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SOME AUTECOLOGICAL CHARACTERISTICS OF ELK SEDGE

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ABSTRACT

Elk sedge (*Carex geyeri*), a grasslike plant with extensive fibrous root systems and apparent high drought tolerance, may be one of the most important native, herbaceous forage species on National Forest lands of Oregon and Washington. Quick establishment of elk sedge (*Carex geyeri*) on disturbed or depleted grazing lands of Oregon and Washington would be desirable for erosion control. However, reproduction from seeds in the laboratory has not yet been successfully accomplished. "Cores" were transplanted to the laboratory to investigate this method of reproduction and to provide material for tests of this plant's response to fertilization. The transplanting practice was successful and elk sedge showed positive response to nitrogen and potassium fertilization.

INTRODUCTION

In a number of areas on the eastern slopes of the Oregon and Washington Cascade Range, extremely erosive conditions have developed. In many of these watersheds, the terrain is quite steep and erodibility is highly influenced by the amount and type of vegetative cover.

Pinegrass (*Calamagrostis rubescens*), lupine (*Lupinus* spp.) and elk sedge (*Carex geyeri*) are the dominant ground cover on the watersheds.[1/] Apparently, elk sedge will tolerate unfavorable conditions, such as high soil temperatures and high soil moisture stress, as well as produce a

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[1/] Rummel, R. S. Some effects of livestock grazing on ponderosa pine forest and ranges in central Washington. Ecology 32: 594-607. 1951.

dense, extensive root system which is desirable for stabilizing soils on sites actively eroding or potentially erodible.

Little information is available on the autecological characteristics of elk sedge. Since it appears desirable to extend the distribution of elk sedge on depleted sites, we need more knowledge of some of these characteristics.

METHODS

Little is known about propagating elk sedge. The plant normally produces one seed per spike annually which is available for harvest for only a few days. For this reason, there is a very limited supply of seed. Also, Wiesner et al.[2/] have shown that the potential seed viability of a number of sedge species is low; therefore, high germination percentages could not be expected. With 2 years of effort, Kirk[3/] has been unable to germinate seed collected in the Wenatchee, Wash., area.

For this reason, "plugs" 2 inches in diameter normal to the ground surface were taken in March from an apparently healthy, vigorous elk sedge clone growing in the Mission Creek watershed. In the laboratory, collected cores were sorted, tops removed, graded to a uniform size, and planted in individual plastic pots. A resident soil from the Mission Creek watershed was used for potting material. Physical and chemical analyses of this soil are listed below:

Sand: 74.1 percent

Silt: 15.9 percent

Clay: 10.0 percent

Cation exchange capacity: 17.29 meq. per 100 g.

Organic matter: 1.61 percent

Element analysis:

N	0.03 percent (total)	Na	0.20 meq. per 100 g.
P	11.0 p.p.m.	Mn	0.01 meq. per 100 g.
K	0.53 meq. per 100 g.	Al	0.14 meq. per 100 g.
Ca	10.88 meq. per 100 g.	Zn	0.01 meq. per 100 g.
Mg	1.49 meq. per 100 g.	Fe	0.01 meq. per 100 g.

2/ Wiesner, L. E., Carleton, A. E., and Bailey, R. C. Seed evaluation of sedge species. Mont. Agr. Exp. Sta. J. 831, 9 pp., illus. 1967.

3/ Kirk, J. Personal communication. Forest Hydrology Laboratory, Pacific Northwest Forest & Range Exp. Sta., Wenatchee, Wash. 1968.

The individual pots were irrigated to near field capacity each time the soil moisture stress approached two bars. A soil moisture release curve is shown in figure 1. The pots were placed in an open area exposed to full sunlight.

At the time of transplanting, 12 fertility levels were imposed to provide an estimate of the plant's nutrient level requirements. A split-plot design was used with four replications. Treatment levels used were: nitrogen, 0, 100, and 200 pounds per acre; phosphorus, 0 and 200 pounds per acre; and potassium, 0 and 200 pounds per acre. Chemical fertilizers used were ammonium nitrate (NH_4NO_3), super phosphate (P_2O_5), and muriate of potash (KCl).

After 120 days of growth, the vegetation of all treatments was clipped at a height of 3 centimeters above the soil surface for a measurement of forage production. After an additional 60 days of growth, a second cutting was made.

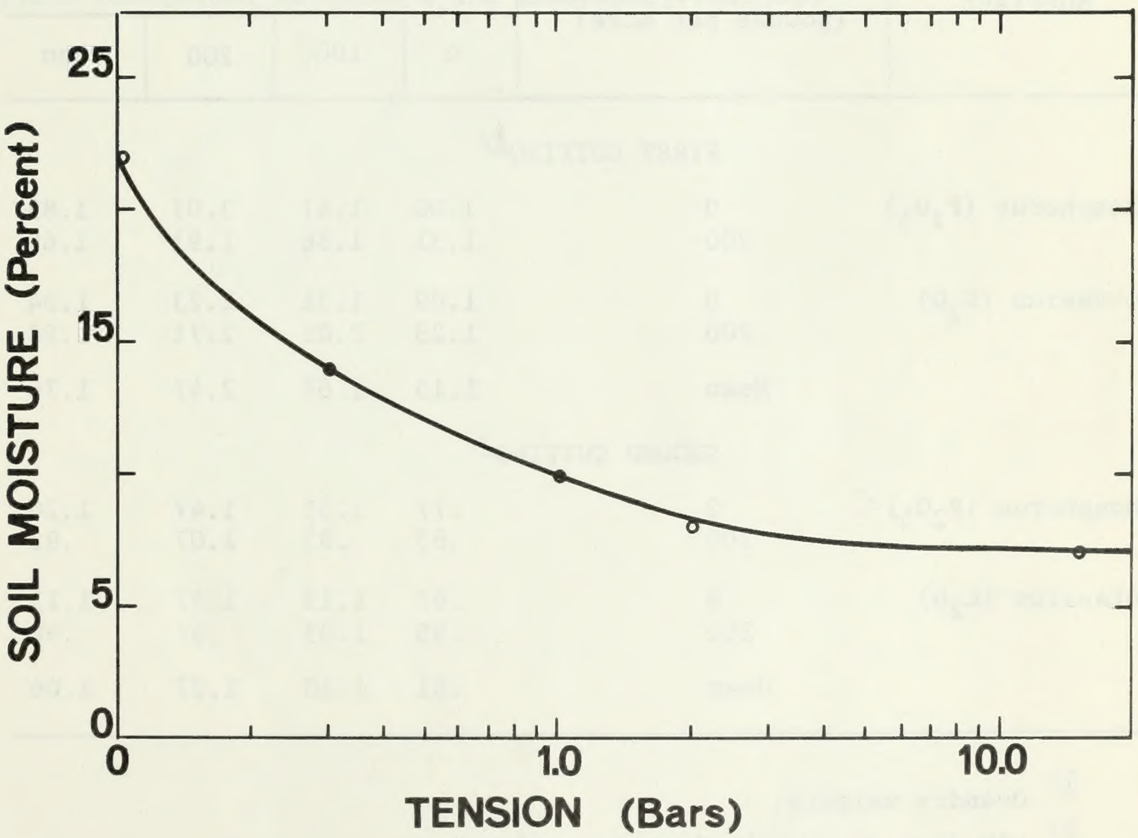

Figure 1.--*Soil moisture-tension relationship for the resident soil used for potting elk sedge.*

RESULTS

The ovendry vegetation yields in grams per pot for the first and second cuttings are shown in table 1. The figures in table 1, multiplied by 555, place this yield on a per-acre basis of pure stand. The first cutting showed a significant response (1-percent significance level) for both nitrogen and potassium, with the nitrogen having the predominant treatment influence on yield. The heavy application of phosphorus to a soil already containing 11 parts per million (p.p.m.) may have contributed to the negative response for this element.

Table 1.--*Yield of elk sedge in response to three levels of nitrogen, two levels of phosphorus, and two levels of potassium fertilizer application*

(In grams[1] per pot)

Nutrient	Level of application (pounds per acre)	Nitrogen (pounds per acre) 0	100	200	Mean
		FIRST CUTTING[2]			
Phosphorus (P_2O_5)	0	1.00	1.47	3.03	1.83
	200	1.31	1.86	1.91	1.69
Potassium (K_2O)	0	1.09	1.31	2.23	1.54
	200	1.23	2.01	2.71	1.98
	Mean	1.15	1.67	2.47	1.76
		SECOND CUTTING[3]			
Phosphorus (P_2O_5)	0	.77	1.35	1.47	1.20
	200	.85	.85	1.07	.92
Potassium (K_2O)	0	.67	1.15	1.57	1.13
	200	.95	1.05	.97	.99
	Mean	.81	1.10	1.27	1.06

1/ Ovendry weights.

2/ 120 days of growth after transplanting.

3/ 60 days of growth after first cutting.

Only a nitrogen treatment response was evident in the second cutting. This cutting was influenced to an unknown degree by the potting conditions. Frequent pot watering was necessary due to high summer temperatures, and some leaching may have occurred. Although all core plantings showed new growth, five out of the 48 plants used in the experiment died from unknown causes. The roots of the surviving plants fully permeated the pot.

CONCLUSIONS

It can be concluded that elk sedge (*Carex geyeri*) will withstand coring, transplanting, and greenhouse cultivation techniques. The species continued to respond to nitrogen and potassium fertilization up to the top treatment level of 200 pounds per acre. Although the root development was excellent, which is very important for erosion control, the annual forage yield in the experimental pots was not exceptional.

The planting technique employed in this study is being tested under field conditions to confirm the laboratory results.