TECHNICAL NOTES

US DEPT. OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE
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PLANT MATERIALS No. 25

PLANT GUIDE for Common Camas:
Ethnobotany, Culture, Management, and Use

Common Name: Common camas
Scientific Name: *Camassia quamash* (Pursh) E. Green ssp. *breviflora* Gould
Synonyms: *Camassia esculenta* Raf.
Symbol: CAQUB2, CAES
Family: Liliaceae
Other Names: small camas, blue camas

Uses: food, trade, medicine, wildlife, conservation plantings, site restoration

Warning!: Death camas (*Zigadenus venenosus*) can be confused with edible camas bulbs and is toxic to humans; be sure of your identification of camas bulbs before digging or eating them!

Description

Common camas (*Camassia quamash* ssp. *breviflora*) is a stout, robust herbaceous plant with a dense inflorescence; 12-28 inches tall (30-70 cm). Camas' are liliaceous, perennial herbs that grow from an edible bulb. The leaves are long and narrow, grass-like, and emerge from the base. Common camas flowers are light to deep blue (rarely white); more than three flowers in an inflorescence may be open at one time. The flowers have six tepals, six stamens, and three stigmas. The inflorescence is a spike-like cluster borne on a leafless stem that is held above the leaves. Common camas blooms from April through June. The fruit is barrel-shaped to three-angled capsule, splitting into three parts to release many black, angled seeds.

Common camas is distinguished from great camas (*Camassia quamash* ssp. *quamash*; synonym *Camassia leichtlinii*) by the following: the flowers are slightly irregular, with the lowest tepal curving outward away from the stem; the anthers are bright yellow; the plant is relatively short and stout, with shorter flowers stalks and smaller bulb; and there is no waxy powder on the leaves. Common camas occurs in wet prairies and meadows across much of western Canada and the Northwestern USA; great camas generally only occurs west of the Cascade Mountains. Other botanical varieties have been described for our area (Hitchcock 1969) as clearly marked geographic races.

Adaptation

Common camas grows in wet meadows, wet prairies, swales, depressions, annual floodplains, moist hillsides, and along streambanks. Camas habitat is often wet ephemeral, usually drying out by late spring. It naturally occurs from southwestern British Columbia to northern California, east to Montana, Wyoming, and Utah. It is found from near sea level to 10,800 feet (3300 meters) in the Rocky Mountains and Sierra Nevada Mountains. Common camas inhabits moist meadows, rocky outcrops, bluffs, and islands in southwestern British Columbia. In eastern Washington and northern Idaho, it occurs in wet prairies and wet meadows, historically very common in the Camas Prairie and the Palouse Prairie.

Cultivars: Cultivars of common camas are available in the flower bulb industry. *Camassia quamash* 'Orion' has deep blue flowers. The flowers of 'San Juan form' are an even deeper, more vibrant blue (Brenzel 1995). Another common camas variety has a white flower.

Ethnobotanic Uses

Historically, camas was an extremely important native plant and continues to be one of the most important "root" foods of western North American indigenous peoples, from southwestern British Columbia to Montana, and south to California (Kuhnlein and Turner 1991). The part of the plant that was relished is actually a bulb. Camas was used by Northwest Coast peoples: the Coast Salish of Vancouver Island, western Washington groups: the Squamish, the Sechelt, the Comox, and the Kwak-waka'wakw of the British Columbia coast, and western Oregon groups: the Grand Ronde and the Kalapuya (or Callapooya). Common camas was a very important food and trading material to the Nez Perce of northeastern Oregon, eastern Washington and northern Idaho. It was also considered to be one of the most important bulbs to northern California native peoples.

Except for choice varieties of dried salmon, no other food item was more widely traded than camas bulbs (Gunther 1973). People traveled great distances to harvest the bulbs and there is some suggestion that plants were dispersed beyond their range by transplanting (Turner and Efrat 1982; Turner et al. 1983). To the Nez Perce people, camas is still the most important root in trade, and trading is traditionally impossible without camas bulbs (Harbinger 1964). Dried camas is the most expensive form of camas, with baked and then raw camas being less expensive. At marriage trades, the girl's family gives roots in corn husk bags. At funeral trades, camas roots are given to friends and relatives by the widow. The Nez Perce traded camas roots with the Warm Springs, the Umatilla, the Cayuse, the Walla Walla, the Nespelem, the Yakama, the Crows, and the Flatheads.

Common camas does not appear to naturally occur in southcentral British Columbia and the Okanogan region of Washington State. But the native people, the Thompsons, used the dried bulbs as food. The dried bulbs were obtained from the Coastal Salish (Turner 1990) or from the Nez Perce.

The bulbs were usually dug after flowering, in summer, although some peoples dug them in spring. Harvesting the bulbs traditionally took weeks or months among the Nez Perce. Each family group "owned" its own camping spot and harvesting spot. These were passed down in families from generation to generation. Turf was lifted out systematically in small sections and then replaced after only larger bulbs had been removed. The bulbs were dug with a pointed digging stick; bulbs were broken up and replanted. Annual controlled burning was used to maintain an open prairie-like habitat for optimum camas production. Areas were only harvested once every few years.

Traditionally, camas bulbs were almost always pit-cooked; within the past 100 years, camas bulbs have also been cooked by stovetop methods (Turner and Kuhnlein 1983). The bulbs are allowed to cook for 24-36 hours when pit-cooked (Turner and Bell 1971). It is probable that lengthy cooking is necessary for maximum conversion of the inulin in *Camassia* to fructose. The sweetness of cooked camas gave it utility as a sweetener and enhancer of other foods. Before sugar, molasses, and honey were introduced by European traders, sweetening agents were in short supply among native peoples, and camas was highly valued in this capacity. Sometimes other foods, such as the rhizomes of springbank clover (*Trifolium wormskioldii*) and the roots of Pacific silverweed (*Potentilla anserina* ssp. *pacifica*) were cooked with the camas bulbs. The Kalapuya of the Willamette Valley in Oregon used to flavor camas with tarweed (*Madia sp.*). Bulbs don't keep well fresh. They were cooked or sun-dried and stored for later use. Sometimes camas bulbs were pressed flat and made into camas cakes the size of biscuits before being dried (Turner et al. 1983). Dried bulbs were re-constituted by soaking in water, usually overnight.

Many of the traditional camas gathering sites, such as wet prairies of the Palouse Prairie In eastern Washington, Weippe Prairie and Camas Prairie in Idaho and the Willamette Valley in Oregon, have been converted to agriculture. The average size of a camas patch needed to feed a five person family was 2.7 ha (Thoms 1989). Areas producing camas roots are hard to find now. Restoration of camas prairies and access to camas bulbs are priorities of many Indian people. Once, dense stands dominated many sites in the region. According the Journal of Meriwether Lewis on June 12, 1806, "…the quawmash in now in blume and from the colour of its bloom at a short distance it resembles lakes of fine clear water, so complete is this deseption than on first sight I could have swarn it was water. " (original spellings; "quawmash" is the Chopunnish name for root plant). (See also Murphey 1959 for a similar description).

Camas stalks and leaves were used for making mattresses. It was sometimes used in place of grass when baking camas in pits. Camas is used by the Nez Perce as a cough medicine. It is boiled, and the juice is strained and mixed with honey. Horticulturally, this plant is used for cut flowers, beds, borders, ground cover, rock gardens, and prairie restoration.

Wildlife Uses Elk, deer, and moose reportedly graze camas early in the spring (Craighead, Craighead, and Davis 1963). Gophers eat camas and move the bulbs to another area where they sprout and grow the next year (Watson 1988). Indian women in Oregon's Umpqua Valley robbed camas bulbs from gopher caches (Piper 1916). Herbivorous insects also eat camas leaves.

Commercial Sources of Common Camas (incomplete list)

- Balance Restoration Nursery, 27995 Chambers Hill Road, Lorane, Oregon 97431. (541) 942-5530
- Sevenoaks Native Nursery, 29730 Harvest Drive, Albany, Oregon 97321. (541)757-6520
- Las Pilitas Nursery, Las Pilitas Rd., Santa Margarita, California 93453. (805) 438-5992
- Northplan/Mountain Seed, P.O. Box 9107, Moscow, Idaho 83843-1607. (208) 882-8040.
- San Lorenzo Garden Center, 235 River St., Santa Cruz, California 95060. (408) 462-1020.
- Daffodil Mart, Route 3, Box 794, Gloucester, Virginia 23061. (804) 693-3966
- Southwestern Native Seeds, P.O. Box 50503, Tucson, Arizona 85703
- Hudson, J.L., Seedsman, P.O. Box 1058, Redwood City, California 94064
- McClure & Zimmerman, 108 W. Winnebago, P.O. Box 368, Friesland, Wisconsin 53935. (414) 326-4220
- Forestfarm, 990 Tetherow Rd., Williams, Oregon 97544. (503) 846-6963
- High Altitude Gardens, P.O. Box 4238, Ketchum, Idaho 83340. (208) 726-3221
- We-Du Nurseries, Route 5, Box 724, Marion, North Carolina 28752. (704) 738-8300
- Bundles of Bulbs, 112 Greenspring Valley Rd., Owings Mills, Maryland 21117. (410) 363-1371
- Van Engelen Inc., 313 Maple Street, Litchfield, Connecticut 06759. (203) 567-8734
- Reid, Collins Nurseries, 2396 272nd Street, P.O. Box 430, Aldergrove, B.C., VOX 1AO, Canada. (604) 533-2212
- International Bulb Company, Inc., P.O. Box 545, 5 Worlendyke Ave., Montvale, New Jersey 07645. (201) 573-0306

Plant Establishment

Common camas can be propagated from seeds or bulbs. Common camas generally prefers full sun to partial shade, with bulb depth ranging from 2-8 inches (most commonly 4-6 inches deep). The bulbs of common camas can be substantially smaller in size and occur at shallower soil depths than great camas. Bulb depth appears limited by high water tables, anoxic conditions, or restrictive layers. The occasional occurrence of a large, thick root beneath a bulb may aid in re-locating or re-establishing it at a greater depth. Plants require moist soil conditions or irrigation to become established.

Live Plant (Bulb) Collections: Common camas is readily established by transplanting wild or commercially grown bulbs. Wild harvests should be restricted to salvage sites with appropriate approvals or permits. Due to loss of wetland habitat throughout the United States, harvesting plants from the wild is rarely appropriate or legal except under salvage situations. Use of bulbs or seeds from local nurseries or greenhouses is strongly recommended.

The best time to excavate bulbs is from early summer through mid-fall. This is the "quiescent" period that follows seed maturation, foliar senescence, and development of the daughter bulb. However, commercial bulb harvest takes place when the leaves are still green and must be done carefully to avoid damage. The bulb tunic or covering is very thin (De Hertogh and Le Nard 1993). Given that camas commonly occupies sites high in silt and clay that dry out in summer, windows for digging are often narrow. There is a brief period when soils are moist after flowering in the spring; the next time to harvest is in the fall after the rains begin. Store the bulbs in a dry, dark, cool, well ventilated place in a potting medium such as dry peat moss, similar to recommendations for fall planted/spring flowering bulbs (such as daffodils and tulips). Keep the bulbs from completely drying out and transport or store at 63-68° F (De Hertogh, Noone and Lutman 1990). Common camas reproduces vegetatively by offset bulblets (De Hertogh et. al. 1993). However, much less than one percent of a wild population may produce offsets and bulbs may be stimulated to do so only as the result of a wound (Thoms 1989).

Plant camas outdoors in the fall or early winter when soils are moist enough to dig and prevailing soil temperatures are cool; this is generally below 60°F. Fall planting allows for better root development and fulfillment of any chilling requirement for flowering (De Hertogh et. al. 1993). Bulbs, bulblets, and offsets can be utilized. However, if flowering is desired the following spring, bulbs must be of sufficient age (3-5 years old with 3-4 bulb leaves or scales) and size (Thoms 1989). Bulb leaves are laminate concentric layers that comprise much of the bulb, reminiscent of an onion. Bulbs with just two bulb leaves never flower, those with three routinely flower, and those with four almost always flower. Older bulbs will be found deeper in the ground, and bulbs which flower will probably be at least 0.6-0.8 inch (1.5-2.0 cm) wide (Thoms 1989). In the commercial bulb trade the minimum size for export and thus flowering is a circumference of 2.4 inches (6 cm) (De Hertogh and Le Nard 1993). This is roughly equivalent to a diameter of 0.75 inch and about one-half the diameter and circumference of great camas.

The larger the bulb the greater the planting depth. Planting depth ranges from 0.5-1 inches for 1-2 year old bulblets up to 4-6 inches for mature bulbs (as measured to their base). Larger bulbs (1.5 inches in diameter or greater) can be planted deeper (8-10 inches) if drainage is appropriate.

Commercial production involves transplanting immature bulbs from October to November in well-drained soil, pH 6-7, with at least 2% organic matter. Seed is not commonly used. Bulbs are covered with at least 3 inches of soil above the bulb "nose", followed by 2 inches of straw mulch. Four weeks after planting a 7-14-28 fertilizer is applied (presumably topdressed). The camas bed is kept damp in the spring. Once the plants senesce after flowering, watering is discontinued. By this time the seeds have formed and the bulbs are curing. Camas bulbs are harvested in late July (De Hertogh, Noone and Lutman 1990, Langaslag 1989). No serious insect pests are reported but diseases include *Rhizoctonia tuliparum*, *Ditylenchus destructor* and *Ditylenchus dipasci* (De Hertogh, Noone and Lutman 1990). Control is by hot water treatment for 4 hours at 43.5-45 degrees C. Other pests include nematodes and mosaic virus (De Hertogh and Le Nard 1993).

Suggested spacing for flower beds and naturalized landscapes vary from 3-4 inches apart (8-10 per sq. ft.) to 6-8 inches apart. Other publications recommend 6-8 bulbs every 12 inches for outdoor gardens. A dense "natural" stand may have nine plants/sq. ft. (100/sq. meter) or more (Thoms 1989). It may be necessary to bury bulbs with a protective wire mesh to prevent herbivore damage; the mesh needs to be coarse enough to allow shoots to grow through (De Hertogh et. al. 1993).

Seed Collections: Common camas propagates easily from seed. It can be collected as soon as the pods mature (turn light brown) or split open to reveal the mature black seeds. Pods ripen from late May-July depending on latitude, longitude, moisture conditions, or elevation. Dry seeds can be stored frozen or in a cool, dry place prior to planting.

Camas seed requires 42-100 days of cold temperatures (34-40°F) under moist stratification for maximum germination (90-100%) (Emery 1988, Guerrant and Raven 1995, Deno 1993, Northway pers. comm. 1998, Thoms 1989). "Moist stratification" means placement of dry seeds in layers of a moist medium at cool temperatures to allow for moisture uptake (imbibing) and after-ripening. Germination itself also requires cool conditions and can occur in the dark (Northway pers. comm. 1998). An alternative is to plant seed outdoors in the fall (Sept-Oct). One-leafed, grass-like seedlings will emerge in February or March under suitable conditions where winters are comparatively mild. Germination occurs in early May in Montana or at 40°F (Wick et. al. 1998). Seedlings require moisture through the spring growing period to survive. Warm temperatures during seedling development can be lethal.

Suggested site preparation methods and seeding rates for wetland revegetation are not well known, but in at least one study, a broadcast rate of 20 live seeds/sq. ft. for both *Camassia* sub-species resulted in poor to good seedling counts the following spring (0-10 or more seedlings/sq. ft.) (Darris, pers. comm., 1999). Seedling success was dependent on weed competition, hydrology, type of disturbance, mulch, erosion, or other factors. Camas seedling establishment appeared inhibited by dense stands of perennial ryegrass (*Lolium multiflorum*) but benefited from a thin mulch (straw) of tufted hairgrass (*Deschampsia cespitosa*) and less plant competition, at least on well-drained, stable, slightly higher ground (*Ibid*). In areas with wet, mild winters, soil scarification for shallow seed coverage or just constant moisture from irrigation or winter rains can result in good germination. At least one western Oregon grower sows seed directly on the soil surface in the fall (Robinson pers. comm. 1999). However, growers in Idaho have found that a 1-2 inch covering of organic mulch is required during the first growing season to protect the tiny bulblet from exposure to dry soil, surface cracking, and extreme temperatures. Sawdust or a chemically killed dense stand of grass works well (Watson pers. comm. 1999). Seeds buried deeper than 0.4-0.8 inch (1-2 cm) will not germinate successfully (Watson 1988).

Seeds per pound: *Camassia quamash* ssp. *breviflora* – 130,000 (+/- 30,000)

Management

Camas is favored as forage by deer and other wildlife species, so fencing or repellents may be a useful tool, especially important during the first growing season. Consistent soil moisture is required every spring, but the soil can be allowed to dry out soon after the pods mature or the leaves senesce (dry up and turn brown) in early summer. Moderate soil nutrient levels are beneficial. In natural settings, minor soil disturbance (loosening, surface scarification) adjacent to existing specimens may enhance natural regeneration by seed. Late summer field burning (where and when permitted) may improve stand vigor, reduce competition from brush and certain weeds, and aid in regeneration. For optimal bulb development, avoid mowing or grazing more than lightly, if at all, even during foliar senescence. Individual plants may live 15-20 years.

Traditional Resource Management (TRM) of common camas was often intensive, to the point of being considered "semi-agricultural" by some authors. According to Dr. Nancy Turner, TRM included the following:

- ownership, demarcation, and inheritance of beds or patches,
- clearing of rock, brush, and weedy vegetation,
- harvesting bulbs after seeds were produced, during specific times of the year,
- periodic field burning in summer after digging,
- in some cases sod removal then bulb removal followed by sod replacement,
- digging or "cultivation" to keep the soil loose,
- "selective breeding" by transplanting "better" bulbs to the beds,
- sustainable harvest techniques, including partial, selective harvesting and incidental or planned promotion of camas colonization and reproduction,
- removing death camas bulbs (*Zigadenus venenosus*) so they wouldn't accidentally be mistaken for the edible camas bulbs.

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