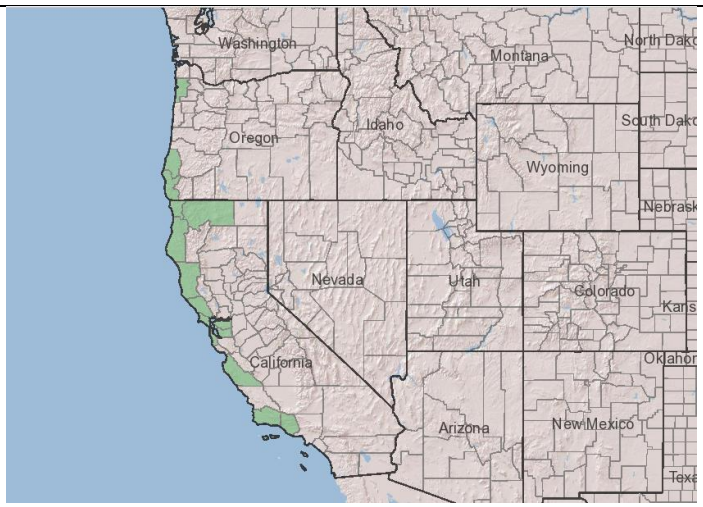
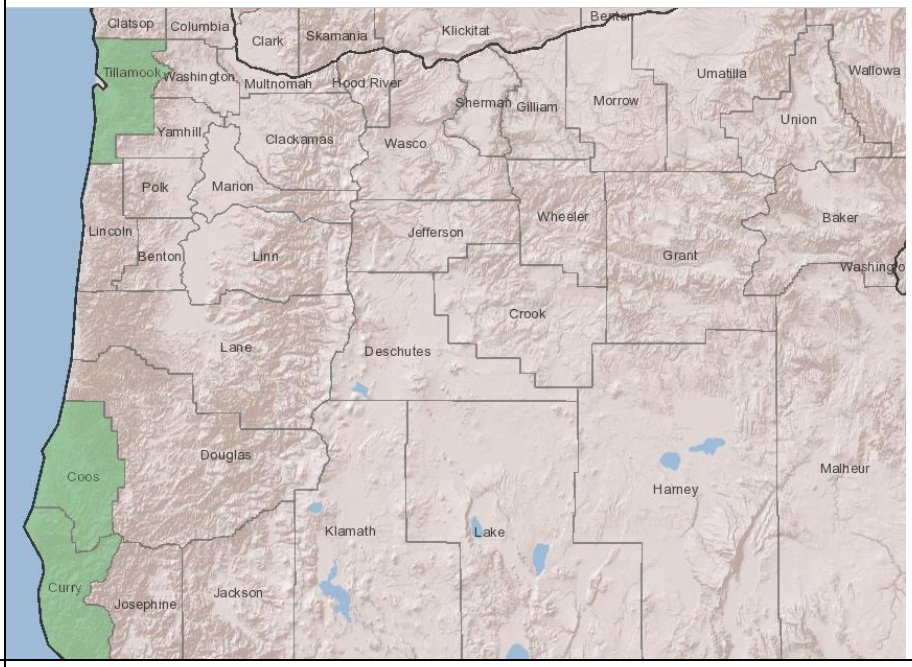
Plant Propagation Protocol for *Dudleya farinosa*

ESRM 412 – Native Plant Production

URL: https://courses.washington.edu/esrm412/protocols/*2021/DUFA. pdf*

Photo credits: Left: Monroe, G.A.[4]; Right: Spade, A.B.[5]

TAXONOMY	
Plant Family	
Scientific Name	Crassulaceae
Common Name	Stonecrop family
Species Scientific Name	
Scientific Name	*Dudleya farinosa* (Lindl.) Britton & Rose
Varieties	Not found
Sub-species	Not found
Cultivar	Not found
Common Synonym(s)	*Dudleya compacta* Rose *Dudleya eastwoodiae* Rose *Dudleya septentrionalis* Rose
Common Name(s)	Powdery Liveforever, Bluff Lettuce, Sea Lettuce, Cliff Lettuce, Powdery Dudleya, Sea-cliff Stone Crop
Species Code (as per USDA Plants database)	DUFA
GENERAL INFORMATION	

Geographical range	 Maps: Distribution of *D. farinosa* in both California and Oregon (above); Distribution by counties in Oregon State. (below).[1] 
Ecological distribution	From the north, *D. farinosa* ranges from the coast of Tillamook, Coos and Curry Counties in Oregon; and to the south in Del Norte, Siskiyou and Ventura Counties in California.[1] Highly sought after by collectors. *D. farinosa* requires careful monitoring. [8] In Oregon, *D. farinosa* was considered rare and threatened. [8] This status was later rejected by the Oregon Natural Heritage Program and classified as common. [9] While not rare in California, distribution has been significantly impacted by poaching. Illegal trade in *D. farinosa* may have damaged distribution ranges, thereby harming gene pool. As a result, efforts to preserve genetic information and disincentivize poaching (through propagation and market saturation) are currently underway. [6, 7,12]

Climate and elevation range	Summer-dry coastal climates; 23-50' elevation.[1]
Local habitat and abundance	*D. farinosa* is found on sea bluffs, coastal sage and scrub communities.[2,11] Seed germination on coastal rocks is aided by moss and lichens, which retain soil and moisture, and coastal fog helps in reducing moisture loss.[10]
Plant strategy type / successional stage	Crassulacean acid metabolism (CAM) metabolism. [7]
Plant characteristics	An evergreen leaf succulent, closely related to the Mexican hens-and-chicks. Whitish stalks bearing clusters of yellow flowers and growing from a dense rosette of ovate, succulent leaves often covered with whitish powder. Rootstocks penetrate rock crevices and bear rosettes of lance-shaped, often red-tipped, bright-green or gray leaves. Borne from leaf axils, the 4-12 in. flower stalks bear candelabra-like clusters of small, lemon-yellow flowers. Blooms May-September. This plant often forms a large mat. In the northern part of its range it is the only coastal Dudleya; to the south there are several species.[3] *D. farinosa* is known to be variable, with each locality being unique. Both powdery-white (farinose) and green plants can be found growing side-by-side at many locations.[10] Identifying *D. farinosa* can be challenging due to the tendency to interbreed and produce hybrids both in the wild and nursery setting.[10,12] Hybridizes with *D. caespitosa* and *D. cymosa*, often in hybrid swarms. [11]
PROPAGATION DETAILS	
Ecotype	Marin County, California [2]
Propagation Goal	Plants [2]
Propagation Method	Seed [2]
Product Type	Container (plug) [2]
Stock Type	3-inch pot [2]
Time to Grow	Not specified
Target Specifications	Root System: Firm plug in container. [2]
Propagule Collection Instructions	Tiny, dust-like seeds[7]are collected between June 1st and September 1st.[2] Mature inflorescences are brown cymes which rise from succulent basal leaves.[2]
Propagule Processing/Propagule Characteristics	Seeds/gram: 3,300[2]
Pre-Planting Propagule Treatments	Cleaning: Seed, is very fine and difficult.[3] To clean, rub capsules over a screen and let seeds fall through.[2] Storage Conditions: Seeds are kept dry and stored in a refrigerator.[2]

	Pre-Planting Propagule Treatment: Cold stratify seeds for 2 weeks in moist peat moss.[2]
Growing Area Preparation / Annual Practices for Perennial Crops	Nursery Environment: - Fully Controlled Greenhouse.[2] Growing Media: 1. Sowing Mix- Sunshine Mix #4 Aggregate Plus (peat moss, perlite, major and minor nutrients, gypsum, and dolomitic lime).[2] 2. Transplant Mix- Contains standard potting mix of peat moss, fir bark, perlite, and sand.[2] Containers: 1. Flats-(14-days). Seeds are mixed with sowing media and are surface sown into flats.[2] 2. 3-inch Pots- 14-days after germination, seedlings are transplanted to 3-inch, individual pots.[2]
Establishment Phase Details	Seeds are sown on June 1st following the pre-planting propagule treatment described above. Seeds are mixed with media and are surface sown in flats containing Sunshine® Mix #4 Aggregate Plus (2 g/flat).[2] Flats are then watered in with an automatic irrigation system.[2] Seedlings germinate 14-days after sowing.[2] Percent Germination is 50%. [2]
Length of Establishment Phase	1 month[2]
Active Growth Phase	Seedlings are transplanted 14-days after germination to individual, 3-inch containers with standard potting mix described above. Transplant survival averages 85%.[2] After seedlings are established, fertilize with Nutricote NPK (13-13-13) 3 months after transplanting. [2] Plants require good drainage.[2] Most *Dudleya* species grow in winter and spring and are prone to rot when watered in the summer.[10]
Length of Active Growth Phase	Dudleya will be ready for "potting up" to commercial sized containers in 4-6 months. Final soil mix can be a garden loam or cactus mix. [13]
Hardening Phase	No information found.
Length of Hardening	No information found.
Harvesting, Storage and Shipping	No information found.
Length of Storage	No information found.

Guidelines for Outplanting / Performance on Typical Sites	Outplanting conditions should include dry, rocky soil in a location with part shade. [3] Planting among rocks and on slopes is preferable to flat ground. [10] Overly rich soil can yield overly frost-sensitive plants.[13] Nursery-grown plants can cause genetic contamination if planted within the native range of the species but not in the area from which the propagules were collected. [10]
Other Comments	In-vitro production of *Dudleya farinosa* may be a beneficial tool against the poaching effort. Recent overseas popularity of *D. farinosa* has attracted poachers that profit from uprooting these plants by the tens-of-thousands to supply demand. An emerging research project, led by Kevin Alison, aims to deflate these price incentives through the utilization of plant tissue culture (micropropagation) to ethically produce large quantities of select *Dudleya* species; thereby flooding the market. Such a strategy may also provide agencies with an additional tool for conservation. [7,12] As such, Alison is currently developing a plant tissue culture protocol for *Dudleya* species; most recently completing a successful cleaning and in-vitro establishment protocol for his MCRS Capstone project. An overview of this research may be seen in the YouTube video, "Dudleya Conservation-In Vitro Propagation to Combat Plant Poaching and Extinction with Kevin Alison." [7] Sponsored by the California Native Plant Society, Alison shares some of the details of his research including a (separate) seed germination method (~85% germination) in nutrient agar; a method for sterilizing plant tissue with 2500 ppm NaDCC; and the subsequent and successful in-vitro establishment of *Dudleya* species in nutrient agar (which may, or may not contain hormones).[7,12] The author of this *Dudleya farinosa* Propagation Protocol would like to acknowledge Alison's capstone research, which has not yet been published by his graduate program at UC Irvine. It is recommended that future revisions for this *Dudleya farinosa* Propagation Protocol include Alison's work, once it is incorporated within the literature.
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