The rare case of a cluster mutation in grapevine – a metabolomics study

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The metabolomics study of wild type (WT) and mutant (MUT) genotypes can provide insights into the pathways of the plants, revealing the genetic basis of a specific metabolism. A relevant problem related to such metabolomics studies is to maintain both plants, WT and MUT, exactly under the same conditions, such as temperature, nutrients, humidity, exposure, etc. This is extremely important to be able to assign differences found in the metobolomes to the genetic modification.
In grapevine (*Vitis vinifera* L.) a mutation affecting the colour of a single cluster on a plant rarely occurs. This event depends on the stability of the genotype and on the environmental conditions. It provides the possibility to compare WT and MUT under identical circumstances as they grow on the same plant shoot. This phenomenon inexorably leads to another problem: very few biological replicates are available. Hence, no robust statistics can be applied and other methods to prove that the obtained metabolic data are reliable are requested.
This study reports on the investigation of the volatile metabolome of two Pinot gris clones which showed beside the normal gray-skinned berry clusters also a green/white-skinned cluster. Grape samples were homogenized under cooled conditions (liquid nitrogen) to prevent alteration of the metabolome. The powder was subjected to headspace solid phase microextraction (HS-SPME) prior to gas chromatography - mass spectrometry (GC-MS) analysis. A correct methodological approach is crucial to gain control of the experiment in order to obtain reliable results.
To achieve credible identification of as many metabolites as possible, GCxGC-MS as well as GC-HRMS were applied.