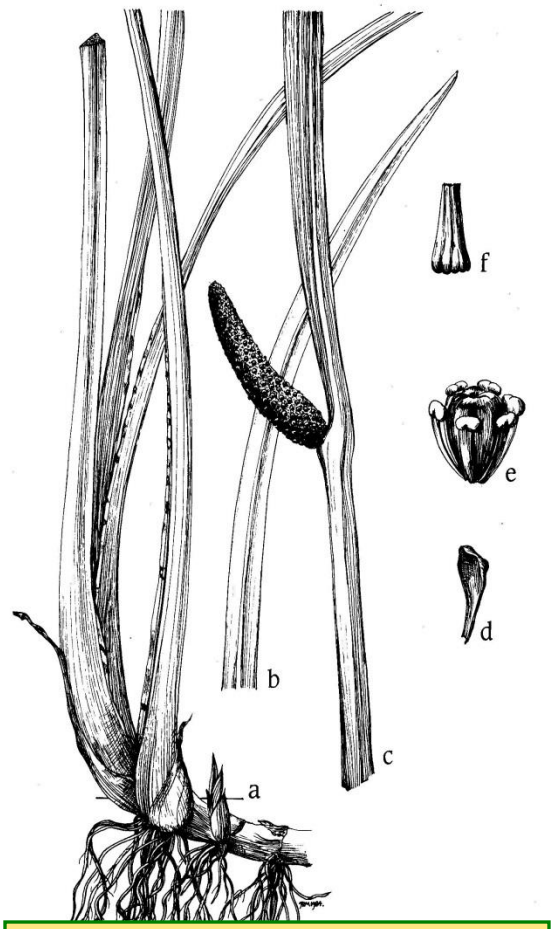
Scientific Name: *Acorus americanus* (Raf.) Raf. **Family:** *Araceae*

Common Names: rat root, sweet flag, calamus



***Acorus* sp. a. leaves, rhizome and roots b. leaf c. flowering stalk d. bract e. stamens and pistil f. seed.**

Plant Description

Herbaceous perennial from thick rootstocks; aquatic erect perennial herb, 40 to 80 cm growing from an aromatic thick, creeping rhizome often forming mats; leaf-like erect stem bears a lateral spadix 3 to 8 cm long; leaves basal, alternate, 40 to 80 cm long and 8 to 20 mm broad, linear, flat; stem/scape resembles leaves; spadix borne laterally partway up the flat stem, 3 to 8 cm long, covered with yellow-brown flowers; flowers perfect, 6 scale-like sepals, ovary 2 to 3 loculed, thick creeping rootstock (Moss 1983).
Fruit: Hard dry fruit, gelatinous inside, bearing a single achene (Johnson et al. 1995).
Seed: 3 mm, lentiform seeds, cream coloured.

Habitat and Distribution

Marshes, shallow water and stream edges, ephemeral streams and swamps (Moss 1983).
Habitat: Emergent species (Baskin and Baskin 2001).
Soils: Organic, poorly drained soils. Moist soils found in riparian areas. Sweet flag is intolerant of droughty soils, but tolerant of seasonal and permanent flooding with 15 to 50 cm maximum water depths (Cooper et al. 2006).
The pH range is 5 to 7, weakly acid to weakly basic conditions (Bush 2001). *Acorus calamus* (possibly *Acorus americanus*) was found in the highest alkaline locales in a fen of south central Ohio (Choesin and Boerner 2000).
Distribution: Central and northern Alberta; British Columbia to Nova Scotia, south to Montana, Texas and Florida. Scattered across southern boreal forest (Moss 1983).

Phenology

Flowers May to August. Seeds ripen late summer or early fall in US (Bush 2001). Flower July to August and seed ripens mid to late September in northern Alberta.

Pollination

Based on morphology, Cook (1988) suggests that *Acorus* is insect pollinated.

Seed Dispersal

Acorus sp. spread seed by water (eFloras n.d.).

Genetics

2n=24 (Moss 1983).

Symbiosis

Plants from Ohio (*A. calamus*) have vesicular-arbuscular mycorrhizal (Bohrer et al. 2004).

***Acorus americanus* seed**

Seed Processing

Harvest Dates: Late summer or early fall (Bush 2001).

Collection: Heads can be handpicked or snipped.

Seed Weight: 0.526 to 0.922 g/1,000 seeds (0.746 average).

Cleaning: Air-dry fruit at 15 to 25°C. Crush material or remove large chaff and crush remaining material. Sieve to remove seeds from chaff using appropriate size screens. Small chaff and dust can be removed by winnowing.

Storage: Store in sealed containers.

Propagation

Natural Regeneration: By seed (Bush 2001) and by rhizome.

Germination: Smreciu et al. (2012) found that fresh seed germinated very well, with 90% of the seed germinating with no stratification. They also found that some seed stored at room temperature for 6 months went into dormancy, which could be broken with stratification. Seed required exposure to sunlight and preferred warmer temperatures to germinate. Motley (1994) found that seed required moist to saturated substrate and full sun. Shipley and Parent (1991) obtain 91% germination after 30 days using 9 month old seeds from Ontario planted in pots filled with acid-washed sand and remaining 1 cm filled with a commercial potting soil.

Pre-treatment: No pre-treatment required for fresh seed and a four week cold stratification was used to break the dormancy of stored seed (Smreciu et al. 2012). None required (Bush 2001). Placed in porous nylon bags and buried in wet sand for 9 months of cold stratification (4°C) (Shipley and Parent 1991).

Direct Seeding: Germinates in less than 2 weeks with

***Acorus americanus* spadex and spathe (flowering florescence and bract).**

direct seeding (Bush 2001).

Vegetative Propagation: In an experiment performed by Smreciu et al. (2012) rhizome cuttings with some roots and leaves still attached had 100% survival rates. They also found that rhizome pieces with roots had good to fair survival and cuttings without roots or shoots did not survive. Plants can be propagated by division, specifically of the rhizome. There was a 38% survival of non-leafy rhizome cuttings the first year and 23% survival after 3 years; a 71% survival of leafy rhizomes the first year and 37% survival after 3 years in northeastern Alberta oil sands tailings pond.

Rhizome cutting of *Acorus americanus* with attached leaves and roots.

Aboriginal/Food Uses

Food: Can be chewed directly after picking (Duke 1992, Kindscher 1987, Northern Bushcraft n.d.). Rhizome can be made tender by prolonged boiling (Northern Bushcraft n.d.).

Some authors suggest stimulation, others hallucination from overconsumption. Was chewed in lieu of tobacco in Depression years. Can be boiled with maple sap to prepare candied sweet flag (Duke 1992). Young tender leaves can be added to salad (Kindscher 1987).

Medicinal: The bitter and aromatic rhizomes are highly valued as a multiple-usage medicine. Rhizome is chewed to treat colds and coughs, rheumatism, toothaches, headaches, muscle pain, and intestinal worms. Boiled rhizome may be used as an expectorant and to treat tonsillitis, sinus congestion, pneumonia, diabetes, high blood pressure or menstrual cramps. Also used as an antibiotic and insecticide (Marles et al. 2000).

Other: Calamus ascribed mystic powers and leaves used to make ceremonial garlands (Kindscher 1987).

Wildlife/Forage Usage

Wildlife: Rhizomes are eaten by muskrats and seeds are eaten by wood ducks. Waterfowl use sweet flag for habitat (Bush 2001).

Livestock: Little or no value for livestock.

Commercial Resources

Availability: Could be developed as an aqua-cultural product by modifying wild rice production methods (Marles et al. 2000).

Cultivars: None are known.

Uses: Essential oil for aromatherapy (Aromatherapies.net 2010).

Plant is an effective insect repellent (Northern Bushcraft n.d.).

Reclamation Potential

Studies are currently being done using *Acorus americanus* in the Athabasca oil sands region in wetlands reclamation. *Acorus americanus* is important in developing ecological diversity in

disturbed wetlands. As well, it is a culturally significant plant for the Aboriginal peoples in Northern Alberta (Smreciu et al. 2012).

Notes

Chromosome studies have shown that *Acorus calamus* plants are tetraploid and fertile in Asia, triploid and sterile in Europe, and mostly diploid and fertile in North America. Some authors believe that the North American diploids should be recognized as a distinct species, *Acorus americanus* (Rafinesque) Rafinesque. As for the eastern North American triploid populations, they are believed to have been introduced by early European settlers (Motley 1994, Packer and Ringius 1984). It is possible that there was intentional propagation of *Acorus* in some locations by Aboriginal people (Marles et al. 2000). *Acorus calamus* can survive long periods of anoxia (oxygen deprivation (Joly and Brandle 1995)).

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