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WALNUT

Botanical name: *Juglans regia* L. and other *Juglans* species

Botanical family: Juglandaceae

Foreign names: Noyer commun (Fr.), Walnuss (Ger.), Nogal (Sp.), Noce (It.)

Description: Majestic tree up to 30 m (98 ft) in height, branched, with large, alternate pinnatifid leaves and stamiferous and pistilliferous flowers (April to June). The fruits have a fibrous mesocarp, woody endocarp and fleshy, oily seeds edible when ripe (September). The parts used are the leaves, husks and edible seeds. Walnut has a bitter-tonic flavor and a warm, sweet odor.

Derivatives: The derivatives from leaves are decoction (5%), fluid extract, tincture (20% in 20% ethanol) and soft aqueous extract. The derivatives from husks are fluid extract and petroleum ether fluid extract

Consumption: Annual: n/a

Individual: n/a

Regulatory Status:

CoE: n/a

FDA: 21 CFR 164.110, **172.510**

FDA (other): HOC (1992)

JECFA: n/a

Trade association guidelines: FEMA PADI: n/a

IOFI: n/a

Composition: The total oil content of walnut ranged from 62.6 to 70.3%, while the crude protein ranged from 13.6 to 18.1%. Dietary fiber ranged from 4.2 to 5.2%, while the starch content made up no more than 2.8% of the remaining portion of the kernel. The amino acid content of the walnuts was similar between cultivars and the patterns of essential amino acids were characteristic of a high quality protein.* The immature fruit is one of the richest sources of ascorbic acid. The leaves, also rich in ascorbic acid (almost 1% of the weight), are rich in carotene (ca. 0.3% wet weight). Juglone is the active compound in the leaves; also quercetin, cyanadin, kaempferol, caffeic acid and traces of *p*-coumaric acid, hyperin (0.2%), quercitrin, kaempferol-3-arabinoside, quercetin-3-arabinoside. The seed oil contains 3 to 7% palmitic, 0.5 to 3% stearic, 9 to 30% oleic, 57 to 76% linoleic and 2 to 16% linolenic acids.

Aroma threshold values: n/a

Taste threshold values: n/a

WALNUT HULL EXTRACT

CAS No.:	n/a	FL No.:	n/a	FEMA No.:	3111	NAS No.:	3111
CoE No.:	n/a	EINECS No.:	n/a	JECFA No.:	n/a	EAFUS No.:	977014-38-2

Description: See Walnut.

Consumption: Annual: 5433.33 lb

Individual: 0.004604 mg/kg/day

Regulatory Status:

CoE: n/a

FDA: 21 CFR **172.510**

FDA (other): See Walnut.

JECFA: n/a

Trade association guidelines: FEMA PADI: 30.020 mg

IOFI: Natural

Reported uses (ppm): (FEMA, 1994)

Food Category	Usual	Max.
Alcoholic beverages	80.91	80.91
Baked goods	72.79	94.20
Breakfast cereals	346.40	346.40
Frozen dairy	73.72	96.13

Food Category	Usual	Max.
Gelatins, puddings	170.50	189.50
Nonalcoholic beverages	45.38	65.21
Soft candy	67.36	88.29

* Savage. (2001). *Plant Foods Hum. Nutr.* **56**, 75.

Aroma threshold values: n/a

Taste threshold values: n/a

WALNUT LEAVES EXTRACT

CAS No.:	n/a	FL No.:	n/a	FEMA No.:	n/a	NAS No.:	6168
CoE No.:	n/a	EINECS No.:	n/a	JECFA No.:	n/a	EAFUS No.:	977091-98-7

Description: The essential oil is obtained by steam distillation of leaves with yields ranging between 0.012 and 0.029%; it is little known and seldom used. The oil is a yellow to greenish-brown liquid exhibiting a powerful, warm, sweet odor reminiscent of tea and labdanum.

Consumption: Annual: 366.67 lb

Individual: 0.0003107 mg/kg/day

Regulatory Status:

CoE: n/a

FDA: 21 CFR **172.510**

FDA (other): n/a

JECFA: n/a

Trade association guidelines: FEMA PADI: n/a

IOFI: Natural

Composition: The main constituents of the leaf oil include juglone, α - and β -hydrojuglone, tannin, geraniol, cineol and methyl eugenol.

Aroma threshold values: n/a

Taste threshold values: n/a

WHORTLEBERRY

Botanical name: *Vaccinium myrtillus* L.

Botanical family: Ericaceae

Other names: Arandano; Black Whortles; Bleaberry; Blueberry; British Bilberry; Hurtleberry; Hurts; Whinberry; Whortle-berry; *Vaccinium myrtillus*

Foreign names: Myrtille (Fr.), Heidelbeere, Blaubeere (Ger.), Arandano (Sp.), Mirtillo nero (It.)

CAS No.:	n/a	FL No.:	n/a	FEMA No.:	n/a	NAS No.:	n/a
CoE No.:	469	EINECS No.:	n/a	JECFA No.:	n/a		

Description: A European species of blueberry. The shrub is approximately 40 to 60 cm (16 to 24 in.) high and grows wild in the mountain areas of Europe and Asia. The plant has erect, branched stems; long, creeping rhizomes; alternate oval leaves; white-pinkish flowers; and bluish, globose berries. This variety should not be confused with *V. vitis idaea*, leaves of which are used for pharmaceutical purposes. The parts used are the berries and leaves. Whortleberry has a sweet, aromatic, sour, astringent flavor. Annual use in Europe is 13,000 kg. Fruits of other species, *V. macrocarpon* Ait. (cranberry) and *V. uliginosum* L. (Bog bilberry), are consumed as a foodstuff.

Derivatives: The derivatives from the berries are fluid extract, tincture (20% in 20% alcohol), concentrated (six- to eightfold) juice. The derivatives from the leaves are infusion (3%), dried aqueous extract.

Consumption: Annual: n/a

Individual: n/a

Regulatory Status:

CoE: Fruits: Category 1 (no restriction on use). Fruits are used in the preparation of jellies and marmalades, dairy products or consumed as is. Derivatives are used for medical purposes. Leaves: Category 5 (additional toxicological and/or chemical information is required). Leaves are used in beverages (3 g/L).

FDA: n/a

FDA (other): HOC (1992)

JECFA: n/a

Trade association guidelines: FEMA PADI: n/a

IOFI: n/a

Composition: Whortleberry fruit contains flavonoids (including quercitrin, rutin, myrtillin, isoquercitrin, anthocyan pigments), ursolic acid, coumaric acid, tannins (7%), volatile alcohols, terpene hydrocarbons and carbonyl compounds (CoE, 2000). The leaves

contain flavonoids (including quercetin, quercitrin, rutin, myrtillin, isoquercitrin, anthocyan pigments), vaccinin and neomyrtillin, phenol glucosides, tannins, triterpenoids and alkaloids (CoE, 2000).

Aroma threshold values: n/a

Taste threshold values: n/a

WINTERGREEN

Botanical name: *Gaultheria procumbens* L.

Botanical family: Ericaceae

Other names: Boxberry; Checkerberry; Deerberry; Mountain tea; Canada tea; Patridgeberry

Foreign names: Gaultherie (Fr.), Wintergrün (Ger.), Gaulteria (Sp.), Gaulteria (It.)

Description: Wintergreen is an evergreen shrub with slender, creeping stems, assurgent, flowering branches with toothed leaves clustered at the top, white, bell-shaped flowers blossoming July to August, followed by red berries (checkerberries). The plant grows extensively in the woods of Canada and the United States (Pennsylvania). The leaves are harvested between June and September. Wintergreen has an aromatic odor and flavor similar to methyl salicylate.

Derivatives: Infusion and alcohol extract.

Consumption: Annual: n/a

Individual: n/a

Regulatory Status:

- CoE: n/a
- FDA: n/a
- FDA (other): HOC (1992)
- JECFA: n/a

Trade association guidelines: FEMA PADI: n/a

IOFI: n/a

Composition: The leaves of wintergreen are reported to contain arbutin, caffeic acid, ericolin, ferulic acid, gaultherase, gaultheric acid, gaultherin, gentisinc acid, methyl salicylate (5445 to 7920 ppm) *o*-pyrocatachuic acid, *p*-coumaric acid, *p*-hydroxybenzoic acid, primverose, protocatachuic acid, syringic acid, tannic acid, tannin, tricontane and vallininc acid.

Aroma threshold values: n/a

Taste threshold values: n/a

WINTERGREEN EXTRACT

CAS No.:	90045-28-6	FL No.:	n/a	FEMA No.:	3112	NAS No.:	3112
CoE No.:	n/a	EINECS No.:	289-888-0	JECFA No.:	n/a	EAFUS No.:	977092-74-2

Description: See Wintergreen.

Consumption: Annual: <1.00 lb

Individual: <1.00 mg/kg/day

Regulatory Status:

- CoE: n/a
- FDA: n/a
- FDA (other): See Wintergreen.
- JECFA: n/a

Trade association guidelines: FEMA PADI: 764.025 mg

IOFI: Natural

Reported uses (ppm): (FEMA, 1994)

Food Category	Usual	Max.
Alcoholic beverages	250.00	275.00
Baked goods	5000.00	7500.00
Frozen dairy	450.00	500.00

Food Category	Usual	Max.
Gelatins, puddings	450.00	500.00
Nonalcoholic beverages	250.00	275.00
Soft candy	4000.00	5000.00

Aroma threshold values: n/a

Taste threshold values: n/a

WINTERGREEN OIL

Other names: Gaultheria oil; Oils, wintergreen

CAS No.:	68917-75-9	FL No.:	n/a	FEMA No.:	3113	NAS No.:	3113
CoE No.:	n/a	EINECS No.:	n/a	JECFA No.:	n/a		

Description: Wintergreen essential oil is water steam-distilled from leaves charged into the still and allowed to macerate for several hours to hydrolyze the gaultherin glucoside (methyl salicylate + glucose). Distillation lasts from 5 to 6 hours and yields approximately 0.7% essential oil. The oil is often adulterated by intentionally co-distilling sweet birch (*Betula lenta*) bark. FCC (1996) has described wintergreen oil as obtained from the leaves of *G. procumbens* and bark of *B. lenta*. The oil has a strong, sweet, aromatic odor reminiscent of methyl salicylate, its main constituent.

Consumption: Annual: 2733.33 lb

Individual: 0.002316 mg/kg/day

Regulatory Status:

CoE: n/a

FDA: n/a

FDA (other): n/a

JECFA: n/a

Trade association guidelines: FEMA PADI: 42.238 mg

IOFI: Natural

Specifications: (FCC, 1996)

Acid value (max)	1.0
Angular rotation	Slightly levorotatory, exhibiting a rotation of not more than -1.5°
Assay	Not less than 98% and not more than 100.5% methyl salicylate ($C_8H_8O_3$)
Heavy metals (as Pb)	Passes test

Refractive index	Between 1.535 and 1.538 (20°C)
Solubility in alcohol	Passes test
Specific gravity	Between 1.176 and 1.182 (25°C)

Physical–chemical characteristics: Wintergreen oil is a colorless, yellowish or reddish liquid. It boils with decomposition between 219 to 224°C. It is soluble in alcohol and in glacial acetic acid, and it is very slightly soluble in water.

Essential oil composition: The oil contains approximately 98% methyl salicylate.

Reported uses (ppm): (FEMA, 1994)

Food Category	Usual	Max.
Alcoholic beverages	49.19	84.53
Baked goods	249.80	307.10
Chewing gum	1550.00	3006.00
Frozen dairy	58.81	184.30

Food Category	Usual	Max.
Gelatins, puddings	9.88	19.25
Hard candy	584.80	584.80
Nonalcoholic beverages	27.64	108.20
Soft candy	193.90	405.40

Aroma threshold values: n/a

Taste threshold values: n/a

WOODRUFF, SWEET

Botanical name: *Asperula odorata* L.; *Galium odoratum* (L.) Scop.

Botanical family: Rubiaceae

Other names: Woodruff; Sweet woodruff; Master of the wood; Woodward; European woodruff

Foreign names: Asperule odorante (Fr.), Waldmeister (Ger.), Asperula (Sp.), Asperula (It.)

CAS No.:	n/a	FL No.:	n/a	FEMA No.:	n/a	NAS No.:	6364
CoE No.:	n/a	EINECS No.:	n/a	JECFA No.:	n/a	EAFUS No.:	977070-09-9

Description: Woodruff sweet is a small, slightly sweet-scented perennial herb widespread throughout Europe and the Near East. It has very thin creeping rhizomes, both fertile and sterile stalks, and spear-like oblong leaves arranged about the central axis of the stalk (verticil) as spokes on a wheel. The verticils are spaced along the length of the stalk. The plant has terminal flowers (usually three) with white petals and blooms from June to July. The dried herb is commercially available throughout Europe. The whole plant is used. Sweet woodruff has a heavy, sweet, tobacco-like flavor and odor. The plant does not yield an essential oil upon steam distillation. While the fresh plant is nearly odorless, it exhibits a coumarin-like fragrance when dried.

Derivatives: Tincture (10% in 65% ethanol), infusion (5%); absolutes and concretes are rarely seen as articles of commerce.

Consumption: Annual: 50.00 lb

Individual: 0.00004237 mg/kg/day

Regulatory Status:

CoE: n/a

FDA: 21 CFR **172.510**

FDA (other): HOC (1992)

JECFA: n/a

Trade association guidelines: FEMA PADI: n/a

IOFI: Natural

Composition: The agreeable odor of sweet woodruff is due to coumarin. The plant also contains citric, malic and rubichloric acids, together with some tannic acid. Coumarin is present in glycosidic form, which is freed by the enzymatic action during the drying process. The other minor components include asperuloside (0.05%) and monoterpein.*

Aroma threshold values: n/a

Taste threshold values: n/a

* Sticher. (1971). *Pharm. Acta Helv.* **46**, 121.