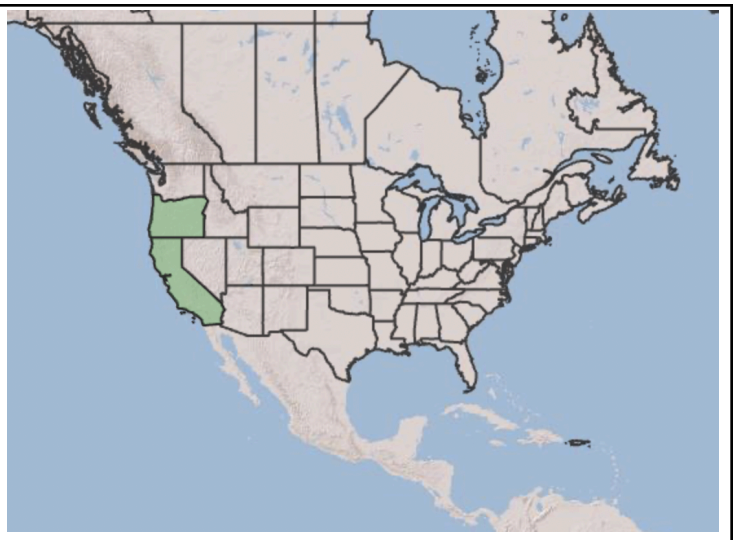
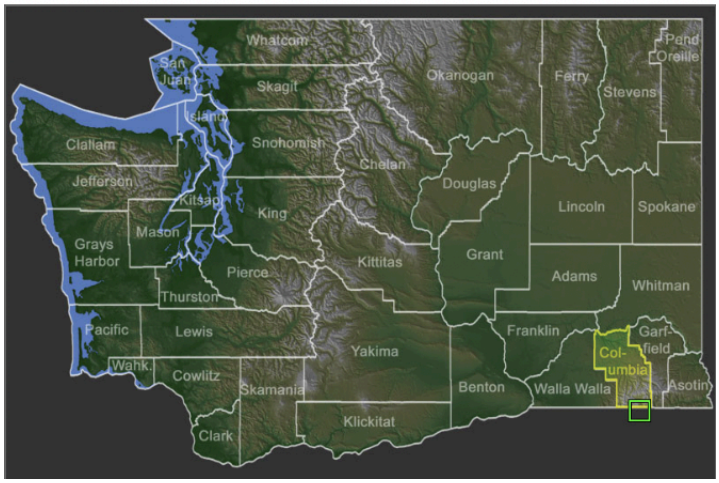
Plant Propagation Protocol for *Allium dictuon*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols//*[2024]//[ALDI3.pdf]*

Credits for image[3]

TAXONOMY	
Plant Family	
Scientific Name	Liliaceae
Common Name	Lily
Species Scientific Name	
Scientific Name	*Allium diction* H. St. John[1]
Varieties	
Sub-species	
Cultivar	
Common Synonym(s)	
Common Name(s)	Blue Mountain Onion[1]
Species Code (as per USDA Plants database)	ALDI3
GENERAL INFORMATION	

Geographical range	 Geographical distribution map[1]  Distribution map by counties[1]  Updated distribution map[3]

	Endemic to Columbia County, but populations occur east of the Cascades crest in Washington[3] Specifically endemic to Weller's Butte, Blue Mountains, WA[9]
Ecological distribution	Occurs in steep, open, rocky slopes, sparsely vegetated grass steppe, lithosols and rock outcrops. Soils are derived from surface basalts and interflow material[2]
Climate and elevation range	Occurs in elevations ranging from 800-1650m (2680-5600ft) on relatively steep slopes (0-55 degrees)[2]
Local habitat and abundance	Surfaces are typically rocky and dominated by loose gravel. Slopes occupied with *allium dictuon* are relatively unstable and vulnerable to erosion with <5% vegetative cover present. Associated species include Douglas-fir (pseudotsuga menziesii), ponderosa pine (Pinus ponderosa), western juniper (Juniperus occidentalis), stiff sagebrush (Artemisia rigida), bluebunch wheatgrass (Pseudoroegneria spicata), Sandberg bluegrass (Poa secunda), wormleaf stonecrop (sedum stenopetalum), Gray's biscuitroot (Lomatium grayi), hotrock penstemon (Penstemon deustus var. deustus) and buckwheat (Eriogonum spp.)[2] Occurs also in grassland/herbaceous, Bare rock/talus/scree[8]
Plant strategy type / successional stage	
Plant characteristics	Bulbs are typically solitary, forming rhizomes[4] Flowering occurs through Jun-Jul[4] Grows from bulbs connected by rhizomes. Produces two or three leaves each up to 28 centimeters in length. The scape ranges from 20 to 40 centimeters tall and bears an umbel of up to 25 bell-shaped pink and purplish flowers[7] It differs from A. acuminatum by its rhizomatous habit, in which it resembles A. bolanderi, and in the cellular pattern on the inner bulb coats[10]
PROPAGATION DETAILS: FROM SEED As explained by Tara Luna, Jeff Evans and Dale Wick (2008)[5]	
Ecotype	Subalpine slopes, adjacent to the stream, Glacier National Park. Similar environments as *Allium dictuon.*

Propagation Goal	Plants
Propagation Method	Seed
Product Type	Container (plug)
Stock Type	160ml conetainer
Time to Grow	10 months
Target Specifications	Stock Type: Container seedlings Height: 6 to 10 true leaves, 8cm Root System: Firm plug with developed bulb in conetainer.
Propagule Collection Instructions	Collect mature capsules as they begin to turn light tan, split and feel papery. Capsules are collected in paper bags and kept in a ventilated drying shed. Seeds are black at maturity.
Propagule Processing/Propagule Characteristics	Seeds are hand cleaned from capsules. Seed longevity is unknown information. Seed dormancy is classified as physiological dormancy. Seeds/Kg: 2,600,000/kg % Purity: 100% % Germination: 50%
Pre-Planting Propagule Treatments	5 month outdoor cold, moist stratification of fresh seeds. Germination characteristics are reported to vary due to dress seeds or seeds dry stored for a six month period. Seeds are reported to germinate well in light or dark at the same rates.
Growing Area Preparation / Annual Practices for Perennial Crops	Outdoor nursery growing facility. Direct seeding sowing method. Growing medium used is 6:1:1 milled spaghnum peat, perlite and vermiculite with Osmocote controlled release fertilizer and Micromax fertilizer at the rate of 1 gram Osmocote and 0.20 gram of Micromax per 172 ml conetainer. Conetainer are filled with medium and sown in late fall and irrigated thoroughly before winter stratification. Seedlings germinate in spring under fluctuating outdoor temperatures and grow under full sun exposure. Seedlings are irrigated with an automatic irrigation system in early morning until containers are thoroughly leached. Average growing time in nursery is from late April after snowmelt until October 15th.
Establishment Phase Details	Medium is kept slightly moist during germination. Germination was uniform and was finished in 7 days. Seedlings developed 1 to 2 true leaves in 1 week.
Length of Establishment Phase	4 weeks

Active Growth Phase	Root and shoot development occur rapidly following germination. Plants were fertilized with 13-13-13 liquid NPK fertilizer at 100 ppm during the growing season. Plants developed 10 to 12 true leaves and were root tight with a developed bulb in 8 weeks.
Length of Active Growth Phase	12 weeks
Hardening Phase	Plants are fertilized with 10-20-20 liquid NPL at 200ppm during August and September. Irrigation slowly tapers off in September and October. Plants are given a final irrigation before winterization.
Length of Hardening Phase	4 weeks
Harvesting, Storage and Shipping	Total Time to Harvest: 10 months Harvest Date: August Storage Conditions: Overwinter in outdoor nursery insulating foam cover and snow.
Length of Storage	5 months
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	
PROPAGATION DETAILS: FROM SEED **As explained by Mark Leigh, Matthew Matthew, James Pushnick, Rachelle Boul, John Hunt and David Koenig (2006)**[6]	
Ecotype	Seed collected from The Nature Conservancy's Dye Creek and Vina Plains Preserves in Tehama County, California
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules)	Bulbs
Propagation Method (Options: Seed or Vegetative)	Seed
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container (plug)
Stock Type	Potted nursery stock
Time to Grow (time from seeding until plants are ready to be outplanted)	
Target Specifications (size or characteristics of target plants to be produced)	First year bulb, typically ranging from 2-5mm in diameter

Propagule Collection Instructions (how, when, etc.)	Seed may be collected from dry flower heads and rubbed free from the bracts
Propagule Processing/Propagule Characteristics (seed density (# per pound), seed longevity, etc)	Seeds can be gathered from May to June, possibly extending into July. They may remain on the heads until later in the summer, with variations depending on factors such as the specific year. The number of seeds per gram typically ranges from 450 to 650, influenced by factors like the characteristics of individual plants, the population, the year, and the purity of the seeds. On average, there are about 580 seeds per gram.
Pre-Planting Propagule Treatments (cleaning, storage, dormancy treatments, etc.)	Clean, dry seed eas placed in dry, cold storage after collection and before sowing
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc.)	Seeds were sown directly into 1.5" deep flats filled with a potting mixture of approximately equal parts sand, pumice, peat moss, and fir bark. These flats were placed in an outdoor cold frame from late fall to spring. Most seedlings were later transplanted into variously sized pots using the same mixture, while some were not. Extending the active growth phase can be achieved by misting plants after the last spring rains, but caution is needed to prevent rot. Dormancy can be induced by allowing pots to dry down and storing them until the following fall rains. Plants should enter dormancy by early summer. Optimal growth in the first year may be achieved by avoiding transplanting and directly seeding into larger containers rather than flats. Field results suggest that planting in native soil, such as loam, rather than potting soil, yields better growth above and below ground due to lower fluctuations in moisture and temperature. Growth from seed to dormant seedling occurs from the first fall rains through the spring-summer dry-down.
Establishment Phase Details	Initial germination occurred within two weeks. However, germination rates were relatively low for both populations: 15% for Dye Creek and 46% for Vina Plains when seeds were cold, moist stratified in vermiculite at approximately 44°F. When seeds were

	sown in outdoor cold frames, germination rates were slightly lower, with 14% for Dye Creek and 37% for Vina Plains observed. Small bulbs measuring 2-6mm in diameter are expected to be produced within 6-8 months.
Length of Establishment Phase	3-4 weeks
Active Growth Phase	Active growth began with the onset of autumn rains, characterized by seed swelling, and continued until drying down, leading to die-back and dormancy in late spring or early summer. The duration of the active growth phase can be influenced to some extent by irrigation, but this species naturally enters summer dormancy.
Length of Active Growth Phase	6-8 months (late fall- early summer)
Hardening Phase	Not necessary since these plants senesce around the end of Spring and beginning of Summer
Length of Hardening Phase	
Harvesting, Storage and Shipping	Individuals go dormant following spring-summer months. Dormant individuals are placed in dry storage at 60-70 degrees fahrenheit.
Length of Storage	3-5 months
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	Total population of this species is estimated to be between 200-500 individuals[7]
INFORMATION SOURCES	
References (full citations)	[1]United States Department of Agriculture. (n.d.).Alliumdictuon. USDA plants database. https://plants.usda.gov/home/plantProfile?symbol=ALDI3 (accessed 2024/05/21). [2] *Allium dictuon - wa - DNR*. Washington State Department of Natural Resources. (n.d.). https://www.dnr.wa.gov/publications/amp_nh_aldi3.pdf [3]WTU Herbarium, B. M. (n.d.). *Allium diction*. Allium dictuon - burke herbarium image collection. https://burkeherbarium.org/imagecollection/taxon.php?Taxon=Allium+dictuon

	[4]Allium dictuon in Flora of North America. (n.d.). http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=242101353 [5] Luna, Tara; Evans, Jeff; Wick, Dale. 2008. Propagation protocol for production of Container (plug) *Allium schoenoprasum* L. plants 160 ml conetainer; USDI NPS - Glacier National Park West Glacier, Montana. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2024/05/21). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. [6] Leigh, Mark; Matthew, Matthew R.; Pushnik, James C.; Boul, Rachelle D.; Hunt, John W.; Koenig, David A.. 2006. Propagation protocol for production of Container (plug) *Allium amplectens* bulbs Potted nursery stock; University of California - Chico Chico, California. In: Native Plant Network. URL: https://NativePlantNetwork.org (accessed 2024/05/21). US Department of Agriculture, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. [7] *Blue Mountain Onion (allium dictuon)*. iNaturalist. (n.d.). https://www.inaturalist.org/taxa/158174-Allium-dictuon [8] *Allium dictuon, Blue Mountain Onion*. NatureServe Explorer 2.0. (n.d.). https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.161019/Allium_dictuon [9] *Flora of North America species comparison*. FNA: Allium+dictuon vs. +allium+anceps. (n.d.). https://nwwildflowers.com/compare/?t=Allium%2Bdictuon%2C%2BAllium%2Banceps [10]SEINet portal network - allium dictuon. (n.d.). https://swbiodiversity.org/seinet/taxa/?tid=71427

Other Sources Consulted	
Protocol Author	Kailyn Azadi
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