



INTERNATIONAL JOURNAL
OF
PHARMACEUTICAL SCIENCES
AND
RESEARCH



Received 02 February, 2010; received in revised form 15 March, 2010; accepted 25 March, 2010

ANALYSIS OF *MENTHA* WASTE PRODUCTS USING GC-MS

Sameer Sapra¹, Kunal Nepali¹, Raj Kumar¹, Rohit Goyal¹, Om P. Suri¹, Vijay K. Koul² and Kanaya L. Dhar*¹

Department of Pharmaceutical Sciences, ISF College of Pharmacy*¹, Moga 142001, India
Department of Natural Plant Product, Institute of Himalayan Bioresource Technology (IHBT)²,
Palampur, Himachal Pradesh, India

Keywords:

Menthol,
Mentha,
anti-inflammatory

ABSTRACT

Mentha piperita, a commercially important medicinal plant, yields essential oils. The oil extracted by steam distillation, gives two types of waste products viz. high boiling hydrosol and bottom pitch, which sell at a very low price. Some constituents of the waste products are useful in perfumery industry and they also exhibit medicinal activities such as anti-inflammatory. The aim of present study is to characterize the value adding constituents from the target products by saponification followed by hydro-distillation.

Correspondence to author:

Kanaya L. Dhar

Department of
Pharmaceutical Sciences,

ISF College of Pharmacy,
Moga 142001, India

INTRODUCTION: The genus *Mentha* (Lamiaceae) consists of more than 25 species, mainly perennial herbs growing wildly in damp or wet places through temperate regions of Eurasia and South Africa¹. Three *Mentha* species, *M. piperita* (peppermint), *M. arvensis* L. (Cornmint) and *M. spicata* L. (spearmint), are commonly cultivated around the world for essential oil production, which are extensively used in the liquor and confectionary industries, flavoring, perfume production and medicinal purposes^{2,3}.

Leaves, flowers and the stems of *Mentha* spp. are frequently used in herbal teas and as additive in commercial spice mixtures for many food preparations to offer aroma and flavour^{4,5}. In addition, *Mentha* spp. have been used as a folk remedy for treatment of nausea, bronchitis, flatulence, anorexia, ulcerative colitis, and liver complaints due to its anti-inflammatory, carminative, antiemetic, diaphoretic, antispasmodic, analgesic, stimulant, emmenagogue, and anticatarrhal activities⁶.

MATERIAL AND METHODS:

Plant material: The waste product of *Mentha piperita* i. e. Bottom pitch and High boiling hydrosol was provided by Hindustan Mint and Agro Products Private Ltd. Chandausi. Uttar Pradesh. India.

Isolation procedure:

1. Isolation of residual essential oil from Bottom pitch by hydrodistillation: Bottom pitch (30 ml.) was subjected for

3hr. to hydrodistillation using a Clevenger apparatus. (ILDAM Ltd., Ankara, Turkey) (yield: 0.5 ml/30ml). The essential oil thus obtained was dried over anhydrous sodium sulphate and, after filtration, stored at +4°C until tested and analysed. The residue left behind was subjected to saponification with 5% KOH under reflux for 3 hours to remove the long chain fatty acid from the esters. The saponified residue was again hydrodistilled using Clevenger apparatus (yield: 1/30ml) and the distillate was subsequently dried, stored and finally analysed.

2. Isolation of essential oil from High boiling hydrosol by hydrodistillation: High boiling hydrosol (30 ml) was saponified with 5% KOH by refluxing for 3hrs to hydrolyse the long chain fatty acid esters and the finally prepared extract was subjected to hydrodistillation using a British type Clevenger apparatus. (ILDAM Ltd., Ankara, Turkey) (yield: 0.5 ml/30ml). The essential oil thus obtained was dried over anhydrous sodium sulphate, filtered and, stored at 4°C until tested and analysed.

GC-MS analysis conditions: GC-MS (70 ev) data were generated on MS-QP-2010 series Shimadzu, Tokyo, Japan equipped with FID, AOC – 20i auto-sampler and BP-20 capillary column 30 m x 0.25 mm x 0.25 μ m (polyethylene glycol, TPA treated). Oil sample (10 μ l) was diluted (upto 2ml) with dichloromethane (HPLC grade), sample injection volume, 1 μ l; Helium as carrier gas with 1.2 ml/min flow

rate; split ratio 1:50; mass scan 50-800; oven temperature was programmed from 40°C to 220°C at the rate of 4°C /min, held isothermally at 40° and 220° for 5 min each. Ion source temperature 200°C; interface temperature 250°C; injector temperature was maintained at 220°C.

RESULTS AND DISCUSSIONS:

Table 1: GC-MS data of Hydro distilled bottom pitch oil

Compounds identified	R.I.*	Percentage
l- Menthol	1603.857	15.25
Cadinene	1732.943	0.98
α - cadinol	2114.671	2.74
Caryophyllene oxide	2180.577	0.94

Table-2: GC-MS data of Hydro distilled high boiling hydrosol oil

Compounds identified	R.I.*	Percentage
Limonene	1239.623	4.43
<i>p</i> -methyl cumyl alcohol	1245.764	10.62
<i>p</i> -menthone	1469.959	33.92

GC-MS analysis showed that *Mentha* waste product i.e. Bottom pitch and High boiling hydrosol both after subsequent hydrodistillation followed by saponification yielded some important

constituents such as menthol, caryophyllene oxide, cadinene which have ample use in perfumery industry.

ACKNOWLEDGMENT: We wish to express our gratitude to Shri. Parveen Garg, Honorable Chairman, ISF College of Pharmacy, Moga, Punjab, India for his inspiration and constant support and Dr. P. S. Ahuja, Director IHBT, Palampur (H. P.), for the facilities made available to the authors.

REFERENCES:

1. Lange B M and croteau, R: Genetic engineering of essential oil Production in mint. Current opinion in plant biotechnology 1999; 2, 149-144.
2. Iscan, G, Kirimer, N, Kurkcuoglu, M, Baser, K.H.C.), and Demirci F: Antimicrobial screening of *Mentha piperita* essential oils. Journal of agriculture and food chemistry, 2002; 50, 14.
3. Risch, S J : sources, processing & chemistry. In spices flavor chemistry and antioxidant properties; American chemical society: Washington, DC, 1997; 2-6.
4. Kothari S K., & Singh, U B: The effect of row spacing and nitrogen fertilization on scotch spearmint. Journal of essential oil research, 1995; 7, 287-297.
5. Moreno, L, Bello R, Primo-Yufer, E and Esplugues, J. Pharmacological properties of methanol extract from *Mentha suaveolens Ehrh.* Phytotherapy research 2002; 16, 10-13.
6. Cowan, M M: Plant products as antimicrobial agents. Clinical microbiology reviews, 1999; 12, 564-582.