

Horseradish

Species (Family)

Radicula armoracia (L.) Robinson (Brassicaceae/ Cruciferae)

Synonym(s)

Armoracia lopathifolia Gilib., *A. rusticana* (Gaertn.) Mey & Scherb., *Cochlearia armoracia* L., *Nasturtium armoracia* Fries, *Roripa armoracia* Hitch.

Part(s) Used

Root

Pharmacopoeial and Other Monographs

Complete German Commission E^(G3)
PDR for Herbal Medicines 2nd edition^(G36)

Legal Category (Licensed Products)

GSL^(G37)

Constituents^(G40,G48,G49,G57,G58,G62,G64)

Coumarins Aesculetin, scopoletin.⁽¹⁾

Phenols Caffeic acid derivatives and lesser amounts of hydroxycinnamic acid derivatives. Concentrations of acids are reported to be much lower in the root than in the leaf.⁽¹⁾

Volatile oils Glucosinolates (mustard oil glycosides) gluconasturtiin and sinigrin (S-glucosides), yielding phenylethylisothiocyanate and allylisothiocyanate after hydrolysis. Isothiocyanate content estimated as 12.2–20.4 mg/g freeze dried root.^(2,3) Other isothiocyanate types include isopropyl, 3-butenyl, 4-pentenyl, phenyl, 3-methylthiopropyl and benzyl derivatives.⁽⁴⁾

Other constituents Ascorbic acid, asparagin, peroxidase enzymes, resin, starch and sugar.

Other plant parts Kaempferol and quercetin have been documented for the leaf.

Food Use

Horseradish is listed by the Council of Europe as a natural source of food flavouring (category N2). This category indicates that horseradish 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, horseradish is listed as GRAS (Generally Recognised As Safe).^(G57) Horseradish is commonly used as a food flavouring.

Herbal Use

Horseradish is stated to possess antiseptic, circulatory and digestive stimulant, diuretic and vulnerary properties.^(G42,G49,G64) Traditionally, it has been used for pulmonary and urinary infection, urinary stones, oedematous conditions, and externally for application to inflamed joints or tissues.^(G49)

Dosage

Root (fresh) 2–4 g before meals.^(G49)

Pharmacological Actions

In vitro and animal studies

A marked hypotensive effect in cats has been documented for horseradish peroxidase, following intravenous administration.⁽⁵⁾ The effect was completely blocked by aspirin and indomethacin, but was not affected by antihistamines. It was concluded that horseradish peroxidase acts by stimulating the synthesis of arachidonic acid metabolites.

Side-effects, Toxicity

Isothiocyanates are reported to have irritant effects on the skin and also to be allergenic.^(G51,G58) Animal poisoning has been documented for horseradish. Symptoms described include inflammation of the stomach or rumen, and excitement followed by collapse.^(G33)

Contra-indications, Warnings

It is stated that horseradish may depress thyroid function, and should be avoided by individuals with hypothyroidism or by those receiving thyroxine.^(G42,G49) No rationale for this statement is

included except that this action is common to all members of the cabbage and mustard family.

Pregnancy and lactation Allyl isothiocyanate is extremely toxic and a violent irritant to mucous membranes.^(G58) Its use should be avoided during pregnancy and lactation.

Pharmaceutical Comment

The chemistry of horseradish is well established and it is recognised as one of the richest plant sources of peroxidase enzymes.^(G48) Little pharmacological information was located, although the isothiocyanates and peroxidases probably account for the reputed circulatory stimulant and wound-healing actions, respectively. The oil is one of the most hazardous of all essential oils and it is not recommended for either external or internal use.^(G58) Horseradish should not be ingested in amounts exceeding those used in foods.

References

See also General References G3, G10, G16, G31, G36, G40, G42, G48, G49, G51, G57, G58, G62 and G64.

- 1 Stoehr H, Herrman K. Phenolic acids of vegetables. III. Hydroxycinnamic acids and hydroxybenzoic acids of root vegetables. *Z Lebensm-Unters Forsch* 1975; 159: 219-224.
- 2 Hansen H. Content of glucosinolates in horseradish (*Armoracia rusticana*). *Tidsskr Planteavl* 1974; 73: 408-410.
- 3 Kojima M. Volatile components of *Wasabia japonica*. II. Volatile components other than isothiocyanates. *Hakko Kogaku Zasshi* 1971; 49: 650-653.
- 4 Kojima M *et al*. Studies on the volatile components of *Wasabia japonica*, *Brassica juncea*, and *Cocholearia armoracia* by gas chromatography-mass spectrometry. *Yakugaku Zasshi* 1973; 93: 453-459.
- 5 Sjaastad OV *et al*. Hypotensive effects in cats caused by horseradish peroxidase mediated by metabolites of arachidonic acid. *J Histochem Cytochem* 1984; 32: 1328-1330.