

Chemical Evaluation of Oil from *Mentha piperita* L.

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Abstract

Yield, physico-chemical characteristics and chemical composition of the oil from the leaves of *Mentha piperita* L. were determined. The results obtained compared well with those of oil from *Mentha piperita* Var. *Vulgaris*, *Mentha piperita* L. and *Mentha arvensis*. It was concluded that this oil could be used in many products in place of oil from other *Mentha* spp.

Introduction

The oil is usually extracted from the fresh or partially dried leaves of *Mentha* spp. by steam distillation. The mints belong to the genus *Mentha* of family Labiatae, which includes in addition to *Mentha* species, other commonly grown oil yielding plants such as Basil, Rosemary, Marjoram, Thyme and *Salvia* (9).

Mentha piperita L. was originally introduced from Europe, but it has now spread throughout America, Japan, Russia, India and Pakistan. *Mentha piperita* syn. *A. officinalis* L. is grown in regions around England. The oil obtained from this variety is considered the finest of all commercial peppermint oils.

In Pakistan *Mentha piperita* L. and *Mentha arvensis* L. are found in Azad Kashmir, N.W.F.P., Punjab and Balochistan at an altitude from 2000-3500 m. It is also now cultivated on a large scale in Pakistan (10).

The volatile oils distilled from mint are important flavouring material throughout the World. They are used extensively by manufacturers of confectionary, Pharmaceuticals, tooth pastes, Liqueurs and cigarettes (8,9).

Menthol separated from the mint oil is a natural laevo organic compound. It exists in the form of colourless prismatic crystals. It has a warm taste followed by a sensation of cold (2).

Since the yield, chemical composition and quality of the peppermint oil varied, significantly depending

upon the soil and climatic condition of region (9), it was decided to determine the chemical constituents of the locally grown *Mentha* species. The present study was taken up to determine the yield and physico-chemical characteristics of the oil from *Mentha piperita* L. grown in Medicinal Plant Farm at Pakistan Forest Institute, Peshawar with a view to explore its possibility for commercial utilization in various industries.

Material and Methods

Mentha piperita L. Leaves were collected from the plants grown in Medicinal Plants Farm of Pakistan Forest Institute, Peshawar in the month of May 1986. They were cleaned, dried in shade and cut into small pieces. The oil was then extracted from the partially dried leaves by steam distillation. The steam containing mint oil vapours were passed through a condenser and condensed to water and oil. They were collected in a receiving flask, and then transferred to a separating funnel. The oil and water being immiscible separated into two layers, oil being the lighter floated at the top and was periodically tapped off. In this process petroleum ether was used as solvent for the complete recovery of the oil (3,5,9).

Physico-chemical characteristics such as specific gravity and refractive index of the oil were determined following the methods given by Griffin and Jacobs (1,6,7). Isolation of menthol was carried out by freezing method outlined by Gul and Guenther (5,8).

Results and Discussion

Yield of oil obtained from the leaves of *Mentha piperita* L. was found to be 0.25% on dry leaf weight basis. It was encouraging as oil yield of 0.2 to 0.3% has been reported by Guenther in case of Italian mint (5). It was also found to be within agreeable range of oil yield (0.3 to 0.4%) reported by Ellis and Morris in case of meadow mint (4).

Menthol content obtained in the laboratory from the oil of *Mentha piperita* L. is much low as compared to

those reported by Guenther(5) in case of *Mentha piperita* var. *Vulgaris* L. and *Mentha piperita* L. It may be either due to difference in climatic condition or due to variation in physico-chemical characteristics of the soil.

The observed physico-chemical characteristics of oil from *Mentha piperita* L. are compared below with those of oil from exotic species, reported in literature.

It is evident from the results given above that the physico-chemical characteristics of the oil from *Mentha piperita* L. compare favourably well with those of oil reported in literature.

It is concluded from the study that this oil could be similarly used as a flavouring agent in pharmaceuticals, soaps, cosmetics and cigarettes in place of oil from other *Mentha* spp.

Table 3
Physico-chemical characteristics of oil from *Mentha piperita* L.

Physico-chemical constants	<i>M. piperita</i> L. (Lab. work)	<i>M. piperita</i> Var. <i>Vulgaris</i> (Guenther)	<i>M. piperita</i> L. (Guenther)	<i>M. arvensis</i> L. (Gul. F.W. Khan)
Specific gravity	0.9091	0.901 to 0.921	0.90 to 0.920	0.8980
Refractive index	1.4625	1.460 to 1.463	1.46 to 1.464	1.4554
Optical rotation	—	20.000 to 33.000	18.00 to 34.00	—
Menthol (Percent)	40.0000	48.500 to 68.000	48.00 to 65.000	30.0000

Literature Cited

1. Association of Official Analytical Chemists (1980). Official Methods of Analysis 13th ED. Washington D.C. p. 437.
2. British Pharmacopoeia (1953). The pharmaceutical press 17-Blooms-Burry Square London. WCI p. 323.
3. British Pharmacopoeia (1973). Her Majesty's Stationery Office London Appendix 1 and EA 87.
4. Ellis and Morris (1945). Soil Sci. Soc. Am. Proceedings 10, 28 L.
5. E. Guenther, (1949). The Essential Oil Vol. 111. D. Van Nostrand Co. Inc. New York pp. 586-675.
6. Griffin, R. C. (1955). Technical Methods of Analysis 2nd Ed. McGraw Hill Book Co. , Inc. New York pp. 298-319.
7. Jacobs, M.B. (1962). The Chemical Analysis of Food and Food Products. D. Van Nostrand Co. London. p. 44
8. Khan, P. G. and F. W. Khan (1986). Chemical Evaluation of Oil from *Mentha arvensis* Part. 1. The Pak. Jour. For. pp. 23-27.
9. Small, B. E. J. (1986). "Mint Oil". Agfact P. 6.4.1, second edition Division of Plant Industries Sydney.
10. Zaman, M. B. and Muhammad Shariq Khan (1970). Hundred Drug Plants of West Pakistan Medicinal Plants Branch, Pakistan Forest Institute, Peshawar p-49.