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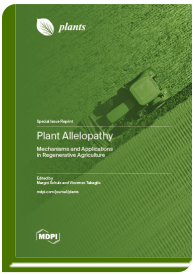
Special Issue Reprint

Plant Allelopathy: Mechanisms and Applications in Regenerative Agriculture



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Sustainable agriculture aims to minimize or to avoid the contamination of ecosystems with harmful, long-lasting chemicals for improving food safety and quality, and to protect and maintain species diversity and soil fertility. An important and innovative approach of regenerative agriculture addresses weed control by using plant and microbial secondary metabolites, which function as biodegradable allelochemicals with short dwelling- times in ecosystems. To accomplish the goal, it is necessary to identify the compounds and to elucidate their allelochemical potential. The research articles of this Special Issue present recent research of species/accession-specific allelochemicals, and the extraction and identification of the compounds. Suitable methods are two-phase partitioning, column chromatography, hydro-distillation, HPLC-MS, GC-MS, and NMR-spectroscopy. Diverse methods are utilized for the description of effects in target plants, emphasizing on physiological and biochemical effects, on defined gene expression responses. Characterization of effects include determination of radical scavenging reactions, relative electrolyte leakage, chlorophyll content, ROS localization, and real time PCR for relative transcript abundance determination. The reviews present insights in the allelochemical potential of microalgae with specialized metabolites such as alkaloids and terpenoids, compounds of *Solidago* species, and of *Cyperus esculentus*. One review addresses the translocation of allelochemicals between plants, and another review considers microorganisms as protectors of *Abutilon theophrasti* against benzoxazinoids.

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