

# Resistance against powdery and downy mildew of grapes - Searching for biomarkers in the grape leaf metabolome

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Powdery and downy mildew of grapevine are widespread diseases, which may cause severe harvest losses. In organic farming only copper containing fungicides are permitted. Since copper accumulates in soil and can be toxic to diverse organisms, the European Commission considers whether or not copper containing fungicides should be restricted. Thus, finding potent naturally occurring copper substitutes is an important research field. Although induced phytoalexins in grape leaves of European cultivars have long been discussed in the literature (LANGCAKE und PRYCE, 1977), wild type grape species and interspecific grape varieties show more efficient resistance mechanisms against mildew. Therefore, comparing the metabolic fingerprints of these resistant grape species with representatives of the more susceptible European grape varieties by non-targeted analysis assays might give some hints to additional resistance biomarkers. Our analyses consider the impact on the metabolome caused by grape species and leaf development stadium. Furthermore, the leaves of different plants of the same species (resp.

varieties) were analyzed to examine the particular impact on the metabolite composition. In a first step of the research project we focused on headspace-SPME-GC-MS to analyze the different volatile organic compounds (VOCs) of the leaf metabolome. We could already identify about 70 out of 110 volatiles. Though the chromatographic fingerprints of the volatile patterns of individual species and varieties consist of mainly the same components, there are detectable differences in peak quality and quantity. Multivariate statistical data processing (PCA) showed that both the leaf development stadium and the grape species (resp. variety) have a great impact on the volatile composition. In contrast, the distinctions in the metabolomes of different plants which belong to the same variety are less obvious. Regarding the early stage of investigation clear statements are not yet possible and additional studies are required.

LANGCAKE, P. and R. J. PRYCE, 1977: New Class of Phytoalexins from Grapevines. *Experientia* **33** (2), 151-152.