**Screening grapes for infection by *Botrytis cinerea*: detection of spores versus the evaluation of laccase activity**

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*Botrytis cinerea* is a fungal pathogen responsible for high economic losses in vineyards worldwide. Various approaches have been considered for the detection of *Botrytis cinerea* [1], including gigahertz ultrasonic imaging of fungal spores [2], the fingerprint of the Raman spectrum of the fungal spores [3], detection from the mycelia using antibodies specific for *Botrytis* species [4], detection of the fungal DNA [5] or indirect detection through the measurement of indicators such as laccase activity, glycerol and gluconic acid [6]. While not all strains of *Botrytis cinerea* produce laccase, laccase activity evaluation is the most convenient and widely used test for screening for grape’s infection by *Botrytis cinerea*. Enzymatic activity higher than 3U/mL indicates a high risk of oxidative degradation of wine [7].

In this work we present a paper based electrochemical assay for the evaluation of laccase activity which is simple, can detect activities in grape must down to 0.4U/mL in 5 minutes and is adequate for on-site analysis. Its application to monitoring the artificial infection of white, rosé and red grapes with two strains of *Botrytis cinerea* via the laccase activity evaluation is hereby described. In parallel we report studies towards the development of a molecularly imprinted polymer electrochemical sensor for *Botrytis cinerea* spores. The MIP was obtained through the electropolymerisation of the phenazine dye Toluidine Blue O. The initial studies were performed with commercially available lyophilized bacteria of *Micrococcus lysodeikticus* taken as a model. The spores of *Botrytis cinerea* and the bacteria used as model were characterized by Atomic force microscopy, Scanning electron microscopy and Raman spectroscopy. Our studies have shown that the non-specific adsorption is a major hurdle in obtaining an effective MIP and suggested that Raman spectroscopy can provide a more specific test for detecting the spores of *Botrytis cinerea* on grapes. When comparing the two approaches, i.e. the evaluation of laccase activity versus the detection of *Botrytis cinerea* spores, it becomes evident that each analytical tool is advantageous for a specific application. Thus, the evaluation of laccase activity is essential for screening grapes at processing points while a portable sensor for the (ideally) specific direct detection of spores would be preferable for screening grapes in the vineyard.

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