Plant Diversity Website

Lathyrus odoratus L.

Common Names: Sweet pea, pois de senteur (French), gartenwicke (German), guisante de olor (Spanish), ervilha-de-cheiro (Portuguese), cicerchia odorosa (Italian), pisello odoroso (Italian) (1,17).

Etymology: *Lathyrus* comes from the Greek word *Lathyros*; the prefix *la-* meaning "very," and suffix *–thyros* meaning "passionate." *Odoratus* is derived from Latin, meaning "fragrant" (7).

Botanical synonyms: None found.

FAMILY: Fabaceae, the pea family



Quick Notable Features (1)**:**
¬ Large (>2cm) fragrant flowers of almost any color except yellow
¬ Branched tendrils develop at the end of the 2-foliate leaf
¬ Winged stem
¬ Densely pubescent ovary and legume

Plant Height: *L. odoratus* can climb up to 2.4m in height (6).



Subspecies/varieties recognized (5)**:** *L. odoratus* v. *siculus* L. and *L. odoratus* v. *zeylanicus* L.

Most Likely Confused with: *Lathyrus latifolius*, *Lathyrus sylvestris*, *Lathyrus hirsutus*, and *Vicia* spp.

Habitat Preference: Prefers cool, rich soils of moderate moisture. *L. odoratus* prefers full sun, although it tolerates partial shading. In the United States, it rarely escapes from cultivation to disturbed ground (6,7).

Geographic Distribution in Michigan: *L. odoratus* is cultivated widely in Michigan, however there is only one recorded instance, in Washtenaw County, of this plant escaping cultivation (1).

Known Elevational Distribution: In Bolivia, *L. odoratus* is found 3300m above sea level (5).

Complete Geographic Distribution: Introduced from Europe, the native range of *L. odoratus* is in the Mediterranean region, including the islands of Sicily (Italy) and Crete (Greece). This species is cultivated worldwide for its showy flowers and attractive scent. There are collections of *L. odoratus* in 32 countries across 6 continents (7,11).

Vegetative Plant Description: *L. odoratus* is a climbing vine with a pubescent stem (~ 30mm in diameter). Both the branched stem and the leaf rachis are winged. Each leaf is two-foliate, with the leaf apex modified into a branched tendril. The leaflets are ovate-oblong to elliptic, 2-6cm long, 0.7-3cm wide, and dark green in color. Individual leaflets have entire margins and pinnate to sub-parallel venation. Two semi-sagittate stipules (1.5-2.5cm long) are present at the base of each leaf (1,5,9,15).

Climbing Mechanism: *L. odoratus* climbs using the tendrils at the leaf apex. The tendrils are sensitive to contact, allowing the sweet pea to climb neighboring plants or fences (14).

Flower Description: The inflorescence is axillary, each with 1 - 3 flowers per peduncle, which is longer than the leaves. The calyx (10-11mm long) is composed of 5 sepals, connate at the base, with teeth of uniform length, and about equal in length to the tube, or slightly longer. The papilionaceous corolla has 5 petals: a standard, 2 free wing petals, and 2 fused petals (the keel). Because this plant is widely cultivated for flowers and fragrance, the corolla (2-3.5cm long) may be found in nearly any color except yellow. Commonly the petals are white, pink, purple, violet, blue, orange, red, or lavender. The stamens are diadelphous, with 9 of the 10 stamens united and one free. The ovary is linear, pubescent, bearing pustular hairs and a twisted style (5,6,7,9,13,16).



Flowering Time: Flowering occurs in mid-summer (May-July) (6).

Pollinator: Members of the genus *Lathyrus* are, in general, bee-pollinated (8). However, a study showed that *L. odoratus* is rarely visited by bees, which may be attributed to the tightly closed petals that require a lot of energy from the bee to access pollen (18).

Fruit Type and Description: The legume fruit is pubescent and brown-yellow at maturity. Each fruit is 5-7cm long by 1-1.2cm wide and contains 3-6 seeds (5,9,15).

Seed Description: The seeds are smooth, brown, and globular, measuring approximately 4mm across. The hilum (attachment scar) is orange-brown and approximately 2mm long (see seed image) (9,15).

Dispersal Syndrome: The legumes are dehiscent, forcibly expelling the seeds from the fruit (15).

Distinguished by: Like *Lathyrus odoratus*, 3 other members of *Lathyrus* (*L. latifolius, L. sylvestris,* and *L. hirsutus*) have winged stems, 2 leaflets per leaf, and a terminal leaflet modified as a tendril, which may make them difficult to distinguish. *L. latifolius* also has large, showy flowers (1.6-2.6cm long), however it is distinguished by the completely glabrous ovary and fruit, and by the leathery leaflets and stipules, which are thicker than those of *L. odoratus*. *L. sylvestris* is distinguished by the narrowly lanceolate leaflets, which are shorter than



L. odoratus (only up to 1.5cm long), the smaller flowers (1.2-1.8 cm long), and the glabrous ovary and fruit. *L. hirsutus* is distinguished from *L. odoratus* by its linear-lanceolate leaflets (elliptic in *L. odoratus*), and the un-winged petiole (winged in *L. odoratus*). Like *Lathyrus odoratus, L. hirsutus* has a pubescent ovary and legume, but the flowers are much smaller (<1.5cm long).

Lathyrus spp. are generally very similar to *Vicia* spp. *Lathyrus* flowers are differentiated by mostly free wings, which are adherent to the keel petals in *Vicia*, and a widened, flattened style with hairs along the inner side, in contrast to a filiform style with apical hairs found in *Vicia*. Without flowers, *Lathyrus* can usually be distinguished from *Vicia* by the size and shape of the stipules. In *Lathyrus*, the stipules are hastate to semi-sagittate and more than 7mm broad, with the exceptions of *L. palustris* and *L. venosus*, which have smaller stipules. Species in the genus *Vicia* have semi-sagittate to lanceolate stipules that are less than 7mm broad. Finally, no species in *Vicia* have 2-foliate leaves, instead each leaf has at least 4 leaflets (1,7).

Other members of the family in Michigan (number species): *Amorpha* (2), *Amphicarpaea* (1), *Anthyllis* (1), *Apios* (1), *Astragalus* (3), *Baptisia* (3), *Caragana* (1), *Cercis* (1), *Chamaecrista* (2), *Crotalaria* (1), *Cytisus* (1), *Dalea* (2), *Desmanthus* (1), *Desmodium* (12), *Galega* (1), *Gleditsia* (1), *Glycine* (1), *Gymnocladus* (1), *Hedysarum* (1), *Hylodesmum* (2), *Kummerowia* (1), *Lathyrus* (9), *Lespedeza* (9), *Lotus* (1), *Lupinus* (3), *Medicago* (3), *Melilotus* (3), *Mimosa* (1), *Orbexilum* (1), *Phaseolus* (2), *Pisum* (1), *Pueraria* (1), *Robinia* (2), *Securigera* (1), *Senna* (2), *Strophostyles* (1), *Tephrosia* (1), *Trifolium* (10), *Vicia* (10), *Vigna* (1), *Wisteria* (2) (source 1).

Ethnobotanical Uses: There are no known medicinal uses, but essential oils can be extracted from the plant and used in perfume blends. Consumption of the plant is not recommended, as it contains several different toxins that may cause permanent damage if ingested in large quantities. One of these toxins, beta-(N)-oxalylamino-L-alanine acid (BOAA), is common in a few members of the genus *Lathyrus* (*L. sativus, L. odoratus, L. cicera, L. ochrus,* and *L. clymenum*). BOAA is a neurotoxin that causes neurolathyrism, a disease leading to muscle pain and weakness, paresis, spinal cord degeneration, and death, in extreme cases. A second toxin present in *Lathyrus odoratus,* specifically, is beta-aminopropionitrile (BAPN). BAPN is implicated in the disease osteolathyrism, which causes degradation of collagen in the body, leading to skeletal deformation and degenerative arthritis. These toxins are most highly concentrated in the seeds of *L. odoratus*. Some species of *Lathyrus* are edible, but because this genus also includes species that may be toxic, always confirm edibility before consuming any part of a *Lathyrus* species. (3,4).

Phylogenetic Information: The genus *Lathyrus* is a member of the subfamily Papilionoideae (Faboideae) in the Fabaceae family, which is in the order Fabales, superorder Rosanae, subclass Magnoliidae. Members of the Fabaceae family are distributed worldwide, and the family contains approximately 9.4% of all eudicots and 16% of all known woody plants found in neotropical rainforests (2).

Interesting Quotation or Other Interesting Factoid not inserted above: The enzyme beta-aminopropionitrile (BAPN), which has been implicated in osteolathyrism, may provide benefits patients in need of skin grafts. The replacement skin in a graft often contracts with time, becoming hard, uncomfortable, and often restricting movement and necessitating corrective surgeries. A research team at the University of Sheffield is experimenting with extracts from sweet pea, containing BAPN, and polymers with the hope that they will be able to prevent the contraction of skin after replacement surgery. The scientists are currently experimenting with a polymer hydrogel, containing BAPN, which is applied topically to the skin grafts. The logic

behind the experiment is that BAPN may be able to inhibit the cross-linking of collagen fibers and maintain flexibility of the grafted skin (12).

Literature and websites used:

1) Michigan Flora Online. A.A. Reznicek, E.G. Voss, & B.S. Walters February 2011. University of Michigan. Web. April 25, 2012. http://michiganflora.net/species.aspx?id=1310.
2) Stevens, P.F. Angiosperm Phylogeny Website. Version 9 June 2008. http://www.mobot.org/mobot/research/apweb.
3) Plants For A Future, 1996-2012. Accessed: 25 April 2012. http://www.pfaf.org/user/Plant.aspx?LatinName=Lathyrus+odoratus
4) Institute for Tropical Medicine Website. Accessed: 25 April 2012. http://www.itg.be/itg/DistanceLearning/LectureNotesVandenEndenE/index.htm
5) Tropicos.org. Missouri Botanical Garden. Accessed: 25 April 2012. http://tropicos.org/Name/13021655
6) Missouri Botanical Garden Website. Accessed: 25 April 2012. http://www.missouribotanicalgarden.org/
7) Fernald, M.L. 1950. *Gray's Manual of Botany,* 8th ed. New York: American Book Company.
8) Badr, S.F. 2007. Karyotype Analysis and Chromosome Evolution in Species of *Lathyrus* (Fabaceae). *Pakistan Journal of Biological Sciences* 10: 49-56.
9) Xiang Wan Dou. 2010. *Flora of China, Vol. 10* (*Fabaceae).* Science Press, Beijing, and Missouri Botanical Garden Press, St. Louis. (Online). http://efloras.org/florataxon.aspx?flora_id=2&taxon_id=200012184
10) Menninger, E.A. 1970. *Flowering Vines of the World: An Encyclopedia of Climbing Plants*. New York: Hearthside Press Incorporated.
11) Gbif.org. Global Biodiversity Information Facility Website. Accessed: 30 April 2012.
12) Pollitt, M. 30 July 2008. "Sweet peas make a second skin." *The Guardian*. http://www.guardian.co.uk/technology/2008/jul/31/researchanddevelopment
13) Bentley, R. 1883. *The Student's Guide to Structural, Morphological, and Physiological Botany.* London, UK: J. & A. Churchill. 241p.
14) Hofer, J., L. Turner, C. Moreau, M. Ambrose, P. Isaac, S. Butcher, J. Weller, A. Dupin, M. Dalmais, C. Le Signor, A. Bendahmane, & N. Ellis 2009. *Tendril-less* regulates tendril formation in pea leaves. *The Plant Cell* 21:420-428.
15) Bartlett, G. 1914. The native and cultivated Viceae and Phaseoleae of Ohio. *The Ohio Naturalist* 15: 393-404.
16) Sharma, O.P. 2009. *Plant Taxonomy,* 2nd ed. New Delhi: Tata McGraw Hill Education Private Limited.
17) *Flora Italiana* Website. Accessed: 16 May 2012. http://luirig.altervista.org/schedeit/fo/lathyrus_odoratus.htm
18) Inouye, D.W. 1980. The effect of proboscis and corolla tube lengths on patterns and rates of flower visitation by bumblebees. *Oecologia* 45: 197-201.

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