Propagation and Establishment of Hardstem Bulrush at Johnson Lake, Confederated Tribes of the Warm Springs Reservation of Oregon

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Introduction

Hardstem bulrush, also known as tule (*Scirpus acutus* Muhl.), is an obligate, emergent, perennial wetland plant. While ecologically important for wildlife habitat, waste water treatment, and stabilization of marsh sediments and shorelines, this species is also culturally significant for many native Americans. For the Warm Springs, Paiute, and Wasco Tribes of The Confederated Tribes of Warm Springs Reservation of Oregon, traditional uses include seats, baskets, clothing, mats for burial, wedding and name giving ceremonies, and covers for lodges and floors (Dick 1998).

In addition, tule populations have declined on the Reservation. Therefore, a project was undertaken to determine production and establishment methods for local populations under site specific conditions. More specifically, the purpose of this work is to: (1) document seed and vegetative propagation methods, (2) conduct studies to contrast the ability of container stock versus wild transplants to establish and spread, and (3) make inferences regarding the possible effect of rhizome quality, plant spacing, and planting season on establishment. Besides the Confederated Tribes of Warm Springs, partners include the NRCS Plant Materials Center (PMC) at Corvallis, OR, (lead), OSU Cooperative Extension Service, and the Bureau of Indian Affairs.

Methods and Materials

In May and July of 1997 rhizomes and seed were collected at Tule Lake (elev. 410 m) and along the Warm Springs River (elev. 440 m). For Phase I (Oct. 1997 planting) stock was produced in the PMC greenhouse by inserting 8-13 cm pieces of rhizomes

into 14 cm square pots. For phase II (Aug. 1998 planting) stock was grown from seed that was prechilled for 30 days in wet peat moss at 3 degrees C then placed on the media surface. The potting mix was peat moss, perlite and vermiculite at a volume ratio of 1:1:1. Pots were fertilized and kept in tubs with the water level maintained at the top of the media for three weeks then at a depth of 2.5-5 cm until planting time. The day length was 16 hours. Minimum day and night temperatures were 24 and 13 degrees C respectively in 1997 and 18 degrees C in 1998. The 1998 and May 1997 stock was hardened off in a shade house for 30 days but July 1997 stock was not. Shoots were cut to a height of 45 cm in 1997 and 75 cm in 1998 prior to out planting.

For objective two, experimental design is a randomized complete block with three replications. The two treatments are propagule type (2 or 3) and population (2). The experiment is duplicated at two different spacings (0.6 and 0.9 m o/c) both years. The 1997 planting was made in moist or saturated soil while the 1998 planting was in 25-43 cm deep standing water. Both are at Johnson Lake (elev. 760 m, soil 0-2.5 cm muck over clay) in an area fenced for livestock exclusion. Each plot is a square of four (1997) or nine plants (1998). Container stock was planted with a shovel and bare root rhizomes were inserted at a 5-8 cm soil depth. No fertilizer or weed control was applied. In 1998, rhizomes were further secured in place with a "staple" and "rhizomes with soil" was added as a third propagule type. Initial stem number was recorded for all material. Also, length, caliper, and number of terminal and stem buds were recorded for bare root rhizomes.

Discussion

Container stock was easier and more reliable to produce and had superior stem and root development when grown from seed compared to rhizomes. Most plants grown from May 1997 rhizomes reached transplant quality after 70 days. Those produced from July rhizomes were less vigorous. Following methods described by Hoag (1997), most seed germinated in 8-12 days after sowing and transplant size material was obtained in 95 days.

Observations in Nov. 1998 for the 1997 out planting (Table 1) indicate that container stock from May rhizomes survived nearly the same but spread substantially more than bare root stock. Stock produced from July rhizomes failed, possibly because it was not hardened off, had fewer shoots, and was not as well rooted compared to May stock. Overall survival was 12.3 percent for 357 (Tule Lake) and 8.9 percent for 358 (Warm Springs River) material.

Lack of precipitation in late Oct.-Nov. 1997 following out planting may have increased mortality. Water levels continued to drop leaving transplants out of the water, in drier soil, and as a result, more exposed to rapid freezing temperatures. Better results are anticipated for phase II because the 1998 stock is of higher quality and the water is deeper. Data will be collected for two more years and results published in 2001.

Literature Cited

Dick, L. 1998. Personal communication. Tule Man. Confederated Tribes of Warm Springs, OR.

Hoag, J.C. 1997. Wetland plant fact sheet: hardstem bulrush (*Scirpus acutus*). Interagency Riparian/Wetland Project. USDA-NRCS, Plant Materials Center, Aberdeen, ID.

Table 1. Initial survival and growth of *Scirpus acutus* at Johnson Lake, Nov. 1998.

Accession	propagule/ Month	% survival	avg. ht.	avg. stem No.	spread (cm)
357	bareroot (Oct.)	16	116	3.7	8.7
357	container (May)	21	126	7.3	19.8
357	container (July)	2	30	1.0	4.0
358	bareroot (Oct.)	17	108	4.4	14.3
358	container (May)	15	156	5.4	20.1
358	container (July)	0	---	---	---