recent study showed that regionally adapted native grass species are worth investigating as suitable alternatives to the conventional turfgrasses in many applications (Mark *et al*. 2011), and several native grass species are suitable for low-maintenance turfgrass use has also been reported (Mintenko *et al*. 2002). Awnless cleistogenes (*Cleistogenes songorica*) is a drought tolerance perennial grass native to the northwest desert grasslands of China. It grows well with a mean annual rainfall of 100 to 200 mm and is tolerant to the winter temperatures as low as – 40°C. A series of studies related to the domestication of this species have been reported by the writers including seed germination ecology (Yu *et al*. 2004), seedling establishment techniques (Tai *et al*. 2008) and seed production (Wei 2010). This paper reports the performance of *C. songorica* as a turf use grass under drought conditions.

Material and methods

The turf performance test of *C. songorica* was conducted in the Hexi Corridor of Gansu Province, China (38°24 N, 100°29′ E, a.s.l. 1450 m) from 2008 to 2010. Two varieties of tall fescue: Houndog 5 and Water Saver were used as controls. The sowing density of three varieties was 15,000 plants/m^2. The experiment was performed in split plots based on a completely randomized blocks design with four replications. The plots were irrigated at 10 day intervals in 2008 and 2009, and 20 day intervals in 2010. The charateristics measured included: plant density, coverage, green period, and growth rate in 20 days after cutting each year. In 2010, leaf relative water content (RWC) was also determined according to Barrs and Weatherley (1962).

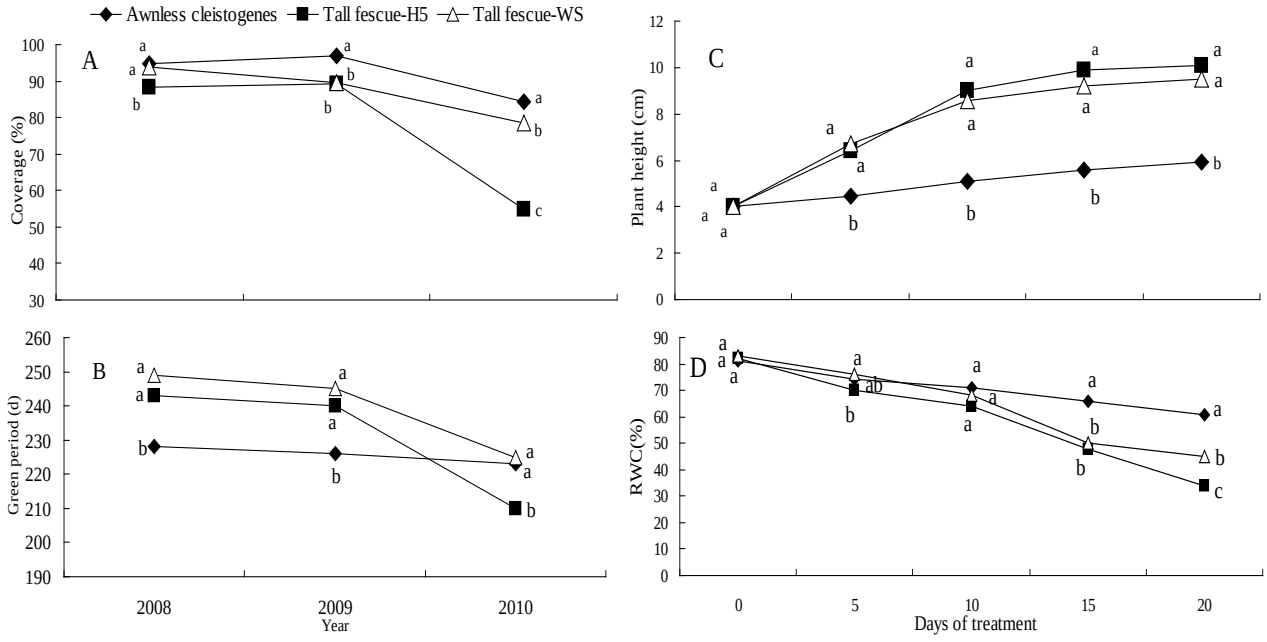

Figure 1. Performances comparison between awnless cleistogenes and two tall fescue varieties in 2008, 2009 and 2010. A: coverage, B: green period, C: plant height, D: RWC. Different letters indicate significant differences between test materials at 5% level in LSD test.

Results

Compared with two varieties of tall fescue, *C. songorica* showed a higher coverage ($P<0.05$), particularly under the drought stress in 2010 (Fig. 1A). Although the green period of *C. songorica* was shorter in 2008 and 2009, it was more consistent over the three years of observations compared with the tall fescues (Fig. 1B). By 2010, the coverage and green period of *C. songorica* were 84% and 223d, compared with 78% and 225d for Water Saver, and 54% and 210d for Houndog5, respectively. After cutting, regrowth of *C. songorica* was much slower ($P<0.05$) than that of two fescue varieties (Fig. 1C), indicating low management inputs needed. The RWC of *C. songorica* was much higher ($P<0.05$) under drought stress. For example, after 20 days water stress RWC of *C. songorica* was 60%, compared with 45% and 30% for Water Saver and Houndog5, respectively (Fig. 1D).

Conclusion

It is concluded that *C. songorica* can be used as a turfgrass or groundcover grass which has advantages of drought tolerance and low management inputs.

Acknowledgments

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