RODALE INSTITUTE™

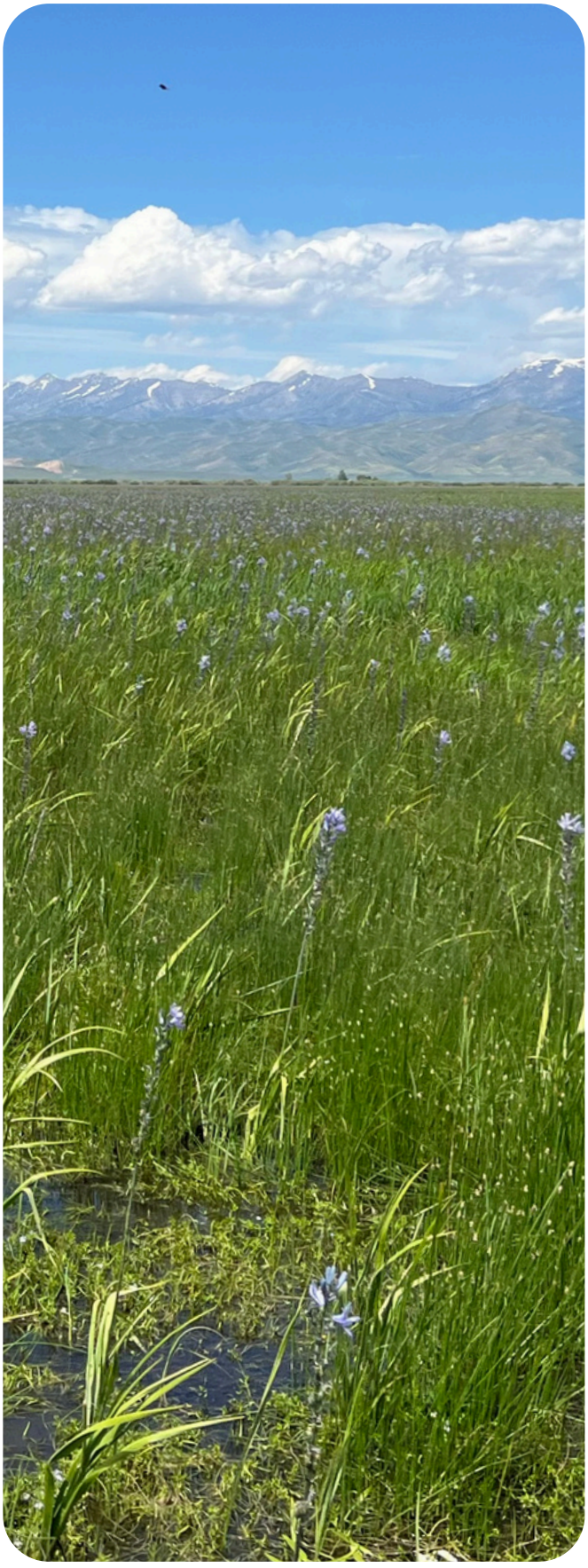
ORGANIC CONSULTING

AGRONOMIC GUIDE

CAMAS
SEED PROPAGATION

Introduction

This Camas Seed Propagation Guide is designed to assist new and beginning growers, land stewards, and others interested in developing and supporting their relationship with this plant and the lands on which we all grow. As native plant habitats continue to be harmed by extractive and pollutive practices, the decline in their healthy populations calls for propagation methods that support the continuation of and access to these plants. In our changing environment, this guide is a “living” document meant to be enhanced and adapted over time.



This guide is specific to the Lemhi/Salmon River region, Fort Hall Indian Reservation, and greater central Idaho bioregion. To increase accessibility to people from different backgrounds, the propagation methods described are rooted in many ways of knowing, including organic methods and Indigenous knowledge such as the “4 Rs”.

For this guide, the 4 Rs refer to Respect, Responsibility, Reciprocity, and Relationality. These methods provide a standard for humans when working with the land, including camas. The 4 Rs are articulated by and foundational to Indigenous lifeways around the world, including the Shoshone-Bannock Peoples of what is now called southeast Idaho. When these values inspire our interactions with plants, we are better able to nourish ourselves and the land. They are therefore integrated throughout this guide.

Camas (*Camassia quamash*)

Characteristics:

The camas plant is a perennial herb with a white bulb contained within a brown, papery outer layer. Reproduction happens primarily through seeds, although bulbs can also reproduce through offsets. It can take 3-5 years for a camas plant to begin sexually reproducing, meaning it takes this long for a newly planted seed to become mature and begin producing seeds annually. The bulb varies in size depending on the species and environment. The bulb is composed of scales that appear layered like an onion when halved. A new stem, long leaves, and six-petaled flowers grow from the bulb in the spring to early summer. The flower color ranges from pale blue to light purple to white. Black tear-shaped seeds form in mid to late summer. Following seed development when the aboveground growth is completed, camas enters a seasonal dormancy until the following spring. Sometimes, due to disturbance or other unknown reasons, the plant can enter prolonged dormancy where it skips one or more years of aboveground growth.

Figure 1. Mature camas plant with cleaned bulb.

Habitat & Ecology:

Camas is found from British Colombia to northwest California and eastward to Montana and Nevada. It grows in seasonally wet areas such as wet meadows or floodplains. Moist or wet conditions occur during the winter into the spring, and a dry period occurs during the summer into the fall. These hydrologic conditions are demonstrated by soft, wet soils in the spring and hard, dry soils in the summer and fall. Soils that retain water at or near the surface during the spring, such as loam & silty clay loam or silt loam, and low-laying areas in landscapes are characteristic of camas habitats in the northwest. If the soil remains saturated into the later part of the growing season (summer-fall), bulbs can rot and flowering and seed dispersal can be negatively impacted.

The flowers are an important food source for pollinators whereas water birds consume the seeds, and other birds may build their nests among the plant leaves. The bulbs and leaves are consumed by big game and small mammals. The wet meadows, wet prairies, or similar ecosystems where camas grow are a type of wetland ecosystem. **Wetlands** are thought of as “biological supermarkets” that perform crucial ecological functions, while providing diverse food sources and habitat for specialized plants and animals. Early settlers and botanists of the Pacific Northwest (PNW) region documented the thriving and plentiful camas prairies. **Camas prairies** refer to the wet meadows or prairies where camas species and associated vegetation are the majority.

An Ancestral Food

For thousands of years, various tribes across the northwest relied on different species of camas as a staple food. Other species of camas are found in territories of eastern tribes who presumably integrated camas into their diets similarly. Today, this ancestral food is still harvested and tended to by numerous tribes. **Ancestral food(s)** is a term that describes this time-honored relationship between humans and diverse foods. Stories, language, plant harvests, and preparation protocols demonstrate how this plant is interwoven into various tribal cultures. Because of this plant's role in culture, stewarding camas from a tribal perspective often prioritizes strengthening cultural practices associated with camas in addition to increasing populations and access to the bulb for food. Cultural connectiveness is protective of health and wellness, therefore camas propagation meets opportunities for the healing of land through actions like restoration, in addition to the healing of diverse Peoples impacted by colonization.

Stewarding Camas

To sustain camas populations for annual harvest, this historic staple food has been stewarded for thousands of years in the PNW. **Stewardship** is defined here as the intentional actions or engagement with organisms and their environments to achieve specific, long-term goals. This includes the cumulative knowledge gained from those interactions over many centuries and passed down through the generations.

Through harvest itself, replanting of small bulbs, weeding of surrounding vegetation, applying natural fertilizers, and burning, camas prairies were made abundant for annual, sustainable harvests. Operating on a community-level, learned cooperative protocols and cultural rules ensured the continuation of the plant's populations over millennia. The 4 Rs describe values that helped shape these sustainable practices while honoring the gifts of the plant in the form of food, beauty, and other ecosystem services. Today, tribal communities still apply these protocols and rules. They do so, however, in camas prairies that are heavily impacted by western agriculture, land privatization, and the removal of the Peoples whose cultivation practices facilitated abundant camas populations. The decline in camas prairies and wetlands at large present an opportunity for Restoration through propagation.

Figure 2. Camas in bloom in late spring during a wet period. Located in a central Idaho wetland.

Propagation

Seed propagation is a great way to tend to our Relationship with this native plant and its connected environment. Seed propagation honors diversity and regional plant traits that are necessary for healthy populations. As native plant habitat continues to be harmed and depleted under extractive and pollutive land practices, propagation techniques that are accessible, place-based, and Reciprocal support the continuation of these plants and our Relationship to them.

Figure 3. Camas seed.

1. SEED COLLECTION

The drastic decline in camas prairies calls for sourcing seeds responsibly. Source your camas seed from your bioregional native plant nursery, local seed cooperative, or similar sources that value social equity and open access seeds. This allows you to attain seeds while ensuring that camas seeds are not at risk for being over-harvested.

2. STRATIFICATION

Stratification is the process of breaking seed dormancy. **Dormancy** is an adaptation to protect seeds from germinating in unsuitable conditions. Stratification aims to mimic the natural conditions of the seed's environment in order to break dormancy for seed germination. For camas seed stratification, adequately cold and moist conditions are needed. This cold, moist environment can be achieved naturally outdoors during the winter months, or it can be mimicked in a refrigerator. *Camassia quamash* typically requires 42-100 days of cold-moist stratification. **Plan** your sowing date depending on stratification methods.

How To Stratify Your Seed: Refrigerator or Outdoors

Refrigerator:

1. W**inter:** Plan to sow seeds around late February to ensure the seeds germinate by the spring. Select a small plastic sandwich-sized bag with a zipper closure. Fill the bag with 2-3 handfuls of potting soil, sand, or local soil (See Soil Options).
2. Use water to completely moisten the medium and drain any excess water. Add two tablespoons of seed to the medium, close the bag, and shake contents together. Place into the refrigerator.
3. Keep the growing medium and seeds moist during the months leading up to germination. Check the medium's moisture every few days and add water if needed. Continue monitoring until you see germination. **Germination** is when the seed begins to sprout and the radicle, or the first root, emerges.

Propagation Continued

Figure 4. Germinated camas seeds in a soil mixture that was cold stratified in a small plastic bag.

Outdoors:

1. **Fall- Early Winter:** Plan to sow seeds in the fall to early winter to ensure the seeds germinate by the spring. Fill a propagation tray (approximately 21” x 11” x 2.5” deep) with a growing medium like potting soil. Add water to the soil until is completely moist and drain any excess water.

Soil Options: If you’re interested in using soil local to your central-southeast Idaho bioregion, try soils described as loam, silty clay loam, or silt loam. These may be best suited for germination. You can identify these sorts of soils in your area using NRCS’s Web Soil Survey. Otherwise, experiment with soil from your backyard.

2. Sprinkle camas seeds across the soil surface. Avoid packing the seeds immediately next to each other.
3. Add approximately 1/8” – 1/4” of soil on top of the sown seed. Gently water the soil surface until it is completely moist.
4. Place your tray outdoors in a sunny area where the soil is susceptible to drying out completely. Place the tray under a protective barrier, such as chicken wire, to prevent wildlife from eating the seeds/plants.
5. **Winter & Early Spring:** Keep the growing medium and seeds moist during the months leading up to germination. If the winter and early spring are consistently providing moisture (in contrast to a dry period that could dry out the growing medium and seeds) then no supplemental watering is needed. If the winter and early spring provide dry periods (i.e., no snow or rain) consistently enough to dry out the growing medium and seeds, water the trays to ensure that the growing medium and seeds do not get dry. Continue monitoring the tray’s moisture until you see germination.

Propagation Continued

3. GERMINATION: "YEAR ONE" OF GROWTH

For Seeds Germinated in Refrigerator:

1. Sow germinated seeds when at least 50% of the seeds have signs of germination indicated by visible cracking of the seed coat. Fill a propagation tray (approximately 21" x 11" x 2.5" deep) with a growing medium like potting soil. See Soil Options.
2. Empty the germinated seeds and medium onto the soil surface and gently spread the seed evenly. Avoid packing the seeds immediately next to each other.
3. Add approximately 1/8" – 1/4" of soil on top of the sown seed. Gently water the soil surface until it is completely moist.
4. Place tray into an unheated hoop house or greenhouse. This allows you to better regulate the growing mediums moisture. Alternatively, an indoor south-facing window seal may work. As the spring months go by, the germinated seeds will grow into grass-like seedlings at around 1"-3" in height (Figure 4).

Figure 5. Camas seedlings growing in a hoop house during the late spring. Each seedling has a single leaf with white roots.

Transplanting Options: Once seedlings have their leaf, they can be carefully transplanted into either a larger container or the ground. See Ground Requirements: Outdoor Transplanting. First year seedlings can also either be transplanted in 1) the fall when they are dormant or 2) the following year upon new plant growth in the spring.

5. **Late Spring- Summer:** Water plants in the trays frequently enough to avoid drying out the soil completely. Sometime in the summer, after their annual growth is complete, the seedling leaf will begin to naturally brown and dry as the plant goes into dormancy.
6. **Summer:** When the plant begins to go dormant, move your tray to the outdoors in a sunny area where the soil is susceptible to drying out completely. Place the tray under a protective barrier, such as chicken wire, to prevent wildlife from eating the young plants/bulbs. At this point, the "dry season", water the tray once a week and throughout the winter if needed (Refer to directions on pg. 5). This likely helps them stay alive while not over-watering them which would cause rot.

For Seeds Germinated Outdoors in Trays:

1. Place trays in an unheated greenhouse or hoop house. This allows you to better regulate the growing mediums moisture. Alternatively, an indoor south-facing window seal may work. As the spring months go by, the germinated seeds will grow into grass-like seedlings at around 1"-3" in height. Refer to Transplanting Options.
2. **Late Spring- Summer:** Water plant trays frequently enough to avoid drying out the soil completely. In the summer, after their annual growth is complete, the seedling leaf will begin to naturally brown and dry as the plant goes into dormancy.
3. **Summer:** When the plant begins to go dormant, move your tray to the outdoors in a sunny area where the soil is susceptible to drying out completely. Place the tray under a protective barrier, such as chicken wire, to prevent wildlife from eating the young plants/bulbs. At this point, the "dry season", water the tray once a week and throughout the winter if needed (Refer to directions on pg. 5). This likely helps them stay alive while not over-watering them which would cause rot.

Propagation Continued

4. CARING FOR YOUNG CAMAS PLANTS IN TRAYS: "YEAR TWO" AND AFTER

Continue the following:

- Maintain a moist growing medium/plant(s) throughout the year(s) of the plants remaining in the trays, while adequately reducing your watering when they enter dormancy.
- Move the trays into an unheated greenhouse or hoop house once spring growth begins; move them outside into a protected, full-sun area once dormant.
- Size up containers until the plants are ready to be planted into the ground.

5. GROUND REQUIREMENTS: OUTDOOR TRANSPLANTING

1. Camas requires adequate moisture, dry periods, and hot and cold temperatures throughout the year as described above. Soils that retain water at or near the surface during the spring, such as loam & silty clay loam or silt loam are preferred. Try to select a low-laying area. Keeping these land characteristics in mind, select an area that is either of the following:
    a. A wetland environment with seasonal wet and dry periods with full sunlight.
    b. An area with access to supplemental watering with full sunlight.
2. Pull out any plants in the area to reduce competition. Rake or remove any thatch or dead plants that layer the ground. Continue to weed out other plants that may outcompete the camas plants.
3. Following the watering protocol above, if the ground is not naturally wet during the winter-early summer, water the plants thoroughly when the soil begins to dry after winter moisture. Refer to the watering notes above for winter, spring, and summer.

Conclusion

Camas propagation to transplanting is a responsibility that requires years of care. The plant's close relationship to humans and its significant role across the diverse wetlands of the PNW give reason to invest that care. The need for camas prairie restoration provides an opportunity for growers to develop and support a Relationship to this plant through planting seeds.

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