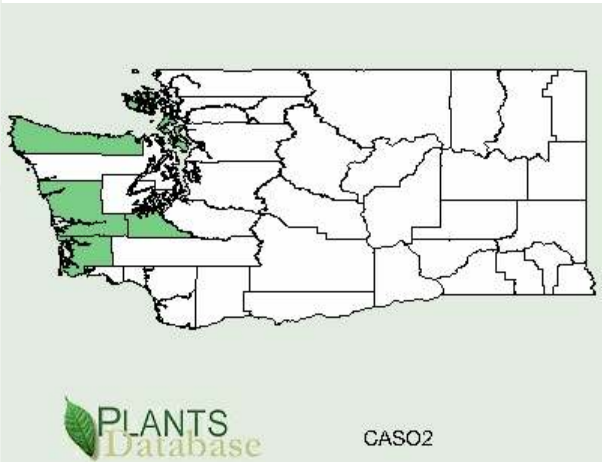
Plant Propagation Protocol for *Calystegia soldanella* (L.)R.Br.
ESRM 412 – Native Plant Production
Spring 2008

North America Distribution

Washington State Distribution



Source: USDA PLANTS database

TAXONOMY	
Family Names	
Family Scientific Name:	Convolvulaceae
Family Common Name:	morning glory family
Scientific Names	
Genus:	*Calystegia*
Species:	*soldanella*
Species Authority:	(L.) R. Br
Common Synonym(s) (include full scientific names (e.g., *Elymus glaucus* Buckley), including variety or subspecies information)	*Convolvulus soldanella* L.
Common Name(s):	seashore false bindweed, sea bindweed, beach morning-glory
Species Code (as per USDA Plants database):	CASO2
GENERAL INFORMATION	
Geographical range (distribution maps for North America and Washington state)	Scattered from Queen Charlotte Islands south to California on western North America coast[1]. See maps above for North America and Washington State distribution. Also located on coasts around the world

	including Tasmania, Crimea, and Bulgaria[9].

Ecological distribution (ecosystems it occurs in, etc):	Coastal beaches, sand dunes[1], and shingly coasts[9].
Climate and elevation range	Dry low elevation sites. Can be found as far up as grazed grassland areas
Local habitat and abundance; may include commonly associated species	Usually found on dry coastal areas but is also found in granite soils and grazed coastal grasslands[3]. Commonly found in dunegrass communites with *Leymus mollis, Poa douglasii, Abronia latifolia, and Cakile maritime*[15]. "The plant prefers light (sandy), medium (loamy) and heavy (clay) soils. The plant prefers acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It requires moist soil."[7]
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	A stress-tolerator of salt spray, continual sand burial and droughty conditions. *Calystegia soldanella* is a sand binder, salt, and drought tolerant plant that allows it to exist in harsh habitats.
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	*C. soldanella* is a forb that is a "Hairless fleshy perennial from deep rhizomes: stems leafy, creeping but not twining, 20-50cm long"[1]. Pink/purple showy flowers.[1]
PROPAGATION DETAILS	
Response of C. soldanella to salt spray and seawater inundation.[5]	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Alsea Spit, OR
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
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
Propagule Collection (how, when, etc):	Seeds were stored in paper bags at room temperature and may have been treated before sowing.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Unknown treatment
Growing Area Preparation / Annual	"After germination seeds were transplanted too

Practices for Perennial Crops (growing media, type and size of containers, etc):	20x20x5 cm plastic trays filled with sterilized river sand and placed in a growth chamber with the following conditions: 12 hr photoperiod, 350 muE m^{-2} sec^{1} light intensity. 20/10C thermoperiod, 50% relative humidity during the day. These conditions represent a cloudy spring day on the beach at about 30^{o} N latitude."
Active Growth Phase (from germination until plants are no longer actively growing):	"Seedlings were grown for approximately one month, subirrigated with distilled water every 2-3 days and with $1/4^{th}$ strength Hoagland's solution every 7 days. After that period, trays were wthinned to an average of nine seedlings." Seedlings were sprayed every day water. Mortality and vigor was then measured to observe the salt spray and inundation tolerance of C. soldanella. The results showed that even though C. soldanella was generally located further away from the shoreline, it had a salt spray and inundation tolerance higher than many species which are found closer to the sea shore.
Calystegia macrostegia (Greene) Brummitt (Island Morning Glory) Protocol developed by Michael Herrera . Although this is a different species, it lives in a similar environment and may exhibit some of the same propagation methods of _C. soldanella_[12]	
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Catalina Island, California
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Plants
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:	1 gallon treepot
Time to Grow (from seeding until plants are ready to be outplanted):	
Target Specifications (size or characteristics of target plants to be produced):	Root System: Firm root plug in container.
Propagule Collection (how, when,	Seeds are hand collected when seed capsules have fully

etc):	matured. We have collected capsules in late July.
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Fruits dry in paper bags in a warm, dry room. We clean the seeds by using a seed blower set at 50 to 60 settings to separate chaff and non-viable seeds. After seeds have been cleaned, they are stored under refrigeration in air tight glass containers at 40 F and 40% RH. With 2 collections, seeds weigh an average of 1.29 grams per 90 seeds.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	We soak seeds in warm water for 2 hours and/or place them into a 5% bleach solution for 3 minutes. Floaters are removed from sinkers during water soak. We have found that floaters are non-viable.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	The James H. Ackerman Native Plant Nursery is located on Catalina Island off the coast of southern California. From 1993 to 2004, the average maximum and minimum temperatures have been 75.4 F and 46 F, with an average of 361 frost free days per year and annual rainfall of 14 inches. The facility is comprised of shade houses, mist propagation house, and an outdoor growing compound. All propagation environments are utilized at different stages of seedling growth to provide for the variance in temperature and shading requirements needed during the growing season. We irrigate all containers with an overhead emitter system in the shadehouses and use a drip system or hand water in the outdoor nursery.
Establishment Phase (from seeding to germination):	Seeds are sown in late fall (November) and placed in a shadehouse were they remain for several weeks. Flats or containers are filled with a 1 inch layer of special seed germination mix of 1:1 (v:v) Sunshine Professional Growing Mix and sand on top of 4:1:1 (v:v:v) peat, perlite, and organic compost. We incorporate Osmocote time release fertilizer (9 month release rate) (14 N:14P2O5:14K2O) at the rate of ½ cup per 0.75 cubic yard of medium. Seeded flats are watered with an overhead emitter system as needed.
Length of Establishment Phase:	3 to 4 months
Active Growth Phase (from germination until plants are no longer actively growing):	After seedlings are well established, they are transplanted into #1 treepots (173 cubic inches)filled with a growing medium of 4:1:1 (v:v:v) peat, perlite, and organic compost. Osmocote time release fertilizer (9 mo release rate) (14 N:14P2O5:14K2O) is incorporated into the medium at a rate of of ½ cup per .75 cubic yards of medium.
Hardening Phase (from end of active growth phase to end of growing	Any nursery stock grown under shadehouse conditions are hardened by placing them in full sun exposure for a

season; primarily related to the development of cold-hardiness and preparation for winter):	minimum of 2 weeks prior to outplanting.
Length of Hardening Phase:	2 to 4 months
Harvesting, Storage and Shipping (of seedlings):	Containerized seedlings are over wintered directly in the open growing compound.
Length of Storage (of seedlings, between nursery and outplanting):	Variable; depends on out planting date.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Our ideal outplanting season runs from November to mid-March when moisture is available. We water nursery stock once after planting.[12]
Other Comments (including collection restrictions or guidelines, if available):	The RHS dictionary of gardening states that *C. soldanella* is very difficult to establish successfully compared to other species in the *Calystegia* genus. Propagation reports from the native plant database of other species in this genus list germination rates from 50-75%. These germination rates are achieved after scarification treatment. Dave's Garden lists C. *soldanella* as needing scarification for germination.[8] Other propagation information from the Encyclopedia of northwest native plants for gardens and landscapes: Cultivation: full sun and sandy or rocky well drained soil. Prefer to sprawl on the ground. Worth trying in sandy fast -draining soils away from the immediate coast and is tolerant of salty conditions. Propagation: Usually grown from seed collected in the fall and planted soon after harvest; plant seeds where they are to grow into well-drained potting soil in contatiners, and leave them outside to stratify in moist cool winter conditions. can also be propagated by cuttings mad in the summer. Since they are prostrate, propagation by layering(nicking a stem and covering the cut segment with sand should be successful. Another likely method would be to divide rhizomes in early spring from plants originally grown from seed.[13] C. soldanella responds well to nitrogen addition.[6]
INFORMATION SOURCES	
Protocol Author (First and last name):	Patrick Sowers
Date Protocol Created or Updated (MM/DD/YY):	5/28/08

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[4]Ushimaru A. and Kikuzawa K. 1999. Variation of Breeding System, Floral Rewards, and Reproductive Success in Clonal Calystegia Species (Convolvulaceae). American Journal of Botany, Vol. 86, No. 3, (Mar., 1999), pp. 436-446 Published by: Botanical Society of America

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