Protocol for standardised detection of berry and grape characteristics with relevance to *Botrytis* bunch rot

Background

Ripening, sweet grapes are especially at increased risk of *Botrytis* bunch rot infection after rain. As no active defence mechanisms of vines against *Botrytis* bunch rot are known yet, physical barriers that lead to a rapid drying of the berry surface are a key component for increasing *Botrytis* resilience: loose bunches, firm berry skin with a dense, water-repellent wax layer.

The grape varieties in the INTERREG project WiVitis will be analysed for three years with regard to their grape architecture and berry skin properties. Established sensors are used for this purpose. The use of sensors has the decisive advantage that the data collected is objective and therefore comparable. Simultaneously, the time required to collect the data can be reduced from several hours to just a few minutes. In this way, precise data sets are recorded for the comparison of grape varieties. In addition to the influence of the variety, location and environmental influences can be considered for the forecast of *Botrytis* resilience of the analysed grape varieties and breeding material.
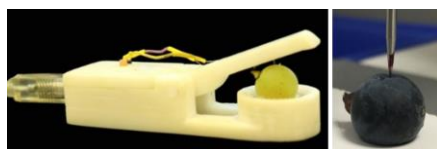

3D scanner   3D grape

Sensors for measuring impedance (left) and berry skin texture (right)

What is analysed?

Nine bunches and 60 undamaged single berries with berry stalks per grape variety from the open field are analysed at ~17,1 °Brix and harvest maturity.

Sensors used and their significance

(1) **3D scanner**[1] for detailed recording of the grape architecture.

(2) **Impedance**[2,3] to measure the electrical surface resistance as an indicator of the thickness and permeability of the cuticle (= the outer protecting layer) and their wax coating.

(3) **Texture analyses**[3] to measure the force per unit time required to pierce the berry skin. This is an indicator of berry skin firmness and elasticity.

Data collection procedure

The grapes are harvested in the field. In the laboratory, a 3D scan of the complete bunch is first recorded and the berry sample is taken. The impedance of the berry surface and the berry skin texture are then measured and the state of ripeness is determined by FTIR (**F**ourier **T**ransform **I**nfra**r**ed). In total, data collection takes less than 15 minutes per variety.

Automated software is used to determine the grape characteristics, e.g. number of berries, average berry size and the grape volume (= grape weight) of the 3D scans obtained.

Seibel 7511   Sauvignon Blanc   Orion

Degree of ripeness in °Brix, if up to 5% of the berries are infected with *Botrytis* bunch rot

Further literature (peer-review):
*1 Herzog et al. 2015
*2 Herzog et al. 2022
*3 Rist et al. 2018

WiVitis