United States Department of Agriculture
NRCS Natural Resources Conservation Service
Plant Guide

COMMON CAMAS
Camassia quamash (Pursh) Greene ssp. *breviflora* Gould

plant symbol = CAQUB2

Contributed By: USDA, NRCS, National Plant Data

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Center & Corvallis (OR) Plant Materials Center

Alternative Names
small camas, blue camas; *Camassia esculenta*.

Warning: Death camas (*Zigadenus venenosus*) can be confused with edible camas bulbs and is toxic. Be sure of your identification of camas bulbs before eating them!

Uses
Ethnobotanic: Camas was 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, Squamish, Sechelt, Comox, and Kwak-waka'wakw of the British Columbia coast. Camas was considered to be one of the most important bulbs to local California natives. The Maidu particularly valued great camas.

Except for choice varieties of dried salmon, no other food item was more widely traded (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, the widow gives camas roots to friends and relatives. The Nez Perce traded camas roots with the Warm Springs, Umatilla, Cayuse, Walla Walla, Nespelem, Yakama, Crows, and Flatheads.

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 harvested only 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, European traders introduced molasses, and honey. 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 Kalapuyan of the Willamette Valley in Oregon used to flavor camas with tarweed (*Madia elegans*). 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 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). Camas roots are hard to find now. Restoration of camas prairies and access to camas bulbs are priorities of many Indian people. At one time, "When camas was in bloom in wet meadows, the flowers grow so thickly that they look like a blue lake" (Murphey 1959).

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.

Ornamental: Horticulturally, this plant is used for cut flowers, beds, borders, ground cover, rock gardens, and prairie restoration.

Wildlife: 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.

Status

Please consult the PLANTS Web site and your State Department of Natural Resources for this plant's current status, such as, state noxious status, and wetland indicator values.

Description

General: Lily Family (Liliaceae). Common camas (*Camassia quamash* ssp. *breviflora*) is a stout, robust, 12-28 inches (30-70 cm) tall plant with a dense inflorescence. Camases 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; more than 3 flowers in an inflorescence may be open at one time. Camas flowers have 6 tepals, 6 stamens, and 3 stigmas. The inflorescence is a spike-like cluster borne on a leafless stem that is held above the leaves. Common camas is distinguished from great camas (*Camassia quamash* ssp.*quamash*) 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 flower stalks and smaller bulbs; and there is no waxy powder on the leaves. Common camas blooms from April through June. The fruits are barrel-shaped to three-angled capsules, splitting into three parts to release many black, angled seeds.

Distribution

Common camas grows in wet meadows, wet prairies, swales, depressions, annual floodplains, moist hillsides, and streamside areas. Camas habitat is often ephemeral, drying out by late spring. Common camas grows throughout the American West to southwest Alberta, Montana, Wyoming, and Utah at elevations below 3300 meters. The southern limit of its range in California is the high Sierra Nevada Mountains and Modoc Plateau. In British Columbia, common camas is found in moist meadows, rocky outcrops, bluffs, and islands in southwestern British Columbia, mainly on southwestern Vancouver Island and the Gulf Islands. For current distribution, please consult the Plant Profile page for this species on the PLANTS Web site.

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 more shallow soil depths than great camas. Bulb depth appears limited by shallow 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 irrigation or moist soil conditions to become established, and camas can be difficult to establish in California.

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 can be. 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 planting from October to November in well drained soil of pH 6-7 with at least 2% organic matter, covering with at least 3 inches of soil above the bulb "nose", applying 2 inches of straw mulch, fertilizing with 7-14-28 fertilizer four weeks after planting, and harvesting in July (De Hertogh, Noone and Lutman 1990). Keep the camas bed damp until it gets warm. Once plants senesce after flowering, stop watering so seeds form and bulbs cure. 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 9 plants/sq. ft. (100/sq. meter) or more (Thoms 1989). It may be necessary to bury bulbs with a protective wire mesh to prevent herbivory. 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 seeds which are "imbibed", or have soaked up water, in layers of a moist medium at cool temperatures to allow for after-ripening. Germination also requires cool conditions and can occur in the dark (Northway pers. comm. 1998). The 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. 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 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 seedlings were inhibited by dense stands of live grass such as *Lolium multiflorum*. However, seedlings appeared to benefit when grown in the mulch of native grass (*Deschampsia cespitosa*), 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 grower sows seed directly on the soil surface in the fall (Robinson pers. comm. 1999). However, other growers 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 deeper than 0.4-0.8 inch (1-2 cm) will not germinate successfully (Watson 1988).

Seeds per pound: *Camassia quamash* ssp. *breviflora* – 131,000 (+/- 20,000)

Management

Camas is favored as forage by deer so fencing or repellents may be useful, particularly 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). 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) was often intensive, to the point of being considered "semi-agricultural" by some. 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 harvests and incidental or planned promotion of camas colonization and reproduction, and
- Death camas bulbs (*Zigadenus venenosus*) were removed, so they wouldn't accidentally be mistaken for the edible camas bulbs.

Cultivars, Improved and Selected Materials (and area of origin)

CAQUB2 is readily available through native plant nurseries within its range. Please check the Vendor Database, expected to be on-line through the PLANTS Web site in 2001 by clicking on Plant Materials. Cultivars of common camas are available from the flower bulb industry. *Camassia quamash* 'Orion' is deep blue, while those of 'San Juan Form' are an even deeper, more vibrant blue. There is also a white form (Benzel 1995).

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