

Celery

Species (Family)

Apium graveolens L. (Apiaceae/Umbelliferae)

Synonym(s)

Apii Fructus, Celery Fruit, Celery Seed, Smallage

Part(s) Used

Fruit

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^(G2,G6,G22,G38,G41,G48,G57,G58,G64)

Flavonoids Apigenin, apiin, isoquercitrin and others.⁽¹⁾

Furanocoumarins Apigravin, apiumetin, apiumoside, bergapten, celerin, celereoside, isoimperatorin, isopimpinellin, osthénol, rutaretin, seselin, umbelliferone and 8-hydroxy-5-methoxypsoralen.⁽¹⁻⁹⁾

Low concentrations (not exceeding 1.3 ppm) of furanocoumarins have been identified in commercial celery,⁽¹⁰⁾ although concentrations are reported to rise considerably in diseased stems.⁽¹¹⁾

Volatile oils 2–3%. Many components including limonene (60%) and selenine (10–15%), and various sesquiterpene alcohols (1–3%), e.g. α -eudesmol and β -eudesmol, santalol.^(12,13) Phthalide compounds, 3-*n*-butyl phthalide and sedanolide, provide the characteristic odour of the oil (presence of sedanolide and sedanonic anhydride disputed).^(14,15)

Other constituents Choline ascorbate,⁽¹⁶⁾ fatty acids (e.g. linoleic, myristic, myristic, myristoleic, oleic, palmitic, palmitoleic, petroselinic and stearic acids).

Food Use

Celery is listed by the Council of Europe as a natural source of food flavouring (category N2). This category indicates that celery can be added to foodstuffs in small quantities, with a possible limitation of an active principle (as yet unspecified) in the final product.^(G16) Celery stem (not the fruit) is commonly used in foods. In the USA, celery seed is listed as GRAS (Generally Recognised As Safe).^(G41)

Herbal Use

Celery is stated to possess antirheumatic, sedative, mild diuretic and urinary antiseptic properties. It has been used for arthritis, rheumatism, gout, urinary tract inflammation, and specifically for rheumatoid arthritis with mental depression.^(G2,G6,G7,G8,G64)

Dosage

Dried fruits 0.5–2.0 g or by decoction 1:5 three times daily.^(G7)

Liquid extract 0.3–1.2 mL (1:1 in 60% alcohol) three times daily.^(G7)

Liquid Extract of Celery (BPC 1934) 0.3–1.2 mL.

Pharmacological Actions

In vitro and animal studies

In mice, sedative and antispasmodic activities have been documented for the phthalide constituents.^(17,G22) Celery seed oil has been reported to exhibit bacteriostatic activity against *Bacillus subtilis*, *Vibrio cholerae*, *Staphylococcus aureus*, *Staphylococcus albus*, *Shigella dysenteriae*, *Corynebacterium diphtheriae*, *Salmonella typhi*, *Streptococcus faecalis*, *Bacillus pumilus*, *Streptococcus pyogenes* and *Pseudomonas solanacearum*.⁽⁹⁾ No activity was observed against *Escherichia coli*, *Sarcina lutea* or *Pseudomonas aeruginosa*.

Apigenin has exhibited potent antiplatelet activity *in vitro*, inhibiting the aggregation of rabbit platelets induced by collagen, ADP, arachidonic acid and platelet-activating factor (PAF), but not that induced by thrombin or ionophore A23187.⁽¹⁸⁾

Studies with celery plant extracts have demonstrated anti-inflammatory activity in the mouse ear test and against carrageenan-induced rat paw oedema,⁽¹⁹⁾ and a hypotensive effect in rabbits and dogs after intravenous administration.^(G41) In addition, hypoglycaemic activity has been documented.^(G22)

Celery juice has been reported to exhibit choleric activity and the phthalide constituents are stated to possess diuretic activity.⁽¹³⁾

Clinical studies

None documented for celery fruit. Hypotensive activity was reported in 14 of the 16 hypertensive patients given a celery plant extract.^(G41)

Side-effects, Toxicity

None documented for celery fruit. Photosensitivity reactions have been reported as a result of external contact with celery stems.^(20,21,G51) These reactions have been attributed to the furanocoumarin constituents which are known to possess photosensitising properties.^(11,22) The concentrations of these compounds are reported to increase considerably in diseased celery stems.^(11,22) It is thought that psoralen, the most potent phototoxic furanocoumarin, acts as a transient precursor for other furanocoumarins and does not accumulate in celery.^(5,11)

Instances of allergic and anaphylactic reactions to celery have also been documented⁽²³⁾ following oral ingestion of the stems.⁽²⁴⁾ Celery allergy is reported to be mediated by IgE antibodies and an association between pollen and celery allergy has been postulated, although the common antigen had not been determined.⁽²⁵⁾

Cross-sensitivities to celery have been documented in patients with existing allergies to dandelion and wild carrot.^(G51)

Acute LD₅₀ values (rats, by mouth; rabbits, dermal) have been reported as greater than 5 g/kg body weight.⁽²⁶⁾ Celery seed oil is stated to be non-irritant, non-phototoxic and non-sensitising in humans.^(26,G58)

Contra-indications, Warnings

Celery fruit contains phototoxic compounds, furanocoumarins, which may cause photosensitive reactions. Celery fruit may precipitate allergic reactions, particularly in individuals with existing plant, pollen or food allergies. Diseased celery stems (indicated by a browning of the stem) should not be ingested.

Pregnancy and lactation Celery fruit is reputed to affect the menstrual cycle and to be abortifac-

ient.^(G30) Uterine stimulant activity has been documented for the oil,^(G22,G30) and the use of celery fruits is contra-indicated during pregnancy.^(G49) This does not refer to celery stems that are commonly ingested as a food, although excessive consumption should be avoided.

Pharmaceutical Comment

Celery fruit should not be confused with the commercial celery stem, which is commonly eaten as a food. The chemistry of celery fruit is well studied and the phototoxic furanocoumarin constituents are well documented. Phototoxicity appears to be associated with the handling of the celery stems, especially diseased plant material. Limited scientific evidence is available to justify the herbal uses of celery, although bacteriostatic activity has been documented for the oil. Celery fruit should be used cautiously in view of the documented allergic reactions.

References

See also General References G2, G6, G9, G11, G16, G22, G30, G31, G32, G36, G37, G38, G41, G43, G48, G49, G51, G57, G58 and G64.

- 1 Garg SK *et al.* Glucosides of *Apium graveolens*. *Planta Med* 1980; 38: 363–365.
- 2 Garg SK *et al.* Apiumetin – a new furanocoumarin from the seeds of *Apium graveolens*. *Phytochemistry* 1978; 17: 2135–2136.
- 3 Garg SK *et al.* Celerin, a new coumarin from *Apium graveolens*. *Planta Med* 1980; 38: 186–188.
- 4 Garg SK *et al.* Minor phenolics of *Apium graveolens* seeds. *Phytochemistry* 1979; 18: 352.
- 5 Dall'Acqua *et al.* Biosynthesis of O-alkylfurocoumarins. *Planta Med* 1975; 27: 343–348.
- 6 Garg SK *et al.* Apiumoside, a new furanocoumarin glucoside from the seeds of *Apium graveolens*. *Phytochemistry* 1979; 18: 1764–1765.
- 7 Garg SK *et al.* Coumarins from *Apium graveolens* seeds. *Phytochemistry* 1979; 18: 1580–1581.
- 8 Innocenti G *et al.* Investigations of the content of furocoumarins in *Apium graveolens* and in *Petroselinum sativum*. *Planta Med* 1976; 29: 165–170.
- 9 Kar A, Jain SR. Investigations on the antibacterial activity of some Indian indigenous aromatic plants. *Flavour Industry* 1971; February.
- 10 Beier RC *et al.* Hplc analysis of linear furocoumarins (psoralens) in healthy celery (*Apium graveolens*). *Food Chem Toxicol* 1983; 21: 163–165.
- 11 Chaudhary SK *et al.* Increased furocoumarin content of celery during storage. *J Agric Food Chem* 1985; 33: 1153–1157.
- 12 Fehr D. Untersuchung über aromastoffe von sellerie (*Apium graveolens* L.). *Pharmazie* 1979; 34: 658–662.

- 13 Stahl E. *Drug Analysis by Chromatography and Microscopy*. Ann Arbor, Michigan: Ann Arbor Science, 1973.
- 14 Bjeldanes LF, Kim I-S. Phthalide components of celery essential oil. *J Org Chem* 1977; 42: 2333-2335.
- 15 Bos R *et al*. Composition of the volatile oils from the roots, leaves and fruits of different taxa of *Apium graveolens*. *Planta Med* 1986; 52: 531.
- 16 Kavalali G, Akcasu A. Isolation of choline ascorbate from *Apium graveolens*. *J Nat Prod* 1985; 48: 495.
- 17 Gijbels MJM *et al*. Phthalides in roots of *Apium graveolens*, *A. graveolens* var. *rapaceum*, *Bifora testiculata* and *Petroselinum crispum* var. *tuberosum*. *Fitoterapia* 1985; 56: 17-23.
- 18 Teng CM *et al*. Inhibition of platelet aggregation by apigenin from *Apium graveolens*. *Asia Pac J Pharmacol* 1988; 1: 85-89.
- 19 Lewis DA *et al*. The anti-inflammatory activity of celery *Apium graveolens* L. (Fam. Umbelliferae). *Int J Crude Drug Res* 1985; 23: 27-32.
- 20 Berkley SF *et al*. Dermatitis in grocery workers associated with high natural concentrations of furanocoumarins in celery. *Ann Intern Med* 1986; 105; 351-355.
- 21 Austad J, Kavli G. Phototoxic dermatitis caused by celery infected by *Sclerotinia sclerotiorum*. *Contact Dermatitis* 1983; 9: 448-451.
- 22 Ashwood-Smith MJ *et al*. Mechanisms of photosensitivity reactions to diseased celery. *BMJ* 1985; 290: 1249.
- 23 Déchamp C *et al*. Choc anaphylactique au céleri et sensibilisation à l'ambrosie et à l'armoise. Allergie croisée ou allergie concomitante? *Presse Med* 1984; 13: 871-874.
- 24 Forsbeck M, Ros A-M. Anaphylactoid reaction to celery. *Contact Dermatitis* 1979; 5: 191.
- 25 Pauli G *et al*. Celery sensitivity: clinical and immunological correlations with pollen allergy. *Clin Allergy* 1985; 15: 273-279.
- 26 Opdyke DLJ. Celery seed oil. *Food Cosmet Toxicol* 1974; 12: 849-850.