

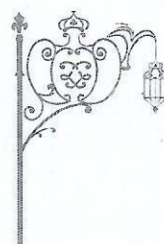
10th

INTERNATIONAL CONFERENCE
ON SERPENTINE ECOLOGY

12-16 JUNE 2023 NANCY, FRANCE



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Disentangling plant ionomes of two pseudo-metallophyte orchid species on contrasting soils in the Balkans

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ABSTRACT

Orchids are known to occur in almost all terrestrial habitats, including on potentially toxic metalliferous soils. *Dactylorhiza sambucina* (L.) Soó and *Gymnadenia conopsea* (L.) R.Br. are widespread terrestrial orchids in Europe, which are generalists, i.e., they inhabit different habitat types on various geological substrates. The high ecological plasticity with respect to soil properties raised the question whether these contrasting geological substrates lead to differences in the elementome profiles and ecophysiological responses of these orchid species. Of particular interest are ultramafic soils characterized by a strong edaphic filter due to their adverse chemical properties. In this context, plants from eight populations of *D. sambucina* and nine populations of *G. conopsea* from three types of substrates (ultramafic, calcareous, and siliceous soils) were analyzed to evaluate differences in ionome, physiological and biochemical parameters. These results are evaluated in light of previous findings suggesting that the uptake of macroelements in aboveground plant organs is predominant, while for trace elements the exclusion strategy is generally found. The analysis of ecophysiological parameters (including concentrations of photosynthetic pigments and phenolic compounds) should clearly reveal any differences between populations from the different geological substrates, with the lowest stress level expected in plants growing on limestone soils. The results of this study are important not only because of the general lack of data on elementome profiles and ecophysiological properties of orchid species on ultramafic substrates, but also from the point of view of the safe use of the underground tubers which are locally used to produce the drink 'salep'.

KEYWORDS: *Orchidaceae*, *ultramafic*, *metal tolerance*, *physiology*

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