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Tümü

Detaylı Arama

ANA SAYFA › SON EKLENEN YAYINLAR › ESSENTİAL OİL OF STACHYS ALEURİTES FROM ...

Essential oil of Stachys aleurites from Turkey

Flamini G., Cioni P. L. , Morelli I., Çelik S., Gokturk R. S. , Unal O.

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Özet

The essential oil obtained from the aerial parts of the Turkish endemism Stachys aleurites (Lamiaceae) has been studied. The main constituents were sesquiterpene hydrocarbons: beta-caryophyllene (33.7%), bicyclogermacrene (14.5%) and germacrene D (9.6%). The main monoterpene was alpha-pinene (8.4%). Some chernotax(o)nomical considerations have been provided. (C) 2004 Elsevier Ltd. All rights reserved.

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Essential oil of Stachys aleurites from Turkey

January 2005 · Biochemical Systematics and Ecology 33(1):61-66
DOI:10.1016/j.bse.2004.05.013

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... ne esters, namely the nuciferyl ones, was unexpectedly high (7.2%).Table 3summarizes the data on the composition of the essential oils of the taxa belonging to the S. germanica complex previously studied compared to the S. germanica ssp. heldreichii studied in this work. No trace of nuciferyl esters was detected in the previously investigated oils. Flamini et al. (2005) gaveTable 3Summarized data on the essential oil composition of the taxa belonging to S. germanica complex previously studied compared to the S. germanica ssp. heldreichii studied in this work Components S. germanica ssp. heldreichii (present study) S. germanica ssp. germanica (Lawrence et al., 1972)S. germanica ssp. heldreichii (Skaltsa ...

... Swainsoniana) (Skaltsa et al., 2001), whereas four additional species contained from trace amounts to 1.8% (Skaltsa et al., 2001;Skaltsa et al., 2003;Grujic-Jovanovic et al., 2004). The survey showed that the distribution of these secondary metabolites, related to nuciferyl esters, does not follow the morphological nor current chemotaxonomical classifications (Flamini et al., 2005). An additional motivation for this survey was the recently published phylogenetic analysis (Lindqvist and Albert, 2002) of species of Stachys and related genera from North America that accumulated evidence for excluding the Betonica L. group form the genus Stachys, but including other genera that were found to be nested within Stachys s.l. ...

... This implies, together with the varying sesquiterpene hydrocarbon principal components of previously investigated oils, that the quantity of germacrene D and any of its congeners (Bülow and König, 2000) in hydro-distilled essential oils cannot be regarded as a reliable chemotaxonomic marker. Having this in mind, the proposition of Flamini et al. (2005) (relevant data summarized inTable 2) to use groups of compounds rather than individual compounds as the division principle seems sound. Another class of secondary metabolites present in the essential oils is the diterpenes. ...

Chemotaxonomic significance of the volatiles in the genus Stachys (Lamiaceae): Essential oil composition of four Balkan Stachys species

Article Apr 2007 · BIOCHEM SYST ECOL

Niko Radulović · Jelena Lazarevic · Novica Ristić · Radosav Palic

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... There are many reports on the chemical composition of the essential oils from the members of Stachys genus. Flamini et al. (2005), Radulovic et al. (2007) and, more recently, Tundis et al. (2014), summarised data on the essential oil composition of the taxa belonging to Stachys genus studied since 1972. Following the proposition of Flamini et al. (2005) to use groups of compounds rather than individual compounds as the division principle, these authors identify three groups: (a) species mainly characterised by monoterpene hydrocarbons or sesquiterpene hydrocarbons, (b) species that contain mainly oxygenated monoterpenes or oxygenated sesquiterpenes, (c) species containing similar amounts of mono-and sesquiterpene hydrocarbons and oxygenated mono-and sesquiterpenes. ...

... Flamini et al. (2005), Radulovic et al. (2007) and, more recently, Tundis et al. (2014), summarised data on the essential oil composition of the taxa belonging to Stachys genus studied since 1972. Following the proposition of Flamini et al. (2005) to use groups of compounds rather than individual compounds as the division principle, these authors identify three groups: (a) species mainly characterised by monoterpene hydrocarbons or sesquiterpene hydrocarbons, (b) species that contain mainly oxygenated monoterpenes or oxygenated sesquiterpenes, (c) species containing similar amounts of mono-and sesquiterpene hydrocarbons and oxygenated mono-and sesquiterpenes. In general, sesquiterpene hydrocarbons represent the main group of components in several Stachys species (Venditti et al. 2013). ...

Volatile constituents of Stachys palaestina L. (Palestine woundwort) growing in Lebanon

Article | Full-text available | Jul 2014

Franco Piozzi · Carmen Formisano · Daniela Rigano · Felice Senatore

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... Chemical studies have been reported for some Stachys species [10][11][12][13][14], as well as various biological properties, such as radical scavenging [15], antioxidant due to polyphenol content [16,17], anxiolytic [18], anticandidal [19,20], antiinflammatory [10], antimycobacterial [21] and antimutagenic [22] activities. A literature survey showed that germacrene-D, α-pinene, β-pinene, β-caryophyllene, caryophyllene oxide, δ-cadinene, myrtenyl acetate, dehydroabietane, pimaradiene, α-copaene, E-nerolidol, abietatriene, linalool, spathulenol and methyl linoleate were the most encountered essential oil components of Stachys species [1,[23][24][25][26][27][28][29] [30]. The essential oils and/or the activity of nineteen Stachys species growing in Turkey were investigated previously [1,17,[20][21][22][25][26][27][28][29][30][31][32]. ...

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GC-MS Analysis and Antimicrobial Activity of Essential Oil of Stachys Cretica Subsp. Smyrnaea

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... In recent years, plentiful researches have been done on antimicrobial effects of diverse essences, extractions, and condiments that show highly abilities of these sorts of components to prevent the growth of pathogenic microorganisms and decomposing of food matters (Ababutain, 2011). Regarding this, the study on species of Stachys genus showed that sesquiterpene formed the most parts of all species essence (Chalchat , 2000; Flamini , 2005; Tepe , 2004). (Maleki , 2004) clarified the main and whole components of Stachys lavandulifolia and some its antibacterial effects. ...

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Study of chemical composition and antibacterial effects of essential oils of Stachys lavandulifolia Vahl., Salvia verticillata L., and Tanacetum polycephalum Schultz-Bip. on some microbial lineages

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Samanehsadat Mahzooni-kachapi · Solyman Halimi 'jelodar · Mohammad Mahdavi · Mohammad H. Jouri

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... α-bisabolol, bicyclogermacrene, βbourbonene, α-cadinene, α-cadinol, β-caryophyllene, (E)-β-caryophyllene, (Z)-β-caryophyllene, caryophyllene oxide, trans-β-farnesene, germacrene D, globulol, τmuurolol, α-pinene, β-pinene, and spathulenol were found to be the main components of most of the reported species from Turkey. Also, sesquiterpene hydrocarbons were shown to be the main group of constituents of the majority of Stachys species grown in Turkey (5,8,(15)(16) (17) (18)(19)(20)(21)(22)(23)(24)(25)(26). The essential oil composition of many Stachys species have been reported but a literature survey revealed that the chemical composition and biological activity of S. subnuda essential oil has not been investigated. ...

Chemical composition of endemic Stachys subnuda Montbret & Aucher ex Benth. essential oil and its anti-inflammatory and antioxidant activities

Article Mar 2019 · J ESSENT OIL RES

Ali Sen · M. Kurkcuoglu · Leyla Bitiş · K. Husnu Can Baser

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... Grujic-Jovanovic, Skaltsa, Marin and Sokovic (2004) analysed different Stachys species from Serbia, finding that sesquiterpene hydrocarbons were the major components of all samples except that of Stachys plumosa, which was rich in monoterpene hydrocarbons. A species from Turkey, Stachys aleurites, was studied by Flamini et al. (2005) and was found to be rich in sesquiterpene hydrocarbons, while germacrene D was the main component of Stachys sylvatica, an Italian species (Tirillini, Pellegrino, & Maleci Bini, 2004). In spite of the large size of Stachys, the composition of its volatile compounds is known in only a small number of species. ...

Essential oil composition of leaves of Stachys yemenensis obtained by supercritical CO2

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Nasser Ali · Bruno Maronqiu · Alessandra Piras · Stefania Zanetti

... fil., which is the endemic species growing in East Anatolia (Duman et al., 2005). The main components of the endemic species S. aleurites, which grows only in Antalya province, was determined as to be b-caryophyllene (33.7%) (Flamini et al., 2005). In the essential oil of S. cretica, S. pinardii a-curcumene (34.1%), cedrandiol (25.3%) and caryophyllene dioxide (22.2%) were reported (Ozturk et al., 2009). ...

Fatty acid composition and chemotaxonomic evaluation of species of Stachys

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Ahmet C Gören · E. Akcicek · T. Dirmenci · Hasibe Yilmaz

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... These investigations have reported the presence of flavonoids, phenolic acids, iridoids and terpenoids (Zinchenko, 1972; Ross and Zinchenko, 1975; Lenherr et al., 1984a,b; Kobzar, 1986; Kobzar and Nikonov, 1986; Yamamoto et al., 1994; Bankova et al., 1999; Bilusic Vundac et al., 2005). Like many other representatives of the family Lamiaceae, Stachys species also produce essential oils (Maly, 1985; Sezik and Basaran, 1986; Halim et al., 1991; Ghannadi and Alemdoost, 1996; Sajjadi, 1996; Cakir et al., 1997; Harmandar et al., 1997; Mariotti et al., 1997; Duru et al., 1999; Pélissier et al., 1999; Skaltsa et al., 1999 Skaltsa et al., , 2001 Skaltsa et al., , 2003 Chalchat et al., 2000 Chalchat et al., , 2001 Javidnia et al., 2003; Sajjadi and Mehregan, 2003; Sefidkon et al., 2003; Duman et al., 2005; Grujic-Jovanovic et al., 2004; Javidnia et al., 2004; Tirillini et al., 2004; Flamini et al., 2005; Petrovic et al., 2006), but in spite of the large size of this genus, the composition of volatile compounds is known only in a small number of species. The present study aims at investigating the essential oils of the following taxa: Stachys alpina, Stachys officinalis, Stachys palustris, S. recta subsp. ...

Essential oils of seven Stachys taxa from Croatia

Article Full-text available Dec 2006 · BIOCHEM SYST ECOL

Vjera bilusic vundac · Hartwig W Pfeifhofer · Adelheid Brantner · M. Plazibat

... Grujic-Jovanovic et al. [28] studied the composition and antibacterial activity of the essential oil of six Stachys species from Serbia and they proved that the essential oil of S. officinalis was the most active. Flamini et al. [29] reported the essential oils of Stachys aleurites, Delazar et al. [30] isolated acylated flavanoid glycosides from S. bombycina. Petrovic et al., [31] studied the composition and antimicrobial activity of essential oil of S. plumosa and reported antimicrobial activity against the bacteria and yeasts tested except Staphylococcus aureus. ...

Antimicrobial Activity of Centaura derderiifolia, Stachys aleurites and Anthemis aciphylla

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Kiymet Guven · Ersin Karabacak · Ismet Uysal · Sezgin Celik

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... Nonacosane (23.1%) was the major component of the essential oil of laetivirens laetivirens, which is the endemic species growing in East Anatolia (Duman et al., 2005). (E)-Caryophyllene (33.7%) was the main component of aleurites aleurites, which grows only in Antalya province (Flamini et al., 2005). The essential oil from aerial parts of Stachys palustris from Southern Italy was characterized mainly by carbonylic compounds (25.4%), fatty acids and their esters (24.2%), along with sesquiterpenoidic compounds (16.0%) and phenols (11.2%) (Senatore et al., 2007). ...

Phytochemical and Biological studies of Stachys species in relation to chemotaxonomy: A review

Article | Jun 2014

Rosa Tundis · Lorenzo Peruzzi · Francesco Menichini

... This may suggest that _-pinene alone could not be responsible for the activity but mostly synergistically interaction with the rest of the ingredients for the reason that, antiinflammatory effect by several experimental models was also found in some essential oils mainly containing the components such as _-pinene, NL-caryophyllene and 1,8-cineole (Silva et al., 2003;Standen and Myers, 2004). _-Pinene, has been so far reported to be found in a widerange of essential oils such as Salvia lavandulaefolia, Teucrium lusitanicum and Stachys aleurites, etc. (Savelev et al., 2003;Cavaleiro et al., 2004; Flamini et al., 2005). In a prior work by Van der Berg et al. (1998), the polymeric fraction of the mastic gum, a bled resin obtained from Pistacia lentiscus was found to consist of mainly a monoterpene called NL-myrcene. ...

Bioassay-guided evaluation of anti-inflammatory and antinociceptive activities of pistachio, Pistacia vera L

Article | May 2006 · J ETHNOPHARMACOL

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... These elements have many usages in medicinal and food industries, for instance, treatment of infection (Maleki et al., 2001), the digestive disorders (Mos'hafi et al, 2009). As the monoterpene and sesquiterpene hydrocarbons were the main components of the species, the obtained results according to reports of some researches such as Guido et al. (2005) (2012) on Stachys lavandulifolia. However, with a view to the percentages of essence components in the three altitude levels of the species did not match to the others as it influenced by microedaphic and microtopographic conditions. ...

The effects of altitude on chemical compositions and function of essential oils in Stachys lavandulifolia Vahl. (Iran)

Article | Full-text available | Jan 2014

S.S. Mahzooni-Kachapi · Mohammad Mahdavi · Mohammad H. Jouri · Leila Rouzbeh

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... fil., which is the endemic species growing in East Anatolia (Duman et al., 2005). The main components of the endemic species S. aleurites, which grows only in Antalya province, was determined as to be b-caryophyllene (33.7%) (Flamini et al., 2005). In the essential oil of S. cretica, S. pinardii a-curcumene (34.1%), cedrandiol (25.3%) and caryophyllene dioxide (22.2%) were reported (Ozturk et al., 2009). ...

Essential oil composition of twenty-two Stachys species (mountain tea) and their biological activities

Article | Dec 2011 · PHYTOCHEM LETT

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... Many Stachys species are known as "mountain tea" and applied in yogurt, jelly, and spices (Conforti et al., 2009). Moreover, S. lavandulifolia has been used as an herbal remedy in the treatment of several complaints (Goren et al., 2011; Flamini et al., 2005) Anxiolytic, antidepressive, appetite stimulant, and analgesic effectts have also been reported for the S. lavandulifolia extract (Khadivi-Khub et al., 2014). ...

Phytochemical and morphological variation of Stachys lavandulifolia Vahl. populations as affected by genotype × year interaction

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Chemical constituents of the essential oils of different stages of the growth of Stachys lavandulifolia Vahl. from Iran

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Chemical Composition of the Essential Oil from Aerial Parts of Stachys palustris L. (Lamiaceae) Growing Wild in Southern Italy

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Chemical constituents of the essential oils of aerial part of the Stachys lavandulifolia Vahl. and Stachys inflata Benth. from Iran

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TLC and GC analysis of the essential oils of Stachys species

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Essential oil of *Stachys aleurites* from Turkey

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Abstract

The essential oil obtained from the aerial parts of the Turkish endemism *Stachys aleurites* (Lamiaceae) has been studied. The main constituents were sesquiterpene hydrocarbons: β-caryophyllene (33.7%), bicyclogermacrene (14.5%) and germacrene D (9.6%). The main monoterpene was α-pinene (8.4%). Some chemotaxonomical considerations have been provided.
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Keywords: *Stachys aleurites*; Lamiaceae; Essential oil composition; Turkey; β-Caryophyllene; Bicyclogermacrene; Germacrene D; α-Pinene

1. Introduction

Since the revision of the 72 Turkish species of *Stachys* (Lamiaceae) by Bhattacharjee (1982), nine new species have been described: *Stachys choruhensis* Kit Tan and Sorger, *Stachys antalyensis* Y. Ayasligil and P.H. Davis, *Stachys chasmosericea* Y. Ayasligil and P.H. Davis, *Stachys tundjeliensis* Kit Tan and Sorger (Davis et al., 1988), *Stachys*

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anamurensis Sumbul (1990), *Stachys sivasica* Kit Tan and Yildiz, *Stachys baytopiorum* Kit Tan and Yildiz, *Stachys willemsei* Kit Tan and Hedge (Yildiz and Tan, 1988), and *Stachys cydni* Kotschy ex Gemici and Leblebici (Gemici and Leblebici, 1998).

Stachys aleurites is a 80 cm perennial suffrutescent erect species with purple flowers. It is endemic to Anatolia, where it grows in Antalya province only. This plant may be described as a termophilous species; it prefers calcareous rocks near the coast.

2. Materials and methods

The flowering aerial parts of *S. aleurites* Boiss. and Heldr. were collected in Turkey, C3 Antalya, Konyaalti, Varyant (36° 53′ 068″ N, 30° 40′ 697″ E), on calcareous rocks near the coast, about 10 m above the sea level at the end of May 2003. A voucher specimen is deposited at AKDU (Herbarium of the Biology Department of Akdeniz University) as Gokturk 5100. The plant material, deprived of the woody parts, was dried in the shade and hydrodistilled in a Clevenger-like apparatus for 2 h.

The GC analyses were accomplished with a HP-5890 Series II instrument equipped with HP-WAX and HP-5 capillary columns (both 30 m × 0.25 mm, 0.25 μm film thickness), working with the following temperature program: 60 °C for 10 min, ramp of 5 °C/min up to 220 °C; injector and detector temperatures 250 °C; carrier gas nitrogen (2 ml/min); detector dual FID; split ratio 1:30; injection of 0.5 μl). The identification of the components was performed, for both columns, by comparison of their retention times with those of pure authentic samples and by means of their linear retention indices (l.r.i.) relative to a series of *n*-hydrocarbons.

The relative proportions of the essential oil constituents were percentages obtained by FID peak-area normalization, without using response factors.

GC/EIMS analyses were performed with a Varian CP-3800 gas-chromatograph equipped with a DB-5 capillary column (30 m × 0.25 mm; coating thickness 0.25 μm) and a Varian Saturn 2000 ion trap mass detector. Analytical conditions: injector and transfer line temperatures 220 and 240 °C, respectively; oven temperature programmed from 60 °C to 240 °C at 3 °C/min; carrier gas helium at 1 ml/min; injection of 0.2 μl (10% hexane solution); split ratio 1:30. Identification of the constituents was based on comparison of the retention times with those of authentic samples, comparing their linear retention indices relative to the series of *n*-hydrocarbons, and on computer matching against commercial (NIST 98 and ADAMS) and home-made library mass spectra built up from pure substances and components of known oils and MS literature data (Stenhagen et al., 1974; Massada, 1976; Jennings and Shibamoto, 1980; Swigar and Silverstein, 1981; Davies, 1990; Adams, 1995). Moreover, the molecular weights of all the identified substances were confirmed by GC/CIMS, using MeOH as CI ionizing gas.

3. Results and discussion

The composition of the essential oil of *S. aleurites* is reported in Table 1. In total 51 compounds were identified, amounting to 92.2% of the whole oil.

Table 1
Composition[a] of the essential oil of *Stachys aleurites*

Constituents	LRI[b]	%
(*E*)-2-Hexenal	855	0.3
Heptanal	901	0.1
α-Thujene	933	0.2
α-Pinene	941	8.4
Benzaldehyde	963	tr[c]
Sabinene	978	tr
1-Octen-3-one	980	tr
1-Octen-3-ol	982	1.0
Myrcene	992	0.5
2-Pentylfuran	993	0.8
3-Octanol	995	tr
Octanal	1003	tr
α-Phellandrene	1007	tr
3-Carene	1013	0.2
p-Cymene	1028	tr
Limonene	1032	1.8
(*Z*)-Ocimene	1040	tr
(*E*)-Ocimene	1051	0.5
γ-Terpinene	1064	0.2
Terpinolene	1089	0.2
Linalool	1101	0.8
Nonanal	1104	0.7
(*E*)-2-Nonenal	1165	0.1
Decanal	1206	0.1
β-Cyclocitral	1223	0.1
α-Copaene	1377	0.4
β-Bourbonene	1384	1.0
Sativene	1392	0.2
Isocaryophyllene	1404	0.1
β-Caryophyllene	1420	33.7
β-Gurjunene	1432	0.2
α-Guaiene	1440	1.5
α-Humulene	1455	4.1
(*E*)-β-Farnesene	1460	0.4
Alloaromadendrene	1462	0.3
β-Chamigrene	1475	0.4
Germacrene D	1481	9.6
Bicyclogermacrene	1495	14.5
β-Himachalene	1499	0.1
β-Bisabolene	1509	1.1
cis-γ-cadinene	1511	tr
δ-Cadinene	1524	0.4
β-Sesquiphellandrene	1526	0.1
(*E*)-γ-Bisabolene	1533	1.9
trans-nerolidolo	1564	0.4
Spathulenol	1577	2.1
Caryophyllene oxide	1582	2.5
Cedrol	1598	0.5

(*continued on next page*)

Table 1 (*continued*)

Constituents	LRI[b]	%
T-Cadinol	1642	0.2
T-Muurolol	1643	0.3
n-Tricosane	2300	0.2
Total identified		92.2

[a] Percentages obtained by FID peak-area normalization (HP-5 column).
[b] Linear retention indices (HP-5 column).
[c] tr < 0.1%.

The main constituents of the essential oil were terpene derivatives; only a small percentage (3.6%) was represented by oxygenated straight-chain non-terpenic aldehydes, ketones and alcohols. Furthermore, an aromatic aldehyde (benzaldehyde) and an aliphatic hydrocarbon were present.

Monoterpenes represented 13 of the 51 compounds, corresponding to 12.8% of the whole oil. Linalool was the only monoterpene alcohol present (0.8%). In contrast, sesquiterpenes constituted 76% of the whole oil (25 derivatives) and oxygenated compounds were scarcely represented (6%). The main sesquiterpene hydrocarbons were β-caryophyllene (33.7%), bicyclogermacrene (14.5%), germacrene D (9.6%), followed by the monoterpene hydrocarbon α-pinene (8.4%).

Many other *Stachys* species have been investigated for their essential oil composition. In fact, taking into account the main constituents identified in these species, it is possible to differentiate among four groups of species:

1. Species producing principally monoterpene hydrocarbons such as *Stachys aegyptiaca* (Halim et al., 1991) or sesquiterpene hydrocarbons such as *Stachys officinalis* (Chalchat et al., 2001), *Stachys cretica* ssp. *cretica*, *Stachys menthifolia*, *Stachys germanica* ssp. *heldreichii*, *Stachys euboica*, *Stachys scardica* (Skaltsa et al., 2003) and *Stachys* subsect. Swainsonianeae (Skaltsa et al., 2001) or both the classes such as *Stachys lavandulifolia* (Javidnia et al., 2003; Feizbakhsh et al., 2003) (even if also high oxygenated sesquiterpene percentages have been reported for this species by Ramzani et al. (2002)).
2. Species containing mainly oxygenated monoterpenes (*Stachys iberica* (Kaya et al., 2001), *Stachys acerosa* (Masoudi et al., 2003)) or oxygenated sesquiterpenes (*Stachys candida*, *Stachys chrysantha* (Skaltsa et al., 1999), *Stachys pilifera* (Masoudi et al., 2003)).
3. Species containing similar amounts of mono and sesquiterpene hydrocarbons and oxygenated mono- and sesquiterpenes, such as *S. officinalis*, *Stachys grandiflora*, *S. germanica*, *Stachys sylvatica* (Radnai et al., 2003) *Stachys byzantina* (Khanavi et al., 2003; Radnai et al., 2003), *Stachys balansae* (Cakir et al., 1997), *Stachys alopecuros*, *Stachys spinulosa* (Skaltsa et al., 2003) and *Stachys obliqua* (Harmander et al., 1997).
4. Species producing non-terpenic alcohols and terpene oxides (*Stachys recta* (Cakir et al., 1997; Chalchat et al., 2000)).

S. aleurites, because of its high content of sesquiterpenes (76%), in particular sesquiterpene hydrocarbons (70%), could be inserted in the first proposed group, together with *S. officinalis* and the species of the Swainsonianeae subsection.

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