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# Metabolomics study of allelochemicals from selected Mediterranean plant species

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## Abstract

Allelopathy plays a very important role in natural and agricultural ecosystems and it has been suggested to have a great impact on vegetation of Mediterranean area [1]. The understanding of this phenomenon has been partially constrained, among other things, by the methods available to study the secondary metabolites involved. A new method based on metabolomics has been recently developed [2, 3], and it is herewith applied to the study of allelochemicals from selected plant species of the Mediterranean region. Donor plant (*Arbutus unedo*, *Myrtus communis*, *Medicago minima* and *Daphne gnidium*) extracts were analysed by 1H and 2D NMR in order to define their chemical composition. They were tested for their phytotoxicity on a receiving plant species (*Aegilops geniculata*). Morphological and metabolomics analyses were carried out on shoots and roots of *A. geniculata* plants treated with the extracts. Tests were carried out also with partially purified fractions and with the pure putative allelochemicals. The extracts of the four plant species showed a strong inhibitory activity on the receiving plant. NMR paired with multivariate data analysis of the receiving plant let to hypothesize the main metabolic pathways affected. Studies with pure compounds confirmed in some cases the putative allelochemicals, while in other cases it was possible to determine the occurrence of synergistic effects. Some of the compounds were taken up and, in some cases, modified by the receiving plant. Although phytotoxic activity is only one aspect of allelopathy, the identification of the active compounds lays the bases for in field studies, while the identification of the metabolic pathways affected by the allelochemicals offers new insights for the study of their mode of action.

References

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