Grapevine berry wax: One trait supporting resilience to *Botrytis cinerea*

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The necrotrophic fungus *Botrytis cinerea* is the causal agent of grey mould and causes serious quality and yield losses in viticulture. Due to the high economic importance of this pathogen, the resilience to *B. cinerea* plays an important role in grapevine breeding. Though there are no genetic resistance mechanisms known, different physical properties of the berry skin and the berry wax layer are known to be responsible for differences in susceptibility to *B. cinerea*.

The epicuticular wax as the outer layer of berries forms in combination with the cuticle a hydrophobic surface of berries. Cultivars with a thick epicuticle wax layer are known to be widely resilient to *B. cinerea*. Among the amount of wax, the composition and the ultrastructure of the wax layer determine the resilience to *B. cinerea.*

Phenotyping of the wax layer for breeding purposes are time-consuming. Therefore a fast and reliable method is needed to screen a high number of plants. The objectives of this project are the development of a sensor-based method to (1) quantify the wax layer and (2) classify the quality of wax relating to susceptibility to *B. cinerea*.

A set of different cultivars has been used to determine differences between cultivars. Therefore, visual assessments in the field have been made, as well as an infection test with Botrytis spores under controlled conditions in the laboratory. Additionally, the effect of the wax layer has been tested by using one set of berries of each cultivar with a removed wax layer. The infection tests were observed for 14 days by visual assessments and RGB images were acquired. To reference the influence of the wax layer, extractions of the berry waxes were made for all of the tested cultivars, followed by an ongoing gas chromatographic analysis of the waxes. As the chemical analysis is complex and time-consuming it should eventually be replaced by a non-destructive method for further phenotyping of higher number of plants.

Visually collected phenotypic data of a segregating F1 progeny were used to do a quantitative trait locus (QTL) analysis of the trait “wax layer”. Due to the subjective character of the assessments, future screenings should be done by a reliable and time-saving method. To develop a sensor based method, datasets of the described analysis were recorded by two hyperspectral cameras which covered the reflection in the spectral range between 400 and 2500 nm. The further research aims at finding wavelengths to describe differences between the wax layers of different genotypes.