

# Clover

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Family:	Fabaceae
Subfamily:	Faboideae
Genus:	<i>Trifolium</i>
Common name:	clover

**Note:** Worldwide, there are about 300 known species of clover. Most of them are found in northern temperate regions, but they also grow at high altitudes in parts of the tropics. All are small annual or perennial herbs, usually having compound leaves with three leaflets as suggested by the word 'trifolium.' A few species have five or seven leaflets. The flowers form globular clusters ranging in colour from white to red, purple, or pink and occasionally yellow. The focus here is on two of the most important species in agriculture - *Trifolium repens* and *Trifolium subterraneum*.

## *Trifolium repens*

### Biogeography:

*Trifolium repens*, also known as White or Dutch clover, originated in the Mediterranean region and quickly spread throughout Europe. It was cultivated as cattle forage in the Netherlands in the 1600s and introduced to England about a hundred years later. White clover is probably the most important forage plant species in temperate grassland areas.

### Botanical features:

White clover's species name, *repens*, reflects the plant's creeping growth habit. The three leaflets on each leaf have slightly toothed margins and usually have a lighter green or white V-shaped pattern close to the base. Each white globular flower head consists of 20 to 40 individual small flowers and the seeds are produced in tiny pods measuring about 4 to 5 mm.

*T. repens* is a perennial that is best suited to fairly moist and fertile soils but has remarkable powers of survival in less favourable conditions. The creeping stems, which can root at the nodes, enable it to colonise new sites and persist through several weeks of drought. Its survival through long periods of stress is helped by the fact that it produces a large number of hard seeds that can remain in the ground for many years before germinating.

## *Trifolium subterraneum*

### Biogeography:

Subterranean clover, or sub clover, is native to the Mediterranean region but is now common throughout temperate regions of the world. It was introduced to Australia in the early 1800s and has since become the most important pasture legume in Western Australia. It provides feed for livestock, and nitrogen for



*Trifolium repens*

pasture grasses and cereal crops when grown in rotation. Historically, subterranean clovers were very important in the establishment of the wheat-clover rotation in Western Australia.

## Botanical features:

Subterranean clover is a flat-growing annual plant that is covered with long, soft hairs. The leaves are composed of three heart-shaped leaflets and are carried on a long stalk. Clusters of three or four small white to pale pink flowers are produced on shorter stalks.

Subterranean clover gets its name from its unusual reproductive system. After pollination, the flower develops a seed head structure called a **burr**. The burr is covered with forked bristles that curve around the seed head. The stem carrying the burr bends downward and pushes the seed head below the surface of the soil where the forked hairs anchor it in place.

## Uses:

*Trifolium* species are important throughout the world as honey plants, pasture forage, hay and silage. They are also key in soil improvement by providing biological nitrogen fixation and green manure. Within this large genus are species suitable for all seasons, types of soil, levels of fertility and almost all climatic conditions.

Clovers have also been the subject of extensive chemical investigation because of their oestrogen-containing compounds called **flavonoids**. Antioxidant flavonoid compounds are currently extracted from red clovers for use as a post-menopause treatment.

## Nodulation and biological nitrogen fixation studies:

Clover bacteria were among the first root-nodule bacteria studied. Researchers from the CILR were among the early pioneers, especially in the discovery of nodulation genes and the nature of the plant signal. Clover species form a highly specialised plant group because their symbiotic nitrogen-fixing bacteria, *Rhizobium trifolii*, are specific only to *Trifolium* species.

Clovers are also a useful model plant for a number of recently developed analytical techniques of molecular biology. Large numbers of these small-seeded legumes can be screened rapidly in laboratory assays to see how plants respond to different conditions. These studies have identified and provided a range of defined plant and bacterial mutants along with information about the chemical signal components of the interaction. A program of sequencing the genome of white clovers is well advanced. Transgenic clover plants have provided new insights into the timing and location of phytohormone activities and the developmental pathways that are tapped during *Rhizobium* infection and nodule establishment.

## References:

<http://encyclopedia.thefreedictionary.com/clover>

[http://forages.oregonstate.edu/topics/species/fact\\_sheet\\_print\\_leg.cfm?specID=43](http://forages.oregonstate.edu/topics/species/fact_sheet_print_leg.cfm?specID=43)

<http://www.oregonclover.org>

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