Assessment of Lavender Essential Oil Quality: Insights from Lithuanian Cultivation

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Introduction. Lavender is grown widely in many countries (France, Bulgaria etc.). For proper lavender cultivation it is necessary to choose a location with plenty of sunlight and fast-draining soil [1]. In Lithuania there are at least 7 big lavender fields and *Lavandula angustifolia* is the only type that is widely cultivated. The main reason is that *L. angustifolia* has the best winter hardiness of all species [2]. Most of the EO in Lithuania's market are imported from other countries, for example, Bulgaria. Since environmental factors have a great influence on the qualitative composition of EO, the aim of the study was to comparatively assess the composition of lavender EO from different regions of Lithuania.

Materials and methods. *L. angustifolia* cultivar herbs were harvested in Babtai (lavender "Hidcote blue"), Kleboniškis (lavender "Provence blue") and Biržai (lavender mix of "Munstead", "Provence blue", and "Hidcote blue"), Lithuania in June, 2023. The essential oil was obtained by hydrodistillation. Chromatographic separation of terpenoids was conducted on the SHIMADZU GC-2010 system with FID. GC was performed while following Eur. Ph. 11.1 procedures.

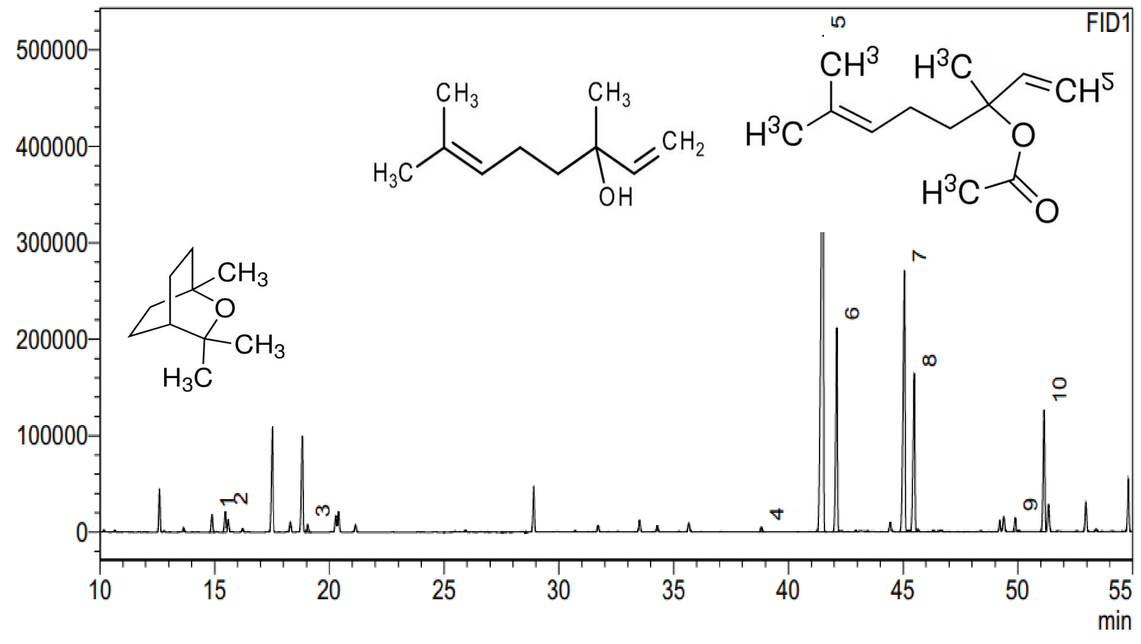

Fig. 1. GC-FID system analysis of lavender oil from Babtai. 10 constituents are visible: limonene (1), 1,8-cineole (2), 3-octanone (3), camphor (4), linalool (5), linalyl acetate (6), terpinen-4-ol (7), lavandulyl acetate (8), lavandulol (9), alpha-terpineol (10).

Results and discussion. The GC method of EO samples gave the following results: in general, 10 substances were identified in each EO. The amount of limonene, 1,8-cineole, 3-octanone and camphor in essential oils differed not significantly between the cities. The biggest differences were spotted when analysing the quantities of linalool and linalyl acetate. Results of linalool differed from 14,326 mg/ml in Biržai to 35,903 mg/ml in Kleboniškis. Quantity of linalyl acetate ranged between 8,857 mg/ml in Babtai to 30,011 mg/ml in Biržai. For the other compounds, slight differences in quantities were also visible. Lithuania is a small country with no considerable differences between altitutes and even with no big differences between temperatures in cities. Hence, this leaves us with a discussion, can slight climate differences have impact on the amount of active compounds.

City	Limonene	Cineole	3-octanone	Camphor	Linalol	Linalyl acetate	Terpinen-4-ol	Lavandulyl acetate	Lavandulol	Alpha-terpineol
Babtai, Kauno rajonas.	0,528	0,803	0,288	0,18	25,14	8,857	6,19	8,324	0,559	4,627
Kleboniškis, Kaunas	0,566	0,408	0,069	0,121	35,9	18,516	0,199	4,482	0,262	6,437
Biržai	0,674	0,566	0,271	0,081	14,33	30,011	0,41	6,951	0,445	0,503

Fig. 2. Quantitative results obtained from GC-FID (in mg/ml)

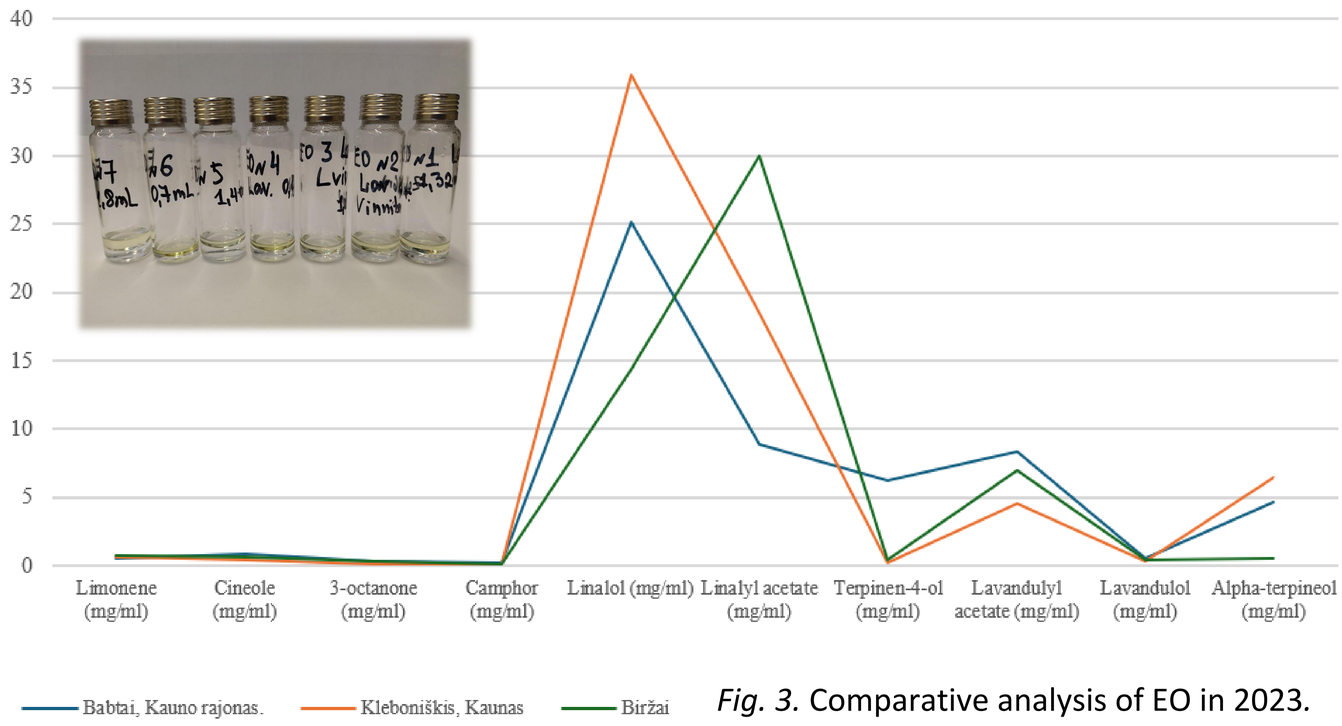

Fig. 3. Comparative analysis of EO in 2023.

Conclusions. Regarding the Eur.Ph.11.1., the content of each of the components was determined: 7 out of 10 compounds of EO from Babtai and Kleboniškis; and 8 out of 10 compounds from Biržai were within the ranges. Overal, this information proves that it is possible to grow lavender in Lithuania and to obtain a good quality essential oil.

References

1. M. Zorintsa, V. Pankov. Opportunities for growing lavender in areas facing natural constraints exemplified by the Borika village, Bulgaria. 2018. Pg.: 134-142.
2. Van Oost, Ewout, et al. Determining frost tolerance in Lavandula. *XXVII International EUCARPIA Symposium Section Ornamentals: From Nature to Culture-Breeding Ornamentals for Sustainability 1383*. 2023

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