Pak. j. sci. ind. res., vol. 38, no. 7, July 1995.

Evaluation of Pakistani Sweet Basil Oil for Commercial Exploitation

L.M. Khatri, M.K.A. Nasir, R. Saleem and F. Noor*
PCSIR Laboratories Complex, Karachi-75280
(Received February 7, 1994; revised May 28, 1995)

Ocimum basilicum Linn Var. Selasih hidjau, an aromatic herb, locally known as "Niazbo" and universally as "Sweet basil", is cultivated in India, Ceylon, Burma, Taiwan, Italy, France and other European Countries.

The plant finds numerous uses in local system of medicine and its essential oil is used to feed industry and perfumery [1-3].No work has been done on its physico chemical characteristics and chemical composition, therefore, it was selected for the present studies.

The aerial parts of the plant (3 kg) were chopped into small pieces and hydrodistilled in a 20 litres flask for three hours. The essential oil was seperated and dried over anhydrous sodium sulphate.

The physico-chemical properties of the essential oil were determined by standard methods [4] and the results are given in Table 1.

TABLE 1. PHYSICO-CHEMICAL PROPERTIES OF SWEET BASIL OIL

1.	Yield	0.28%
2.	Colour	Yellow
3.	Optical rotation at 34°C.	+ 0°50'
4.	Specific Gravity at 20°C.	0.9592
5.	Refractive Index at 20°C.	1.5129
6.	Acid value	0.28

The basil oil was resolved into individual components by G.C.using Dani 6800/fitted with FID. The parameters were: Nitrogen as carrier gas, glass capillary column SP 2310 (2 m, i.d. 1/8", O.V. - 101, 10%), Inj. temp. 120°, FID at 260°, instrument temp. programmed at 50° (min) to 300° (max.) at the rate of 5°C / minutes.

The GC/MS analyses were performed using a Finnigan MAT 1125 mass spectrometer with MAT 188 data system, attached with Varian 3400 gas chromatograph. Helium was used as carrier gas, flow rate 0.1 ml/minute, glass capillary column SP 2100 (O.V. - 101), temp. programmed at 60° (initial) to 260° (final) at the rate of 8°C / minute.

The major components of basil oil, as determined by GC and GC/MS (Fig.1), are recorded in Table-2. They were identified by comparison with their standard samples in the GC and fragmentation pattern of the individual component in the mass spectra [5-6]. The percentage composition was found by gas chromatography on the basis of peak areas. The compounds of lower content (less than 0.1%) were not identified.

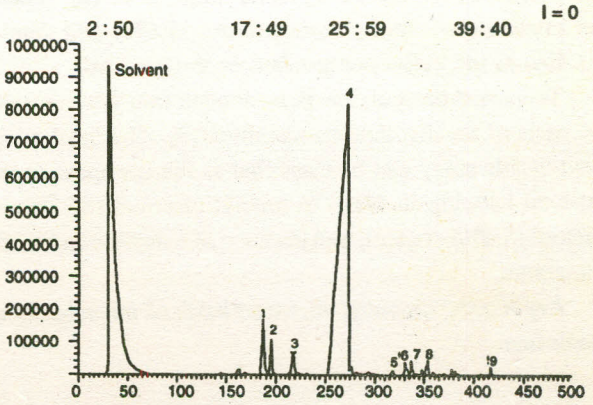

Fig. 1. GC/MS of sweet basil oil.

The oil yield (0.28%) is quite similar to the yield reported by Hoang *et al.* [7] but different from Singh *et al.* [8]. The variations in the yield of oil may be due to the changes in the soil and climatic conditions.

The GC and GC/MS analysis of the sweet basil oil revealed the presence of methyl chavicol as the predominating component (87.3%) Other major compounds identified are linalool 5.4%), methyl eugenol (1.5%), β-caryophyllene (2.4%), α-pinene (1.0%), β-pinene (0.8%), limonene (0.5%) and camphene (0.2%). A component (0.3%) having molecular weight 178, could not be identified.

TABLE 2. THE COMPOSITION AND MASS SPECTRAL DATA OF THE INDIVIDUAL COMPONENTS OF SWEET BASIL OIL

Peak No.	Component	Mass ion $(M)^+$	Mass spectrum peaks (m/e)
1.	Linalool	154	154,139,136,121,93,80, 71,55
2.	α-pinene	136	136,121,105,93,77,53
3.	β-pinene	136	136,121,107,93,79, 71,69,55.
4.	Methyl chavicol	148	148,133,121,117, 105, 91,77.
5.	Camphene	136	136,121,105,93,79,67
6.	Methyl eugenol	178	178,163,147,107, 103,91,77,65,55
7.	β-Caryophyllene	204	189,161,148,147, 133,121,107,93,91, 81,79,69.
8.	Limonene	136	136,121,107,93,79,68,53
9.	Un-identified	178	178,147,119,107,93, 91,79,77,67,55

* Dept. Chemistry, University of Karachi, Karachi-75270, Pakistan.

Studies on sweet basil oil has been carried out by various workers [7-11], Randrimiharisoa *et al.* [9] reported the presence of methyl chavicol (74-87%) and the sesquiterpenes (2-4%) in the oil while Tapanes *et al.* [10] reported methyl chavicol (56.58%)< limonene (15.5%), linalool (10.03%), α-terpineol (2.3%), Ocimene (1.61%) and β-pinene (1.6%). Gulati [11] identified methyl chavicol (70-80%) and linalool (15-20%) while Singh *et al.* [8] reported the presence of methyl cinnamate (53.8%) and linalool (13.4%) as the major components in the basil oil.

The sweet basil oil has been divided into four groups on the basis of its chemical composition [3]. The basil oil isolated in this study can be classified as the European type of basil oil keeping in view its methyl chavicol (87.3%) and linalool (5.4%) content, and absence of camphor and methyl cinnamate.

Key Words: Essential oil, Sweet basil, *Ocimum basilicum*, Lamiaceae.

References

1. G. Watt., Dictionary of Economic Products of India. (Govt of India, Department of Revenue and Agriculture, Calcutta, 1889), Vol.5 PP.440.
2. K.R. Kirtikar and B.D. Basu, *Indian Medicinal Plants* (L, Mohan Basu, 40 Leader Road, Allahabad, India, 1933), Vol,3 PP.1961.
3. E.Guenther, *The Essential Oils* (R.E. Krieger Publishing Co., Newyork, 1972), Vol.2 PP.506.
4. E.Guenther, *The Essential Oils* (R.E. Krieger Publishing Co., Newyork, 1972), Vol, 1, pp. 236.
5. Y. Masada, *Analysis of Essential Oils by Gas Chromatography and Mass Spectrometry* (Halsted Press, John Wiley & Sons Inc. New York/Japan, 1976), PP.188.
6. A. Cornu and R. Masset, *Compilation of Mass Spectral Data* (Heyden & Sons Ltd., Spectrum House, Alderton Crescent London, N.W.4, 1966).
7. V.P. Hoang and T.H. Hoang, Chem. Abst., **88** 158268 (1978).
8. R.S. Singh, M.G. Pathak and D.N. Bordoloi, Chem. Abst., **105**, 196969 (1986).
9. R. Randriamiharisoa, E.M. Gaydou, J.P. Bianchini, G. Ravelojaona, and G. Vernin, Chem. Abst. **105** 102314 (1986).
10. R. Tapanes, M. Delgedo and M.T. Correa, Chem. Abst., **107**, 83681 (1987).
11. B.C. Gulati, 7th International Congress, Essential Oils (1977), Chem. Abst., **92**, 64520 (1980).