

06-03: Metabolomics as tool to improve food quality

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There is a growing global demand to produce more crops material with an improved quality and reduced waste. Many crops are successful biochemical factories to produce nutrients for food and feed, but also to produce ingredients used by the pharmaceutical, cosmetic or biobased industry. The commercial value of crops is determined by the tissue quality in relation to aspects of, for example, flavour, fragrance, or shelf life but also by its resistance against pests. Hence, the quality crops is a direct function of their metabolite content. Each of these can be fully defined in terms of the metabolic profile of the material concerned at a particular time.

Enabling technologies, such as metabolomics, broaden our knowledge of how plants are molecularly organized and how genetic and environmental factors are translated into phenotypes which in turn relate to final product quality.

Metabolomics in particular has been widely applied over the last two decades due both to the comprehensiveness of the technology and also the potentially close relationship between biochemical composition and phenotype. These technologies now support us to gain a deeper insight into the complexity of plant metabolism and its plasticity. Here, we will give a number of examples involving a number of plant and fungal crops where we have exploited several metabolomics technologies, including GC-MS, LC-MS, NMR, and MS-imaging, to gain a better understanding of how metabolite profiles are linked to crop health and product quality.

The generic nature of such approaches entails broad future use for tailored breeding programmes aimed at improvement of food quality or an increased resistance in crops.