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Chemical composition, antioxidant and antimicrobial activities of essential oils of different *Pinus* species from Kosovo

Fatbardhë Kurti, Annamaria Giorgi, **Giangiaco Beretta** ✉, Behxhet Mustafa, Fabrizio Gelmini, Cristian Testa, Stefania Angioletti, Luca Giupponi, Emanuela Zilio, Daniela Pentimalli & Avni Hajdari ...[show less](#)

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ABSTRACT

Chemical profile, antioxidant and antimicrobial activity of total and fractionated essential oils (EOs) derived from *Pinus heldreichii*, *P. peuce*, *P. mugo*, *Pinus nigra* and *P. sylvestris*, along with the volatiles profile (VOCs) of needles of these species were investigated. The EOs and their fractions (direct solid phase extraction, SPE) were analysed by GC-MS, while VOCs of needles were determined by HS-SPME-GC-MS. 112 compounds were identified in EOs and their fractions. The same trend was observed in the needles' VOCs. The EOs antioxidant activities were lower than those of the corresponding fractions, with F2 the strongest in all cases. EOs and fractions showed different degrees of antibacterial efficacy against different microbial pathogens. The components responsible for the antioxidant and antimicrobial activity were oxygenated monoterpenes and sesquiterpenes. These activities seem to be regulated by reciprocal interactions among the different subclasses of phytochemical species present in the EOs.

KEYWORDS: *Pinus*, essential oil, GC-MS, antioxidant activity, fractions, antibacterial activity

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Funding

No specific funding was received for this work.

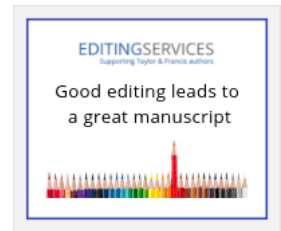
Data availability statement

The study data are all available in figures and tables in the main manuscript and in supplementary tables.

Disclosure statement

No financial interest or benefit that has arisen from the direct applications of this research.

Supplementary material



Supplemental data for this article can be accessed [here](#).

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