Lotus

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Lotus japonicus

Family: Fabaceae

Subfamily: Faboideae

Genus: *Lotus*

Common names: Birdsfoot trefoil, bacon and eggs plant, birdfoot deer vetch, big trefoil, narrowleaf trefoil, wiry lotus, desert rock pea, California broom, parrot's beak flower, coral gem

Note: The genus *Lotus* refers to a large group of leguminous plants. The common name 'lotus' is also given to a group of unrelated, non-leguminous aquatic plants of the genus *Nelumbo*.

Biogeography:

Lotus is a large and extremely diverse genus consisting of approximately 150 species. The exact number is uncertain because there are several closely related groups that have very similar characteristics, making it difficult to separate them into individual species. They are also highly **polymorphic**, meaning that the same species can vary in appearance depending on the environmental conditions.

Most occur in temperate regions, but there are also subtropical and tropical species. Two centres of diversity have been identified – the Mediterranean region, including parts of Europe, Africa and western Asia, and western North America. *Lotus* is also found in a number of island ecosystems, including the Canary Islands, California Channel Islands and islands of the Aegean Sea.

Botanical features:

The genus *Lotus* has both annual and perennial species. They generally have deep branching tap roots and compound leaves, usually with five leaflets. The leaves may be hairy or smooth depending on the species. Flower colour also varies with species, but is usually yellow to orange-red. Pods may contain from one to as many as 45 seeds.

General:

Lotus species are adapted to a wide range of habitats, from maritime (e.g. the island of Miyakojima in southern Japan) to alpine. They are generally adapted to soils that are relatively unfertile and many can grow in stressful conditions in soils that are saline, acidic or waterlogged.

According to a 1994 report by the World Conservation Union (IUCN), 15% of the world's *Lotus* species are considered endangered, vulnerable or rare due to habitat destruction. Many of them are **endemic** to specific regions, meaning they are found nowhere else.

Uses:

Broadleaf birdsfoot trefoil (*Lotus corniculatus*), narrowleaf trefoil (*L. glaber*), and big trefoil (*L. uliginosus*) are common commercial species of *Lotus* that are used for pastures and hay. Because they contain compounds known as **proanthocyanidins** or **condensed tannins**, they reduce problems with bloating in

cattle. Bloating is caused by the inability of a ruminant animal to release gas pressure that accumulates as a result of bacterial fermentation in the animal's gut. On the down side, however, certain strains of some species, such as *L. corniculatus* and *L. americanus*, contain cyanogen-compounds that can cause cyanide poisoning in cattle.

Species such as *Lotus bertholetii* (also called Parrot's beak) and *Lotus maculata* (Gold flash), which are native to the Canary Islands, have showy red or gold flowers and are used as ornamental plants.

Some species have been used medicinally to relieve muscle cramps, as a local anti-inflammatory, to reduce fever, to relieve intestinal gas and as a sedative.

Oil from an Iranian species, *Lotus michauxianas*, is used in the perfume industry.

Lotus research:

One perennial species, *Lotus japonicus*, is used as a model plant by legume researchers. It is valuable for research because it has a relatively small **genome** (the total collection of the genetic information contained in the organism). In contrast to many other legumes, it is **diploid**, meaning that it has only two sets of paired chromosomes, one from each parent for a total of 12. It also grows quickly and produces numerous small brown/blackish seeds. It is self-fertilising and can be regenerated from cell culture.

Researchers from the CILR were instrumental in developing important nodulation mutants in Lotus. Additionally, Centre researchers developed methods for high efficiency gene transfer. This allows the genetic engineering of this model legume to test new genes for their function.

Lotus japonicus flower
(Photo by Makoto Endo)

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