

# Essential oil composition of different accessions of *Mentha × piperita* L. grown on the northern plains of India

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**ABSTRACT:** The essential oil composition of four accessions, C-62, P-17, C-45 and C-59, with control LK of *Mentha × piperita*, cultivated at the CIMAP Research Farm, Lucknow, were analysed by GC and GC–MS, which resulted in the identification of 61, 74, 67, 68 and 55 constituents, representing 99.7%, 99.6%, 99.7%, 92.3% and 91.6% of the oils, respectively. The performance of accessions C-62, P-17, C-45 and C-59 against the control LK was also evaluated. The yield of fresh material, 17.2, 18.2, 17.5, 16.4 and 18.0 tons/ha, and the production of essential oils, 72.6, 145.5, 80.1, 74.6 and 75.8 kg/ha, was satisfactory. Accessions C-62, C-45 and P-17 were found suitable for cultivation of peppermint, with acceptable amounts of menthol, menthone and menthyl acetate. It is interesting to observe that menthofuran was also absent in all the four accessions except the control. The essential oil of accession P-17 was superior over the other accessions, with an almost twice higher oil yield and an oil profile composition comparable to those of other accessions. Copyright © 2004 John Wiley & Sons, Ltd.

**KEY WORDS:** *Mentha × piperita* L.; Lamiaceae, mint; peppermint; essential oil composition; monoterpenes

## Introduction

Peppermint oil is an important, most popular and widely used essential oil.<sup>1–2</sup> It is produced by hydro-distillation of the flowering herbs of *Mentha × piperita* L., a hybrid between *M. spicata* and *M. aquatica*. The oil is widely used for the flavouring of pharmaceuticals, dental preparations, mouthwashes, cough drops, soaps, chewing gums, candies, confectionery and alcoholic liqueurs. It is valued in medicine for both internal and external uses. For internal application, menthol is preferred because of its more pleasant taste. It is widely employed in flatulence, nausea and gastralgia. The oil possesses mild antiseptic properties and is applied externally for its local anaesthetic properties. It is used as an external application in rheumatism, neuralgia, congestive headache and toothache.<sup>3</sup> Significant work on peppermint oil has been carried out in different parts of the world<sup>4–10</sup> and it was found that the chemical composition is influenced by various factors, such as geographical location,<sup>11–12</sup> environmental conditions,<sup>13–16</sup> plant ontogenesis<sup>15,17</sup> and agroclimatic requirements of the crops.<sup>18–19</sup>

International demand for peppermint oil has increased in the past few years. The largest oil-producing countries are Bulgaria, Italy, China and the USA, which contribute about 90% of the world total peppermint oil production.

The peppermint oil from different origins contains varying percentages of menthol (20–54%), menthone (5–43%), menthyl acetate (1–29%) and menthofuran (1–8%). In India *M. × piperita* is also cultivated in different agroclimatic zones of the country.<sup>4</sup> Due to lower menthol content, Indian oil is considered inferior in quality and fetches much lower prices on the international market<sup>4</sup> than those produced by the USA and other leading countries. This is evident from the fact that in the year 2000–2001, India exported 993.4 tons of peppermint oil for merely 364.4 million rupees, while in the same year India imported 15.1 tons of peppermint oil for 17.5 million rupees.<sup>20–21</sup>

Hence, in order to produce peppermint oil of better quality (menthol content 45–60% and menthofuran 0–0.3%), investigations were carried out to develop new genotypes/chemovars, whose oils find better acceptance in the international market for a variety of industrial applications.

The present paper reports the essential oil composition of four chemovars recently developed at CIMAP and grown in the northern Indian plains, in comparison with the local check cultivar, 'Kukrail', Lucknow.

## Experimental

### Plant Material

The experiments were carried out on the crops of mint, *Mentha × piperita*, cultivated at the CIMAP Research

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