Chemical Constituents of the Essential oil of *Sanguisorba minor* Scop. Leaves, from Iran

Esmaeili A (Ph.D.)[1], Masoudi Sh (Ph.D.)[2], Masnabadi N (M.Sc.)[3], Rustaiyan AH (Ph.D.)[4]*

1- Department of Chemical Engineering, North Tehran Branch, Islamic Azad University, Tehran, Iran
2- Department of Chemistry, Central Tehran Branch, Islamic Azad University, Tehran, Iran
3- Department of Chemistry, Roudhen Branch, Islamic Azad University, Roudhen, Iran
4- Department of Chemistry, Science & Research Campus, Islamic Azad University, Tehran, Iran
*Corresponding author: Department of Chemistry, Science & Research Campus, Islamic Azad University, P.O.Box: 14515-775, Tehran, Iran
Tel: +98-21- 22436370, Fax: +98-21- 22436370
E -mail: rustaiyan@excite.com

Receive: 22 May 2010 **Acceptance:** 24 Aug. 2010

Abstract

Background: The family Rosaceae, include some large genus, eg; the genus Rose includes 200 species and 18000 cultivars.

Objective: Aim of this study is to determine the chemical composition of the hydrodistilled oil of the leaves of *Sanguisorba minor* scop, of Iranian origin for the first time.

Methods: The essential oil obtained by hydrodistillation of *Sanguisorba minor* was analyzed by GC and GC/MS.

Results: The major constituents appeared to be *(E, E)* farnesyl acetate (13.4%), nonadecane (11.2%) and docosane (11.0%).

Conclusion: In *Sanguisorba minor* we identified 17 components representing 93.2%. It's rich in regard to aliphatic hydrocarbons (40.6%), five sesquiterpenes (36.8%), one oxygenated monoterpene (7.3%) and one aliphatic aldehyde (8.3%).

Keywords: *Sanguisorba minor,* Rosaceae, Essential oil composition, *(E, E)* Farnesyl acetate, Nonadecane, Docosane

[DOR: 20.1001.1.2717204.2010.9.35.6.6]

Introduction

The family Rosaceae, include some large genus, eg; the genus Rose includes 200 species and 18000 cultivars [1]. *Rosa damascena* Mill uses in traditional medicine, eg; analgestic, antidepressant, anti-inflammatory, diuretic and cosmetic [2-6]. The essential oil of the plant is one of the most valuable and important base material in the flavor and fragrance industry [7]. Also the oil of *Rosa damascena* petals was evaluated for its antibacterial effects against three strains of *Xanthomonas axonopodis* spp. *vesicatoria.* The essential oil may be apotential control agent in the management of the disease caused by X. a. vesicatoria in tomato and pepper plants [8].

The other genus of this family is *Sanguisorba* which is represented in the flora of Iran by two species, *S. minor* scop and *S. officinalis* L. [9, 10]. The essential oil of *Sanguisorba minor* has not been investigated up to now, so we decided to examin the leaves oil.

Materials and Methods

Plant Materials

The leaves of *Sanguisorba minor* were collected from Taleghan regions, North of Tehran, in Agust 2008. A voucher specimen has been deposited at the Herbarium of the Research Institute of Forests and Rangelands (TARI), Tehran, Iran.

Isolation of the Essential Oil

The leaves of the plants were dried at room temperature and hydrodistilled for 3h using a Clevenger- type apparatus. The oil was dried over anhydrous sodium sulfate and stored at 2°C in the dark. The yield based on dry weight was 0.2% (w/w).

Table 1- Percentage composition of the leaf oils of *Sanguisorba minor*

Compound	RI[a]	%
linalool	1098	73.0
nonanal	1099	8.5
dodecane	1199	3.6
tridecane	1299	2.4
(E)-α-damascenone	1380	3.2
tetradecane	1399	3.8
β-caryophyllene	1418	9.7
germacrene D	1480	5.4
caryophyllene oxide	1581	5.1
hexadecane	1600	0.1
heptadecane	1700	1.2
octadecane	1800	2.4
(E,E)-farnesyl acetate	1843	13.4
nonadecane	1900	11.2
eicosane	2000	2.6
henicosane	2100	2.3
docosane	2200	11.0
Total		93.2

[a]Retention indices as determined on a DB-5 column using the homologous series of n-alkane

[DOR: 20.1001.1.2717204.2010.9.35.6.6]

The oil was dried over anhydrous sodium sulfate and stored at 2°C in the dark. The yield based on dry weight was 0.2% (w/w).

Gas Chromatography

GC analysis was performed on a Shimadzu ISA gas chromatograph equipped with a split/splitless injector (250°C) and a flame ionization detector (250 °C). N_2 was used as carrier gas (1mL/min) and the capillary used was DB-5 (50 m × 0.2 mm, film thickness 0.32 μm).

The column temperature was kept at 60 °C for 3 min and then heated to 220°C with a 5°C/min rate and kept constant at 220 °C for 5 min. Relative percentage amounts were calculated from peak area using a Shimadzu C-R4A chromatopac without the use of correction factors.

Gas Chromatography-Mass Spectrometry

GC/MS analysis was performed using a Hewlett-Packard 5973 with a HP-5MS column (30m x 0.25 mm, film thickness 0.25 μm). The column temperature was kept at 60 °C for 3 min and programmed to 220 °C at a rate of 5 °C /min and kept constant at 220 °C for 5 min.

The flow rate of helium as carrier gas with (1 mL/min). MS were taken at 70 eV. Identification of the constituents of the oil was made by comparison of their mass spectra and relative retention indices (RRI) with those given in the literature and those authentic samples [11, 12].

Results

The chemical composition of the oil of *Sanguisorba minor* is given in Table I. As it is shown, about 93.2% (17 component) of the oil were identified. The oil of *S. minor* consisted mainly often aliphatic hydrocarbons (40.6%), five sesquiterpenes (36.8%), one oxygenated monoterpene (7.3%) and one aliphatic aldehyde (8.3%). *(E, E)* Farnesyl acetate (13.4%), nonadecane (11.2%) and docosane (11.0%) were the major components in this oil, followed by β-caryophyllene (9.7%), nonanal (8.5%) and linalool (7.3%).

Discussion

There are a few reports on the essential oils of Rutaceae family, eg. the composition of the essential oil from the underground parts of *Geum reptans* L. was analysed by GC and GC/MS.

The main classed of the compounds present are monoterpenoids (20.5%) and fatty acids (52.0%) with linolenic acid as the predominant constituents (18.3%) [13]. In other study the essential oil composition of three strawberry genotypes, *Fragaria ananassa* Duch. Were examined by GC/MS. The major components were linalool (16.1-18.8%) and nonanal (5.9-16.6%). Many of the other constituents were aliphatic in nature [14].

Acknowledgements

We are grateful to Dr. V. Mozaffarian (Research Institute of Forests and Rangelands, Tehran) for helpful assistance in collecting plant material and for botanical identification.

References

1. Gudin S. genetics and breeding, *Plant Breed. Rev.* 2000; 17: 159 - 89.

2. Wells FV, Billet M. Perfumery Technology. Art: Science: Industry, London: John Willey and Sons, 1981, pp: 330.

3. Arctander S. Perfume and flavour

[DOR: 20.1001.1.2717204.2010.9.35.6.6]

materials of natural origin. NJ: Allured Publishing. Crop. Carol Stream IL, USA, 1960, pp: 31.

4. Furia TE. Bellanca N. Fenaroli's hand book of flavor ingredients. Boca Raton, FL USA: CRC Press, 1975, pp 104 - 17.

5. Martindale W. The extra pharmacopoeia. London: The Pharmaceutical Press, 1993, pp: 44 - 8.

6. Panda H. Cultivation and Utilization of Aromatic Plants, 2010, pp: 150 - 5.

7. Baydar, H, and Baydar Göktürk, N. The effects of harvest date, fermentation duration and Tween 20 treatment on essential oil content and composition of industrial oil rose (*Rosa damascena* Mill.). *Ind. Crops Prod.* 2003; 21: 251 - 5.

8. Basim E, Basim H. Antibacterial activity of Rosa damascena essential oil. *Fitoterapia* 2003; 74: 394 - 6.

9. Rechinger KH. *Sanguisorba, In: Flora Iranica, Rosaceae,* No. 66 Edits., KH. Rechinger and I.C.Hedge, Akademische Druck and Verlagsanstalt, Graz, Austria, 1982, p: 153.

10. Mozaffarian V. A Dictionary of Plant Names, Farhang Moaser, Tehran, 1996, pp:481.

11. Eight Peak index of mass spectra, Unwin Brothers LTD, Surry, 2001, pp: 400 - 20.

12. Adams RP. Identification Essential Oils Components by Gas Chromatography/Mass Spectroscopy. Allured. Publ. Crop, Carol Stream IL, USA, 2001, pp: 40 - 100.

13. Schultze W. Mit dir, Lili Marleen. Die Lebenserinnerungen des Komponisten Norbert Sch 1995; 10: 249 - 53.

14. Khanizadeh S. Analysis of the essential oil of the leaves of *Fragaria × ananassa* Duch. *J. Essent. Oil Res*. 1993; 5: 109 - 11.

[DOR: 20.1001.1.2717204.2010.9.35.6.6]