

## American Wild Celery (*Vallisneria americana* Michx.): Propagation of Revegetation Transplants from Seed

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### INTRODUCTION

American wild celery (*Vallisneria americana* Michx., family Hydrocharitaceae) is a submerged grass-like aquatic perennial that grows in fresh or slightly brackish water from Canada to Florida, west to the Dakotas (in the north) and to Arizona and New Mexico (in the south).

Reproduction commonly occurs by vegetative means, either by stolons during the summer, or in the spring from overwintering buds (known as turions) formed at the end of stolons. Sexual reproduction also occurs in the wild, but there have been very few documented observations of seedlings. Wild celery plants are dioecious, and flowering occurs in the upper Chesapeake Bay during August and September. On male plants, flowers develop in a spathe at the base of the plant, breaking free and floating on the water surface to release pollen upon maturation. The flowers of female plants are tubular and sit atop long peduncles (basally attached) that grow to the water surface. Once the female flowers are fertilized at the surface by floating pollen, the peduncles coil to pull the immature fruits underwater. Mature fruits are long capsules that resemble green beans; each capsule contains 150 to 300 seeds (dark brown when ripe) in a gelatinous substance. Capsules split to release seeds and gel into the water.

Wild celery is a particularly valuable submerged aquatic vegetation (SAV) species, since it provides food and habitat for a variety of fish, invertebrates, and waterfowl. The canvasback duck, *Aythya valisineria*, is even named because of its association with wild celery. Wild celery is able to colonize areas that other SAV cannot — it can grow in fairly turbid water and tolerates high nutrient levels as well as nutrient-poor water; it can also tolerate lower light levels than other SAV species. It acts as a shoreline erosion control and a nutrient buffer.

### SEEDLING PROPAGATION

The National Plant Materials Center (NPMC) is cooperating with the U.S. Army Environmental Center (USAEC) at Aberdeen Proving Grounds, Maryland and Anne Arundel Community College (AACC) in Arnold, Maryland on this project. The USAEC is attempting to restore wild celery beds in the Gunpowder River, an upper Chesapeake Bay tributary. Studies were initiated at the NPMC to investigate production of revegetation transplants from seed and at AACC to examine micropropagation techniques. Using nursery-grown wild celery would be an alternative to the current method of disturbing existing celery beds for transplant material, and seedlings would provide greater genetic variability than clonal transplants in the restored areas.

The NPMC is currently in the process of developing a propagation / production protocol and has summarized the information gathered for each step of the process:

**Seed Collection.** Seed pods were collected from the lower Gunpowder River in the first week of Oct. 1996. Proportion of light-colored (immature) to dark brown (mature) seeds was approximately 1 : 1. Pods were collected before they could be scavenged by waterfowl. The NPMC obtained the seeds in Dec. 1996.

**Seed Storage.** Seed pods were stored whole in tap water at 4C in the dark. Seed pods and mucilage began to fall away from the seeds after 4 months.

**Germination.** The literature is mixed regarding the need for a cold treatment prior to sowing. Seeds collected in 1996 stored wet and cold for 3 months (and longer) germinated readily in the greenhouse. The NPMC is testing seeds collected in 1997 for a stratification requirement. From observations at the NPMC, seeds do not require light for germination. In fact, seeds can be lightly covered with medium when sown since uncovered seeds have a tendency to float after germinating. An experiment was carried out in Aug. 1997 on a range of temperatures to determine which resulted in the greatest germination. Four 10-gal aquaria were heated to 20, 25, 30, and 35C, respectively. Three pots of sand, each containing 100 celery seeds (sown 5 mm deep) were placed in each aquarium. Germination was counted over a period of 1 month and seedlings were removed as they were counted. An incubation temperature of 20 C resulted in 7.7% germination, 25C in 25.0%, 30C in 21.7%, and 35C in 3.0%.

**Seedling Production.** The NPMC is currently investigating growing conditions and media most effective for generating transplant material in a reasonable amount of time. Three growing methods were evaluated in 1997: peat pots, plastic pots, and coconut fiber mats.