Restoration of threadleaf sedge at Scotts Bluff National Monument

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Prairie restoration is a management priority of Scotts Bluff National Monument, Nebraska. More than 365 ha (900 acres) of formerly agricultural land have been added to the park since it was established in 1919. Restoration was necessary to return the vegetation to its condition at the time of migration on the Oregon Trail in the mid-1800s. The park lies in the northern mixed-grass prairie where the original plant community was the *Agropyron-Hesperostipa* association. Dominant species included threadleaf sedge (*Carex filifolia* Nutt.), needleandthread (*Hesperostipa comata* [Trin. & Rupr.] Barkw.), western wheatgrass (*Elymus smithii* [Rybd.] Gould), blue grama (*Bouteloua gracilis* [Willd. ex Kunth] Lag. ex Griffiths), buffalograss (*Buchloe dactyloides* [Nutt.] Engelm.), and many forbs. Much is known about propagation of the grasses, but little is known about threadleaf sedge. Its seed production is extremely low and most efforts to propagate threadleaf sedge have ended in failure. This important native component of the vegetation is valuable for soil stabilization in this windy environment and it provides food for many species of wildlife. Since threadleaf sedge is one of the dominant species in the native plant community, restoration cannot be considered to be complete without this species.

Scotts Bluff National Monument has a long history of grass restoration on previously farmed and other disturbed sites. Sod was transplanted around a newly constructed parking lot in the 1930s, but the first seedings more than 30 years ago included only a few species of grasses. Though these seedings provided perennial grass cover to the land, they were not prairie restorations. Prairie restorations are aimed at recreating the historical vegetation and more fully restoring ecological function to the land. In 1997, the National Park Service and the University of Nebraska used a $124,000 grant from the Nebraska Environmental Trust Fund to begin restoration of the former site of the Scotts Bluff Country Club that was incorporated into the national monument in 1975. The work included removal of building foundations, a swimming pool, irrigation canals, and nonnative trees and was followed by land contouring, native seed purchases, and preliminary research on threadleaf sedge propagation. Park staff planted seed mixtures of native grasses and forbs in two restoration units (12 ha and 5 ha; 29.7 acres and 12.4 acres). Success of those seedings has been rated as excellent by restoration specialists.

Threadleaf sedge, one of the main components of the native park vegetation, was not included in the restoration because seeds were not available. Research conducted in the park by the University of Nebraska has shown that both seed production and germination for this species are extremely low (Griffin 2002; Fassett 2003). In order to fully restore the vegetation community to meet park goals, greenhouse-grown threadleaf sedge plants would need to be transplanted in the old golf course site. Though research at the University of Nebraska is investigating ways to enhance seed production and establish this species from seed, techniques are incomplete and seeds are not commercially available. Additionally, the university's research on vegetative propagation has shown that transplanting plugs of sod was not successful; however, transplanting greenhouse-grown plants into the plant community has been highly successful (Tichota 2000; Stubbendieck et al. 2002). In the late fall and early spring of 2002–2003 and 2003–2004, we investigated the success of a transplant method to incorporate threadleaf sedge, taken from the park and propagated in the greenhouse, back into the restoration units at the national monument.

Methods

University personnel collected threadleaf sedge sod from Scotts Bluff National Monument in early November 2002 and 2003. The sod was transported to the University of Nebraska–Lincoln where it was separated into individual plants (fig. 1) and planted into Ray Leach Cone-tainers™ (3.8 cm in diameter, 20 cm depth; 1.5 x 7.9 in, respectively) in a 2:1 soil mixture of silty clay loam:sand. After separating the plants, we clipped them to a height of 2.5 cm (1 in). The plants were watered every two to four days depending on soil dryness and received a maintenance fertilizer (20-20-20 NPK) every three weeks.

Following six months of growth in the greenhouse, we transplanted 7,000 threadleaf sedge plants into two restoration sites on the former golf course at Scotts Bluff National Monument in May 2003 (fig. 2). The experiment was duplicated in 2004 with an additional 7,000 plants. In order to monitor survival over time, the threadleaf sedge transplants were planted into eight, 6 x 6-m (19.7 x 19.7-ft) plots in each of the restoration sites in both years. We evaluated threadleaf sedge survival on the 16 plots, 2 and 12 months after transplanting. The cost of the project was $28,000.

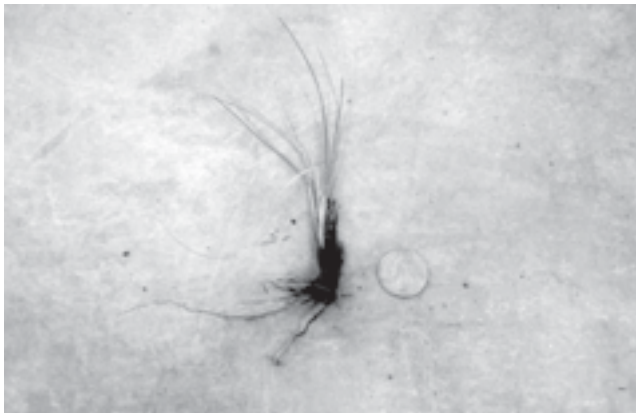

Figure 1. For the investigation, researchers collected threadleaf sedge samples from Scotts Bluff National Monument, then separated them into individual plants for propagation in the greenhouse. The photo shows a typical threadleaf sedge plant separated from the sod. UNIVERSITY OF NEBRASKA/SUSAN J. TUNNELL

Figure 2. Following greenhouse propagation, resource managers transplanted threadleaf sedge into two restoration units at Scotts Bluff National Monument. UNIVERSITY OF NEBRASKA/SUSAN J. TUNNELL

Results and discussion

The method of collecting threadleaf sedge sod, growing the plants in the greenhouse for six months, and transplanting them in the field was successful in 2003.

However, the increase in annual weedy species and soil disturbance from plains pocket gophers in 2004 reduced the success of the transplants. Whereas the 12-month survival of threadleaf sedge transplants in 2003 was 82%, it was only 29% in 2004. The high density of Russian thistle (*Salsola iberica* Sennen & Pau) and downy brome (*Bromus tectorum* L.), and increased pocket gopher activity in the area where the 16 plots were located in 2004, did not appear to be representative of the entire restored area; therefore, we believe threadleaf sedge survival was greater than the plot measurement (29%) suggests. Densities of Russian thistle and downy brome are highly variable with environmental conditions, and the national monument does not employ special techniques to manage these species.

We determined that this method of transplanting can be viable for restoration, but environmental conditions need to be considered in order to achieve a high level of transplant success. Transplanting threadleaf sedge on appropriate sites will be considered during planning for any future restoration projects at Scotts Bluff National Monument.

Acknowledgment

This article is a contribution of the University of Nebraska Agricultural Research Division, Lincoln, NE 68583, Journal Series No. 15013.

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