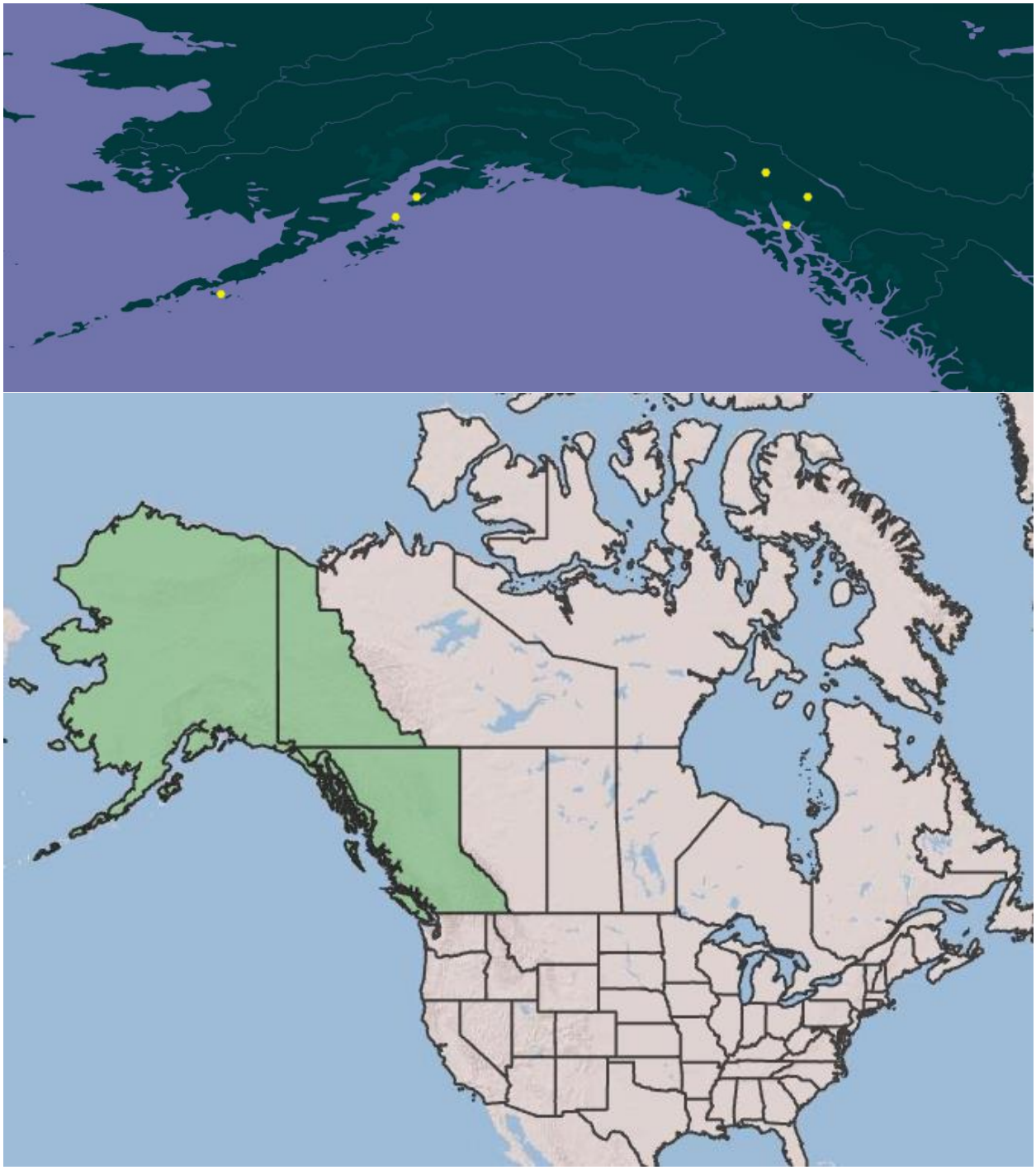
Plant Propagation Protocol for *Atriplex alaskensis*
ESRM 412 – Native Plant Production
URL: https://courses.washington.edu/esrm412/protocols/*2024/ATAL.pdf*



Top image: georeferenced observations of Atriplex alaskensis along coastal western Alaska, US. Image courtesy of the Global Biodiversity Information Facility
Bottom image: North American range of Atriplex alaskensis courtesy of USDA PLANTS database.

TAXONOMY	
Plant Family	*Amaranthaceae (Subfamily Chenopodioideae)*
Scientific Name	
Common Name	Goosefoot family
Species Scientific Name	
Scientific Name	*Atriplex alaskensis* S. Watson [1]
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	*Atriplex gmelinii* var. *alaskensis* C.A. Mey. Var. *alaskensis* (S. Watson) S.L. Welsh (ATGMA) *Atriplex patula* L. var. *alaskensis* (S. Watson) S.L. Welsh (ATPAA)
Common Name(s)	Alaska orache, garden orache, red orache, mountain spinach, French spinach, orache, arrach, Alaska saltbush, Arroche d'Alaska [2]
Species Code (as per USDA Plants database)	ATAL [1]
GENERAL INFORMATION	
Geographical range	Western coastal Alaska and Canada in the provinces British Columbia and Yukon. Not observed farther inland than approximately 5 miles. See attached maps for additional specificity for coastal range inland. [1] [3]
Ecological distribution	Found along coastal western North America primarily in moist soils in line with saline marshes as well as loamy sand beaches and near-coastal mixed forests. Likely preferring high-moisture environments and is not likely drought-tolerant. [4]
Climate and elevation range	Hardy and flexible to varying climates but primarily found in temperate temperature ranges with some extending to subarctic. Almost exclusively found in lowland elevations below 50m above sea level. [5]
Local habitat and abundance	Commonly found with other salt marsh or coastal saline-tolerant plants such as *Zostera* and *Elymus* on strands and beaches. [6] [4]
Plant strategy type / successional stage	Highly tolerant to saline conditions and salt spray due to thick cuticle layer preventing damage to leaves. Not particularly shade-tolerant and slow-growing, indicating a strength in late succession, but overall stress-tolerant and hardy. Tolerates wind and low-nutrient conditions via strong rooting system and compact profile. [7]
Plant characteristics	Medium-sized (approximately 10 m) evergreen herbaceous shrub with sparse and robust branching. Leaves petiolate with alternate attachment and bright, thick leaves typically in oblong-to-lanceolate with denticulate margins to entire margins along proximal lobes. Margins can also be undulate. Plant is erect with branches rising from spreading base, reproduces vegetatively through layering.

	Flowers are terminal and are not showy, 4-parted and dense. Fruits derived from bracts typically wider than length and ranging from 4-14 mm. Long-lived due to tolerance of non-competitive environment and ready access to moisture. Fruits are generally formed from the bracts into achenes. [4] [6] [8]  *Image courtesy of Earthpedia. [9]*
PROPAGATION DETAILS: VEGETATIVE **Adapted from *Atriplex* patula (University of Kentucky, 2002) and Atriplex *canescens* vegetative protocol (Washington State University, 2006)**	
Ecotype	Pacific Northwest of North America – temperate shrubsteppes to coastal beaches and slopes. [10]
Propagation Goal	From the 2006 Washington state protocol for *A. canescens*, the goal of propagating *Atriplex* is whole plants. [10]
Propagation Method	Vegetative, but protocols exist for seed propagation using similar methodology, including plug containers, cold stratification, and a long growth period. [10] [11]
Product Type	Most records for *Atriplex* propagation use plug containers. Given the uniformity of rooting patterns and germination time for species of *Atriplex*, *A. alaskensis* should be no different. [10] In addition, *A. patula* even when grown from seed is preferentially grown using plug containers, reinforcing this. [11]
Stock Type	From the 2006 WA protocol, *A. canescens* was grown in 10 $inch^3$ containers. [10]
Time to Grow	*A. canescens* is advised to grow for 18 weeks. [1] However, given that *A. canescens* is typically found in less challenging conditions (lower exposure to saline conditions, more nutrient-rich soils in grasslands along central North America, *A. alaskensis* should likely be given longer.

Target Specifications	Growth is deemed sufficient for outplanting once rooting system has developed enough to retain soil (potting mix) together within the structure, suggesting it is robust enough to weather coarse and unstable soils such as the sand-dominant soils which *A. alaskensis* occupies. [10]
Propagule Collection Instructions	Propagules are advised to keep leaves largely on the cutting save for lower end of the stem and for the cutting to be kept in standard cool and moist conditions to promote rooting later. Cuttings should be collected later in the season during transition to hardwood to ensure longevity, largely in mid-to-late summer (July, August). [10]
Propagule Processing/Propagule Characteristics	Propagules should be treated with fungicide prior to planting but can occur any time after cutting. [10] In addition, due to the isolated nature of wild-occurring plants, germinants should be given ample space (4-6 inches) for the purpose of establishing the robust root systems. Propagules can be kept in cold storage for a number of weeks [11] which triggers physiological dormancy.
Pre-Planting Propagule Treatments	Cuttings' ends should be treated with low concentration of indole-butyric acid rooting powder to encourage rooting after cold storage induced dormancy. [10] In the case of *A. patula*'s seed propagation, cold stratification is recommended in cyclical 41-77 degree Fahrenheit temperature cycles with light readily available. [11]
Growing Area Preparation / Annual Practices for Perennial Crops	Growing media should be well-drained to reflect sand-dominant soils in native habitats, largely with higher concentrations of aerated growth medium like perlite or vermiculite. [10] Protocols used potting-mix-dominant and additive sand regardless of propagating from seed or vegetative cutting, suggesting an aim to mimic the saline beaches of native habitat.
Establishment Phase Details	No details found in existing protocols. However, due to the preference for cold stratification and overall temperate-to-cool temperatures of the native habitat, it is expected that *A. alaskensis* would do best in hoophouse conditions with very frequent, low-intensity watering.
Length of Establishment Phase	Establishment into transplanted soil is expected to take 3-4 weeks for the majority of cuttings, with some taking longer in accordance with the slow-growth strategy employed by the plant. [10]
Active Growth Phase	No specific details found in existing protocols. Due to the hardiness of *A. alaskensis* and shrub structure it should not require staking or trellising, and can be left to grow with regular waterings (minimum of once daily).
Length of Active Growth Phase	Several months of active growth can occur. As an evergreen, full growth is expected to last approximately one year [8], although under cultivation conditions growth could accelerate beyond wildtype rates.
Hardening Phase	Slowly lengthening time between waterings helps to induce the end of active growth and trigger frost avoidance syndromes. In addition, plants are kept at lower temperatures to mimic coastal temperatures in native habitat, approximately 45 ◦ F. [10]

Length of Hardening Phase	1-2 weeks. [10]
Harvesting, Storage and Shipping	Once plants have hardened, plants can remain in storage in well-drained, moist soils with even low light conditions in accordance with overcast and low photosynthetic activity as an adaptation to Pacific Northwest solar trends. Hardened plants are advised to be stored in cold, moist conditions reflective of their natural habitat, ranging from 33-38 degrees Fahrenheit. [12]
Length of Storage	No details found in existing protocols. In seed protocols it is stated that seed dormancy is equivalent with physiological dormancy for *A. alaskensis*, so it is likely that so long as cold stratification conditions are met, the plants can remain in storage for a matter of months.
Guidelines for Outplanting / Performance on Typical Sites	Plants should be spaced at minimum 1 foot apart to enable spread of rooting system and establishment into sparse soil and given ample water upon establishment as water is expected to be abundant in native habitats.
Other Comments	Based on limitations for the specific species in published cultivation details or previous production protocols on *A. alaskensis* specifically, *A. canescens* was used as a proxy as it most geographically and morphologically aligns with *A. alaskensis*. As such, due to their differing nature as distinct species, some variation is likely to be the case between the proper propagation of the two species, and such is noted throughout the propagation information present in this protocol.
INFORMATION SOURCES	
References	See below
Other Sources Consulted	"Holotype of Atriplex Alaskensis S. Watson [Family CHENOPODIACEAE]." *JSTOR: Global Plants*, 26 Mar. 2009, plants.jstor.org/stable/10.5555/al.ap.specimen.gh00036866?searchUri=genus%3DAtriplex%26species%3Dpatula. "Atriplex Patula - Burke Herbarium Image Collection." *Copyright (C) 2004-2024 WTU Herbarium, Burke Museum, University of Washington*, burkeherbarium.org/imagecollection/taxon.php?Taxon=Atriplex%20patula. "Atriplex Gmelinii - Burke Herbarium Image Collection." *Copyright (C) 2004-2024 WTU Herbarium, Burke Museum, University of Washington*, burkeherbarium.org/imagecollection/taxon.php?Taxon=Atriplex%20gmelinii.
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Date Protocol Created or Updated	05/01/2024

[1] *USDA Plants Database*. plants.sc.egov.usda.gov/home/plantProfile?symbol=ATAL.

[2] *Garden Orache of Alaska - Alaska.Guide*. alaska.guide/plant/atriplex-hortensis/garden-orache.

[3] *Atriplex Alaskensis S.Watson*. www.gbif.org/species/3083774.

[4] *Lady Bird Johnson Wildflower Center - the University of Texas at Austin*. www.wildflower.org/plants/result.php?id_plant=ATAL.

[5] Club, Ottawa Field-Naturalists' *The Canadian Field-naturalist*. 2004, www.biodiversitylibrary.org/page/34449021#page/579/mode/1up.

[6] *Atriplex Gmelinii Var. Alaskensis in Flora of North America @ efloras.org*. www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242415501.

[7] *Atriplex Patula*. ucjeps.berkeley.edu/eflora/eflora_display.php?tid=15252.

[9] "The Phylogenetic Method in Taxonomy." *Google Books*, books.google.com/books?hl=en&lr=&id=XIsoAAAAMAAJ&oi=fnd&pg=PP7&dq=atriplex+alaskensis+outplanting&ots=m2LI0GOSMs&sig=I6qYc5uuAkjLgzfAlg0ejWwlQ7k#v=onepage&q&f=false.

[9] "Atriplex Alaskensis -- Earthpedia Plant." *Earthpedia*, earthpedia.earth.com/plant-encyclopedia/angiosperms/amaranthaceae/atriplex-alaskensis.

[10] Crowder, Wayne. 2006. *Native Plant Network — Reforestation, Nurseries and Genetics Resources*. npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=chenopodiaceae-atriplex-3215.

[11] Baskin, C., Baskin, J. 2002. *Native Plant Network — Reforestation, Nurseries and Genetics Resources*. npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=chenopodiaceae-atriplex-1716.

[12] Barner, J. 2009. *Native Plant Network — Reforestation, Nurseries and Genetics Resources*. npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=chenopodiaceae-atriplex-3768.