

# Plant Diversity Website

## *Lycium barbarum* L.

**Common Names:** matrimony vine, wolfberry, boxthorn, chinese boxthorn, barbary boxthorn, Duke of Argyll's tea-tree, Ningxia wolfberry, and in Chinese, Gou Gi or Gou Qi Zi, the origin of the common name goji berry (1,2,18,11,12).

**Etymology:** *Lycium* is a thorny plant of Lycia, an ancient region of Anatolia, located on the present southwest coast of Turkey or could derive from Lykion, the Greek name used for some thorny tree or shrub by Dioscorides and Pliny (3,22). *Barbarus*, -um is Greek for foreign and *barbatus* is Latin for barbed, bearded, or furnished with long, weak hairs (20,22).

**Botanical synonyms:** *Lycium halimifolium* P. Mill., *Lycium vulgare* Dunal (5)

**Family:** Solanaceae—the potato or nightshade family

**Quick Notable Features:**

- rich violet, 5-lobed, funnel-shaped flower
- bright orange-red, glabrous berries
- arching stems, occasionally climbing
- leaves are alternating on young shoots and fascicled on older growth

**Plant Height:** Reported maximum plant height varies from 0.8 to 3.5m (2,16,18)

**Subspecies/varieties recognized:** *Lycium barbarum* var. *auranticarpum* K. F. Ching, *Lycium barbarum* var. *barbarum* (15).

**Most Likely Confused with:** *Lycium chinense* and *Solanum dulcamara* (bittersweet nightshade), both climbers in Solanaceae. In addition, *Elaeagnus augustifolia* and *Elaeagnus umbellata*.

**Habitat Preference:** In much of North America, this vine has been spread by cultivation; in most instances, it has escaped and naturalized in waste grounds, such as roadsides, railroads, sites of old buildings, dry open fields and river banks (4,6,9,10). In China, Japan, and Russia it is found on wild and cultivated slopes (11).

**Geographic Distribution in Michigan:**

*L. barbarum* is found in thirteen counties of the southern peninsula ranging from south to north: Berrien, Lenawee, Washtenaw, Wayne, Oakland, Jackson,



Ingham, St. Clair, Allegan, Kent, Gratiot, Leelanau, and Cheboygan (6).

**Known Elevational Distribution:** In California, between 0 and 1,500 m (21).

**Complete Geographic Distribution:** This vine is now cosmopolitan, however it is native to Asia (6) and was introduced to Europe in the 18<sup>th</sup> century (18). It is found throughout much of the continental US, excluding Alabama and New Mexico; it is found widely across Canada, excluding the Yukon Territory, Northwest Territories, Manitoba, Newfoundland, and New Brunswick (5).



**Vegetative Plant Description:** A perennial shrub, containing stems that are arching, recurving, and occasionally climbing. Published literature (2) suggests that spines are found on older growth, although they were also observed on specimens with young growth from MICH specimens; as axillary spines, they are branch replacements (L.S.S. pers. obs.). The 2-3cm long leaves are simple, petiolate, entire, and alternate on young shoots while fascicled on older stems (2). The leaf breadth is 0.3 to 0.6cm and the shape varies from lanceolate to lanceolate-spathulate. The leaves are gray-green (10).

**Climbing Mechanism:** Known as a thorn clinger, the weakest of all the superficial modifications (other thorn mechanisms include substantial thorns, armed whips, and recurved spines), the prickles on the stems of *L. barbarum* latch onto other foliage: a passive mode of climbing, keeping the plant fastened to its support, but not a direct way of climbing. Through this mechanism, leaves are aided in exposure to prime sunlight (9).

**Flower Description:** The flowers are found singly or in groups of 2-4 (2), on narrow pedicels 1-2.3cm in length and bear a persistent calyx. Perianth: the calyx is 2-6mm, bell-shaped and has 3-5 obtuse lobes, with lengths of 1-3 mm; the corolla is 5-lobed, campanulate or funnel-shaped, with the petals exhibiting pale lavender to purple or pinkish colors and fading to tan or green at the base. The nps.gov photo of the flower, clearly shows that nectar guides, in the purple range, are present; the floral tube is (4)6-8(10)mm. Stamens: usually 4-5 present, minimally exerted; the anthers dehisce longitudinally. Pistils: the stigma is either capitate or 2-lobed; the style is threadlike (1,2,10,15,16).



**Flowering Time:** July to mid-October in Ohio (4); June to August in the Great Plains (2); June to September in Canada (10).

**Pollinator:** The species can self-pollinate, but it is also reported as being pollinated by insects, although the details of which insects are not reported (7,17).

**Fruit Type and Description:** Ovoid to ellipsoid, glabrous and 2-locular; fleshy, bright yellow-orange, orange-red or scarlet; 15-20mm diameter, 1-2cm long; the fruit is subtended by a persistent calyx. The berry dries to a deep purple-black (1,2,10,16).

**Seed Description:** Yellowish-brown, ovate to subreniform, compressed, minutely pitted, 2-3mm long, 4-20 per fruit (2,16).

**Dispersal Syndrome:** Endozoochory is noted, however, the bright red berries more specifically suggest bird dispersal. Vegetative propagation is also indicated (7). In recent literature, it is suggested that *L.*

*barbarum* dispersal is human-aided via roadside plantings and subsequent car dispersal, whereby urban and suburban habitats can be linked (19). Additionally, in Zaru, Afghanistan, it was found that camels browse on the shrub; granted that if the seeds pass through the animal, this could be a method of dispersal (8).

**Distinguished by:** To differentiate *L. chinense* from *L. barbarum*, note that the leaves of *L. chinense* are more rounded, compared to the acute leaves of *L. barbarum* (6). Although *Solanum dulcamara* may share similar berries and flower color, it can be distinguished by its vibrant yellow anthers (4), the corolla's reflexed lobes (2) and the ovate-cordate leaves (24), ranging from unlobed to deeply lobed at the base (10). Similar to *L. barbarum*, *Elaeagnus umbellata* (autumn olive) escapes, exhibits bright red berries, and gray-green leaves (4); it can be identified by the wavy margins and silvery scales on the leaves and its cream-colored flowers (18). *Elaeagnus augustifolia* (Russian olive) can be distinguished by silvery scales (present on new branches, the undersides of leaves and the fruit), yellow-silvery fruit, and yellow flowers (2,18,23,25).

**Other members of the family in Michigan:** The large Solanaceae includes 11 genera in Michigan: *Nicotiana* (1), *Leucophysalis* (1), *Lycopersicon* (1), *Solanum* (7), *Hyoscyamus* (1), *Datura* (2), *Physalis* (6), *Petunia* (1) *Nicandra* (1), and *Atropa* (1). Within *Lycium*, two introduced species occur in Michigan: *L. barbarum* and *L. chinense* (also referred to as matrimony vine) (6).

**Ethnobotanical Uses:** Medicinally used, with origins in China, the fruit and root of *L. barbarum* have several therapeutic applications. "The fruit is collected in the summer and autumn, dried in the shade till the skin shrunk and then exposed to the sun until the outer skin becomes dry and hard but the pulp still soft"(13). Also referred to as the goji berry, the fruit is noted as being helpful for: treating kidney deficiencies (sores on the lower part of the body, seminal emission), liver deficiencies (vertigo, amblyopia) and lung deficiencies (phthisical cough). Generally the berry aids in immunity, stimulating tissue development, high blood pressure, "menopausal issues", and increasing





leukocyte counts. The root bark is used to treat fever, coughs, tuberculosis and internal hemorrhage (11,12,13). Additionally, it is cultivated as hedge, due to its clinging capabilities (6).

**Phylogenetic Information:** Solanaceae is among 5 families of the order Solanales, which contains 165 genera and 4,080 species, 90 of which are *Lycium*; Solanaceae shares many similarities with the family Convolvulaceae (the morning glory family). The distribution of Solanaceae is extensive worldwide, only excluding areas of extreme temperatures—the Sahara Desert and areas of high latitude (Canada, Greenland, Russia, Antarctica) (14).

**Interesting Quotation or Other Interesting Factoid not inserted above:** In Maine, *L. barbarum* was used as groundcover for large unmown roadsides; it was an ideal candidate because it was inexpensive, hardy, and vigorous (9). In the 18<sup>th</sup> century, *L. barbarum* reached Europe; in England, it was mistaken as a tea plant, thus it became known as the 'Duke of Argyle's tea tree' (18).



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