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CONSERVATION AND UTILIZATION OF BUFFALOGRASS (*BOUTELOUA DACTYLOIDES*) IN MINNESOTA

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Buffalograss (Bouteloua dactyloides) is a native grass of the Great Plains but is a species of concern in Minnesota because it is restricted to only a few sites in the southwestern corner of Minnesota where it is found on rock outcrops. Conservation efforts at the Minnesota Landscape Arboretum have been initiated to investigate the most threatened of these sites and to collect seed for seed banking. Due to its low-growth habit and drought and heat tolerance, buffalograss has recently become popular as a low-maintenance turfgrass. To promote this grass for drier sites in Minnesota, demonstration plots were planted at the Minnesota Landscape Arboretum. Additionally a comparison trial was started at the Arboretum in 2015 to compare the improved turftype buffalograss to the Minnesota native wild type.

Keywords: Bouteloua dactyloides, endangered species, ex situ conservation.

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СОХРАНЕНИЕ И ИСПОЛЬЗОВАНИЕ БИЗОНОВОЙ ТРАВЫ (*BOUTELOUA DACTYLOIDES*) (NUTT.) COLUMBUS В ШТАТЕ МИННЕСОТА

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Бизонова трава (*Bouteloua dactyloides* (Nutt.) Columbus; syn.: *Buchloe dactyloides* (Nutt.) Engelm) является аборигенным видом природной зоны Великих равнин США, однако в штате Миннесота данный вид является изчезающим, так как его распространение ограничено несколькими местами в юго-западной части Миннесоты, где он произрастает только на обнаженных горных породах. Охранная деятельность Ландшафтного Арборетума Университета Миннесоты направлена на изучение тех местообитаний вида, где бизоновой траве угрожает наибольшая опасность вымирания, а также на разработку программ по сохранению вида посредством создания банка семян. Поскольку бизонова трава низкорослое, устойчивое к засухе и высоким температурам растение, в последнее время этот вид стал популярным в ландшафтном дизайне и используется для формирования газонов, не требовательных к уходу. В целях содействия распространению этого злака в засушливых регионах штата Миннесоты в Ландшафтном Арборетуме были заложены демонстрационные участки. Наряду с этим в Арборетуме в 2015 г. были начаты испытания по изучению характеристик улучшенного газонного образца бизоновой травы и сравнению его с диким видом, произрастающим в Миннесоте.

Ключевые слова: бизонова трава, виды, находящиеся под угрозой исчезновения, сохранение видов ex situ.

Introduction. Buffalograss (*Bouteloua dactyloides*) is a low-growing perennial, warm-season grass species that is native to the North America Great Plains. It spreads both by seed and by stolons which take root and produce new plants at the nodes. Buffalograss is usually dioecious with male and female inflorescences occurring on separate plants. It is an important range and pasture grass for both wild and domesticated animal herds and is known for being drought-, heat-, and cold-resistant. Because of its warm-season physiology, this species becomes dormant with the onset of cold temperatures in the fall and breaks dormancy in mid to late spring. Recently it has been growing in popularity as a low-maintenance turfgrass due to its low-water use and low-growth habit [1].

Buffalograss is distributed from Montana to western Minnesota and then south to Arizona and eastward to Louisiana. To the north, buffalograss's cold-tolerance allows it to survive in the southern plains of Manitoba and Saskatchewan, Canada. Although buffalograss is common throughout the Great Plains, it is very rare in Minnesota where it is restricted to the southwest corner of the state and is found almost exclusively on Sioux quartzite rock outcrops. This part of Minnesota has fertile soils and excellent agricultural growing conditions so most of the tillable land is utilized for corn and soybean production. Buffalograss has survived only on the non-tillable rock outcrop areas. These red to pink Sioux quartzite outcrops are open plant communities on horizontal or sloping rock exposures where lichens and herbaceous plant cover is found growing mostly in crevices, shallow soil deposits, and rainwater pools [2].

Conservation. Minnesota has three designations for rare plants: a species is considered **endangered** if the species is threatened with extinction throughout its range in Minnesota; if the species is likely to become endangered in the foreseeable future, it is considered **threatened**; and a species is considered a **species of special concern** if, although the species is not considered endangered or threatened, it is extremely uncommon in Minnesota, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Buffalograss has been listed as a special concern species in Minnesota since 1984 because it is restricted to very few sites [3]. According to the Minnesota Department of Natural Resources [4], there are 37 known populations and are concentrated in two small geographical areas in southwestern Minnesota. Seventeen populations are on publicly owned lands that are being managed for conservation and the other 20 are owned by private individuals or private organizations. However, these populations on rock outcrops on private lands are being threatened by overgrazing of livestock and bedrock mining.

While buffalograss generally tolerates livestock grazing, it is threatened by physical trampling in overstocked pastures. The shallow soil over bedrock is easily churned up by cow hooves. To protect buffalograss from this impact, cattle stocking rates should be kept low enough to avoid physical breakup of shallow soil patches on the margins and in cracks of outcrops. Also many pastures undergo heavy broadleaf herbicide applications for thistle control, which can destroy native plants such as buffalograss. The other major threat is mining. Changes in federal highway construction standards have increased the demand for crushed bedrock. When grain prices rise, many farmers consider blasting or quarrying the rock outcrops on their land to plant more crops.

Turfgrass use. Due to its low-growth habit and drought and heat tolerance, buffalograss was proposed as an alternative lawn grass as early as the 1930s but cultivar development was primarily for forage or conservation use. In the 1990s denser growing cultivars from Texas A&M, Oklahoma State University, the University of Nebraska, and the United State Department of Agriculture were developed for turfgrass use. A turf-type buffalograss differs from a forage type in several ways. The turf-type has shorter, denser leaves and more stolons, with shorter internodes that branch more profusely. They also green up earlier in the spring and stay green longer in the fall than a common buffalograss [5].

Over most of the Great Plains area, where it is naturally distributed and adapted, turf type buffalograss produces an attractive lawn that requires minimum care. However, buffalograss prefers well-drained, alkaline soils where rainfall amounts are below 50–61 cm/year. In the Midwest, where rainfall amounts are higher, buffalograss is not well adapted and tends to form a less dense turf that is less competitive with weeds. In Minnesota, buffalograss is better suited for the drier western part of the state; however, climate change models predict increasingly warmer summers for Minnesota [6] and the anticipated range of temperature changes would more closely resemble what is currently found in regions southwest of the state, where buffalograss is more commonly found. Although heavier spring rainfall events are more common now, summer drought conditions are also more likely which favors buffalograss growth as well. It is imperative for us to anticipate this climate migration and to test potential turf grass replacements that could thrive under a warmer, drier climate.

Materials and methods. Minnesota Landscape Arboretum Comparison Trial. To compare the Minnesota wild type buffalograss to improved turf types, a comparison study was begun at the Minnesota Landscape Arboretum. In September 2014 native buffalograss stolons were collected from Mound Creek County Park in southwestern Minnesota. The stolons were divided into individual nodes and planted into plug trays. At the same time, stolons were collected from the University of Nebraska's improved

turf type cultivar ‘Bowie’. These stolons were also divided into individual nodes and planted into plug trays. The plug trays were covered in plastic and placed outside to overwinter. In the spring, the trays were uncovered and left to grow. In June approximately 50 plugs were planted into each 1,2×1,2 m plot and were replicated three times. These side-by-side comparison plots will be evaluated for vigor, winter hardiness, spring green-up, turf quality and other traits. The wild type material can also be used in the future for conservation, genetic studies, and for turf breeding.

Buffalograss Demonstration Site. In 2009 buffalograss was planted at the Minnesota Landscape Arboretum along with other native and non-native grasses on a low-maintenance turfgrass research area. The site was well-drained with a basic soil. The plots with buffalograss established slowly but eventually performed well [7]. Buffalograss is not a widely used turfgrass in Minnesota. To promote its use as a low-maintenance turfgrass, demonstration plots were established at the Arboretum in 2014 with three cultivars from the University of Nebraska. The plots were set up to demonstrate three different mowing regimes: 1) mowed monthly; 2) mowed twice annually (June and September); and 3) no-mow.

Future plans. Conservation work on buffalograss will continue at the Minnesota Landscape Arboretum. The non-managed 20 locations on private lands have been prioritized and ranked for the most threatened according to information available in the database. These threatened sites will be further investigated and future field trips will be planned to collect seed and to access their current status.

Comparisons between the Minnesota wildtype and the improved turf type will be made in 2016 when the plots are fully established. University of Minnesota turfgrass research scientists will assist with these evaluations.

Demonstration plots at the Minnesota Landscape Arboretum will be maintained to further promote buffalograss as a viable low-maintenance turfgrass for drier sites in Minnesota.

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