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Review

Diversity of Secondary Metabolites in the Genus *Silene* L. (Caryophyllaceae)—Structures, Distribution, and Biological Properties

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Abstract: The genus *Silene* (family Caryophyllaceae) comprises more than 700 species, which are widely distributed in temperate zones of the Northern Hemisphere, but are also present in Africa and have been introduced in other continents. *Silene* produces a high diversity of secondary metabolites and many of them show interesting biological and pharmacological activities. More than 450 compounds have been isolated; important classes include phytoecdysteroids (which mimic insect molting hormones), triterpene saponins (with detergent properties), volatiles, other terpenoids and phenolics. This review focusses on the phytochemical diversity, distribution of *Silene* secondary metabolites and their biological activities.

Keywords: *Silene*; Caryophyllaceae; diversity; secondary metabolites; pharmacology; biological properties

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1. Introduction

The genus *Silene* (family Caryophyllaceae) comprises more than 700 species (allocated in 39 sections) of annuals, biennials, and perennials which are mainly distributed in temperate zones of the Northern Hemisphere of Eurasia and America, but also in Africa [1,2]. Presently, the genus *Silene* includes several taxa which were formerly treated as different genera, such as *Coronaria*, *Cucubalus*, *Lychnis*, *Melandrium*, *Petrocopsis*, and *Viscaria* [1]. There are two major centers of diversity in *Silene*: one in the Mediterranean/Middle East and one in Central Asia. A few taxa have been introduced to other continents.

The genus consists mainly of herbaceous plants and, more rarely, small shrubs or subshrubs. The flowers have free petals, with each petal consisting of a usually visible limb that can be divided or entire, and a claw that is included within the synsepalous calyx. *Silene* has been placed in the tribe *Sileneae* and the subfamily *Caryophylloideae*. In molecular phylogenetic studies, the genus *Silene* clusters in two major clades of approximately equal size, which are tentatively classified as *Silene* subgenus *Silene* and *Silene* subgenus *Behen* (Moench) Bunge [3,4]. In the most recent taxonomic revision covering the entire genus, *Silene* has been divided into 44 sections, without any rank above that [5]. Common names of *Silene* are campion and catchfly. Red Campion (*S. dioica*), white Campion (*S. latifolia*, *S. alba*) and bladder Campion (*S. vulgaris*) are common wildflowers throughout Europe. Some species of *Silene* have served as important model plants for studies in ecology, genetics and evolution by famous scientists such as Charles Darwin, Gregor Mendel, Carl Correns, Herbert G. Baker, and Janis Antonovics [6]. *Silene* is an important model system for genetic studies on gynodioecy, dioecy, and polyploidy.

Silene also includes a number of cultivated species and widespread weeds [7]. *S. acaulis*, *S. multifida* and *S. regia* have been cultivated as ornamental plants because they produce beautiful flowers [8]. The roots of several species, such as *S. latifolia*, *S. acaulis*, *S. kumaonensis*, and *S. conoidea* which are rich in saponins with detergent properties, have been traditionally used as a soap substitute for washing clothes similar to other plants of the Caryophyllaceae [9,10]. The soap is obtained by simmering roots in hot water [11,12]. A few species are edible such as *S. acaulis*, *S. cucubalis*, and *S. vulgaris* [13–16]. Especially young shoots and the leaves of *S. vulgaris* are much appreciated in the traditional gastronomy of Turkey, Italy, Austria, and Spain [14]. A number of *Silene* species have been used in traditional medicine to treat inflammations, bronchitis, cold, and infections or as a diuretic, antipyretic, analgesic, and emetic [17–24]. Phytoecdysteroids mimic molting hormones of insects and are therefore of interest for chemical ecology and for applications of plant derived insecticides. Because of page restrictions, a thorough review of traditional uses of members of *Silene* or their pharmacology is out of scope of this review.

Silene produces a diversity of secondary metabolites, many of them are important for the plants as defence compounds against herbivores and microbes [25,26]. In this review, the secondary metabolites which have been isolated from the genus *Silene* are tabulated in detail; the review is based on an analysis of the relevant literature and data bases such as PubMed, Scifinder, and ScienceDirect. The diversity of structures of identified phytochemicals, their names and corresponding plant sources are summarized in Table 1 (below the main text).

2. Phytochemical Diversity

Phytochemical investigations of the genus *Silene* have led to the isolation of several phytoecdysteroids [27], triterpene saponins [28], terpenoids, benzenoids, flavonoids [29], anthocyanidins, *N*-containing compounds [30], sterols, and vitamins [31,32] (see Table 1). The abundance and widespread occurrence of triterpene saponins is a typical feature of the family Caryophyllaceae. Of special interest is the presence of phytoecdysteroids which mimic insect molting hormones and which strongly interfere with the metamorphosis of insects. The predominantly edysteroid positive genera of *Silene*, (including the former genera *Coronaria*, *Lychnis* and *Petrocoptis*) are in the Silenoideae [33–35]. Information on the phytochemistry of the genera *Coronaria*, *Cucubalus*, *Lychnis*, *Melandrium*, *Petrocopsis*, and *Viscaria* is not included, except if it was published under the merged genus *Silene*. A chemotaxonomical analysis of the data with view on the molecular phylogeny of *Silene* will be part of a subsequent publication.

3. Biological Properties

3.1. In Vitro Biological Activities

3.1.1. Antimicrobial and Antifungal Activities

Erturk *et al.* [8] extracted the apolar fractions from chloroform extract of *S. multifida* and tested for the antimicrobial activities against six bacteria (*Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterobacter cloacae* and *Proteus vulgaris* and one pathogenic fungus *Candida albicans* (0.5 mg/mL). All fractions of *S. multifida* showed activity against all tested bacteria. Only two fractions showed antifungal activity. The oil samples of *S. vulgaris* and *S. cserei* subsp. *aeoniopsis* were also screened against the several standard strains of bacteria and the yeast *Candida* using the microdilution method [36]. Both of these oils displayed the same activity profile, having notable antibacterial activity against the Gram-negative bacterium *Klebsiella pneumoniae* at a concentration of 4 g/mL and significant antifungal activity against *Candida albicans* (16 g/mL). Methanol extracts from three *Silene* species from Iran (*S. gynodioca*, *S. spergulifolia* and S. *swertiifolia*) were screened for their possible *in vitro* antibacterial activities by the disc diffusion method [37]. Results indicated that *S. swertiifolia* has a strong antibacterial activity against three Gram-positive and gram-negative bacteria, namely *Haemophilus influenzae*, *Pseudomonas aeruginosa* and *Bacillus cereus*, whereas *S. spergulifolia* showed a strong inhibition against *Bacillus cereus*. Bajpai *et al.* [38] examined the chemical composition of the essential oil isolated from *S. armeria* and tested the efficacy of essential oil (5 µL/mL, corresponding to 1000 ppm/disc) and different extracts (7.5 µL/mL, corresponding to 1500 ppm/disc) against a diverse range of food spoilage and food-borne pathogens (*Bacillus subtilis* ATCC6633, *Listeria monocytogenes* ATCC19166, *Staphylococcus aureus* KCTC1916, *S. aureus* ATCC6538, *Pseudomonas aeruginosa* KCTC2004, *Salmonella typhimurium* KCTC2515, *Salmonella enteritidis* KCTC2021, *Escherichia coli* O157-Human, *E. coli* ATCC8739, *E. coli* O57:H7 ATCC43888 and *Enterobacter aerogenes* KCTC2190). The results of this study suggested that the essential oil and leaf extracts derived from *S. armeria* could be used for the development of novel types of antibacterial agents to control food spoilage and food-borne pathogens.

We have studied the antimicrobial activity of different extracts and phytoecdysteroids from *Silene* plants towards pathogenic microorganisms [39]. *Acinetobacter* spec., *Enterococcus faecalis*, *Klebsiella oxytoca*, *Pantoea agglomerans*, *Proteus rettgeri*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* strains were inhibited by the methanol extract of *S. wallichiana* (Minimal Inhibitory Concentration, MIC = 2.5 mg/mL), while *Escherichia coli* and *Klebsiella pneumoniae* were inhibited with a MIC = 1.25 mg/mL. The butanol extract of *S. wallichiana* showed activity against pathogenic bacteria *Acinetobacter* sp., *E. coli*, *K. pneumoniae*, *P. agglomerans*, *P. aeruginosa* and *P. rettgeri*, whereas chloroform extract inhibited only *Citrobacter freundii*, *E. coli* and *P. aeruginosa* (MIC = 1.25 mg/mL). The $CHCl_3$ extract of *S. brachuica* inhibited growth of three Gram-negative (*Enterococcus faecalis*, *Proteus rettgeri*, and *Pseudomonas aeruginosa*) and one Gram-positive (*Micrococcus luteus*) bacterial strain. The $CHCl_3$ extract of *S. viridiflora* was active against *M. luteus*, *P. rettgeri*, *Klebsiella pneumoniae*, and *P. aeruginosa*, whereas the extract of *S. wallichiana* exhibited activity against only pathogenic bacteria *E. coli*, *M. luteus* and *P. aeruginosa* [40]. Pure phytoecdysteroids (viticosterone E, 20-hydroxyecdysone-22-benzoate, 2-deoxy-20-hydroxyecdysone, 2-deoxyecdysone, 20-hydroxyecdysone and integristerone A) isolated from *S. wallichiana* exhibited very low activity against the bacteria [39]. Also a preliminary screening of the $CHCl_3$ extract from the aerial part of *S. guntensis* exhibited antibacterial effects against *Escherichia coli*, *P. aeruginosa*, and *Acinetobacter* sp. [41]. From above-mentioned results we can conclude that the apolar fractions of *Silene* exhibit moderate activity against both Gram-positive and Gram-negative bacteria, and this activity may be attributed to a synergistic effect, due to the presence of phenols and some monoterpenoids in the apolar fraction.

3.1.2. Antiviral Activity

The lipophilic extracts of a *S. vulgaris* were tested against the DNA virus *Herpes simplex* (HSV) and RNA virus *Parainfluenza* (PI-3) using Madin-Darby bovine kidney and Vero cell lines [42]. The extracts exerted substantial antiviral effects against both viruses, as compared to acyclovir and oseltamivir. Some plants which have a high amount of palmitic acid were previously reported to have a powerful antiviral activity against *H. simplex* (HSV) and *Parainfluenza* viruses (PIV) [43]. However, no correlation was found between antiviral activity and fatty acid contents of the extracts.

3.1.3. Antioxidant Activity

Methanol extracts from three *Silene* species from Iran (*S. gynodioca*, *S. spergulifolia* and *S. swertiifolia*) were screened for their possible *in vitro* antioxidant activities by three complementary test systems, namely DPPH free radical-scavenging, metal chelating activity and β-carotene/linoleic acid oxidation [37]. Results showed that *S. swertiifolia*, which contains high amount of phenolics and flavonoids, exhibited the greatest antioxidant activity. The extracts of *S. swertiifolia* and *S. spergulifolia* showed a higher potency than ascorbic acid in scavenging of DPPH free radical. In the metal-chelating assay all extracts had a lower activity than ascorbic acid. In the β-carotene/linoleic acid system, oxidation of linoleic acid was effectively inhibited by the *S. swertiifolia* extract. The radical scavenging activity of the plant extracts decreased in the following order: ascorbic acid (IC_{50} = 0.13 mg/mL) > *S. swertiifolia* (IC_{50} = 0.13 mg/mL) > *S. spergulifolia* (IC_{50} = 0.21 mg/mL) > *S. gynodioca* (IC_{50} = 0.29 mg/mL).

Conforti *et al.* [44] studied the *in vitro* antioxidant activity of the hydroalcoholic extract from *S. vulgaris*. A very good correlation between radical scavenging activity and polyphenol content (for *S. vulgaris* 67.5 mg/g of extract) was found. Taskin and Bitis [45] reported that *S. alba* subsp. *divaricata* leaves have beneficial effects on ferrous chelating, DPPH radical-scavenging and ABTS radical cation scavenging abilities. This plant contained the highest phenolic compounds and may thus exert protection against oxidative damage. The radical scavenging ability of the extracts and phytoecdysteroids of *S. guntensis* were evaluated by us using the reaction with the stable DPPH radical [46]. In our experiments phytoecdysteroids were ineffective for DPPH radical scavenging activity (IC_{50} value > 100 μg/mL). Maximum scavenging activity of DPPH was observed with the water extract (IC_{50} 68.90 μg/mL) of *S. guntensis*, followed by the activities of the butanol, methanol, and chloroform extracts with IC_{50} values of 69.12, 122.48, and 148.28 μg/mL, respectively. The activities of 20-hydroxyecdysone, 2-deoxy-20-hydroxyecdysone, and 2,3-diacetate-22-benzoate-20-hydroxyecdysone were 144.75, 157.29, and 291.38 μg/mL, respectively. However, we assume that the antioxidant effect of these extracts might be attributed to some co-eluting phenolic compounds and not to phytoecdysteroids, lipids *etc*.

3.1.4. Phagocytic Activity

Popov *et al.* [47] studied the effects of the polysaccharides from plants and callus of *S. vulgaris* (silenans) on uptake capacity and myeloperoxidase activity in the peripheral human neutrophils and monocytes and rat peritoneal macrophages *in vitro*. All polysaccharides (three silenans from the intact plant; pectic polysaccharides P1, P2 and P3) and two from the callus (acidic arabinogalactan C1 and pectin C2) enhanced uptake capacity at concentration of 15 mg/mL. The acidic arabinogalactan C1 was only found to stimulate lysosomal activity of the peripheral phagocytes. The effect of some polysaccharides was established in peritoneal resident macrophages. Pectins P1, P3 and C2 failed to enhance myeloperoxidase activity of the macrophages in calcium-free solution, whereas arabinogalactan C1 was independent of extracellular calcium. Polysaccharides studied failed to influence either complement receptor CR3- or scavenger receptor SR-mediated adhesion of the macrophages. The data obtained demonstrate that the *S. vulgaris* may be used as sources of immunoactive polysaccharides and that pectins and weakly acidic arabinogalactan seem to stimulate macrophages through different mechanisms. Complement receptor type 3 and scavenger receptor failed to mediate the cell activation induced by plant polysaccharides.

3.1.5. Inhibition of Nitric Oxide (NO) Production

Conforti *et al.* [44] examined whether *S. vulgaris* can modulate the production of NO by the RAW 264.7 mouse macrophage cell line pre-treated with a hydroalcoholic extract (10–1000 μg/mL) prior to activation by bacterial lipopolysaccharide (LPS). The treatment of RAW 264.7 macrophages with LPS (1 μg/mL) for 24 h, induced NO production which can be quantified by utilising the chromogenic Griess reaction and measuring the accumulation of nitrite, a stable metabolite of NO. The beneficial effect of extracts on the quenching of inflammatory mediators in macrophages can be mediated through oxidative degradation of phagocytosis products, such as O_2^- and HOCl. *S. vulgaris* had a weak cytotoxicity (202 ± 2.6 μg/mL), while the reference drug indomethacin showed cytotoxicity with IC_{50} = 58 μg/mL.

3.1.6. Antitumor Activity

In our *in vitro* experiments pure compounds, such as phytoecdysteroid 2,3-diacetate-22-benzoate-20-hydroxyecdysone showed a moderate inhibition against HeLa and HepG-2 cells (IC_{50} values (127.97 ± 11.34 μM) and (106.76 ± 7.81 μM), respectively), while 2-deoxy-20-hydroxyecdysone inhibited MCF-7 cells at a concentration IC_{50} = 126.54 ± 12.09 μM [46]. Conforti *et al.* [44] reported that a hydroalcoholic extract from *S. vulgaris* showed a weak cytotoxicity against the murine monocytic macrophage cell line RAW 264.7 (IC_{50} = 712 μg/mL). Behzad *et al.* [48] also informed that *S. ampulata*, *S. peduncularis* plants showed no cytotoxic activity (IC_{50} > 100 μL/mL) against normal and cancer cell lines.

The triterpene saponins from the roots of *S. fortunei* were tested in an *in vitro* lymphocyte proliferation assay. The saponins, jenisseensosides C and D and their deacylated derivatives stimulated the proliferation of the Jurkat tumor cell lines (human T-cell leukaemia) at low concentrations (1 nM to 5 μM). At high concentrations (>10 μM), they inhibited the proliferation of the cells probably due to the induction of apoptosis [28]. These authors [49] reported that the trans- and cis-*p*-methoxycinnamoyl triterpene saponins jenisseensosides A to D (from *S. jenisseensis* and *S. fortunei*) increased the accumulation and cytotoxicity of the anticancer agent cisplatin in HT 29 (human colon tumor) cells.

3.2. In Vivo Biological Activities

3.2.1. Antitumor Activity

Zibareva [50] reported that the ecdysteroid-containing extract of *S. viridiflora* exerted antitumor activity *in vivo*, however investigations with individual phytoecdysteroids showed no effect [51]. Also, El-Mofti [52,53] reported that ecdysone was able to induce neoplastic lesions in toads and mice, a result which appears somewhat surprising when considering the very low doses of ecdysone used. The phytoecdysteroids cyasterone, polypodine B, and decumbesterone A showed potent antitumor activities in a mouse-skin model *in vivo* in a two-stage carcinogenesis trial, using 7,12-dimethylbenz[a]anthracene as initiator and 12-*O*-tetradecanoylphorbol-13-acetate (TPA) as promoter [54]. However, Lagova and Valueva [55] reported that 20-hydroxyecdysone was mainly ineffective in preventing tumor growth in mice, but it stimulated the growth of mammary gland carcinomas. Because ecdysteroids structurally resemble sex hormones, they might indeed bind to steroid hormone receptors in mammals and stimulate the growth of hormone-dependent tumors. Binding studies performed so far for 20-hydroxyecdysone and a set of phytoecdysteroids [56,57] do not support this hypothesis, but they were not performed with all *in vivo* metabolites.

3.2.2. Immunomodulatory Activity

The total ecdysteroid preparation from *S. viridiflora* for immunostimulation *in vivo* was analyzed by Shakhmurova *et al.* [58]. The preparation (5 mg/kg) acts as an effective immunomodulator in normal mice and in mice with secondary immunodeficiency developed under irradiation, and with acute toxic hepatitis. The immunomodulating activity of total ecdysteroids from *S. viridiflora* is comparable with that of the known immunity stimulator T-activin, a polypeptide preparation from cattle thymus. Furthermore, Bushneva *et al.* [59] showed that pectic polysaccharide named silenan which was isolated from the aerial parts of *S. vulgaris*, possess immunomodulatory activity. Ghonime *et al.* [60] confirmed the immunomodulatory activity *Silene* species. Extracts from *S. nocturna* were examined for their immunomodulatory effect in Balb/c mice. Treatment (intraperitoneal injection) with five doses of the methanol extract enhanced the total white blood cells count (up to 1.2×10^4 cells/mm^3). Bone marrow cell density also increased significantly after the administration of the extract. Furthermore, spleen weight of the treated groups was significantly increased as compared to controls. Two groups of mice were immunosuppressed with cyclophosphamide; the one which was pre-treated with *S. nocturna* extracts significantly restored their resistance against lethal infection with the predominantly granulocyte-dependant *Candida albicans*.

3.2.3. Adaptogen and Actoprotection Activity

The total ecdysteroid preparation from *S. viridiflora* ("Siverinol") and *S. brachuica* ("Silekbin") was analyzed for actoprotector and adaptogenic activity *in vivo* by several researchers [61–64]. Siverinol (oral intake doses ranged between 100 and 3000 mg/kg b.w. over 14 days) increased endurance (swimming tests) and reduced the recovery time (lactic acid recycling, regeneration of glycogen stores) after a severe physical load. Chronic exposure over 7–14 days resulted in a significant stimulation of erythropoiesis and increase of muscle size. Moreover, it reduced the stress effects of an extended physical exercise. The pharmacocorrective influence of Siverinol and Silekbin to biochemical mechanisms of dis-adaptation and basal processes of bioenergetics in the muscle tissue of the experimental animals was the base of actoprotector activity.

3.2.4. Hepatoprotection Activity

The effect of an oral administration of a 50% ethanol extract from *S. aprica* on acute liver injury was examined in rats intoxicated with carbon tetrachloride and acetaminophen [65]. The results indicated that *S. aprica* protected the liver intoxication as judged by morphological and biochemical observations. An increase in both lipid peroxidation and triglyceride concentrations occurred in the liver after carbon tetrachloride injection; *S. aprica* administration significantly reduced these changes. Also Shin *et al.* [66] reported that a *S. takesimensis* extract or a mixed extract with *Melandrium firmum* relieved fibrotic liver damage induced by carbon tetrachloride through inhibition of ALT and AST enzymes in the liver. The extracts inhibited hepatic fibrosis without affecting liver stromal cells by decreasing the amount of collagen, alpha-smooth muscle actin, and TGF-β inside the liver tissues.

3.2.5. Electrical Activity of the Heart

Golovko and Bushneva [21] studied the effect of silenan (a pectin polysaccharide from *S. vulgaris*), during development of arrhythmia and in disorders of cell-cell interactions in the zone of contact between the venous sinus and atrial cells. Electrical activity of myocardial cells was studied with spontaneously contracting strips from the sinoatrial area of *Rana temporaria* heart. Silenan corrected disorders in the conduction of action potentials between cells of the sinoatrial area of frog heart forming a functional syncytium. Recovery of action potential conduction in the sinoatrial cells was recorded in long-term experiments (>8 h). The effect of silenan mainly concerned the background of arrhythmic generation and impaired propagation of action potentials.

3.2.6. Insecticidal Activity

Phytoecdysteroids are analogues of insect molting hormones and sometimes their concentration in plants can reach 0.01%–3%. Even at ultralow concentrations they can affect insect development. For example, ecdysteroid 20-hydroxyecdysone at concentrations of 10^{-8} to 10^{-9} M initiates the transformations occurring in embryogenesis and during larval development with instant metamorphosis to the adult insect [67]. The potential insect deterrent activity of several *Silene* species, such as *S. conoidea*, *S. ampulata* and *S. peduncularis,* have been reported by several authors [48,68]. Chermenskaya *et al.* [69] reported that ethanol extracts of the aerial parts of *S. sussamyrica* showed substantial insecticidal activity, especially against western flower thrips larvae *Frankliniella occidentalis* Perg. (Thysanoptera: Thripidae). In this case we can assume this plant probably contained phytoecdysteroids and these compounds caused death of *F. occidentalis* larvae.

4. Conclusions

The genus *Silene* is known to be a source of biological active compounds. Phytochemical analysis of *Silene* demonstrated their richness in various compounds (>450 compounds have been isolated) belonging to different structural types, such as phytoecdysteroids, triterpene saponins, terpenoids, benzenoids, flavonoids, *N*-containing compounds, sterols, vitamins and others. The most prominent compounds in *Silene* species are the phytoecdysteroids, which have a similar chemical structure to molting hormones of insects. From data collected in this review, it is evident that the genus *Silene* comprises a wide range of pharmaceutically promising, interesting, and valuable plants. Some species of the genus *Silene* are used as ornamental plants and in folk medicine to treat inflammations, bronchitis, cold, and infections or as a diuretic, antipyretic, analgesic, emetic, *etc*. Many of the traditional uses have been validated by scientific research. It would be important for future studies to include the former genera *Coronaria*, *Cucubalus*, *Lychnis*, *Melandrium*, *Petrocopsis*, and *Viscaria*, which presently are partly included in the larger genus *Silene* [1].

The collected data provides a means to understand the latest developments in the pharmacology and phytochemistry of the genus *Silene*. Current pharmacological data is in many cases limited to studies on plant extracts and, hence, efforts are needed towards the isolation of biologically active compounds. Due to their various promising activities, further studies are warranted to be carried out on the drug development of *Silene* extracts and their constituents.

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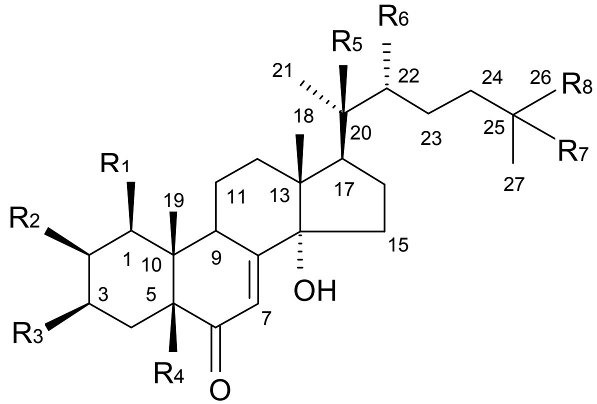
Author Contributions

Nilufar Mamadalieva collected the information and drafted the manuscript which was interpreted and edited by Michael Wink. Rene Lafont conducted the biological part of the manuscript. All authors read and finally approved the final review.

Table 1. Structures and Distribution of Secondary Metabolites in the Genus *Silene*.

Triterpenoids

Phytoecdysteroids



Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R1	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**		
Brahuisterone	H	H	OH	OH	H	OH	OH	CH_3	*S. brahuica* Boiss	[70]
2-Deoxy-20,26-dihydroxyecdysone	H	H	OH	H	OH	OH	OH	CH_2OH	*S. pseudotites* Bess *ex* Reichenb	[71,72]
22-Deoxy-20,26-dihydroxyecdysone	H	OH	OH	H	OH	H	OH	CH_2OH	*S. nutans* L.	[73,74]
2-Deoxyecdysone	H	H	OH	H	H	OH	OH	CH_3	*S. brahuica* Boiss, *S. claviformis* Litv, *S. fridvaldszkyana* Hampe, *S. gigantea* L., *S. graminifolia* Otth, *S. latifolia* (Gilib) Aschers, *S. otites* (L.) Wibel, *S. praemixta* M Pop, *S. pseudotites* Bess *ex* Reichenb, *S. repens* Patrin, *S. roemeri* Friv, *S. scabrifolia* Kom, *S. tomentella* Schischk, *S. wallichiana* Klotsch	[71,72,75–98]
2-Deoxyecdysone-3-acetate	H	H	OAc	H	H	OH	OH	CH_3	*S. scabrifolia* Kom	[99]

Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
2-Deoxyecdysone-22-acetate	H	H	OH	H	H	OAc	OH	CH_3	*S. brahuica* Boiss, *S. otites* (L.) Wibel	[74,100]
2-Deoxyecdysone-22-benzoate	H	H	OH	H	H	OBz	OH	CH_3	*S. wallichiana* Klotsch	[85]
2-Deoxyecdysone-22-glucoside	H	H	OH	H	H	OGlu	OH	CH_3	*S. praemixta* M Pop, *S. pseudotites* Bess *ex* Reichenb	[71,72,98]
2-Deoxy-20-hydroxyecdysone	H	H	OH	H	OH	OH	OH	CH_3	*S. antirrhina* L., *S. brahuica* Boiss, *S. chlorifolia* Smith, *S. claviformis* Litv, *S. cretica* L., *S. disticha* Willd, *S. fridvaldszkyana* Hampe, *S. gigantea* L., *S. guntensis* B Fredtsch, *S. italica* (L.) Pers, *S. italica* ssp. *nemoralis*, *S. latifolia* (Gilib) Aschers, *S. linicola* C.C.Gmelin., *S. otites* (L.) Wibel, *S. portensis* L., *S. praemixta* M Pop, *S. pseudotites* Bess *ex* Reichenb, *S. repens* Patrin, *S. roemeri* Friv, *S. scabrifolia* Kom, *S. viridiflora* L., *S. wallichiana* Klotsch	[46,71,72,76–79,81,82,85–94,96–98,100–113]
2-Deoxy-20-hydroxyecdysone-3-acetate	H	H	OAc	H	OH	OH	OH	CH_3	*S. otites* (L.) Wibel, *S. praemixta* M Pop	[114,115]
5α-2-Deoxy-20-hydroxyecdysone-3-acetate	H	H	OAc	H (α)	OH	OH	OH	CH_3	*S. otites* (L.) Wibel	[114]
2-Deoxy-20-hydroxyecdysone-22-acetate	H	H	OH	H	OH	OAc	OH	CH_3	*S. otites* (L.) Wibel	[74]
2-Deoxy-20-hydroxyecdysone-25-acetate	H	H	OH	H	OH	OH	OAc	CH_3	*S. wallichiana* Klotsch	[116]

Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**		
2-Deoxy-20-hydroxyecdysone-3-benzoate	H	H	OBz	H	OH	OH	OH	CH_3	*S. wallichiana* Klotsch	[77]
2-Deoxy-20-hydroxyecdysone-22-benzoate	H	H	OH	H	OH	OBz	OH	CH_3	*S. nutans* L., *S. otites* (L.) Wibel, *S. supina* Bieb, *S. tatarica* (L.) Wild	[74,81,91,101,117–121]
2-Deoxy-20-hydroxyecdysone-3-crotonate	H	H	$OCOC_2H_2CH_3$	H	OH	OH	OH	CH_3	*S. otites* (L.) Wibel	[114]
2-Deoxy-20-hydroxyecdysone-3,22-diacetate	H	H	OAc	H	OH	OAc	OH	CH_3	*S. otites* (L.) Wibel	[114]
2-Deoxy-20-hydroxyecdysone-22-glucoside	H	H	OH	H	OH	O-β-D-Glu	OH	CH_3	*S. italica* ssp. *nemoralis*	[104]
2-Deoxy-20-hydroxyecdysone-25-glucoside	H	H	OH	H	OH	OH	O-β-D-Glu	CH_3	*S. gigantea* L.	[91,92,95]
2-Deoxyintegristerone A	OH	OH	OH	H	OH	OH	OH	CH_3	*S. italica* ssp. *nemoralis*, *S. otites* (L.) Wibel, *S. pseudotites* Bess *ex* Reichenb, *S. viridiflora* L.	[74,102,105,112,122]
5α-2-Deoxyintegristerone A	OH	OH	OH	H (α)	OH	OH	OH	CH_3	*S. italica* ssp. *nemoralis*, *S. pseudotites* Bess *ex* Reichenb	[72,110]
22-Deoxyintegristerone A	OH	OH	OH	H	OH	H	OH	CH_3	*S. italica* ssp *nemoralis*, *S. nutans* L.	[74,105]
5α-22-Deoxyintegristerone A	OH	OH	OH	H (α)	OH	H	OH	CH_3	*S. nutans* L.	[74]

Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
2-Deoxypolypodine B-3-glucoside	H	H	*O*-β-D-Glu	OH	OH	OH	OH	CH_3	*S. pseudotites* Bess *ex* Reichenb, *S. viridiflora* L.	[71,72,123]
2-Deoxy-5,20,26-trihydroxyecdysone	H	H	OH	OH	OH	OH	OH	CH_2OH	*S. viridiflora* L.	[122]
20,26-Dihydroxyecdysone (Podecdysone C)	H	OH	OH	H	OH	OH	OH	CH_2OH	*S. fridvaldszkyana* Hampe, *S. nutans* L., *S. otites* (L.) Wibel., *S. viridiflora* L.	[71,74,76,88–90,93–95,124]
20,26-Dihydroxyecdysone-2,22-diacetate	H	OAc	OH	H	OH	OAc	OH	CH_2OH	*S. viridiflora* L.	[71,125]
20,26-Dihydroxyecdysone-3,22-diacetate	H	OH	OAc	H	OH	OAc	OH	CH_2OH	*S. viridiflora* L.	[71,125]
Ecdysone	H	OH	OH	H	H	OH	OH	CH_3	*S. cretica* L., *S. disticha* Willd, *S. echinata* Otth, *S. italica* (L.) Pers., *S. italica* ssp. *nemoralis*, *S. linicola* C.C.Gmelin., *S. otites* (L.) Wibel, *S. portensis* L., *S. praemixta* M Pop, *S. pseudotites* Bess. *ex* Reichenb, *S. radicosa* Bois et Heldr	[71,72,88–90,92,93,96,107,109,111–115]
Ecdysone-22-sulfate	H	OH	OH	H	H	OSO_3H	OH	CH_3	*S. brahuica* Boiss	[126]
Ecdysteroside	H	OH	*O*-α-D-Gal (1→6) α-D-Gal	H	OH	OH	OH	CH_3	*S. tatarica* (L.) Wild	[127]
5α-20-Hydroxyecdysone	H	OH	OH	H (α)	OH	OH	OH	CH_3	*S. italica* ssp. *nemoralis*	[110]
5α-20-Hydroxyecdysone-22-benzoate	H	OH	OH	H (α)	OH	OBz	OH	CH_3	*S. scabrifolia* Kom	[128]

Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
20-Hydroxyecdysone	H	OH	OH	H	OH	OH	OH	CH_3	*S. acaulis* (L.) Jacg, *S. altaica* Pers, *S. ambigua* Turcz, *S. antirrhina* L., *S. apetala* Willd, *S. aprica* Turel, *S. armeria* L., *S. bashkirorum* Janish, *S. bellidifolia* Juss. *ex* Jacq, *S. bergiana* Lindm, *S. borystenica* (Gruner) Walters, *S. bourgeaui* H. Christ, *S. brachypoda* Rouy, *S. brahuica* Boiss, *S. burchelli* Otth, *S. campanulata*, *S.* Watson, *S. caramanica* Boiss, *S. catholica* (L.) Aiton fil, *S. caucasica* Boiss, *S. chamarensis* Turcz, *S. chlorantha* Willd, *S. chlorifolia* Smith, *S. ciliata* Pourret, *S. ciliata* var *graefteri* (P), *S. claviformis* Litv, *S. coeli-rosa* (L.) Godron in Gren, *S. colorata* Poiret, *S. colorata* ssp. *trichocalysina*, *S. coronaria* (L.) Clairv, *S. cretaceae* Fisch, *S. cretica* L., *S. damboldtiana* Greuter et Melzh, *S. densiflora* (L.) Wib. Drurv, *S. dioica* (L.) Clairv, *S. disticha* Willd, *S. echinata* Otth, *S. elegans* L., *S. fetissovii* Lazkov, *S. firma* Siebold et Zucc, *S. flavescens* Waldst et Kit, *S. foliosa* Maxim, *S. fridvaldszkyana* Hampe, *S. fruticosa* L., *S. fruticulosa* (Pall.) Schishk, *S. gallica* L., *S. gallica var. quiquivulnera* (L.) Koch, *S. gebleriana* Schrenk, *S. gigantea* L., *S. goulimyi* Turrill, *S. graefferi* Guss, *S. graminifolia* Otth, *S. guntensis* B Fredtsch, *S. hifacensis* Rouy *ex* willk, *S. holopetala* Lebed, *S. ichebogda* Glub, *S. incurvifolia* Kar et Kir, *S. italica* (L.) Pers, *S. italica*	[46,71,72,75,78–93,95–98,101,104, 106–109,111–113,115,117,121,129–140]

Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
20-Hydroxyecdysone	H	OH	OH	H	OH	OH	OH	CH_3	ssp. *nemoralis*, *S. jenisseensis* Willd, *S. kungessana* B Fedtsch, *S. latifolia* (Gilib) Aschers, *S. linicola* C.C.Gmelin, *S. longicalycina* Kom, *S. longicilia* (Brot) Otth, *S. mellifera* Boiss. et Reuter, *S. melzheimeri* Greuter, *S. micropetala* Lag, *S. mollissima* (L.) Pers, *S. mongolica* Maxim, *S. multicaulis* Guss, *S. multiflora* (Waldst et Kit) Pers, *S. nemoralis* Waldst et Kit, *S. nutans* L., *S. obovata* Schischk., *S. odoratissima* Bunge, *S. oligantha* Boiss, *S. otites* (L.) Wibel, *S. otites* var. *parviflorus*, *S. paradoxa* L., *S. parnassica* Boiss, *S. patula* Desf, *S. portensis* L., *S. praemixta* M Pop, *S. pseudotites* Bess. *ex* Reichenb, *S. psevdovelutina* Rothm, *S. pygmaea* Adams, *S. quinquevulnera* L., *S. radicosa* Bois et Heldr, *S. regia*, *S. reichenbachii* Vis, *S. repens* Patrin, *S. roemeri* Friv, *S. rubella* L., *S. saxatilis* Sims, *S. saxifraga* L., *S. scabriflora* Brot, *S. scabrifolia* Kom, *S. schafta* S.G.Gmel. *ex* Hohen, *S. schischkinii* (M Pop) Vved, *S. schmuckeri* Wettst, *S. secundiflora* Otth, *S. sendtneri* Boiss, *S. sericea* All, *S. sieberi* Fenzl, *S. sobolevskajae* Czer, *S. supina* Bieb, *S. spergulifolia* (Willd) Bieb, *S. squamigera* Boiss, *S. stenophylla* Ledeb, *S. stylosa* Bunge, *S. sussamyrica* Lazkov, *S. tatarica* (L.) Wild, *S. thessalonica* Boiss et Heldr, *S. tomentella* Schischk, *S. turchaninova* Lazkov, *S. turgida* L., *S. uralensis* (Rupr) Bocquet, *S. viridiflora* L., *S. viscosa* (L.) Pers, *S. wallichiana* Klotsch, *S. wolgensis* (Hornem) Otth, *S. zawadskii* Herbich	[46,71,72,75,78–93,95–98,101,104, 106–109,111–113,115,117,121,129–140]

Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
20-Hydroxyecdysone-2-acetate	H	OAc	OH	H	OH	OH	OH	CH_3	*S. otites* (L.) Wibel	[102,112]
20-Hydroxyecdysone-3-acetate	H	OH	OAc	H	OH	OH	OH	CH_3	*S. otites* (L.) Wibel	[102,112]
20-Hydroxyecdysone-22-acetate	H	OH	OH	H	OH	OAc	OH	CH_3	*S. otites* (L.) Wibel	[74]
20-Hydroxyecdysone-20-benzoate	H	OH	OH	H	OBz	OH	OH	CH_3	*S. tatarica* (L.) Wild	[141]
20-Hydroxyecdysone-22-benzoate	H	OH	OH	H	OH	OBz	OH	CH_3	*S. otites* (L.) Wibel, *S. scabrifolia* Kom, *S. wallichiana* Klotsch	[74,83,142]
20-Hydroxyecdysone-22-benzoate-25-glucoside	H	OH	OH	H	OH	OBz	O-β-D-Glu	CH_3	*S. otites* (L.) Wibel	[74]
20-Hydroxyecdysone -2,3-diacetate-22-benzoate	H	OAc	OAc	H	OH	OBz	OH	CH_3	*S. guntensis* B Fredtsch	[46]
20-Hydroxyecdysone-22,25-dibenzoate	H	OH	OH	H	OH	OBz	OBz	CH_3	*S. scabrifolia* Kom	[142]
20-Hydroxyecdysone-3-glucoside	H	OH	O-β-D-Glu	H	OH	OH	OH	CH_3	*S. otites* (L.) Wibel	[103]
20-Hydroxyecdysone-25-glucoside	H	OH	OH	H	OH	OH	O-β-D-Glu	CH_3	*S. otites* (L.) Wibel	[74]
26-Hydroxyintegristerone A	OH	OH	OH	H	OH	OH	OH	CH_2OH	*S. fridvaldszkyana* Hampe	[95]
26-Hydroxypolypodine B	H	OH	OH	OH	OH	OH	OH	CH_2OH	*S. fridvaldszkyana* Hampe, *S. nutans* L., *S. viridiflora* L.	[71,74,95,108]
Inokosterone	H	OH	OH	H	OH	OH	H	CH_2OH	*S. disticha* Willd, *S. pseudotites* Bess. *ex* Reichenb, *S. regia* Sims	[72,95,112]

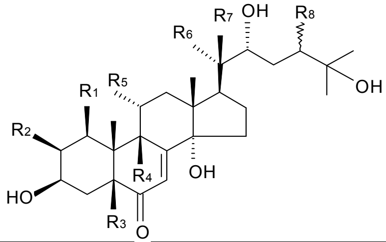
Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
Integristerone A	OH	OH	OH	H	OH	OH	OH	CH_3	*S. brahuica* Boiss., *S. claviformis* Litv, *S. fridvaldszkyana* Hampe, *S. gigantea* L., *S. italica* ssp. *nemoralis*, *S. nutans* L., *S. otites* (L.) Wibel, *S. repens* Patrin, *S. scabrifolia* Kom, *S. supina* Bieb, *S. tatarica* (L.) Wild, *S. tomentella* Schischk, *S. viridiflora* L., *S. wallichiana* Klotsch	[74,77–81,83,86,87,92,95,104,108,112,135,143]
Integristerone A-25-acetate	OH	OH	OH	H	OH	OH	OAc	CH_3	*S. brahuica* Boiss	[144]
Polypodine B	H	OH	OH	OH	OH	OH	OH	CH_3	*S. altaica* Pers, *S. antirrhina* L., *S. brachypoda* Rouy, *S. brahuica* Boiss, *S. campanulata* S. Watson, *S. caramanica* Boiss, *S. catholica* (L.) Aiton fil, *S. caucasica* Boiss, *S. chlorifolia* Smith, *S. ciliata* Pourret, *S. cretica* L., *S. damboldtiana* Greuter et Melzh, *S. disticha* Willd, *S. echinata* Otth, *S. fridvaldszkyana* Hampe, *S. italica* (L.) Pers, *S. italica* ssp. *nemoralis*, *S. linicola* C.C.Gmelin, *S. mellifera* Boiss et Reuter, *S. nutans* L., *S. paradoxa* L., *S. parnassica* Boiss, *S. pseudotites* Bess. *ex* Reichenb, *S. radicosa* Bois et Heldr, *S. regia* Sims, *S. repens* Patrin, *S. roemeri* Friv, *S. schmuckeri* Wettst, *S. sendtneri* Boiss, *S. supina* Bieb, *S. tatarica* (L.) Wild, *S. tomentella* Schischk, *S. viridiflora* L.	[71,72,78–81,84,86,88–93,95–97,101,104, 106–108,111–113,118,131,135]
Ponasterone A	H	OH	OH	H	OH	OH	H	CH_3	*S. antirrhina* L., *S. brahuica* Boiss, *S. chlorifolia* Smith, *S. disticha* Willd, *S. echinata* Otth, *S. italica* (L.) Pers, *S. portensis* L., *S. pseudotites* Bess. *ex* Reichenb, *S. radicosa* Bois et Heldr, *S. regia* Sims	[50,71,72,88–90,92,94,96,106,111–113]

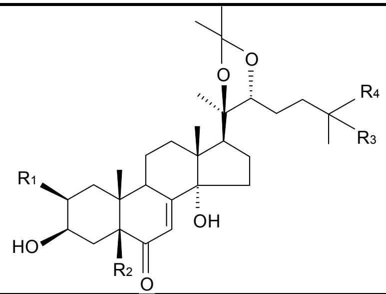
Table 1. *Cont.*

Name	Structure								Plant Source	Reference
	Substituents in Steroidal Core				Substituents in Side-Chain					
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8		
Sileneoside A	H	OH	OH	H	OH	O-α-D-Gal	OH	CH_3	*S. brahuica* Boiss, *S. nutans* L., *S. scabrifolia* Kom, *S. supina* Bieb, *S. tatarica* (L.) Wild, *S. viridiflora* L.	[95,108,112,135]
Sileneoside B	H	OH	O-β-D-Gal	H	OH	O-β-D-Gal	OH	CH_3	*S. brahuica* Boiss	[136]
Sileneoside C	OH	OH	OH	H	OH	O-α-D-Gal	OH	CH_3	*S. brahuica* Boiss	[137]
Sileneoside D	H	OH	O-β-D-Gal	H	OH	OH	OH	CH_3	*S. brahuica* Boiss, *S. scabrifolia* Kom, *S. supina* Bieb, *S. tatarica* (L.) Wild, *S. viridiflora* L.	[108,112,143,145]
Silenoside E (Blechnoside A)	H	H	O-β-D-Glu	H	H	OH	OH	CH_3	*S. brahuica* Boiss	[84]
5α-Silenoside E	H	H	O-β-D-Glu	H (α)	H	OH	OH	CH_3	*S. brahuica* Boiss	[146]
Sileneoside F	H	H	O-β-D-Glu	OH	H	OH	OH	CH_3	*S. brahuica* Boiss	[147]
Sileneoside G	H	OH	O-α-D-Glu	H	OH	O-α-D-Gal	OH	CH_3	*S. brahuica* Boiss	[148]
Sileneoside H	OH	OH	OH	H	OH	O-α-D-Gal	OAc	CH_3	*S. brahuica* Boiss	[149]
Taxisterone	H	OH	OH	H	OH	H	OH	CH_3	*S. italica* ssp. *nemoralis*, *S. nutans* L., *S. viridiflora* L.	[104,150,151]
Tomentesterone A	H	H	OH	H (α)	H	OAc	OBz	CH_3	*S. tomentella* Schischk	[80]
Tomentesterone B	H	H	OH	H (α)	H	OH	OBz	CH_3	*S. tomentella* Schischk	[152]
Viticosterone E	H	OH	OH	H	OH	OH	OAc	CH_3	*S. brahuica* Boiss, *S. linicola* C.C.Gmelin, *S. otites* (L.) Wibel, *S. praemixta* M Pop, *S. tomentella* Schischk, *S. wallichiana* Klotsch	[80,85,102,107,112,115,135]
Viticosterone E-22-benzoate	H	OH	OH	H	OH	OAc	OAc	CH_3	*S. wallichiana* Klotsch	[104,153]

Table 1. *Cont.*



Name	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	Plant Source	Reference
24(28)-Dehydromakisterone A	H	OH	H	H	H	CH_3	OH	CH_2	*S. fridvaldszkyana* Hampe, *S. italica* ssp. *nemoralis*, *S. otites* (L.) Wibel, *S. roemeri* Friv	[71,76,88–90,92–95,104,112]
2-Deoxy-21-hydroxyecdysone	H	H	H	H	H	CH_2OH	H	H	*S. otites* (L.) Wibel, *S. pseudotites* Bess. *ex* Reichenb	[102,112]
5α-2-Deoxy-21-hydroxyecdysone	H	H	H (α)	H	H	CH_2OH	H	H	*S. otites* (L.) Wibel	[102]
9α,20-Dihydroxyecdysone	H	OH	H	OH (α)	H	CH_3	OH	H	*S. italica* ssp. *nemoralis*	[109,110]
9β,20-Dihydroxyecdysone	H	OH	H	OH	H	CH_3	OH	H	*S. italica* ssp. *nemoralis*	[110]
Makisterone A	H	OH	H	H	H	CH_3	OH	CH_3	*S. otites* (L.) Wibel	[112]
Nusilsterone	OH	OH	H	H	H	CH_3	OH	OH	*S. nutans* L.	[154]
Turkesterone	H	OH	H	H	OH	CH_3	OH	H	*S. linicola* C. C. Gmelin	[107]



Name	R_1	R_2	R_3	R_4	Plant Source	Reference
2-Deoxy-20-hydroxyecdysone-20,22-acetonide	H	H	OH	CH_3	*S. viridiflora* L.	[122]
5α-2-Deoxy-20-hydroxyecdysone-20,22-acetonide	H	H (α)	OH	CH_3	*S. viridiflora* L.	[155]
2-Deoxy-5,20,26-trihydroxyecdysone-20,22-acetonide	H	OH	OH	CH_2OH	*S. viridiflora* L.	[122]
20,26-Dihydroxyecdysone-20,22-acetonide	OH	H	OH	CH_2OH	*S. viridiflora* L.	[122]

Table 1. *Cont.*

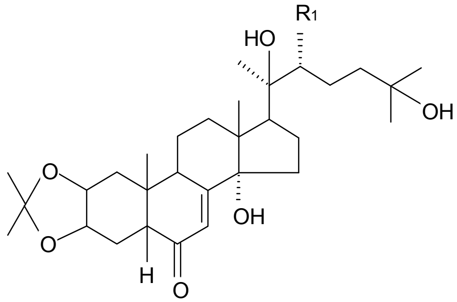
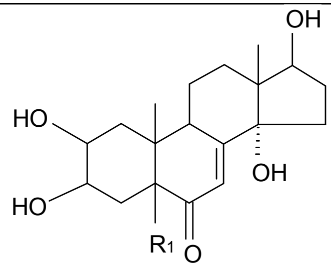
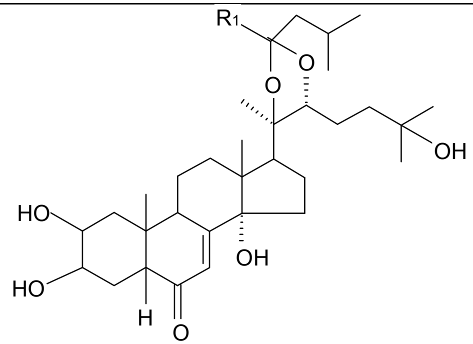
20-Hydroxyecdysone-20,22-acetonide	OH	H	OH	CH_3	*S. scabrifolia* Kom	[156]
20-Hydroxyecdysone 20,22-acetonide-25-acetate	OH	H	OAc	CH_3	*S. viridiflora* L.	[123]
5,20,26-Trihydroxyecdysone-20,22-acetonide	OH	OH	OH	CH_2OH	*S. viridiflora* L.	[122]
20-Hydroxyecdysone-2,3-acetonide	R_1 = OH				*S. scabrifolia* Kom	[142]
20-Hydroxyecdysone-2,3-acetonide-22-benzoate	R_1 = OBz				*S. scabrifolia* Kom	[83,142]
5α-Dihydro rubrosterone	R_1 = H (α)				*S. otites* (L.) Wibel	[103]
5β-Dihydro rubrosterone	R_1 = H				*S. otites* (L.) Wibel	[103]
20, 22-Acetal isovaleric aldehyde-5β-cholest-7-en-2β,3β,14α,20*R*,22*R*,25-hexahydroxy-6-on	R_1 = H (α)				*S. claviformis* Litv	[87]
20,22-Acetal epiisovaleric aldehyde-5β-cholest-7-en-2β,3β,14α,20*R*,22*R*,25-hexahydroxy-6-on	R_1 = H				*S. claviformis* Litv	[87]

Table 1. *Cont.*

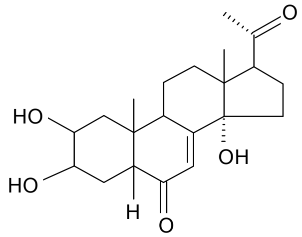
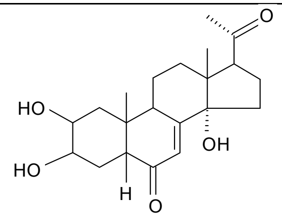
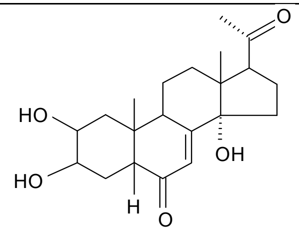
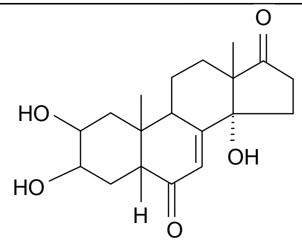
Dihydropoststerone		*S. otites* (L.) Wibel	[74]
Poststerone		*S. otites* (L.) Wibel	[74]
Poststerone		*S. otites* (L.) Wibel	[74]
Rubrosterone		*S. otites* (L.) Wibel	[74]

Table 1. *Cont.*

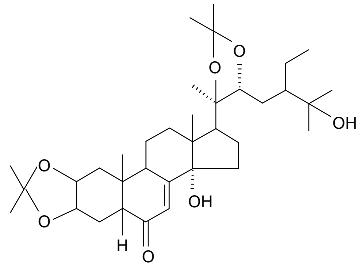
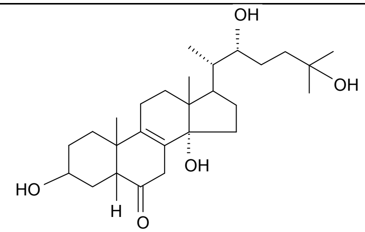
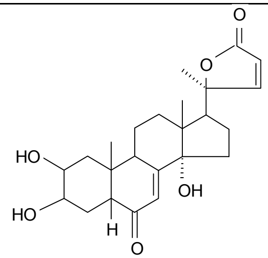
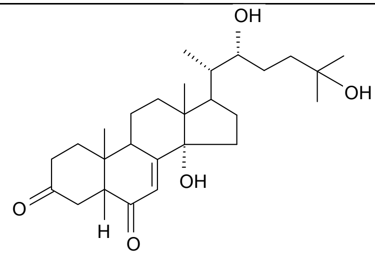
Makisterone C-2,3;20,22-diacetonide		*S. viridiflora* L.	[155]
Praemixisterone		*S. praemixta* M Pop	[134]
Sidisterone		*S. dioica* (L.) Clairv, *S. otites* (L.) Wibel, *S. pseudotites* Bess. *ex* Reichenb	[86,90,92,94,106,112,133]
Silenosterone		*S. praemixta* M Pop	[82]

Table 1. *Cont.*

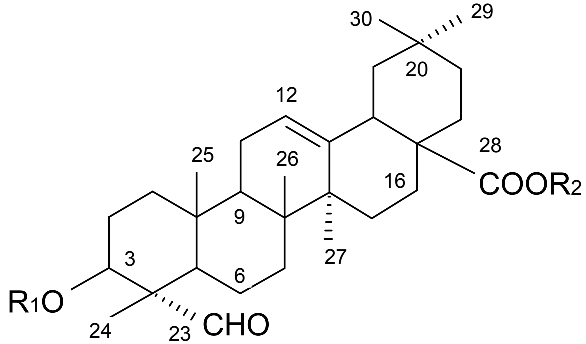
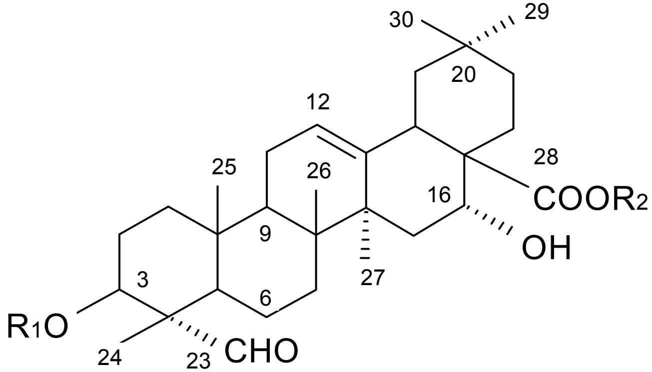
Triterpene Saponins			
			
β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl-3β-hydroxy-23-oxoolean-12-en-28-oic acid 28-*O*-β-D-xylopyranosyl(1→3)-β-D-xylopyranosyl(1→4)-α-L-rhamnopyranosyl (1→2)-β-D-fucopyranoside (Silenosides A)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = -β-D-Fucp-2←1-α-L-Rhap-4←1-β-D-Xylp-3←1-β-D-Xylp	*S. vulgaris* (Moench) Garcke (syn. *S. inflata*)	[157]
3-*O*-{β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl]-(1→3)]-β-D-glucuronopyranosyl}-28-*O*-{β-D-xylopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→2)]-[3,4-di-*O*-acetyl-β-D-quinovopyranosyl-(1→4)]-β-D-fucopyranosyl] gypsogenin (Silenorubicunoside A)	R_1 = -β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = -β-D-Fucp- { 2←1-α-L-Rhap-4←1-β-D-Xylp-3←1-β-D-Xylp; 4←1-(3,4-di-*O*-Ac)-β-D-Quip }	*S. rubicunda* Franch	[158]
3-*O*-{β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl]-(1→3)]-β-D-glucuronopyranosyl}-28-*O*-{β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→2)-3,4-di-*O*-acetyl-β-D- fucopyranosyl] gypsogenin (Silenorubicunoside C)	R_1 = -β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = -(3,4-di-*O*-Ac)-β-D-Fucp-2←1-α-L-Rhap-4←1-β-D-Xylp	*S. rubicunda* Franch	[158]

Table 1. *Cont.*

3-*O*-{β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyrannosyl}-28-*O*-{β-D-xylopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)- α-L-rhamnopyranosyl-(l→2)-[3,4-di-*O*-acetyl-β-D-fucopyranosyl} gypsogenin (Glanduloside C)	R_1 = -β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = -(3,4-di-*O*-Ac)-β-D-Fucp-2←1-α-L-Rhap-4 ←1-β-D-Xylp-3←1-β-D-Xylp	*S. rubicunda* Franch	[158]
Gypsogenin 3-*O*-β-xylopyranosyl-(1→3)-[β-galactopyranosyl-(1→2)]-β-glucuronopyranside	R_1 = -β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = H	*S. cucubalus* Wib	[159]
Nutanoside	R_1 = -β-D-GlcUAp-3 ←1-β-D-Galp- { 6←1-α-L-Arap; 4←1-β-D-Xylp } R_2 = -α-L-Rhap- { 3←1-β-D-Galp-2←1-β-D-Fucp-4←1-β-D-Glcp; 4←1-β-D-Glcp }	*S. nutans* L.	[160]
Gypsogenin 3-*O*-glucuronide	R_1 = -β-D-GlcUAp, R_2 = H	*S. vulgaris* (Moench) Garcke	[161]
Gypsogenin 3-*O*-glycoside	R_1 = -β-D-Glcp, R_2 = H	*S. vulgaris* (Moench) Garcke	[161]

Table 1. *Cont.*



3-*O*-[β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]- 28-*O*-[β-D-glucopyranosyl-(1→2)-α-L-rhamnopyranosyl-(1→2)-β-D-4-*O*-*trans*-*p*-methoxycinnamoyl- fucopyranosyl] quillaic acid (Jenisseensoside A)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = (4-*O*-*E*-p-methoxycinnamoyl-)-β-D-Fucp-2←1-α-L-Rhap-2←1-β-D-Glcp	*S. jenisseensis* Willd	[162,163]
3-*O*-[β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]- 28-*O*-[β-D-glucopyranosyl-(1→2)-α-L-rhamnopyranosyl-(1→2)-β-D-4-*O*-*cis*-*p*-methoxycinnamoyl- fucopyranosyl] quillaic acid (Jenisseensoside B)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = (4-*O*-*Z*-p-methoxycinnamoyl-)-β-D-Fucp-2←1-α-L-Rhap-2←1-β-D-Glcp	*S. jenisseensis* Willd	[162,163]
3-*O*-β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl- 28-*O*-[{α-L-rhamnopyranosyl -(1→2)}-{4-*O*-trans-*p*-methoxycinnamoyl}-β-D-fucopyranosyl] quillaic acid (Jenisseensoside C)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = (4-*O*-*E*-p-methoxycinnamoyl-)-β-D-Fucp-2←1-α-L-Rhap	*S. fortunei* Wis, *S. jenisseensis* Willd	[163, 164]
3-*O*-β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl- 28-*O*-[{α-L-rhamnopyranosyl -(1→2)}-{4-*O*-cis-*p*-methoxycinnamoyl}-β-D-fucopyranosyl] quillaic acid (Jenisseensoside D)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = (4-*O*-*Z*-p-methoxycinnamoyl-)-β-D-Fucp-2←1-α-L-Rhap	*S. fortunei* Wis, *S. jenisseensis* Willd	[163, 164]

Table 1. *Cont.*

3-*O*-[β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]quillaic acid-28-*O*-α-L-rhamnopyranosyl-(1→2)-3-*O*-acetyl-4-*O*-trans-*p*-methoxycinnamoyl β-D-fucopyranoside (Jenisseensoside E)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = (3-*O*-Ac-, 4-*O*-*E*-p-methoxycinnamoyl-)-β-D-Fucp-2←1-α-L-Rhap	*S. fortunei* Wis	[28]
3-*O*-[β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]quillaic acid-28-*O*-α-L-rhamnopyranosyl-(1→2)-3-*O*-acetyl-4-*O*-cis-*p*-methoxycinnamoyl β-D-fucopyranoside (Jenisseensoside F)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = (3-*O*-Ac-, 4-*O*-*Z*-p-methoxycinnamoyl-)-β-D-Fucp-2←1-α-L-Rhap	*S. fortunei* Wis	[28]
3-*O*-[β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl] quillaic acid-28-*O*-[α-L-arabinopyranosyl-(1→2)-α-L-arabinopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→2)]-[6-*O*-acetyl-β-D-glucopyranosyl-(1→3)]-4-*O*-acetyl-β-D-fucopyranoside	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = 4-*O*-Ac-β-D-Fucp- { 3←1-(6-*O*-Ac)-β-D-Glcp 2←1-α-L-Rhap-4←1-β-D-Xylp-3←1-α-L-Arap-2←1-α-L-Arap }	*S. fortunei* Wis	[28]
3-*O*-[β-D-Galactopyranosyl-(1→2)-β-D-glucuronopyranosyl]-28-*O*-[[α-L-arabinopyranosyl-(1→2)-α-L-arabinopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→2)]-[β-D-glucopyranosyl-(1→3)]-4-*O*-acetyl-β-D-fucopyranosyl] quillaic acid	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = 4-*O*-Ac-β-D-Fucp- { 3←1-β-D-Glcp 2←1-α-L-Rhap-4←1-β-D-Xylp-3←1-α-L-Arap-2←1-α-L-Arap }	*S. fortunei* Wis	[164]
3-*O*-β-D-Galactopyranosyl(1→2)-β-D-glucuronopyranosyl-3β,16α-dihydroxy-23-oxoolean-12-en-28-oic acid 28-*O*-β-D-xylopyranosyl(1→4)-[β-D-glucopyranosyl(1→2)]-α-L-rhamnopyranosyl (1→2)-β-D-fucopyranoside (Silenosides B)	R_1 = -β-D-GlcUAp-2←1-β-D-Galp R_2 = -β-D-Fucp-2←1-α-L-Rhap- { 2←1-β-D-Glcp 4←1-β-D-Xylp }	*S. vulgaris* (Moench) Garcke	[157]

Table 1. *Cont.*

3-*O*-α-L-Arabinopyranosyl(1→3)-[β-D-galactopyranosyl (1→2)]-β-D-glucuronopyranosyl-3β,16α-dihydroxy-23-oxoolean-12-en-28-oic acid 28-*O*-β-D-xylopyranosyl(1→4)-[β-D-glucopyranosyl(1→2)]-α-L-rhamnopyranosyl (1→2)-β-D-fucopyranoside (Silenosides C)	R_1 = -β-D-GlcUAp-	3←1-α-L-Arap 2←1-β-D-Galp	*S. vulgaris* (Moench) Garcke	[157]
	R_2 = -β-D-Fucp-2←1-α-L-Rhap-	2←1-β-D-Glcp 4←1-β-D-Xylp		
3-*O*-{β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl]-(1→3)]-β-D-glucuronopyranosyl}-28-*O*-{β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→2)]-[4,6-di-*O*-acetyl-β-D-glycopyranosyl-(1→3)]-4-*O*-acetyl-β-D-fucopyranosyl] quillaic acid (Silenorubicunoside B)	R_1 = -β-D-GlcUAp-	2←1-β-D-Galp 3←1-β-D-Xylp	*S. rubicunda* Franch	[158]
	R_2 = (4-*O*-Ac)-β-D-Fucp-	2←1-α-L-Rhap-4←1-β-D-Xylp 3←1-(4,6-di-*O*-Ac)-β-D-Glcp		
3-*O*-β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyrannosyl}-28-*O*-{β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(l→2)-[6-*O*-acetyl-β-D-glycopyranosyl-(1→3)]-4-*O*-acetyl -β-D-fucopyranosyl}quillaic acid	R_1 = -β-D-GlcUAp-	2←1-β-D-Galp 3←1-β-D-Xylp	*S. rubicunda* Franch	[158]
	R_2 = (4-*O*-Ac)-β-D-Fucp-	2←1-α-L-Rhap-4←1-β-D-Xylp 3←1-(6-*O*-Ac)-β-D-Glcp		

Table 1. *Cont.*

3-*O*-{β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyrannosyl}-28-*O*-{β-D-xylopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(l→2)-[3,4-di-*O*-acetyl-β-D-quinovopyranosyl-(1→4)]-β-D-fucopyranosyl}quillaic acid (Pachystegioside A)	R_1 = -β-D-GlcUAp- R_2 = -β-D-Fucp-	2←1-β-D-Galp 3←1-β-D-Xylp 2←1-α-L-Rhap-4←1-β-D-Xylp-3←1-β-D-Xylp 4←1-(3,4-di-*O*-Ac)-β-D-Quip	*S. rubicunda* Franch	[158]
Quillaic acid 3-*O*-β-xylopyranosyl-(1→3)-[β-galactopyranosyl-(1→2)]-β-glucuronopyranside	R_1 = -β-D-GlcUAp- R_2 = H	2←1-β-D-Galp 3←1-β-D-Xylp	*S. cucubalus* Wib	[159]
Quillaic acid 3-*O*-glucuronide	R_1 = -β-D-GlcUAp R_2 = H		*S. vulgaris* (Moench) Garcke	[161]
3-*O*-β-D-Xylopyranosyl-(1→3)-β-D-galactopyranosyl-(1→2)-β-D-glucuronopyranosyl quillaic acid 28-*O*-β-L-rhamnopyranosyl-(1→2)-[4-methoxycinnamoyl-(3)]-4-*O*-acetyl-β-D-fucopyranoside (Silenoside)	R_1 = -β-D-GlcUAp- R_2 = (4-*O*-Ac)-β-D-Fucp-	2←1-β-D-Galp 3←1-β-D-Xylp 2←1-α-L-Rhap 3←(4-methoxy cinnamoyl)	*S. szechuensis* F.N. Williams	[165]
3-*O*-β-D-Galactopyranosyl(1→2)] [β-D-xylopyranosyl (1→3)]-6-*O*-butyl-β-D-glucuronopyranosyl quillaic acid 28-*O*-[α-L-rhamnopyranosyl(1→2)]-3-*O*-acetyl-4-*O*-[(*E*)-4-methoxycinnamoyl]-β-D- fucopyranosyl ester (Visciduloside A)	R_1 = 6-*O*-Bu-β-D-GlcUAp- R_2 = 3-*O*-Ac-4-*O*-(*E*)-methoxycynnamoyl-β-D-Fucp-2 ←1-α-L-Rhap	2←1-β-D-Galp 3←1-β-D-Xylp	*S. viscidula* Franch	[166]

Table 1. *Cont.*

3-*O*-β-D-Galactopyranosyl(1→2)] [β-D-xylopyranosyl (1→3)]-6-*O*-butyl-β-D-glucuronopyranosyl quillaic acid 28-*O*-[α-L-rhamnopyranosyl(1→2)]-3-*O*-acetyl-4-*O*-[(*Z*)-4-methoxycinnamoyl]-β-D- fucopyranosyl ester (Visciduloside B)	R_1 = 6-*O*-Bu-β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = 3-*O*-Ac-4-*O*-(*Z*)-4-methoxycynnamoyl-β-D-Fucp-2 ←1-α-L-Rhap	*S. viscidula* Franch	[166]
3β,16α-Dihydroxyolean-12-en-23α,28β-dioic acid 28-*O*-{[α-D-mannopyranosyl-(1→4)][α-D-galactopyranosyl-(1→6)]-β-D-glycopyranosyl-(1→3)}[β-D-6-*O*-((3R)-3-hydroxy-3-methylglutaryl)glucopyranosyl-(1→6)-β-D-glucopyranoside (Silenoviscoside D)	R_1 = H R_2 = -β-D-Glcp- { 3←1-β-D-Galp { 4←1-α-D-Manp; 6←1-α-D-Galp }; 6←1-β-D-6-*O*-(3-OH-3-methylglytaryl)-β-D-Glcp }	*S. viscidula* Franch	[166]
3-*O*-[β-D-Galactopyranosyl(1→2)] [β-D-xylopyranosyl (1→3)]-[6-*O*-methyl-β-D-glucuronopyranosyl] quillaic acid 28-*O*-[α-L-rhamnopyranosyl(1→2)]-[3-*O*-acetyl-4-*O*-(*E*)-para-methoxycinnamoyl-β-D-fucopyranosyl]ester (Sinocrassuloside VIII)	R_1 = 6-*O*-Me-β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = 3-*O*-Ac-4-*O*-(*E*)-p-methoxycynnamoyl-β-D-Fucp-2←1-α-L-Rhap	*S. viscidula* Franch	[166]
3-*O*-[β-D-Galactopyranosyl(1→2)] [β-D-xylopyranosyl (1→3)]-[6-*O*-methyl-β-D-glucuronopyranosyl] quillaic acid 28-*O*-[α-L-rhamnopyranosyl(1→2)]-[3-*O*-acetyl-4-*O*-(*Z*)-para-methoxycinnamoyl-β-D-fucopyranosyl]ester (Sinocrassuloside IX)	R_1 = 6-*O*-Me-β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = 3-*O*-Ac-4-*O*-(*Z*)-p-methoxycynnamoyl-β-D-Fucp-2←1-α-L-Rhap	*S. viscidula* Franch	[166]
3-*O*-{β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyrannosyl}-28-*O*-{α-L-rhamnopyranosyl-(l→2)-4-*O*-(*E*)-p-methoxycinnamoyl-β-D-fucopyranosyl}quillaic acid (Sinocrassuloside X)	R_1 = β-D-GlcUAp- { 2←1-β-D-Galp; 3←1-β-D-Xylp } R_2 = 4-*O*-(*E*)-p-methoxycynnamoyl-β-D-Fucp-2←1-α-L-Rhap	*S. rubicunda* Franch	[158]

Table 1. *Cont.*

3-*O*-β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyranosyl quillaic acid 28-*O*-β-D-xylopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→4)-[2′′-*O*-acetyl-β-D-quinovopyranosyl-(1→2)]-3′-*O*-acetyl-β-D-fucopyranoside (Rubicunoside A)	R_1 = β-D-GlcUAp-	2←1-β-D-Galp 3←1-β-D-Xylp	*S. rubicunda* Franch	[167]
	R_2 = (3-*O*-Ac)-β-D-Fucp-	2←1-(2-*O*-Ac)-β-D-Quip 4←1-α-L-Rhap-4←1-β-D-Xylp-3←1-β-D-Xylp		
3-*O*-[β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyranosyl quillaic acid 28-*O*-β-D-xylopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→4)-[β-D-glucopyranosyl-(1→4′)-β-D-quinovopyranosyl-(1→2)]-3′-*O*-acetyl-β-D-fucopyranoside (Rubicunoside B)	R_1 = -β-D-GlcUAp-	2←1-β-D-Galp 3←1-β-D-Xylp	*S. rubicunda* Franch	[167]
	R_2 = -(3-*O*-Ac)-β-D-Fucp-	2←1-β-D-Quip-4←1-β-D-Glcp 4←1-α-L-Rhap-4←1-β-D-Xylp-3←1-β-D-Xylp		
3-*O*-β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucuronopyranosyl quillaic acid 28-*O*-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→4)-[4′′-*O*-acetyl-β-D-glucopyranosyl-(1→2)]-β-D-fucopyranoside (Rubicunoside C)	R_1 = -β-D-GlcUAp-	2←1-β-D-Galp 3←1-β-D-Xylp	*S. rubicunda* Franch	[167]
	R_2 = -β-D-Fucp-	2←1-(4-*O*-Ac)-β-D-Glcp 4←1-α-L-Rhap-4←1-β-D-Xylp		

Table 1. *Cont.*

3-*O*-β-D-Galactopyranosyl-(1→2)-[β-D-xylopyranosyl-(1→3)]-[6′-*O*-n-butyl]-β-D-glucuronopyranosyl quillaic acid 28-*O*-β-D-xylopyranosyl-(1→3)-β-D-xylopyranosyl-(1→4)-α-L-rhamnopyranosyl-(1→4)-[2′′-*O*-acetyl-β-D-quinovopyranosyl-(1→2)]-3′-*O*-acetyl-β-D-fucopyranoside (Rubicunoside D)	R_1 = -(6-*O*-n-Bu)-β-D-GlcUAp-	2←1-β-D-Galp 3←1-β-D-Xylp	*S. rubicunda* Franch	[167]
	R_2 =-(3-*O*-Ac)-β-D-Fucp-	2←1-(2-*O*-Ac)-β-D-Quip 4←1-α-L-Rhap-4←1-β-D-Xylp-3←1-β-D-Xylp		
3-*O*-{β-D-Galactopyranosyl(1→2) [β-D-xylopyranosyl (1→3)]-β-D-glucuronopyranosyl} quillaic acid 28-*O*-{β-D-xylopyranosyl- (1→3)- β-D-xylopyranosyl- (1→4)-α-L-rhamnopyranosyl(1→2)-[β-D-quinovopyranosyl- (1→4)]-β-D-fucopyranosyl} ester	R_1 = -β-D-GlcUAp-	2←1- β-D-Galp 3←1- β-D-Xylp	*S. rubicunda* Franch	[168]
	R_2 = -β-D-Fucp-	4←1- β-D-Quip 2←1-α-L-Rhap -4←1-β-D-Xylp-3←1-β-D-Xylp		
3-*O*-[β-D-Galactopyranosyl(1→2)] [β-D-xylopyranosyl (1→3)]-β-D-glucuronopyranosyl quillaic acid 28-*O*-{[β-D-xylopyranosyl- (1→4)- α-L-rhamnopyranosyl(1→2)} [β-D-glycopyranosyl- (1→3)]-4-*O*-acetyl-β-D-fucopyranosyl} ester	R_1 = -β-D-GlcUAp-	2←1-β-D-Galp 3←1-[β-D-Xylp	*S. rubicunda* Franch	[168]
	R_2 = -4-*O*-acetyl- β-D-Fucp-	3←1-β-D-Quip 2←1-α-L-Rhap -2←1-β-D-Xylp		

Table 1. *Cont.*

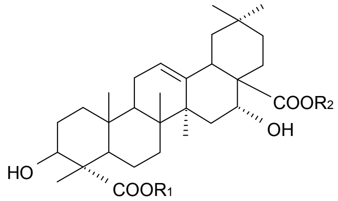
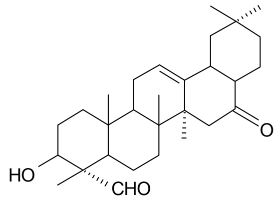
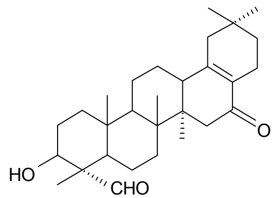
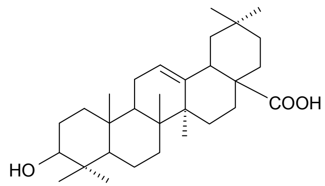
			
23-*O*-[β-D-Glucuronopyranosyl-(1→2)-β-D-glycopyranosyl]-28-*O*-{β-D-glucopyranosyl-(1→3)-[α-D-galactopyranosyl-(1→6)-β-D-glycopyranosyl-(1→6)]-β-D-glucopyranosyl} gypsogenic acid (Silenorubicunoside D)	R_1 = -β-D-Glcp-2←1-β-D-GlcUAp R_2 = -β-D-Glcp- { 6←1-β-D-Glcp-6←1-α-D-Galp; 3←1-β-D-Glcp }	*S. rubicunda* Franch	[158]
3β-Hydroxy-16,23-dioxo-28-nor-17α-18β-olean-12-ene (Villosagenin I)		*S. villosa* Forssk	[169]
3β-Hydroxy-16,23-dioxo-28-norolean-17-ene (Villosagenin II)		*S. villosa* Forssk	[169]
Oleanolic acid		*S. succulenta* Forssk	[170]

Table 1. *Cont.*

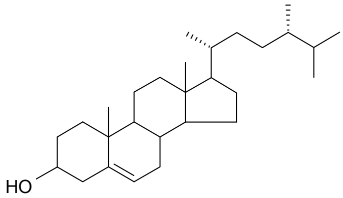
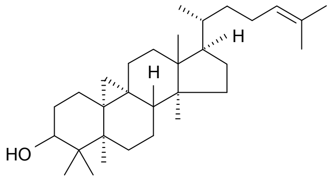
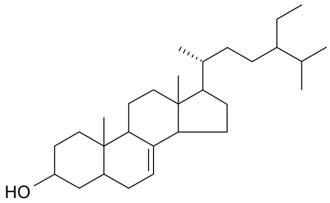
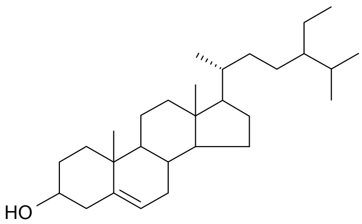
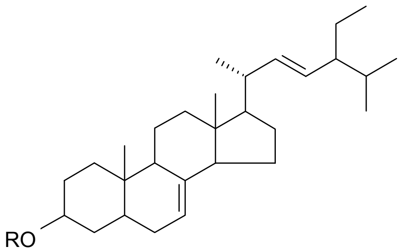
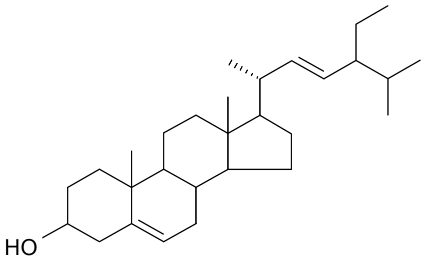
Sterols			
Campesterol		*S. brahuica* Boiss	[171]
Cycloartenol		*S. cucubalus* Wibel	[172]
22-Dihydrospinasterol		*S. cucubalus* Wibel	[172]
Sitosterol		*S. brahuica* Boiss, *S. viridiflora* L.	[31,171]
			
α-Spinasterol	R = H	*S. conoidea* L., *S. cucubalus* Wibel	[9,172]
α-Spinasterolglucoside	R = *O*-β-D-Glu	*S. conoidea* L., *S. jenisseensis* Willd	[9,140]
Stigmasterol		*S. brahuica* Boiss, *S. viridiflora* L.	[31,171]

Table 1. *Cont.*

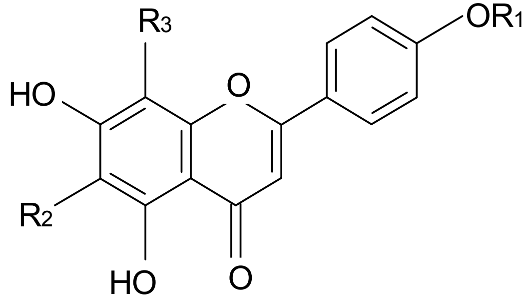
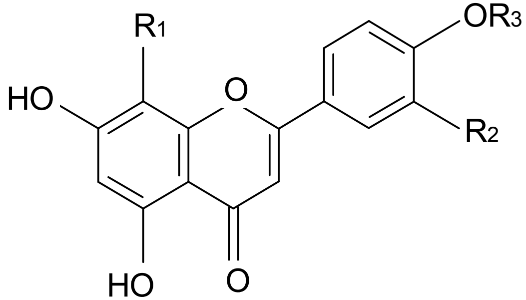
Phenolic Phytochemicals			
Flavonoids			
			
Apigenin	$R_1 = R_2 = R_3 = H$	*S. saxatilis* Sims	[173]
Apigenin-6,8-di-C-glucopyranoside (vicenin 2)	$R_1 = H$ $R_2 = R_3 =$ β-D-Glcp	*S. boissieri* Panjut, *S. chlorantha* Willd, *S. commutata* Guss, *S. cyri* Schischk, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italic* (L.) Pers, *S. macrostyla*, *S. nutans* L., *S. saxatilis* Sims, *S. wolgensis* (Hornem) Otth	[29,173]
Schaftoside (8-α-L-Arabinopyranosyl-6-β-D-glucopyranosylapigenin)	$R_1 = H$ $R_2 =$ β-D-Glcp $R_3 =$ α-L-Arap	*S. schafta* S.G.Gmel. *ex* Hohen	[174]
Vitexin (8-Glucosylapigenin)	$R_1 = R_2 = H$ $R_3 =$ β-D-Glcp	*S. alba* (Miller) Krause, *S. armeria* L., *S. boissieri* Panjut, *S. brachuica* Boiss, *S. bupleuroides* L., *S. chlorantha* Willd, *S. chlorifolia* Smith, *S. commutata* Guss, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. cyri* Schischk, *S. diclinis* (Lag) M. Lainz, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. multifida* (Adams) Rohrb, *S. nutans* L., *S. polaris* (Kleopow) Holub, *S. repens* Patrin, *S. saxatilis* Sims, *S. supina* M. Bieb, *S. turgida* L., *S. wolgensis* (Hornem) Otth	[29,173,175,176]
Vitexin-2-*O*''-glucoside	$R_1 = R_2 = H$ $R_3 =$ β-D-Glcp-2←1-β-D-Glcp	*S. alba* (Miller) Krause	[175]
Isovitexin-2-*O*''-glucoside	$R_1 = R_3 = H$ $R_2 =$ β-D-Glcp-2←1-β-D-Glcp	*S. alba* (Miller) Krause	[175]

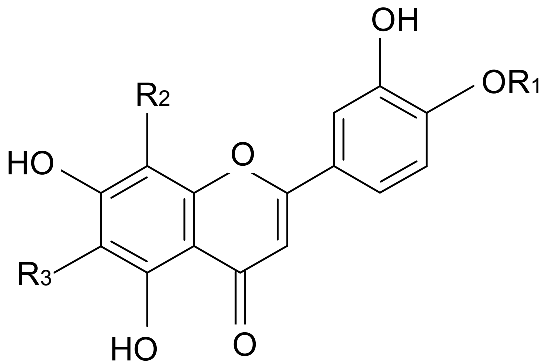
Table 1. *Cont.*

Isovitexin (saponaretin, homovitexin)	$R_1 = R_3 = H$ R_2 = β-D-Glcp	*S. alba* (Miller) Krause, *S. armeria* L., *S. boissieri* Panjut, *S. brachuica* Boiss, *S. bupleuroides* L., *S. chlorantha* Willd, *S. chlorifolia* Smith, *S. commutata* Guss, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. cyri* Schischk, *S. diclinis* (Lag) M.Lainz, *S. dioica* (L.) Clairv, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. multifida* (Adams) Rohrb, *S. nutans* L., *S. polaris* (Kleopow) Holub, *S. repens* Patrin, *S. supina* M. Bieb, *S. turgida* L., *S. wolgensis* (Hornem) Otth	[29,175–177]
Vitexin 4''-α-L-Rhamnopyranosyl	$R_1 = R_2 = H$ R_3 = β-D-Glcp-4←1-α-L-Rhap	*S. conoidea* L.	[17]
Isosaponarin (Isovitexin 4'-β-D-glucopyranoside)	$R_1 = R_2$ = β-D-Glcp $R_3 = H$	*S. armeria* L., *S. bupleuroides* L., *S. chlorifolia* Smith, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. polaris* (Kleopow) Holub	[29]
Vicenin 1	$R_1 = H$ R_2 = β-D-Xylp R_3 = β-D-Glcp	*S. boissieri* Panjut, *S. chlorantha* Willd, *S. commutata* Guss, *S. cyri* Schischk, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. nutans* L., *S. wolgensis* (Hornem) Otth	[29]
Vicenin 3	$R_1 = H$ R_2 = β-D-Glcp R_3 = β-D-Xylp	*S. boissieri* Panjut, *S. chlorantha* Willd, *S. commutata* Guss, *S. cyri* Schischk, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. nutans* L., *S. wolgensis* (Hornem) Otth	[29]
Neovitexin	$R_1 = R_2 = H$ R_3 = α-L-Glcp	*Silene* sp.	[29]
Isoneovitexin	(tautomer of neovitexin)	*Silene* sp.	[29]
Vicenin their mono-, di-glucosides		*S. boissieri* Panjut, *S. chlorantha* Willd, *S. commutata* Guss, *S. cyri* Schischk, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. nutans* L., *S. wolgensis* (Hornem) Otth	[29]
Vitexin their mono-, di-glucosides		*S. brachuica* Boiss, *S. multifida* (Adams) Rohrb, *S. repens* Patrin, *S. supina* M. Bieb, *S. turgida* L.	[29]

Table 1. *Cont.*



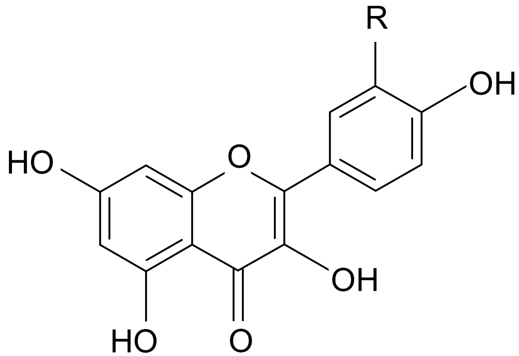
8(4"-*O*-α-L-rhamnopyranosyl)-C-β-D-glucopyranosyldiosmetin	R_1 = β-D-Glcp-4←1-α-L-Rhap R_2 = OH, R_3 = Me	*S. conoidea* L.	[9]
8(4"-*O*-α-L-rhamnopyranosyl)-C-β-D-glucopyranosylapigenin	R_1 = β-D-Glcp-4←1-α-L-Rhap R_2 = H, R_3 = H	*S. conoidea* L.	[9]



Orientin	R_1 = R_3 = H R_2 = β-D-Glcp	*S. armeria* L., *S. boissieri* Panjut, *S. bupleuroides* L., *S. chlorantha* Willd, *S. chlorifolia* Smith, *S. commutata* Guss, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. cyri* Schischk, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. nutans* L., *S. polaris* (Kleopow) Holub, *S. saxatilis* Sims, *S. vulgaris* (Moench) Garcke, *S. wolgensis* (Hornem) Otth	[29,173,176]

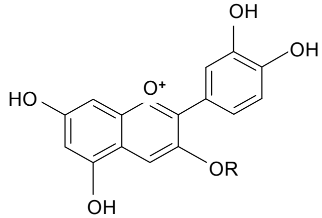
Table 1. *Cont.*

Homoorientin (isoorientin) (their 8a, 6a, 6b isomers)	$R_1 = R_2 = H$ R_3 = β-D-Glcp	*S. armeria* L., *S. boissieri* Panjut, *S. bupleuroides* L., *S. chlorantha* Willd, *S. chlorifolia* Smith, *S. commutata* Guss, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. cyri* Schischk, *S. italic* (L.) Pers, *S. littorea* Brot, *S. foliosa* Maxim, *S. graminifolia* Otth, *S. jenissensis* Willd, *S. italica* (L.) Pers, *S. macrostyla*, *S. nutans* L., *S. polaris* (Kleopow) Holub, *S. saxatilis* Sims, *S. viscariopsis* Bornm, *S. vulgaris* (Moench) Garcke, *S. wolgensis* (Hornem) Otth	[29,173,176,177]
Orientin- 4'-Me ether, 4''-α-L-rhamnopyranosyl	R_1 = Me R_2 = β-D-Glcp-4←1-α-L-Rha R_3 = H	*S. conoidea* L.	[17]
Adonivernite	$R_1 = R_3 = H$ R_2 = β-D-Glcp-2←1-β-D-Xylp	*S. armeria* L., *S. bupleuroides* L., *S. chlorifolia* Smith, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. polaris* (Kleopow) Holub	[29]
Homoadonivernite	$R_1 = R_2 = H$ R_3 = β-D-Glcp-2←1-β-D-Xylp	*S. armeria* L., *S. bupleuroides* L., *S. chlorifolia* Smith, *S. compacta* Fisch. *ex* Hornem, *S. cretacea* Fisch. *ex* Spreng, *S. cubanensis*, *S. polaris* (Kleopow) Holub	[29]



Kaempferol	R = H	*S. diclinis* (Lag) M Lainz, *S. littorea* Brot	[176]
Quercetin	R = OH	*S. littorea* Brot	[176]

Table 1. *Cont.*

Anthocyanins			
			
Cyanidin-3-*O*-rhamnosyl glucoside	R = -β-D-Glcp-Rhap	*S. armeria* L.	[177]
Cyanidin-3-*O*-glucoside	R = -β-D-Glcp	*S. armeria* L.	[177]
Cyanidin-3-rhamnosyl(1→6)-glucoside-5-glucoside	R = -Glcp-5←1-Glcp-6←1-Rhap	*S. dioica* (L.) Clairv	[178]
Cyanidin-3-(4-caffeoylrhamnosyl(1→6)-glucoside)-5-glucoside	R = -Glcp-5←1-Glcp-6←1-Rhap-4←*O*-caffeoyl	*S. dioica* (L.) Clairv	[178]

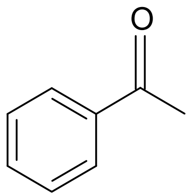
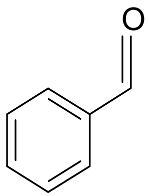
Phenols, Phenolic Acids and Phenylpropanoids			
Acetophenone		*S. armeria* L., *S. otites* (L.) Wibel	[179–181]
Benzaldehyde		*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,180–185]

Table 1. *Cont.*

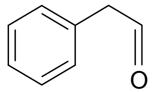
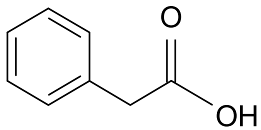
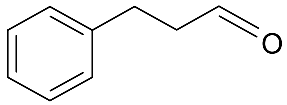
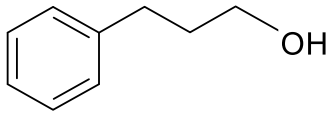
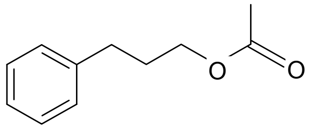
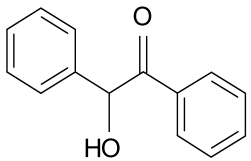
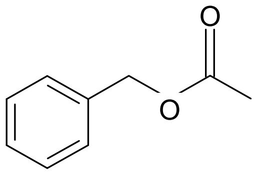
Benzenacetaldehyde		*S. chlorantha* (Willd) Ehrh, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. otites* (L.) Wib, *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. viscosa* (L.) Pers	[183]
Benzene acetic acid		*S. armeria* L.	[179]
Benzenepropanal		*S. latifolia* Poiret	[30]
Benzenepropanol		*S. latifolia* Poiret, *S. nutans* L., *S. vulgaris* (Moench) Garcke	[30,185]
Benzenepropyl acetate		*S. latifolia* Poiret	[30]
Benzoin acid		*S. armeria* L.	[38,179]
Benzyl acetate		*S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,180,183–185]

Table 1. *Cont.*

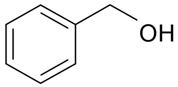
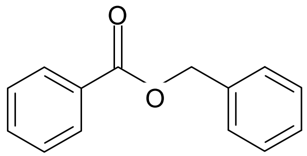
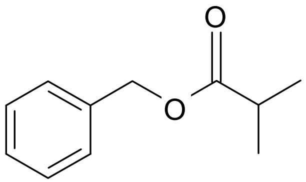
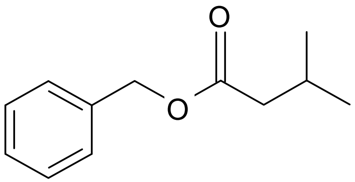
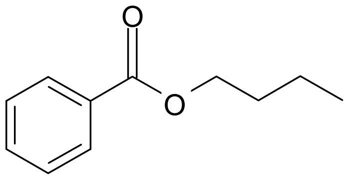
Benzyl alcohol		*S. armeria* L., *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. italica* (L.) Pers, *S. latifolia* Poiret, *S. maritima* (Homem) With, *S. nutans* L., *S. otites* (L.) Wib, *S. sericea* All, *S. subconica* Friv, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,179–181,183–185]
Benzyl benzoate		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. flos-jovis* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill.) Greut. and Burd, *S. maritima* (Homem) With, *S. nutans* L., *S. otites* (L.) Wib, *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,183–185]
Benzyl isobutanoate		*S. latifolia* Poiret	[30]
Benzyl 3-methylbutanoate		*S. flos-jovis* (L.) Greut and Burd, *S. viscaria* (L.) Jessen	[184]
n-Butyl benzoate		*S. flos-jovis* (L.) Greut and Burd	[184]

Table 1. *Cont.*

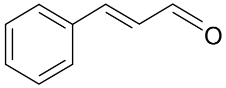
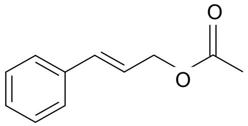
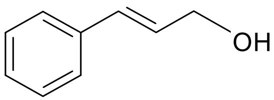
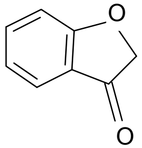
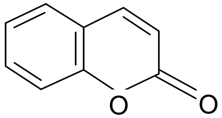
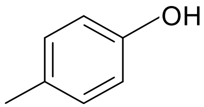
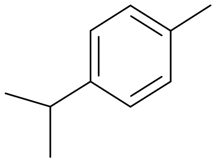
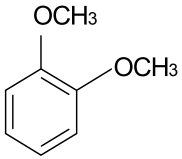
(*E*)-Cinnamaldehyde		*S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L.	[30,183,185]
(*E*)-Cinnamic acetate		*S. latifolia* ssp. *alba* (Mill) Greut and Burd, *S. nutans* L.	[30,185]
(*E*)-Cinnamyl alcohol		*S. latifolia* ssp. *alba* (Mill) Greut and Burd, *S. nutans* L.	[30,185]
Coumaran		*S. armeria* L.	[38]
Coumarin		*S. armeria* L.	[179]
p-Cresol		*S. dichotoma* Ehrh. ssp. *racemosa* Chowdh (Otth) Graeb	[183]
p-Cymene		*S. gallica* L.	[184]
1,2-Dimethoxybenzene		*S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. subconica* Friv, *S. succulenta* Forssk, *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers	[30,183,184]

Table 1. *Cont.*

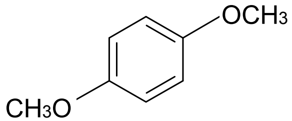
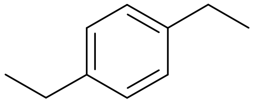
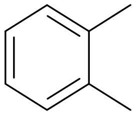
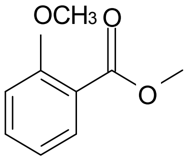
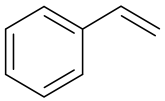
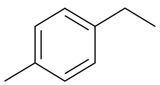
1,4-Dimethoxybenzene		*S. rupestris* L.	[184]
1,4-Diethylbenzene		*S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. pendula* L.	[184]
1,2-Dimethylbenzene		*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. pendula* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,184]
Dimethyl salicylate		*S. alpestris* Jacq, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. latifolia* Poiret	[30,184]
Ethenyl benzene		*S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib., *S. pendula* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,184]
Ethyltoluene		*S. dioica* (L.) Clairv	[184]

Table 1. *Cont.*

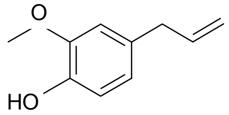
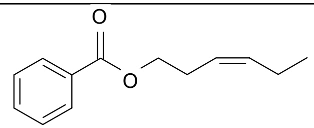
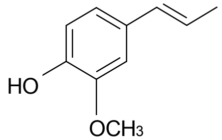
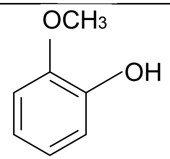
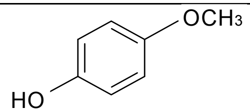
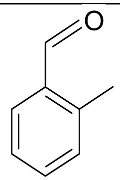
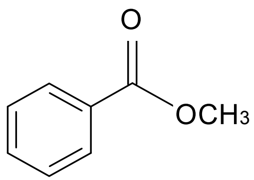
Eugenol		*S. armeria* L.	[38,179]
(*Z*)-3-Hexenyl benzoate		*S. nutans* L., *S. rupestris* L.	[184,185]
(*E*)-Isoeugenol		*S. latifolia* Poiret	[30]
2-Methoxyphenol		*S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,183]
4-Methoxyphenol		*S. flos-jovis* (L.) Greut and Burd	[184]
2-Methyl benzaldehyde		*S. latifolia* Poiret	[30]
Methyl benzoate		*S. alpestris* Jacq, *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. rupestris* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,183,184]

Table 1. *Cont.*

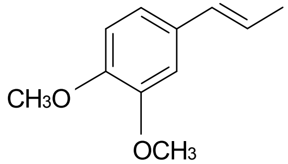
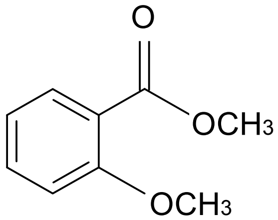
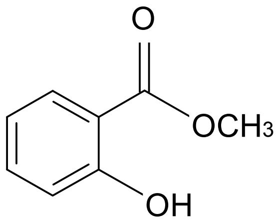
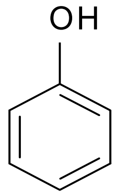
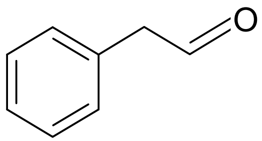
Methyl eugenol		*S. latifolia* Poiret	[30]
Methyl 2-methoxybenzoate		*S. maritima* (Homem) With	[185]
Methyl salicylate		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. nutans* L., *S. otites* (L.) Wibel, *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscosa* (L.) Pers	[30,180,181,183–185]
Phenol		*S. armeria* L.	[38]
Phenyl acetaldehyde		*S. armeria* L., *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. latifolia* Poiret, *S. otites* (L.) Wibel	[30,180,181,184]

Table 1. *Cont.*

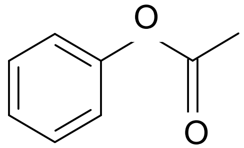
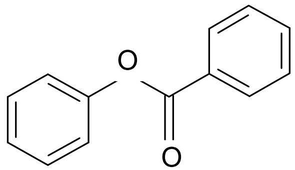
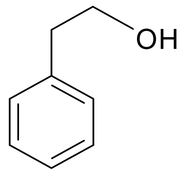
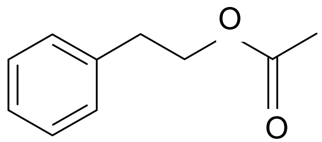
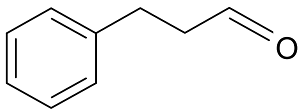
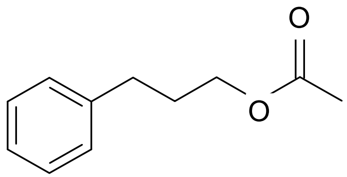
Phenyl acetate		*S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. pendula* L., *S. viscaria* (L.) Jessen	[183,184]
Phenyl benzoate		*S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. viscaria* (L.) Jessen	[184]
2-Phenylethanol		*S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. otites* (L.) Wibel, *S. saxifraga* L., *S. subconica* Friv, *S. vulgaris* (Moench) Garcke	[30,180,181,183,185]
2-Phenylethyl acetate		*S. viscaria* (L.) Jessen	[184]
3-Phenylpropanal		*S. armeria* L.	[179]
3-Phenylpropyl acetate		*S. nutans* L.	[185]

Table 1. *Cont.*

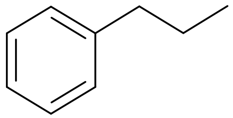
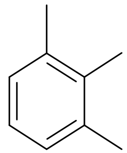
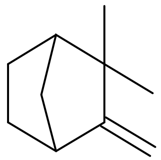
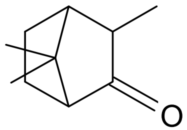
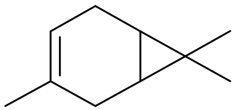
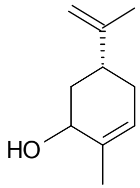
Propylbenzene		*S. alpestris* Jacq, *S. armeria* L., *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. pendula* L., *S. viscaria* (L.) Jessen	[184]
1,2,3-Trimethylbenzene		*S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. pendula* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,184]
		Terpenoids	
Camphene		*S. alpestris* Jacq, *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. gallica* L.	[184]
Camphor		*S. alpestris* Jacq, *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. gallica* L., *S. pendula* L.	[183,184]
δ-3-Carene		*S. otites* (L.) Wibel	[180]
(*Z*)-Carveole		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb	[183]

Table 1. *Cont.*

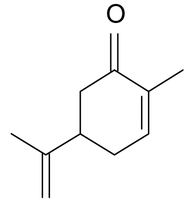
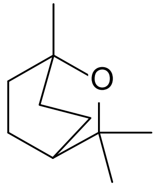
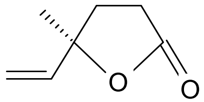
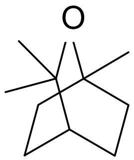
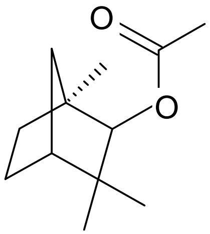
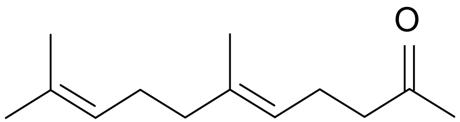
Carvone		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183]
1,8-Cineole		*S. latifolia* Poiret ssp. alba (Mill) Greut and Burd, *S. sericea* All, *S. subconica* Friv, *S. vallesia* L., *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183]
5-Ethenyldihydro-5-methyl-2(3H)-furanone		*S. maritima* (Homem) With	[185]
Eucalyptol		*S. alpestris* Jacq, *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. gallica* L., *S. pendula* L., *S. viscaria* (L.) Jessen	[184]
Fenchyl acetate		*S. chlorantha* (Willd) Ehrh	[183]
Geranyl acetone		*S. nutans* L.	[185]

Table 1. *Cont.*

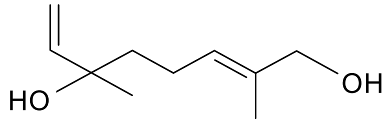
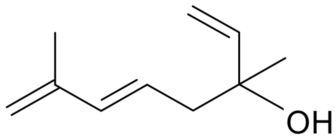
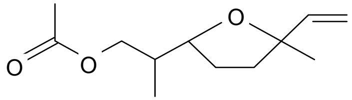
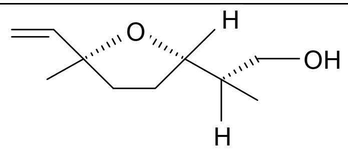
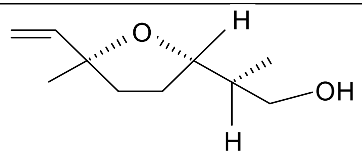
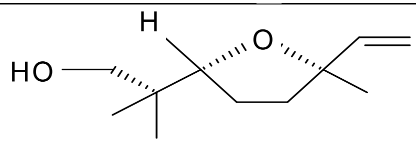
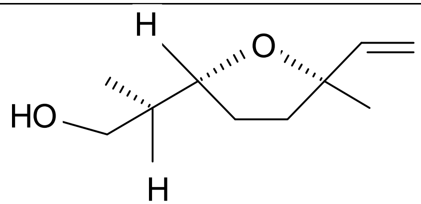
1-Hydroxylinalool		*S. otites* (L.) Wibel	[181]
Hotrienol		*S. otites* (L.) Wibel	[181]
Lilac acetate A, C		*S. maritima* Withering, *S. vulgaris* (Moench) Garcke	[185]
Lilac alcohol (2*R*, 2'*S*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac alcohol (2*S*, 2'*S*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac alcohol (2*S*, 2'*R*, 5'*R*)		*S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac alcohol (2*R*, 2'*R*, 5'*R*)		*S. latifolia* Poiret	[30,181]

Table 1. *Cont.*

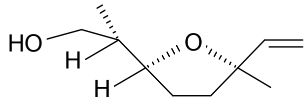
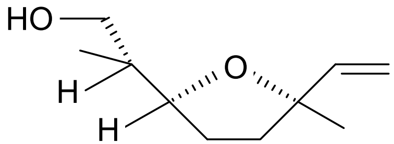
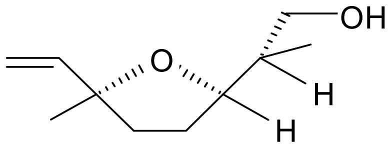
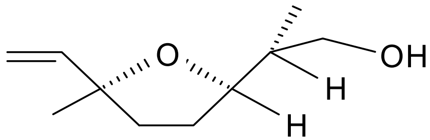
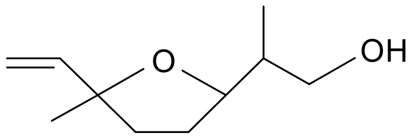
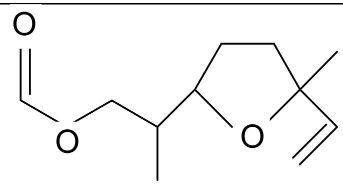
Lilac alcohol (2*R*, 2'*S*, 5'*R*)		*S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac alcohol (2*S*, 2'*S*, 5'*R*)		*S. latifolia* Poiret	[30,181]
Lilac alcohol (2*R*, 2'*R*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel	[30,181,186]
Lilac alcohol (2*S*, 2'*R*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac alcohol A, B, C, D		*S. maritima* (Homem) With, *S. vulgaris* (Moench) Garcke	[185]
Lilac alcohol formate		*S. latifolia* Poiret	[30]
Lilac aldehyde A		*S. flos-cuculi* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. alba (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. otites* (L.) Wib, *S. subconica* Friv, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183–185]

Table 1. *Cont.*

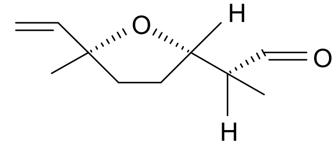
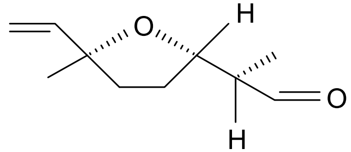
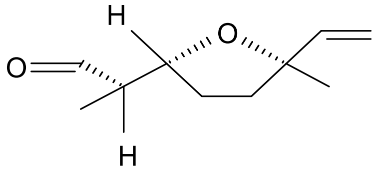
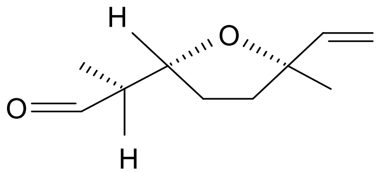
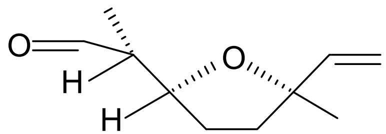
Lilac aldehyde B		*S. flos-cuculi* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. alba (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. nutans* L., *S. otites* (L.) Wib, *S. subconica* Friv, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183–185]
Lilac aldehyde C		*S. maritima* (Homem) With, *S. vulgaris* (Moench) Garcke	[185]
Lilac aldehyde D		*S. latifolia* Poiret ssp. alba (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. otites* (L.) Wib, *S. sericea* All, *S. subconica* Friv, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,185]
Lilac aldehyde (2*S*, 2'*S*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac aldehyde (2*R*, 2'*S*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac aldehyde (2*R*, 2'*R*, 5'*R*)		*S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac aldehyde (2*S*, 2'*R*, 5'*R*)		*S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac aldehyde (2*S*, 2'*S*, 5'*R*)		*S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]

Table 1. *Cont.*

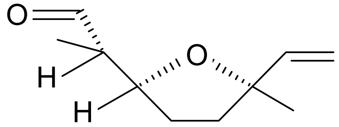
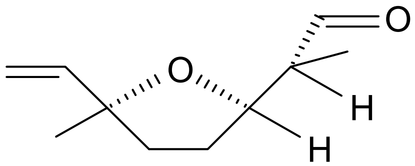
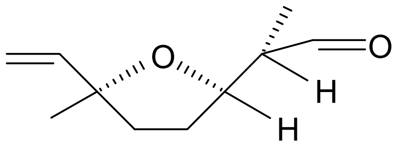
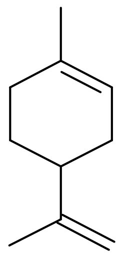
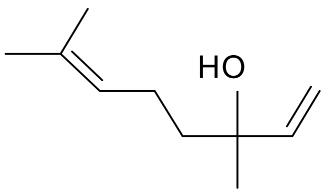
Lilac aldehyde (2*R*, 2'*S*, 5'*R*)		*S. latifolia* Poiret, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac aldehyde (2*S*, 2'*R*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke	[30,181,186]
Lilac aldehyde (2*R*, 2'*R*, 5'*S*)		*S. alba* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke	[30,181,186]
D-Limonene		*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. maritima* (Homem) With, *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. rupestris* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[181–185]
Linalool		*S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. flos-cuculi* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. rupestris* L., *S. sericea* All, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers	[38,179,181–184,186]

Table 1. *Cont.*

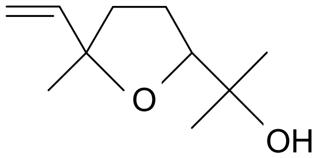
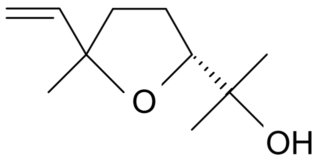
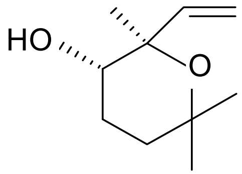
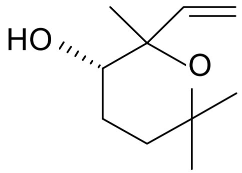
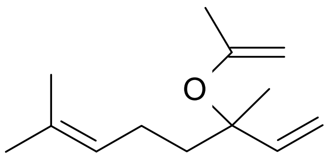
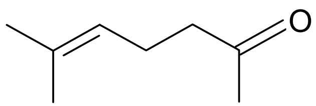
(*E*)-Linalool oxide furanoid		*S. maritima* (Homem) With, *S. otites* (L.) Wibel	[181,185]
(*Z*)-Linalool oxide furanoid		*S. chlorantha* (Willd) Ehrh, *S. italica* (L.) Pers, *S. otites* (L.) Wibel, *S. viscaria* (L.) Jessen	[181,183,184]
(*E*)-Linalool oxide pyranoid		*S. otites* (L.) Wibel	[180,181]
(*Z*)-Linalool oxide pyranoid		*S. otites* (L.) Wibel	[180,181]
Linalyl acetate		*S. flos-cuculi* (L.) Greut and Burd	[182]
6-Methyl-5-hepten-2-one		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. vallesia* L.	[183]

Table 1. *Cont.*

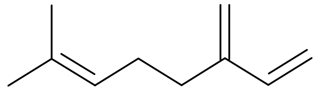
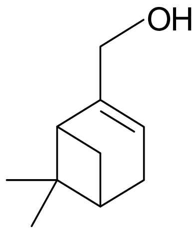
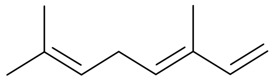
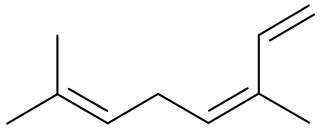
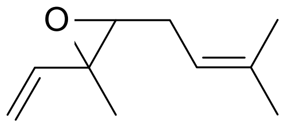
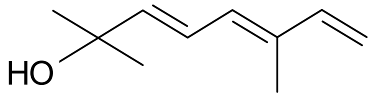
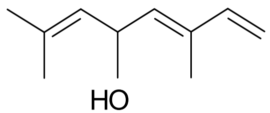
β-Myrcene		*S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. italica* (L.) Pers, *S. latifolia* Poiret, *S. nutans* L., *S. sericea* All, *S. vallesia* L., *S. viscosa* (L.) Pers	[30,38,179,183]
Myrtenol		*S. armeria* L., *S. otites* (L.) Wibel	[38,179,180]
(*E*)-β-Ocimene		*S. alpestris* Jacq, *S. chlorantha* (Willd) Ehrh, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,181,183–185]
(*Z*)-β-Ocimene		*S. nutans* L., *S. otites* (L.) Wibel, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[180,185]
(*E*)-Ocimene epoxide		*S. nutans* L.	[185]
(*E*)-Ocimenol		*S. nutans* L.	[185]
(*Z*)-Ocimenol		*S. nutans* L.	[185]

Table 1. *Cont.*

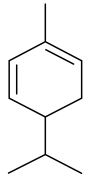
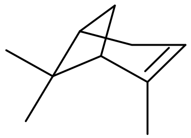
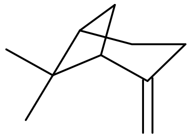
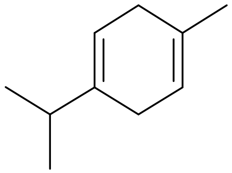
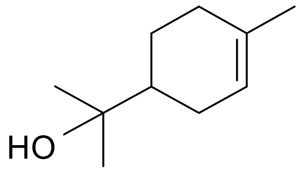
α-Phellandrene		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. subconica* Friv, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,185]
α-Pinene		*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd., *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wibel, *S. pendula* L., *S. rupestris* L., *S. saxifraga* L., *S. sericea* All, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[30,180,181,183,184]
β-Pinene		*S. alpestris* Jacq, *S. armeria* L., *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. otites* (L.) Wibel, *S. pendula* L., *S. viscaria* (L.) Jessen	[30,180,181,183,184]
γ-Terpinene		*S. coeli-rosa* (L.) Godron, *S. gallica* L.	[184]
α-Terpineole		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. maritima* (Homem) With, *S. saxifraga* L., *S. vallesia* L., *S. vulgaris* (Moench) Garcke	[183,185]

Table 1. *Cont.*

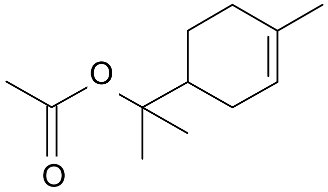
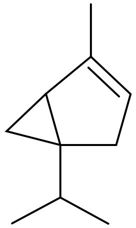
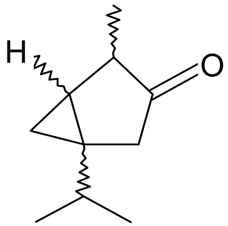
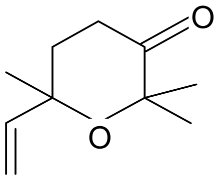
α-Terpinyl acetate		*S. flos-cuculi* (L.) Greut and Burd	[182]
α-Thujene		*S. coeli-rosa* (L.) Godron, *S. gallica* L.	[184]
Thujone		*S. alpestris* Jacq	[184]
2,2,6-Trimethyl-2-vinyl-5-ketotetrahydropyran		*S. otites* (L.) Wibel	[181]

Table 1. *Cont.*

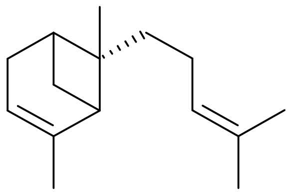
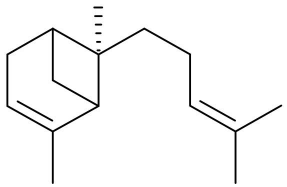
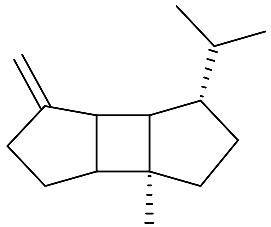
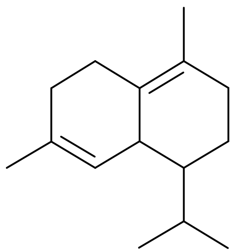
	Sesquiterpenes		
α-(*Z*)-Bergamotene		*S. latifolia* Poiret	[30]
α-(*E*)-Bergamotene		*S. latifolia* Poiret	[30]
β-Bourbonene		*S. flos-cuculi* (L.) Greut and Burd, *S. rupestris* L., *S. vallesia* L.	[183,184]
δ-Cadinene		*S. latifolia* Poiret, *S. vallesia* L.	[30,183]

Table 1. *Cont.*

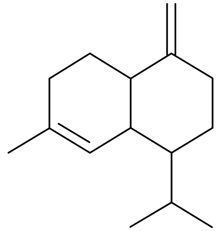
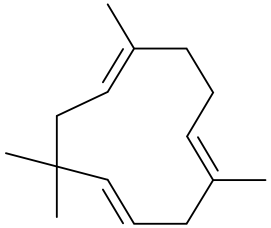
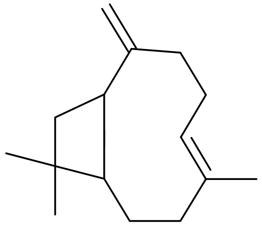
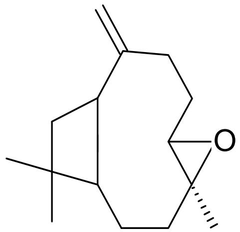
γ-Cadinene		*S. vallesia* L.	[183]
α-Caryophyllene		*S. vallesia* L.	[183]
β-Caryophyllene		*S. chlorantha* (Willd) Ehrh, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. gallica* L., *S. latifolia* Poiret, *S. otites* (L.) Wibel, *S. pendula* L., *S. rupestris* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L.	[30,181,183,184]
Caryophyllene oxide		*S. armeria* L.	[179]

Table 1. *Cont.*

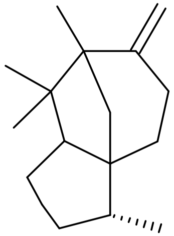
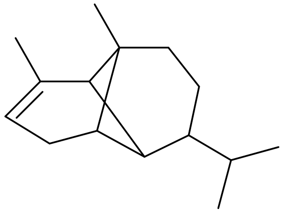
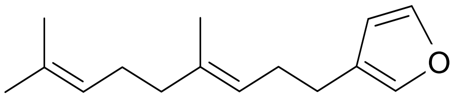
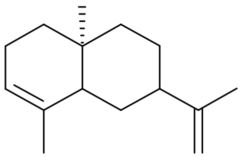
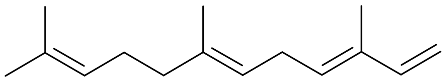
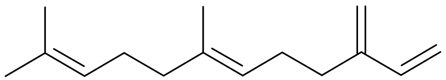
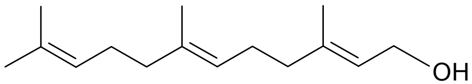
β-Cedrene		*S. vallesia* L.	[183]
α-Copaene		*S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. gallica* L., *S. pendula* L., *S. vallesia* L.	[183,184]
Dendrolasin		*S. latifolia* Poiret	[30]
7-epi-α-Selinene		*S. latifolia* Poiret	[30]
α-Farnesene		*S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. italica* (L.) Pers, *S. latifolia* Poiret, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. sericea* All, *S. succulenta* Forssk, *S. vallesia* L.	[30,183–185]
β-Farnesene		*S. gallica* L.	[184]
Farnesol		*S. armeria* L.	[38,179]

Table 1. *Cont.*

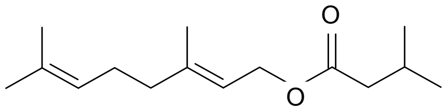
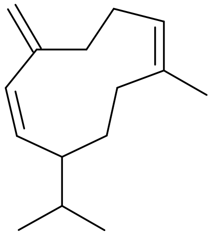
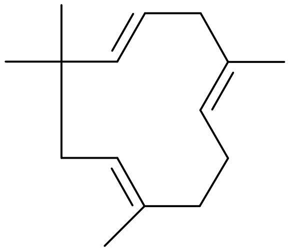
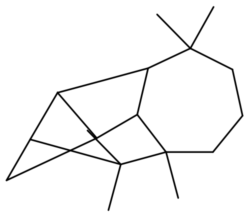
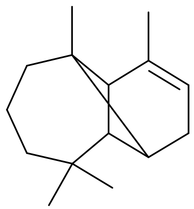
Geranyl isovalerate		*S. otites* (L.) Wibel	[181]
Germacrene D		*S. rupestris* L.	[184]
α-Humelene		*S. armeria* L.	[38,179]
Longicyclene		*S. latifolia* Poiret	[30]
α-Longipinene		*S. latifolia* Poiret	[30]

Table 1. *Cont.*

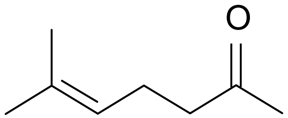
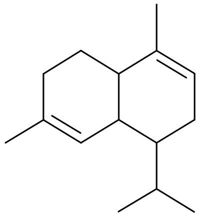
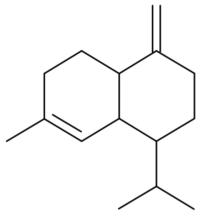
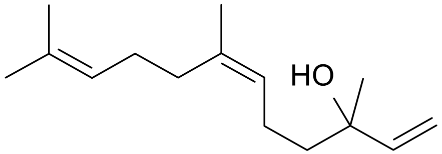
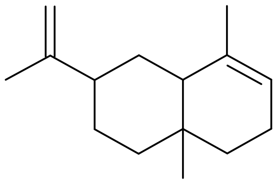
6-Methyl-5-hepten-2-one		*S. dioica* (L.) Clairv, *S. nutans* L., *S. rupestris* L.	[184,185]
α-Muurolene		*S. vallesia* L.	[183]
γ-Muurolene		*S. italica* (L.) Pers, *S. sericea* All, *S. vallesia* L., *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183]
(*E*)-Nerolidol		*S. latifolia* Poiret	[30]
α-Selinene		*S. latifolia* Poiret	[30]

Table 1. *Cont.*

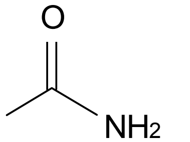
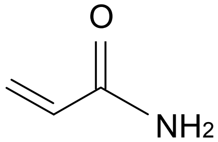
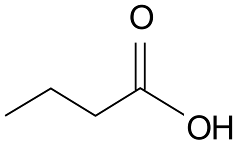
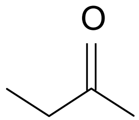
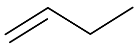
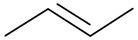
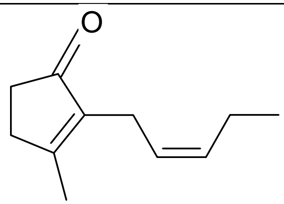
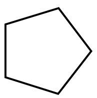
		Other Volatiles	
Acetamide		*S. armeria* L.	[38]
Acrylamide		*S. armeria* L.	[38]
Butanoic acid		*S. armeria* L.	[179]
2-Butanone		*S. armeria* L.	[179]
α-Butene		*S. armeria* L.	[38,179]
β-Butene		*S. armeria* L.	[38,179]
(*Z*)-Jasmone		*S. armeria* L.	[38,179]
Cyclopentane		*S. armeria* L.	[38]

Table 1. *Cont.*

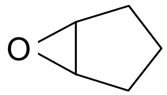
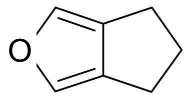
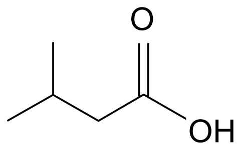
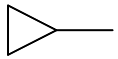
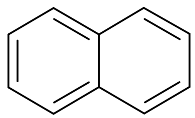
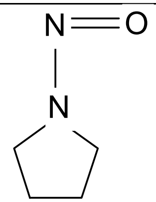
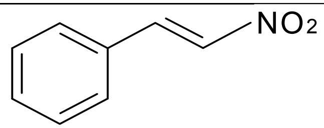
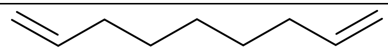
Cyclopentane oxide		*S. armeria* L.	[179]
5,6-Dihydro-4H-cyclopenta-furan		*S. armeria* L.	[38]
Isovaleric acid		*S. armeria* L.	[38,179]
Methylamine	H_3C-NH_2	*S. armeria* L.	[38]
Methylcyclopropane		*S. armeria* L.	[179]
Naphthalene		*S. armeria* L., *S. alpestris* Jacq, *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. viscaria* (L.) Jessen	[179,184]
1-Nitroso-pyrrlidine		*S. armeria* L.	[38]
O-Nitrostyrene		*S. armeria* L.	[38]
1,8-Nonadiene		*S. armeria* L.	[38,179]

Table 1. *Cont.*

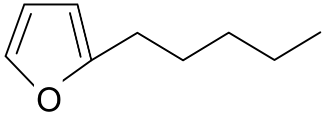
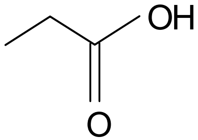
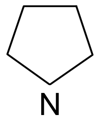
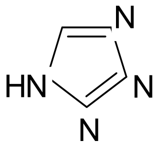
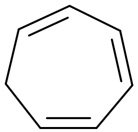
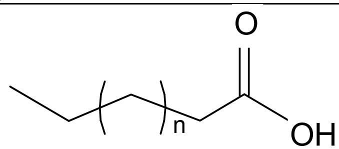
Pentylfuran		*S. armeria* L.	[179]
Propanoic acid		*S. armeria* L.	[38,179]
Pyrrolidine		*S. armeria* L.	[179]
Tetrazole		*S. armeria* L.	[38,179]
Tropilidin		*S. armeria* L.	[38]
Free Fatty Acids and Their Derivatives (*-traces)			
			
Caprylic (8:0)	n = 4	*S. cserei* Baumg subsp. *aeoniopsis**, *S. vulgaris* (Moench) Garcke	[36]
Capric (10:0)	n = 6	*S. brahuica* Boiss, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. wallichiana* Klotsch	[40,41,171]

Table 1. *Cont.*

Lauric (12:0)	n = 8	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis**, *S. guntensis* B Fedtsch., *S. viridiflora* L., *S. vulgaris* (Moench) Garcke*, *S. wallichiana* Klotsch	[40,41,171]
Myristic (14:0)	n = 10	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[36,40,41,171,187]
Pentadecylic (15:0)	n = 11	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[36,40,41,187]
Palmitic (16:0)	n = 12	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[16,36,40–42,171,187]
Margaric (17:0)	n = 13	*S. guntensis* B Fedtsch, *S. vulgaris* subsp. Macrocarpa	[41,187]
Stearic (18:0)	n = 14	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[16,36,40–42,171,187]
Arachidic (20:0)	n = 16	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch., *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[36,40–42,187]
Heneicosylic (21:0)	n = 17	*S. brahuica* Boiss, *S. guntensis* B Fedtsch., *S. viridiflora* L., *S. wallichiana* Klotsch	[40,41]
Behenic (22:0)	n = 18	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. wallichiana* Klotsch	[36,40,41]
Tricosylic (23:0)	n = 19	*S. brahuica* Boiss, *S. guntensis* B Fedtsch, *S. vulgaris* subsp. Macrocarpa, *S. viridiflora* L., *S. wallichiana* Klotsch	[40,41,187]

Table 1. *Cont.*

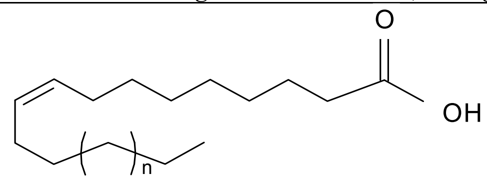
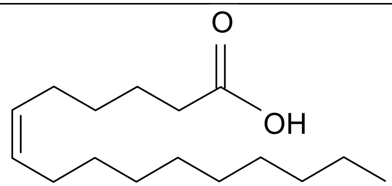
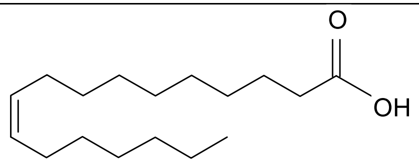
Lignoceric (24:0)	n = 20	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis**, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke*, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[36,40–42,187]
Pentacosylic (25:0)	n = 21	*S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. vulgaris* (Moench) Garcke*	[36,41]
Cerotic (26:0)	n = 22	*S. guntensis* B Fedtsch, *S. vulgaris* (Moench) Garcke	[41,42]
			
Palmitoleic (16:1)	n = 2	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch., *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[36,40–42,171,187]
Oleic (18:1)	n = 4	*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[16,36,40,41,171,187]
Sapienic (16:1)		*S. cserei* Baumg subsp. *aeoniopsis*, *S. vulgaris* (Moench) Garcke*	[36]
Heptadecenoic (17:1)		*S. vulgaris* subsp. Macrocarpa	[187]

Table 1. *Cont.*

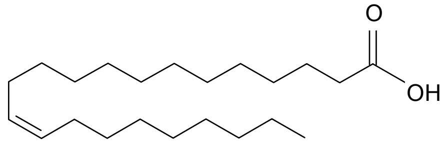
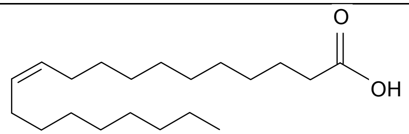
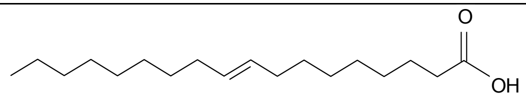
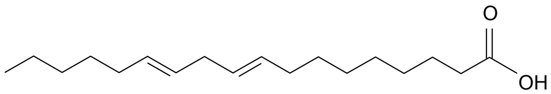
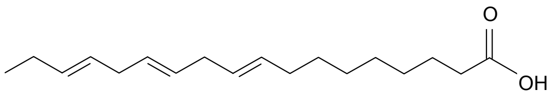
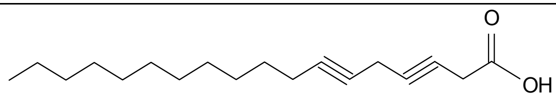
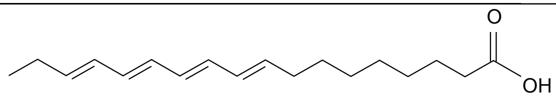
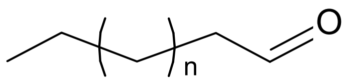
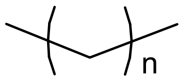
Erucic (22:1)		*S. vulgaris* (Moench) Garcke	[16]
Eicosenoic (20:1)		*S. cserei* Baumg subsp. *aeoniopsis**, *S. vulgaris* (Moench) Garcke	[36]
Elaidic (18:1)		*S. cserei* Baumg subsp. *aeoniopsis**, *S. vulgaris* (Moench) Garcke*	[36]
Linoleic (18:2)		*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[16,36,40–42,44,171,187]
Linolenic (18:3)		*S. brahuica* Boiss, *S. cserei* Baumg subsp. *aeoniopsis*, *S. guntensis* B Fedtsch, *S. viridiflora* L., *S. vulgaris* (Moench) Garcke, *S. vulgaris* subsp. Macrocarpa, *S. wallichiana* Klotsch	[16,36,40,41,44,171,187]
3,6-Octadecadiynoic		*S. armeria* L.	[38]
Parinaric (18:4)		*S. vulgaris* subsp. Macrocarpa	[187]
			
n-Decanal	n = 6	*S. alpestris* Jacq, *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. alba (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. rupestris* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, S. *viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,184]

Table 1. *Cont.*

n-Heptanal	n = 3	*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,184]
n-Hexanal	n = 2	*S. alpestris* Jacq, *S. armeria* L., *S. coeli-rosa* (L.) Godron, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd., *S. gallica* L., *S. pendula* L., *S. viscaria* (L.) Jessen	[184]
n-Nonanal	n = 5	*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd., *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. rupestris* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,184]
n-Octanal	n = 4	*S. alpestris* Jacq, *S. armeria* L., *S. chlorantha* (Willd) Ehrh, *S. coeli-rosa* (L.) Godron, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. flos-jovis* (L.) Greut and Burd, *S. gallica* L., *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. pendula* L., *S. rupestris* L., *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. succulenta* Forssk, *S. vallesia* L., *S. viscaria* (L.) Jessen, *S. viscosa* (L.) Pers, *S. vulgaris* (Moench) Garcke ssp. *Vulgaris*	[183,184]



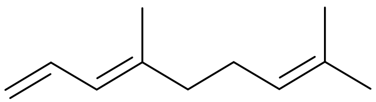
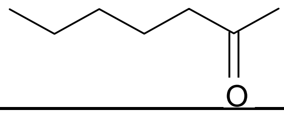
Heptadecane	n = 15	*S. flos-cuculi* (L.) Greut and Burd	[182]
n-Octane	n = 6	*S. alpestris* Jacq, *S. dioica* (L.) Clairv, *S. viscaria* (L.) Jessen	[184]
Pentadecane	n = 13	*S. flos-cuculi* (L.) Greut and Burd	[182]
(*E*)-4,8-Dimethyl 1,3,7 nonatriene		*S. otites* (L.) Wibel	[181]
2-Heptanone		*S. flos-cuculi* (L.) Greut and Burd, *S. viscaria* (L.) Jessen	[184]

Table 1. *Cont.*

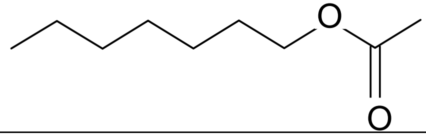
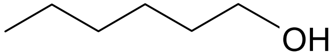
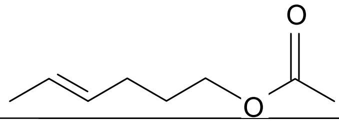
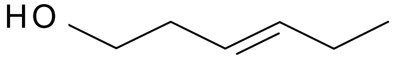
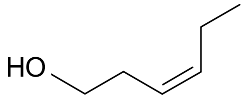
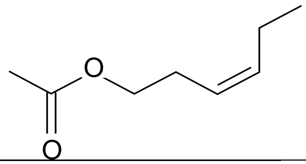
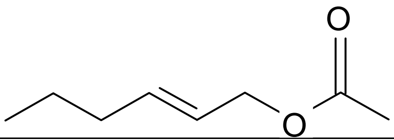
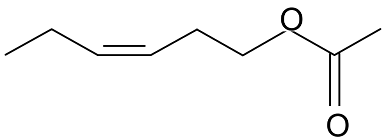
n-Heptyl acetate		*S. alpestris* Jacq, *S. viscaria* (L.) Jessen	[184]
Hexanol		*S. otites* (L.) Wibel	[181]
2-Hexenol acetate		*S. latifolia* Poiret	[30]
(*E*)-3-Hexen-1-ol		*S. otites* (L.) Wibel	[181]
(*Z*)-3-Hexen-1-ol		*S. armeria* L., *S. latifolia* Poiret, *S. nutans* L., *S. otites* (L.) Wibel, *S. rupestris* L., *S. sericea* All, *S. vallesia* L., *S. vulgaris* (Moench) Garcke	[30,181,183–185]
(*Z*)-3-Hexen-1-ol acetate		*S. alpestris* Jacq, *S. armeria* L., *S. coeli-rosa* (L.) Godron, *S. flos-cuculi* (L.) Greut and Burd, *S. gallica* L., *S. pendula* L., *S. viscaria* (L.) Jessen	[184]
(*E*)-2-Hexenyl acetate		*S. otites* (L.) Wibel	[181]
(*Z*)-3-Hexenyl acetate		*S. chlorantha* (Willd) Ehrh, *S. dichotoma* Ehrh ssp. *racemosa* Chowdh (Otth) Graeb, *S. flos-cuculi* (L.) Greut and Burd, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. otites* (L.) Wib, *S. saxifraga* L., *S. sericea* All, *S. subconica* Friv, *S. vallesia* L., *S. viscosa* (L.) Pers	[30,181–183]

Table 1. *Cont.*

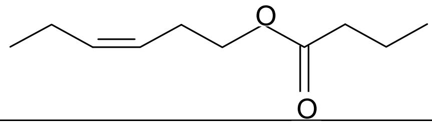
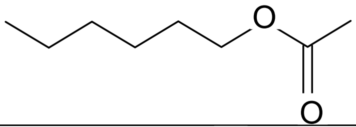
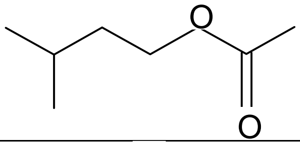
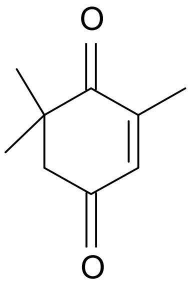
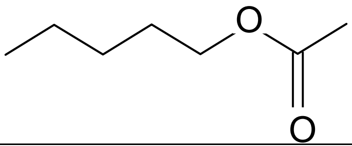
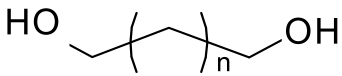
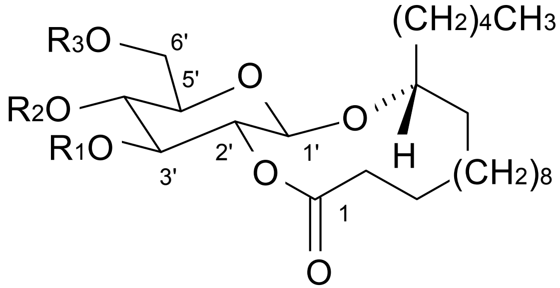
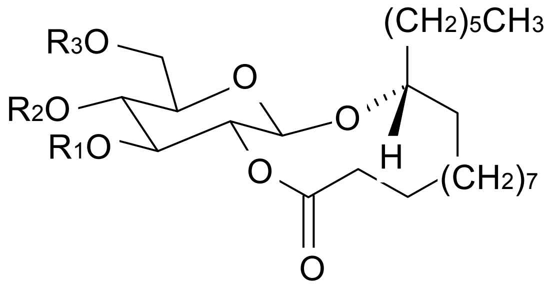
(*Z*)-3-Hexenyl butyrate		*S. otites* (L.) Wibel	[181]
n-Hexyl acetate		*S. alpestris* Jacq, *S. armeria* L., *S. coeli-rosa* (L.) Godron, *S. otites* (L.) Wibel, *S. rupestris* L., *S. viscaria* (L.) Jessen	[181,184]
3-Methylbutyl acetate		*S. nutans* L.	[185]
4-Oxoisophorone		*S. latifolia* Poiret	[30]
n-Pentylacetate		*S. viscaria* (L.) Jessen	[184]
1,14-Tetradecanediol	 n = 12	*S. flos-cuculi* (L.) Greut and Burd	[182]

Table 1. *Cont.*



Gallicaside A	$R_1 = R_2 = Ac, R_3 = H$	*S. gallica* L.	[188]
Gallicaside C	$R_1 = R_3 = Ac, R_2 = H$	*S. gallica* L.	[188]
Gallicaside F	$R_1 = R_2 = H, R_3 = Ac$	*S. gallica* L.	[188]



Gallicaside B	$R_1 = R_2 = Ac, R_3 = H$	*S. gallica* L.	[188]
Gallicaside D	$R_1 = R_3 = Ac, R_2 = H$	*S. gallica* L.	[188]
Gallicaside E	$R_1 = Ac, R_2 = R_3 = H$	*S. gallica* L.	[188]
Gallicaside G	$R_1 = R_2 = H, R_3 = Ac$	*S. gallica* L.	[188]
Gallicaside H	$R_1 = R_2 = R_3 = H$	*S. gallica* L.	[188]

Table 1. *Cont.*

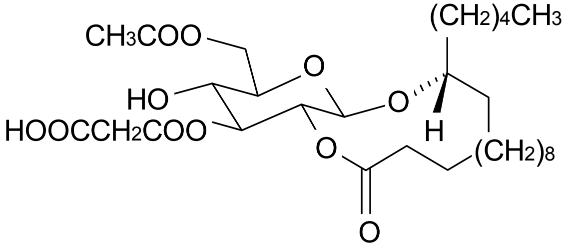
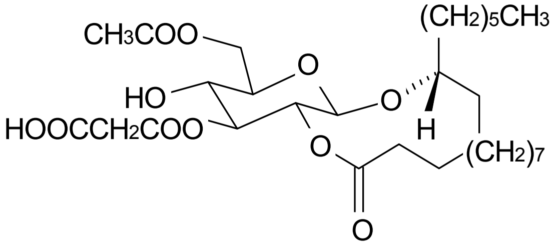
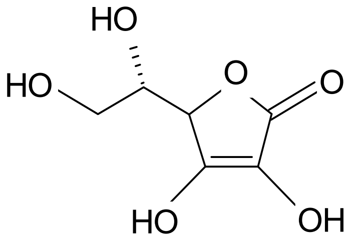
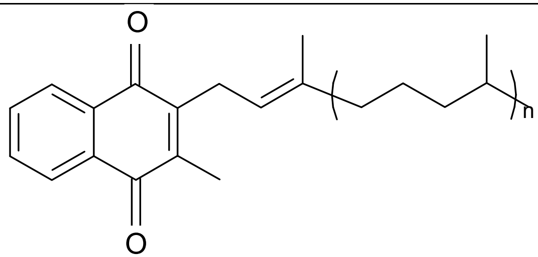
Gallicaside I		*S. gallica* L.	[188]
Gallicaside J		*S. gallica* L.	[188]
Various Structures			
Vitamin C (ascorbic acid)		*S. vulgaris* subsp. *macrocarpa*	[189]
Vitamin K1 (pylloquinone)	 n = 3	*S. vulgaris* subsp. *macrocarpa*	[189]

Table 1. *Cont.*

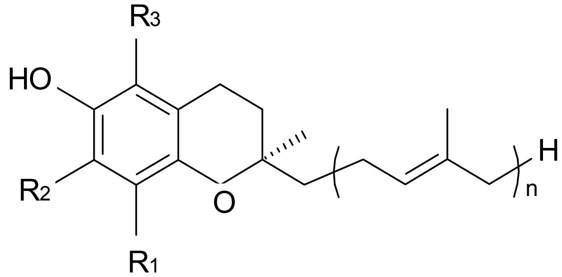
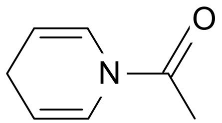
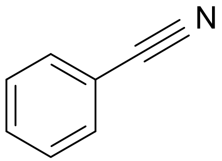
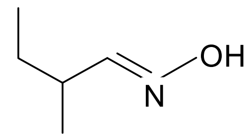
			
α-Tocopherol	$R_1 = R_2 = R_3 = CH_3$ n = 3	*S. viridiflora* L., *S. vulgaris* subsp. *macrocarpa*, *S. vulgaris* (Moench) Garcke	[31,189,190]
β-Tocopherol	$R_1 = R_3 = CH_3$ R_2 = H n = 3	*S. vulgaris* (Moench) Garcke	[190]
γ-Tocopherol	$R_1 = R_2 = CH_3$ R_3 = H n = 3	*S. vulgaris* (Moench) Garcke	[190]
δ-Tocopherol	$R_1 = R_2 = R_3$ = H n = 3	*S. vulgaris* subsp. *macrocarpa*, *S. vulgaris* (Moench) Garcke	[189,190]
n-Acetyl-4(H)-pyridine		*S. alpestris* Jacq, *S. armeria* L., *S. dioica* (L.) Clairv, *S. flos-cuculi* (L.) Greut and Burd, *S. viscaria* (L.) Jessen	[184]
Benzonitrile		*S. armeria* L., *S. dioica* (L.) Clairv	[184]
2-Methylbutyraldoxime		*S. chlorantha* (Willd) Ehrh, *S. italica* (L.) Pers, *S. latifolia* Poiret ssp. *alba* (Mill) Greut and Burd, *S. nutans* L., *S. vallesia* L., *S. vulgaris* (Moench) Garcke ssp. *vulgaris*	[183,185]

Table 1. *Cont.*

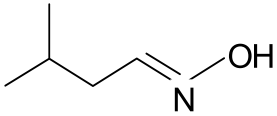
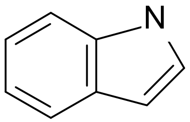
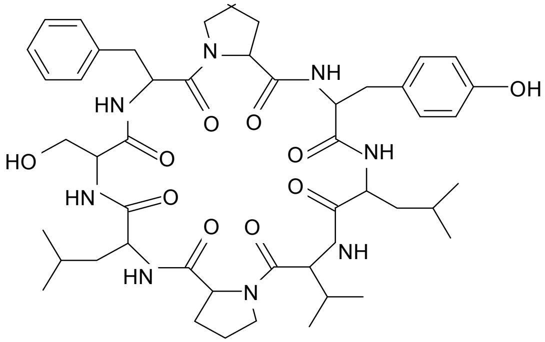
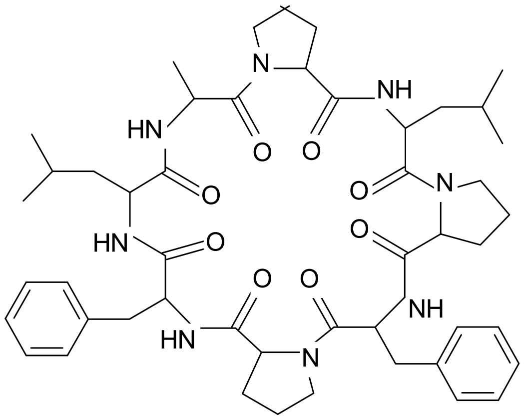
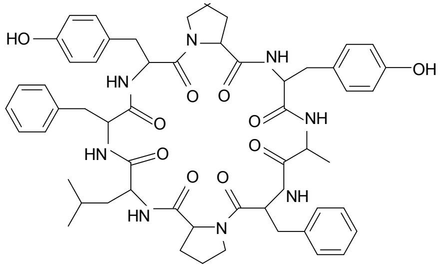
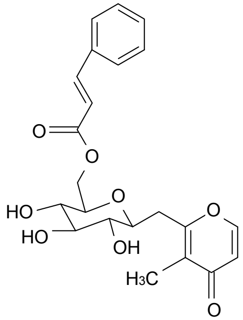
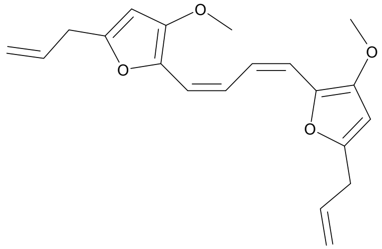
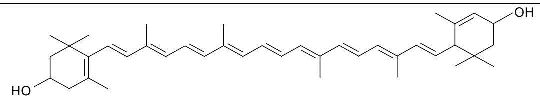
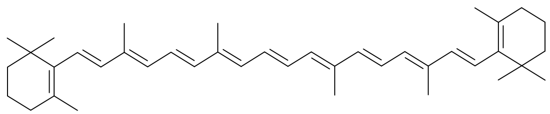
3-Methylbutyraldoxime		*S. chlorantha* (Willd) Ehrh, *S. italica* (L.) Pers, *S. latifolia* Poiret, *S. nutans* L., *S. otites* L., *S. vallesia* L.	[30,180,181,183,185]
Indole		*S. latifolia* Poiret, *S. nutans* L.	[30,185]
Silenin A (Cyclo-(Pro-Leu-Ser-Phe-Pro-Tyr-Leu-Val))		*S. szechuensis* Williams	[19]
Silenin B (Cyclo-(Pro-Leu-Ser-Phe-Pro-Tyr-Leu-Val))		*S. szechuensis* Williams	[19]

Table 1. *Cont.*

Silenin C (Cyclo-(Pro-Leu-Ser-Phe-Pro-Tyr-Leu-Val))		*S. szechuensis* Williams	[19]
Silenan	A (1→4)-α-D-galacturonan	*S. vulgaris* (Moench) Garcke	[191]
2-[6'-(*O*-trans-cinnamoyl)-β-D-glucopyranosyloxy)]-3-methyl-4H-pyran-4-one		*S.vulgaris* (Moench) Garcke	[192]
Conoidene (2,2'-(1,3-butadiene-1,4-diyl) bis[3-methoxy-5-(2-propen-1-yl) furan)		*S. conoidea* L.	[9]
Lutein		*S. vulgaris* subsp. *macrocarpa*	[189]
β-Carotene		*S. vulgaris* subsp. *macrocarpa*	[189]

Conflicts of Interest

The authors declare no conflict of interest.

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