

## Metabolomics and its applications in plant sciences

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A new era of systems biology has disruptively emerged, providing holistic descriptions of biochemical phenomena at the cellular and organismal level. This new era is marked by the advent of '-omics' technologies, that imply a paradigm shift, such as metabolomics – the qualitative and quantitative investigation of the entire metabolome of a biological system. Being at the interface between biology, chemistry, chemometrics, statistics and computer science; metabolomics is a multidisciplinary *omics* science. With the innovative developments in analytical technologies (integrating artificial intelligence), advancement in big data analytics, and the integration of orthogonal biological approaches, metabolomics has emerged as an indispensable approach to study cellular biochemistry at a global level, providing remarkable insights into the mechanisms that underlie various physiological conditions. To illustrate the applications of metabolomics in plant sciences, here we present various studies in natural product research, where metabolomics was applied to holistically characterize the chemical space of the *Momordica* plant species, phytochemically rich plants, representing an inexhaustible source of natural products. The use of computational tools in this study highlighted various classes of metabolites such as a wide range of flavonoids, terpenoids and lipids. Furthermore, application of metabolomics in biostimulant-plant interaction studies reveals that biostimulants induce a remodeling of inter- compartmental metabolic networks, in crop plants, readjusting subsequently the plant physiology towards growth promotion and stress alleviation. Such insights contribute to ongoing efforts in elucidating modes of action of biostimulants generating fundamental knowledge that is necessary for the development of the biostimulant industry, for sustainable food security.

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