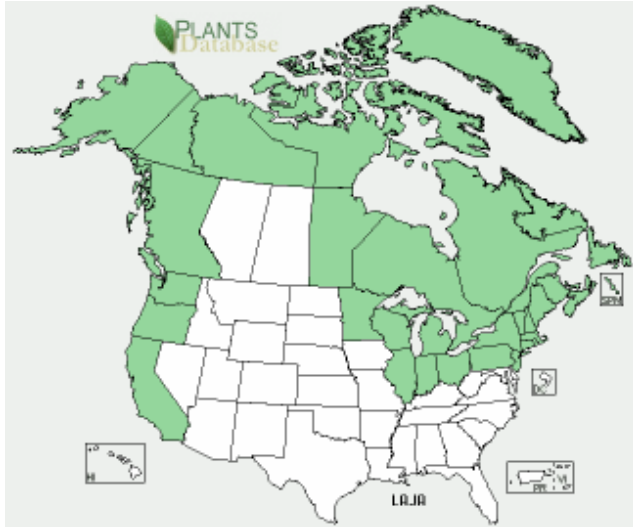


Plant Propagation Protocol for *Lathyrus japonicus*
 ESRM 412 – Native Plant Production
 Spring 2008

North America Distribution



Washington Distribution



Source: USDA PLANTS Database

TAXONOMY	
Family Names	
Family Scientific Name:	Fabaceae
Family Common Name:	Pea family
Scientific Names	
Genus:	<i>Lathyrus</i>
Species:	<i>japonicus</i>
Species Authority:	Willd.
Variety:	
Sub-species:	
Cultivar:	
Authority for Variety/Sub-species:	
Common Synonym(s) (include full scientific names (e.g., <i>Elymus glaucus</i> Buckley), including variety or subspecies information)	<i>Lathyrus japonicus</i> var. <i>acutifolius</i> (Bab.) Bassler <i>Lathyrus japonicus</i> var. <i>japonicus</i> (Greene) Fernald <i>Lathyrus japonicus</i> var. <i>maritimus</i> (L.) Kartesz & Gandhi <i>Lathyrus japonicus</i> var. <i>parviflorus</i> Fassett <i>Lathyrus japonicus</i> var. <i>pellitus</i> Fassett <i>Lathyrus japonicus</i> var. <i>pubescens</i> Hartm.
Common Name(s):	beach pea, beach peavine circumpolar pea, sea vetchling, sea pea
Species Code (as per USDA Plants database):	LAJA
GENERAL INFORMATION	
Geographical range (distribution)	W. and N. Europe, E. Asia - China. N. America. ¹¹ See

maps for North America and Washington state)	maps above for distribution in North America and Washington state.
Ecological distribution (ecosystems it occurs in, etc):	Sandy beaches and dunes, upper gravel amongst driftwood, along the immediate coast. ¹
Climate and elevation range	Lowland zone, circumboreal. ¹² Found in zone 17 on the Barbour et al.(1976) scale(17 is furthest from the tideline). North-South range on West Coast U.S. is 71°-41°. ⁸ Precipitation must be source of water uptake since the water table is too low. ³
Local habitat and abundance; may include commonly associated species	<i>L. japonicus</i> showed higher germination in areas of fine shingle opposed to coarse shingle which has less water holding capacities. ⁶
Plant strategy type / successional stage (stress-tolerator, competitor, weedy/colonizer, seral, late successional)	Stress tolerator of shingle habitat. Tolerates wind, cold(to -8°C) ² and harsh shingle soil conditions. Is a nitrogen fixer.
Plant characteristics (life form (shrub, grass, forb), longevity, key characteristics, etc)	Perennial herb from rhizomes with angled stems 1.5m long trailing or climbing. Has compound leaflets with curling tendrils. ¹ Reproduction is amphimictic. Cleistogamy and vivipary do not occur. ² Germination takes place in April and May following the year of fruit ripening. Longevity is difficult to determine, but isolated individuals of at least 10 years are still in good condition. ² Occurs in small isolated individuals or in clumps up to 25m wide. ² Pollinated by Bees and Lepidoptera (Moths & Butterflies) ¹¹

PROPAGATION DETAILS

Cordon Culture Method as Explained by Huxley and Griffiths¹⁰

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,	Container

and/or Propagules (seeds, cuttings, poles, etc.))	
Time to Grow (from seeding until plants are ready to be outplanted):	6 to 9 months
Target Specifications (size or characteristics of target plants to be produced):	25-30cm tall
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Seeds should be pre soaked in water for 24 hours before sowing
Establishment Phase (from seeding to germination):	Prepare a seed bed in Autumn that consists of two spits 45cm deep and 1 meter wide(for a double row), incorporating rotted animal manure by double digging. Adding bonemeal is beneficial, and lime can be added to reach a pH of 6.5-7. Propagation site for seeds should be sunny and with open rows running north to south. Shelter to north and east is desirable. Sow pre-soaked or chipped seed in autumn or early winter into well crocked pots of loam based propagating mix, or into 4:1:1 mix of loam, leafmould and sharp sand.
Active Growth Phase (from germination until plants are no longer actively growing):	<p>The Cordon system is a framework of pots with a cane for each plant. When plants have reached 25-30cm up the cane select the strongest leader and tie it to the cane. Remove side shoots and tendrils. Plants in full bloom can be given high phosphate fertilizer 5:15:5 NPK. Organic mulch of hops straw or rotted manure retains moisture and keeps plants weed free.</p> <p>For early blooms in the cold glasshouse, autumn sown plants are brought under glass in winter and planted out into a prepared site in the glasshouse border or into large pots of a medium fertility loam based mix. Provide a minimum temperature of 5-10C good ventilation and bright indirect light. Reduce water when temperatures are low to avoid bud drop.</p>
Hardening Phase (from end of active growth phase to end of growing season; primarily related to the development of cold-hardiness and preparation for winter):	<p>Overwinter in a well ventilated cold frame, giving protection of frame lights only when temperatures drop below 0°C. When temperatures drop below -2°, protect the plants with hessian sacks or some other type of material for insulation.</p> <p>In late winter/early spring, stop vertical growth of plants to encourage growth of side shoots. Harden off for planting out in mid-spring or late spring.</p>
C.A. Walmsley and A.J. Davy Propagation for Tests on Effects of Seed Ageing.⁹	

Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Ripe seeds were collected in summer of 1986 and 1992 from the 1-5km shingle beach fronting the Nuclear Electric site at Sizewell, Suffolk, UK.
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic Embryos, and/or Other Propagules):	Germinants
Propagation Method (Options: Seed or Vegetative):	Seed
Target Specifications (size or characteristics of target plants to be produced):	germinants
Propagule Collection (how, when, etc):	Seed collected in summer months July-October(1986) and August to September(1992). Seed stored in paper bags and dried for 5-13 weeks at room temperature.
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	<p>Threshing needed to remove fruit. Seeds were placed in sulfuric acid(96%) for 45min and stirred to soften the testa, before being thoroughly washed. Seed was sterilized before incubation with NaHOCl(1% w/v Cl) for 5 or 10min. Seed was then washed in tap water.</p> <p>Seed transferred to paper envelopes and stored over silica gel in air-tight plastic containers kept in a cold-room at 2°C.</p>
Establishment Phase (from seeding to germination):	<p>Seed was incubated in 9-cm Petri dishes upon a double layer of Whatman no.1 filter paper which was moistened with distilled water regularly.</p> <p>Incubation was in Mercia Scientific or LEEC Type PL2 incubators under a 12h day/12h night regime at 25/15, 20/10, or 15/5°C. Salinity tests were done by substituting distilled water with 10,25,50 or 100% solution of sea water.</p> <p>Results of these tests showed that germination rates were low (4-13%) for seed that had not been pre-treated with sulphuric acid for 45min. Treated germination rates were high, ranging 92-100% for seeds stored for 1 year and 83-90% for seeds stored for 7 years. <i>L. japonicus</i> was practically indifferent to different temperature regimes, but had would not germinate in 50 and 100% solutions of sea water.</p>
Brightmore and White germination of untreated <i>L. japonicus</i> seeds.²	
Propagation Goal (Options: Plants, Cuttings, Seeds, Bulbs, Somatic	Germinants

Embryos, and/or Other Propagules):																										
Propagation Method (Options: Seed or Vegetative):	Seed																									
Propagule Collection (how, when, etc):	Hard seeds removed from unopened pods were used to prevent the possibility of prior abrasion.																									
Propagule Processing/Propagule Characteristics (including seed density (# per pound), seed longevity, etc):	Seeds are viable for several years																									
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	None																									
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	20 seeds were sown in pans in a mixture of shingle and sand left in the open except in (a)(see table below) where John Innes seed compost was used.																									
Establishment Phase (from seeding to germination):	<p style="text-align: center;">Table 1. Germination of untreated seeds of <i>Lathyrus japonicus</i></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Sowing date</th> <th>First seedling</th> <th>Last seedling</th> <th>% germination</th> </tr> </thead> <tbody> <tr> <td>(a)</td> <td>1 Oct. 1958</td> <td>1 April 1959</td> <td>1 May 1959</td> <td>95</td> </tr> <tr> <td>(b)</td> <td>1 Oct. 1959</td> <td>5 April 1960</td> <td>2 May 1960</td> <td>85</td> </tr> <tr> <td>(c)</td> <td>1 Oct. 1960</td> <td>16 April 1961</td> <td>18 May 1961</td> <td>90</td> </tr> <tr> <td>(d)</td> <td>27 July 1961</td> <td>19 May 1962</td> <td>-</td> <td></td> </tr> </tbody> </table> <p>Extensive sowings of viable seed in virtually pure shingle resulted in failure to germinate which was likely due to lack of water holding material in shingle substrate.</p>		Sowing date	First seedling	Last seedling	% germination	(a)	1 Oct. 1958	1 April 1959	1 May 1959	95	(b)	1 Oct. 1959	5 April 1960	2 May 1960	85	(c)	1 Oct. 1960	16 April 1961	18 May 1961	90	(d)	27 July 1961	19 May 1962	-	
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Length of Establishment Phase:	<p>Green unripened seeds germinate within 7-14 days of sowing but the germination(57%) is relatively low.</p> <p>Chipped hard seeds will germinate readily under field conditions with a germination percentage between 85 and 100 with times varying from 8 days(summer) to 55 days(late Autumn)</p>																									
Walmsley and Davey: Effects of substrate on the Establishment of Container Grown Plants⁶																										
Ecotype (this is meant primarily for experimentally derived protocols, and is a description of where the seed that was tested came from):	Ripe seeds were collected in summer of 1986 and 1992 from the 1-5km shingle beach fronting the Nuclear Electric site at Sizewell, Suffolk, UK.																									
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or Vegetative):	
Product Type (options: Container (plug), Bareroot (field grown), Plug + (container-field grown hybrids, and/or Propagules (seeds, cuttings, poles, etc.))	Container
Time to Grow (from seeding until plants are ready to be outplanted):	31 weeks
Pre-Planting Propagule Treatments (cleaning, dormancy treatments, etc):	Threshing needed to remove fruit. Seeds were placed in sulfuric acid(96%) for 45min and stirred to soften the testa, before being thoroughly washed. Seed was sterilized before incubation with NaHOCl(1% w/v Cl) for 5 or 10min. Seed was then washed in tap water.
Growing Area Preparation / Annual Practices for Perennial Crops (growing media, type and size of containers, etc):	Seed was sown in a mixture of Levingston Universal potting compost(Fisons) and sand (1:1 v/v) in September.
Establishment Phase (from seeding to germination):	Seedlings were pricked out individually into 9x9cm square plastic pots containing the same potting mixture and placed in a heated glasshouse.
Length of Establishment Phase:	Seeds planted in September, hardened off over winter and planted out in March.
Active Growth Phase (from germination until plants are no longer actively growing):	Plants in this experiment were tested in the field with amendments of 1)no amendment 2)organic matter addition 3)fertilizer addition and 4) organic matter and fertilizer addition. After the first growing year, mortality rates for plants with no amendment was 21% and 4% for plants with organic matter and fertilizer additions. The other tests 2) and 3) above had 0% mortality after one growing season. The study concluded that there was no significant difference in growth with added fertilizer or organic matter, and that this was likely due to the fact that the potted plants had fertilizer in them already.
Guidelines for Outplanting / Performance on Typical Sites (eg, percent survival, height or diameter growth, elapsed time before flowering):	Outplanting conditions should include a moderately fertile, well drained soil that is in a sunny location. ¹⁰ Seedlings will survive severe frost(-8°C) but do not stand long periods of drought well. ²
Other Comments (including collection restrictions or guidelines, if available):	Scarification with sulfuric acid is a very successful method for breaking seed dormancy. Propagation from rhizomes is possible but less successful than seed. ²

	<p>Reproductive capacity may reach a minimum of 1400 seeds for a well established plant.²</p> <p>Foliage may be infested by thrips, polyphagous aphids and gall midge. Birds and mice can be a problem for seeds and seedlings and seedlings are vulnerable to slugs and snails.¹⁰</p> <p>Seedlings should be raised in sterile medium to reduce mildew and fungal problems.¹⁰</p> <p>Seeds are viable for 4-5 years in seawater.¹⁰</p>
INFORMATION SOURCES	
References (full citations):	See Below
Protocol Author (First and last name):	Patrick Sowers
Date Protocol Created or Updated (MM/DD/YY):	5/14/08

References:

¹Pojar J., McKinnon A., 1994 *Plants of the Pacific Northwest: Washington, Oregon, British Columbia and Alaska*, B.C. Ministry of Forests and Lone Publishing, Canada

²D. Brightmore and P. H. F. White. 1963. *Lathyrus Japonicus Willd.* The Journal of Ecology, Vol. 51, No. 3, (Nov., 1963), pp. 795-801. British Ecological Society

³G. A. M. Scott. 1963. *The Ecology of Shingle Beach Plants.* The Journal of Ecology, Vol. 51, No. 3, (Nov., 1963), pp. 517-527. British Ecological Society

⁴R. M. Fuller. 1987. *Vegetation Establishment on Shingle Beaches.* The Journal of Ecology, Vol. 75, No. 4, (Dec., 1987), pp. 1077-1089

⁵C. A. Walmsley and A. J. Davy. 1997. *The Restoration of Coastal Shingle Vegetation: Effects of Substrate Composition on the Establishment of Seedlings.* The Journal of Applied Ecology, Vol. 34, No. 1, (Feb., 1997), pp. 143-153

⁶C. A. Walmsley and A. J. Davy. 1997. *The Restoration of Coastal Shingle Vegetation: Effects of Substrate on the Establishment of Container Grown Plants.* The Journal of Applied Ecology, Vol. 34, No. 1, (Feb., 1997), pp. 154-165

⁷Harold A. Senn. 1938. *Experimental Data for a Revision of the Genus Lathyrus.* American Journal of Botany, Vol. 25, No. 2, (Feb., 1938), pp. 67-78

⁸Michael G. Barbour and Theodore M. DeJong. 1977. *Response of West Coast Beach Taxa to Salt Spray, Seawater Inundation, and Soil Salinity.* Bulletin of the Torrey Botanical Club, Vol. 104, No. 1, (Jan. - Mar., 1977), pp. 29-34

⁹C. A. Walmsley and A.J. Davy. 1997. *Germination Characteristics of Shingle Beach Species, Effects of Seed Ageing and their Implications for Vegetation Restoration*. The Journal of Applied Ecology, Vol. 34, No. 1 (Feb., 1997), pp. 131-142

¹⁰Huxley, Anthony Julian, and Mark Griffiths. 1999. *The new Royal Horticultural Society dictionary of gardening*. New York: Grove's Dictionaries Inc.

¹¹Plants for a Future, Blagdon Cross, Ashwater, Beaworthy, Devon. *Lathyrus japonicus*. Plants for a Future Database. (c) 1997-2000. Available: http://www.ibiblio.org/pfaf/cgi-bin/arr_html?Lathyrus+japonicus

¹²Klinkenberg, Brian. (Editor) 2007. E-Flora BC: Electronic Atlas of the Plants of British Columbia [www.eflora.bc.ca]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver. [Accessed: 5/13/2008 6:12:05 PM]

Other Sources Consulted (but that contained no pertinent information):

Cannon Valley Nursery[Online]. *Lathyrus japonicus*. Available:
http://www.cannonvalleynursery.com/output/moreinfo/Lathyrus_japonicus.asp

Wiedemann, A. M., Dennis LR. J., Frank H.1999. *Plants of the Oregon coastal dunes*. Smith Corvallis, Or. : Oregon State University Press.

Emery, Dara E., 1988. *Seed propagation of native California plants*. Santa Barbara, Calif. : Santa Barbara Botanic Garden.

Harlow, Nora. 2004. *Plants and landscapes for summer-dry climates of the San Francisco Bay region / Oakland, Calif. : East Bay Municipal Utility District*.

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