

Red Clover

Species (Family)

Trifolium pratense L. (Leguminosae)

Synonym(s)

Cow Clover, Meadow Clover, Purple Clover, Trefoil

Part(s) Used

Flowerhead

Pharmacopoeial and Other Monographs

BHC 1992^(G6)

BHP 1996^(G9)

Martindale 32nd edition^(G43)

PDR for Herbal Medicines 2nd edition^(G36)

Legal Category (Licensed Products)

GSL^(G37)

Constituents^(G6,G22,G41,G64)

Carbohydrates Arabinose, glucose, glucuronic acid, rhamnose, xylose (following hydrolysis of saponin glycosides); polysaccharide (a galactoglucomannan).

Coumarins Coumarin, medicagol.

Isoflavonoids Biochanin A, daidzein, formononetin, genistein, pratensin, trifoside, calycosine galactoside⁽¹⁾ and pectolarin.

Flavonoids Isorhamnetin, -kaempferol, quercetin, and their glycosides.⁽²⁾

Saponins Soyasapogenols B-F (C-F artefacts) and carbohydrates (*see above*) yielded by acid hydrolysis.⁽³⁾

Other constituents Coumaric acid, phaseolic acid, salicylic acid, *trans*- and *cis*-clovamide (L-dopa conjugated with *trans*- and *cis*-caffeic acids), resin, volatile oil (containing furfural),⁽⁴⁾ fats, vitamins and minerals. Cyanogenetic glycosides have been

documented for a related species, *Trifolium repens*.^(G33)

Food Use

Red clover is listed by the Council of Europe as a natural source of food flavouring (category N2). This category indicates that it can be added to foodstuffs in small quantities, with a possible limitation of an active principle (as yet unspecified) in the final product.^(G16) In the USA, red clover is listed as GRAS (Generally Recognised As Safe).^(G65)

Herbal Use

Red clover is stated to act as a dermatological agent, and to possess mildly antispasmodic and expectorant properties. Tannins are known to possess astringent properties. Traditionally red clover has been used for chronic skin disease, whooping cough, and specifically for eczema and psoriasis.^(G6,G7,G8,G64)

Dosage

Dried flowerhead 4g or by infusion three times daily.^(G6,G7)

Liquid extract 1.5–3.0 mL (1:1 in 25% alcohol) three times daily.^(G6,G7)

Tincture 1–2 mL (1:10 in 45% alcohol) three times daily.^(G6,G7)

Pharmacological Actions

In vitro and animal studies

Biochanin A, formononetin, and genistein (isoflaoestrogenic properties).⁽⁵⁾ The saponin constituents are reported to lack any haemolytic or fungistatic activity.⁽³⁾ A possible chemoprotective effect has been documented for biochanin A, which has been reported to inhibit carcinogenic activity in cell culture.⁽⁶⁾

Side-effects, Toxicity

Urticarial reactions have been documented.^(G51) Infertility and growth disorders have been reported

in grazing animals.^(G33) These effects have been attributed to the oestrogenic isoflavone constituents, in particular to formononetin.⁽⁵⁾

Contra-indications, Warnings

In view of the oestrogenic constituents, excessive ingestion should be avoided. Large doses may interfere with anticoagulant and hormonal therapies (coumarin and isoflavonoid constituents).

Pregnancy and lactation In view of the oestrogenic components the use of red clover during pregnancy and lactation should be avoided.

Pharmaceutical Comment

The chemistry of red clover is well documented. Limited information is available on the pharmacological properties and no documented scientific evidence was found to justify the herbal uses. Reported oestrogenic side-effects in grazing animals have been attributed to the isoflavone constituents. Little toxicity data are available for red clover. In view of this and the isoflavone and coumarin components, excessive ingestion should be avoided.

References

See also General References G6, G9, G16, G22, G31, G32, G33, G36, G41, G43, G51 and G64.

- 1 Saxena VK, Jain AK. A new isoflavone glycoside from *Trifolium pratense*. *Fitoterapia* 1987; 58: 262-263.
- 2 Jain AK, Saxena VK. Isolation and characterisation of 3-methoxyquercetin 7-O- β -D-glucopyranoside from *Trifolium pratense*. *Natl Acad Sci Lett* 9: 379-380.
- 3 Olesek WA, Jurzysta M. Isolation, chemical characterization and biological activity of red clover (*Trifolium pratense* L.) root saponins. *Acta Soc Bot Pol* 1986; 55: 247-252.
- 4 Opdyke DLJ. Furfural. *Food Cosmet Toxicol* 1978; 16: 759-764.
- 5 Kelly RW *et al.* Formononetin content of 'Grasslands Pawera' red clover and its oestrogenic activity to sheep. *NZ J Exp Agric* 1979; 7: 131-134.
- 6 Cassady JM *et al.* Use of a mammalian cell culture benzo(a)pyrene metabolism assay for the detection of potential anticarcinogens from natural products: inhibition of metabolism by biochanin A, an isoflavone from *Trifolium pratense* L. *Cancer Res* 1988; 48: 6257-6261.