Asian Journal of Chemistry Vol. 19, No. 6 (2007), 4951-4953

NOTE

Chemical Composition of Essential Oil of *Salvia brachycalyx* Boiss. at Flowering Stage from Iran

MOHAMMAD HADI MESHKATALSADAT* and MAHBOBEH ASADI
Department of Chemistry, Lorestan University, P.O. Box 465, Khoramabad, Iran
Fax: (98)(661)4600092
E-mail: meshkatalsadat.m@lu.ac.ir; mhmeshkatalsadat@yahoo.com

The composition of the essential oil from aerial parts of Salvia specie *i.e.*, *S. brachycalyx* boiss. has been analyzed by GC and GC/MS. During the flowering period, the oil (*S. brachycalyx*) consisted mainly of monoterpenes. The major components of the oil of *S. brachycalyx* were 1,8-cineole (76.58 %), geraniol (15.08 %) and α-pinene (0.78%).

Key Words: *Salvia brachycalyx*, Lamiaceae, Essential oil, 1,8-Cineole, Geraniol, α-Pinene.

58 Species of the genus Salvia (Lamiaceae) are found in Iran, 17 of which are endemic[1,2]. Several species of Salvia have been reported to exhibit antibacterial, estrogenic, antioxidant and antitumour activities[3-6] and are used in the treatment of eczema, psoriasis and tuberculosis[7]. In present studies, the chemical composition of the oil is isolated from *S. brachycalyx* of Iranian origin has been investigated by means of GC and GC/MS in combination with retention indices. In contrast to the oils of many Salvia species[8-14], a literature search did not reveal any references to previous work on the oil of this specie.

Aerial parts of the plant were collected from the zagruse montaine in Lorestan state in south west of Iran in June 2005, at flowering stage. A literature search reveals that the oil of *Salvia brachycalyx* has not been the subject of previous study[2]. The aerial parts of plant (100 g) were subjected to hydro-distillation using a Clevenger-type apparatus to produce an oil in 0.07 % w/w yield.

The GC analysis of the oil was conducted using a Varian CP-3800 instrument equipped with a DB-1 fused silica column (60 m × 0.25 mm id., film thickness 0.25 μm). Nitrogen was used as the carrier gas at the constant flow of 1.1 mL/min. The oven temperature was kept at 60°C for 1 min, then programmed to 250°C at a rate of 4°C/min and kept constant at 250°C for 10 min. The injector and detector (FID) temperatures were kept at 250 and 280°C, respectively. GC-MS analysis was carried out on a Thermoquest-Finnigan Trace and DB-Wax columns under the same

conditions. GC-MS instrument equipped with a DB-1 fused silica column (60 m × 0.25 mm i.d., film thickness 0.25 μm). The oven temperature was raised from 60 to 250ºC at a rate of 5ºC/min and then held at 250ºC for 10 min; transfer line temperature was 250ºC. In this case, the oven temperature was raised from 40 to 250ºC at a rate of 4ºC/min, then held at 250ºC for 10 min with the transfer line temperature adjusted at 250ºC The flow rate of helium as carrier gas was 1.1 mL/min split ratio was 1/50. The quadrupole mass spectrometer was scanned over the 45-465 amu with an ionizing voltage of 70 eV and an ionization current of 150 μA. The constituents of the oil were identified by calculation of their retention indices under temperature-programmed conditions for identification of individual *n*-alkanes (C_6–C_{24}) and the oil on DB-1 compounds was made by comparison of their mass spectra

TABLE-1
COMPOSITION OF THE ESSENTIAL OIL OF
Salvia brachycalyx Boiss. FROM IRAN

Compounds	Tn	RI	Area (flowering) (%)
α-Pinene	9.23	933	0.78
Myrcene	10.22	974	0.08
p-Cymene	11.21	1014	0.16
1,8-Cineole	11.49	1024	76.58
Linalool	13.07	1082	0.18
α-Pinene epoxy	15.64	1175	0.05
Nerol	16.54	1208	0.06
Citronellol	16.76	1216	0.13
Geraniol	17.28	1235	15.08
Citral	17.52	1244	0.18
Formate geranyl	18.48	1280	0.11
Geranyl acetate	20.52	1357	0.06
β-Cubebene	21.36	1389	0.06
γ-Muurolene	23.64	1480	0.09
Buthyl hydroxyl toluene	23.95	1492	0.33
Pentadecane	24.03	1496	0.08
Spathulenol	25.78	1570	0.20
Caryophylleneoxide	25.98	1579	0.11
Geranyl pentanate	26.09	1584	0.09
Benzyl benzoate	29.39	1733	0.45
Palmiticacid	33.53	1943	0.06

Tn : Retention time; RI: Kovats constant, in flowering stage

with those of the internal reference mass spectra library (Wiley 7.0) or with authentic compounds or with those of reported in the literature[15]. Quantitative data was obtained from FID area percentages without the use of correction factors. The list of compounds identified in the oil of *S. brachycalyx* can be seen in Table-1.

The oils isolated by hydrodistillation from the aerial part of brachycalyx was obtained in 0.07 % w/w yield. The composition of the oil of the Salvia species is listed in Table-1, in which the percentage and retention indices of components are given. 21 Constituents representing 94.9 % of the total components in the oil of *S. brachycalyx*, was characterized 1,8-cineole (76.58 %), geraniol (15.08 %) and α-pinene (0.78 %) as the main compounds. Monoterpenes comprised 93.54 %, while sesquiterpenes consisted of 0.83 % of the oil. The comparison of these results with previous investigation on oils of the Salvia genus, showed the oils of *S. sahendica*, *S. lereifolia* and *S. multicaulis* were also dominated by monoterpenes. On the other hand, the oils of *S. aethiopis* and *S. hypoleuca* contain mainly sesquiterpenes[16-18].

REFERENCES

1. K.H. Rechinger, in eds: K.H. Rechinger and I.C. Hedge, Salvia in Flora Iranica, Labiatae. No. 150, Akademische Druck and Verlagsantalt, Graz, Austria, p. 454, 462, 448 (1987).
2. V. Mozaffarian, A Dictionary of Iranian Plant Names, Farhang Moaser Publishers, Tehran, Iran, p. 479 (1996).
3. V.N. Dobrynin, M.N. Kolosov, B.K. Chernov and N.A. Derbentseva, *Khim. Prir. Soedin*, **5**, 686 (1976).
4. W.I. Hanson and G.M. Hocking, *Garden Sage. Econ. Bot.*, **11**, 64 (1957).
5. M.K. Chien, P.C. Yang, K.C. Chin and C.H. Chen, *Yao HsuehTung Pao*, 15 (1980).
6. H. Hitokoto, S. Morozumi, T. Wauke, S. Sakai and H. Kurata, *Appl. Environ. Microbiol.*, **39**, 818 (1980).
7. I. Janosik, Czech. Patent, 185,262 (1980).
8. K.H.C. Baser, H. Duman, M. Vural, N. Adiguzel and Z. Aytac, *J. Essent. Oil Res.*, **9**, 489 (1997).
9. M.M. Endeshaw, O.R. Gautun, N. Asfaw and A.J. Aasen, *Flav. Frag. J.*, **15**, 27 (2000).
10. D. Pitarokili, O. Tzakou, M. Couladis and E. Verykokidou, *J. Essent. Oil Res.*, **11**, 655 (1999).
11. M. Mirza and L. Ahmadi, *J. Essent. Oil Res.*, **12**, 575 (2000).
12. M. Couladia, O. Tzakou, D. Stojanovic, N. Mimica-Dukic and R. Jancic, *Flav. Frag. J.*, **16**, 227 (2001).
13. A. Ulubelen, M. Miski, C. Johansson, E. Lee, T.J. Mabry and S.A. Matlin, *Phytochemistry*, **24**, 1386 (1985).
14. A.A. Hussein and B.J. Rodriguez, *Z. Naturforsch., B: Chem. Sci.*, **55**, 233 (2000).
15. R.P. Adams, Identification of Essential Oil Components by Gas Chromatography/Mass Spectroscopy, Allured Publishing Corp., Carol Steam, IL (1995).
16. M. Miski, A. Ulubelen, C. Johansson and T.J. Mabry, *J. Nat. Prod.*, **46**, 874 (1983).
17. A. Rustaiyan, H. Komeilizadeh, S. Masoudi and A.R. Jassbi, *J. Essent. Oil Res.*, **9**, 713 (1997).
18. A. Rustaiyan, S. Masoudi, M. Yari, M. Rabbani, H.R. Motiefar and K. Larijani, *J. Essent. Oil Res.*, **12**, 601 (2000).

(*Received*: 5 September 2006; *Accepted*: 4 May 2007) AJC-5656