

Elder

Species (Family)

Sambucus nigra L. (Caprifoliaceae)

Synonym(s)

Black Elder, European Elder, Sambucus
Sambucus canadensis L. refers to American Elder

Part(s) Used

Flower

Pharmacopoeial and Other Monographs

BHC 1992^(G6)
BHP 1996^(G9)
BP 2001^(G15)
Complete German Commission E^(G3)
Martindale 32nd edition^(G43)
PDR for Herbal Medicines 2nd edition^(G36)
Ph Eur 2002^(G28)

Legal Category (Licensed Products)

GSL^(G37)

Constituents^(G2,G6,G41,G62,G64)

Flavonoids Flavonols (kaempferol, quercetin), quercetin glycosides (1.5–3.0%) including hyperoside, isoquercitrin and rutin.

Triterpenes α - and β -amyryn, oleanolic and ursolic acids.

Volatile oils 0.3%. 66% fatty acids (primarily linoleic, linolenic and palmitic) and 7% alkanes (C₁₉, C₂₁, C₂₃ and C₂₅). Numerous other constituent types have been identified including ethers and oxides, ketones, aldehydes, alcohols and esters.⁽¹⁾

Other constituents Chlorogenic acid, tannin, mucilage, plastocynin (protein),⁽²⁾ pectin and sugar.

Other plant parts *Leaf* Sambunigrin (0.042%), prunasin, zierin and holocalin (cyanogenetic glycosides),⁽³⁾ choline, flavonoids (rutin, quercetin), sterols (sitosterol, stigmasterol, campesterol), triterpenes (α -

and β -amyryn palmitates, oleanolic and ursolic acids), alkanes, fatty acids, tannins and others.^(G41)

Bark Lectin (mol. wt 140 000) rich in asparagine/aspartic acid, glutamine/glutamic acid, valine and leucine,⁽⁴⁾ phytohaemagglutinin,⁽⁵⁾ triterpenoids (α -amyrenone, α -amyryn, betulin, oleanolic acid, β -sitosterol).⁽⁶⁾

Food Use

Elder is listed by the Council of Europe as a source of natural food flavouring (categories N1 and N2). Category N1 refers to the fruit and indicates that there are no restrictions on quantities used. Category N2 refers to the restrictions on the concentrations of hydrocyanic acid that are permitted, namely 1 mg/kg in beverages and foods, 1 mg/kg for every per cent proof of alcoholic beverages, 5 mg/kg in stone fruit juices, 25 mg/kg in confectionery and 50 mg/kg in marzipan.^(G16) In the USA, the flowers have a regulatory status of GRAS (Generally Recognised As Safe).^(G41)

Herbal Use

Elder is stated to possess diaphoretic and antiepileptic properties. Traditionally, it has been used for influenza colds, chronic nasal catarrh with deafness and sinusitis.^(G8) Elder is also stated to act as a diuretic, laxative and local anti-inflammatory agent.^(G2,G6,G7,G8,G41,G49,G64)

Dosage

Dried flower 2–4 g by infusion three times daily.^(G6,G7)

Liquid extract 2–4 mL (1:1 in 25% alcohol) three times daily.^(G6,G7)

Pharmacological Actions

In vitro and animal studies

Elder is stated to possess diuretic and laxative properties.^(G41)

Moderate (27%) anti-inflammatory action in carrageenan-induced rat paw oedema has been documented for an elder preparation given one hour

before carrageenan (100 mg/kg, by mouth).⁽⁷⁾ Indomethacin as a control exhibited 45% inhibition at a dose of 5 mg/kg.⁽⁷⁾

An infusion made from the flowers of elder, St. John's wort herb and root of soapwort (*Saponaria officinalis*) has exhibited antiviral activity against influenza types A and B (*in vivo* and *in vitro*) and herpes simplex virus type 1 (*in vitro*).⁽⁸⁾

A diuretic effect in rats exceeding that exerted by theophylline has been reported for elder.⁽⁹⁾ An infusion and extracts rich in potassium and in flavonoids all caused diuresis. Greatest activity was exerted by the combined potassium- and flavonoid-rich extracts.

In vitro antispasmodic activity (rat ileum, rabbit/guinea-pig intestine) and spasmogenic activity (rat uterus) have been reported for lectins isolated from elder.⁽¹⁰⁾

A lectin isolated from elder bark was found to be a lactose-specific haemagglutinin with a slightly higher affinity for erythrocytes from blood group A.⁽⁴⁾ Unlike many other plant lectins, the lectin did not inhibit protein synthesis.⁽⁴⁾ The carbohydrate-binding properties of a lectin isolated from elder bark have been studied.⁽¹¹⁾

Phytohaemagglutinins are biologically active extracts isolated from various plants and represent a class of lectin. They are associated with haemagglutination and mitogenic, antigenic and immunosuppressant properties.⁽⁵⁾ *In vitro*, phytohaemagglutinin has been found to stimulate production of an interferon-like substance in human leukocytes.^(G45)

Hepatoprotective activity against carbon tetrachloride-induced toxicity has been reported for triterpenes isolated from *Sambucus formosana* Nakai.⁽¹²⁾

Clinical studies

None documented for elder. Phytohaemagglutinin extracts have been used clinically to treat drug-induced leucopenia and some types of anaemia.⁽³⁾ The blastogenic response of lymphocytes to phytohaemagglutinin has been used extensively as a measure of immunocompetence.^(G45)

Side-effects, Toxicity

No reported side-effects specifically for elder were located. Human poisoning has occurred with *Sambucus* species.⁽¹³⁾ The roots, stems and leaves and, much less so, the flowers and unripe berries, are stated to contain a poisonous alkaloid and cyanogenic glycoside causing nausea, vomiting and diarrhoea.⁽¹³⁾ The flowers and ripe fruit are stated to be edible without harm.⁽¹³⁾

The effects of a lectin isolated from elder bark on mammalian embryonic and fetal development has been studied.⁽⁵⁾ The lectin exerted mainly a toxic effect and, to a lesser degree, a teratogenic effect when administered subcutaneously to pregnant mice. In view of the high doses administered, the authors stated that the results did not indicate a potential hazard to human fetuses exposed to lectins.⁽⁵⁾

Contra-indications, Warnings

Excessive or prolonged use may result in hypokalaemia in view of the documented diuretic effect. Plant parts other than the flowers are reported to be poisonous and should not be ingested.

Pregnancy and lactation The safety of elder taken during pregnancy has not been established. In view of the lack of toxicity data, the use of elder during pregnancy and lactation should be avoided.

Pharmaceutical Comment

Phytochemical details have been documented for elder, with flavonoids and triterpenes representing the main biologically active constituents. Anti-inflammatory, antiviral and diuretic effects have been observed in *in vivo* studies, thus supporting the herbal uses of elder. No documented studies in humans were found. Potentially toxic compounds have been reported for the bark (lectins) and the leaves (cyanogenic glycosides); the flowers are suitable for use as a herbal remedy.

References

See also General References G2, G3, G5, G6, G9, G11, G15, G16, G28, G31, G36, G37, G41, G43, G48, G49, G56, G62 and G64.

- 1 Toulemonde B, Richard HMJ. Volatile constituents of dry elder (*Sambucus nigra* L.) flowers. *J Agric Food Chem* 1983; 31: 365-370.
- 2 Scawen MD *et al.* The amino-acid sequence of plastocyanin from *Sambucus nigra* L. (elder). *Eur J Biochem* 1974; 44: 299-303.
- 3 Jensen SR, Nielsen BJ. Cyanogenic glucosides in *Sambucus nigra* L. *Acta Chem Scand* 1973; 27: 2661-2685.
- 4 Broekaert WF *et al.* A lectin from elder (*Sambucus nigra* L.) bark. *Biochem J* 1984; 221: 163-169.
- 5 Paulo E. Effect of phytohaemagglutinin (PHA) from the bark of *Sambucus nigra* on embryonic and foetal development in mice. *Folia Biol (Kraków)* 1976; 24: 213-222.

- 6 Lawrie W *et al.* Triterpenoids in the bark of elder (*Sambucus nigra*). *Phytochemistry* 1964; 3: 267–268.
- 7 Mascolo N *et al.* Biological screening of Italian medicinal plants for anti-inflammatory activity. *Phytother Res* 1987; 1: 28.
- 8 Serkedjieva J *et al.* Antiviral activity of the infusion (SHS-174) from flowers of *Sambucus nigra* L., aerial parts of *Hypericum perforatum* L., and roots of *Saponaria officinalis* L. against influenza and herpes simplex viruses. *Phytother Res* 1990; 4: 97.
- 9 Rebuelta M *et al.* Étude de l'effet diurétique de différentes préparations des fleurs du *Sambucus nigra* L. *Plant Méd Phytothér* 1983; 17: 173–181.
- 10 Richter A. Changes in the motor activity of smooth muscles of the rat uterus *in vitro* as the effect of phytohaemagglutinins from *Sambucus nigra*. *Folia Biol* 1973; 21: 33–48.
- 11 Shibuya N *et al.* The elderberry (*Sambucus nigra* L.) bark lectin recognizes the Neu5Ac(α 2–6)Gal/GalNAc sequence. *J Biol Chem* 1987; 262: 1596–1601.
- 12 Lin C-N, Tome W-P. Antihepatotoxic principles of *Sambucus formosana*. *Planta Med* 1988; 54: 223–224.
- 13 Hardin JW, Arena JM, eds. *Human Poisoning from Native and Cultivated Plants*, 2nd edn. North Carolina: Duke University Press, 1974.