Exploration of constitutive and induced markers of disease severity caused by Botrytis cinerea in the primary metabolome of tomato

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O.5b.3: EXPLORATION OF CONSTITUTIVE AND INDUCED MARKERS OF DISEASE SEVERITY CAUSED BY *Botrytis cinerea* IN THE PRIMARY METABOLOME OF TOMATO

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Constitutive markers of plant defense are required to provide solutions for plant protection by the control of its environment. While dozens of plant secondary metabolites have been identified as putative markers of defense against necrotrophic fungi, few where robustly related to disease intensity. In this work, we explored the potential of primary metabolites as predictors of disease severity. Plant soluble sugars, as main components of primary metabolism, are thought to be implicated in defense against pathogenic fungi. However, the function of sucrose and hexoses remains unclear. A different role for glucose and fructose in tomato defense against *Botrytis cinerea* was hypothesized. We examined tissue contents in primary metabolites at the time of inoculation with *B. cinerea* for tomato plants subjected to a range of abiotic environments created by various nitrogen and water supplies. Sugar contents and defense hormonal markers were then quantified during the infection process. In a first step, we assessed multiple combinations of primary metabolites as possible constitutive markers of disease intensity. In a second step, we checked for the kinetics of the selected markers during the infection process. Ratios of soluble sugars, rather than those of organic or amino-acids where identified during the first step as best correlators of disease intensity. Soluble sugar contents of tissues surrounding infection sites evolved differently after inoculation. The fructose content never decreased after inoculation with *B. cinerea*, while that of glucose and sucrose showed either positive or negative variation, depending on the abiotic environment. Increase in relative fructose content (defined as the proportion of fructose in the soluble sugar pool), was observed in absence of glucose accumulation, and was associated with lower disease intensity. A lower expression of the salicylic acid marker *PR1a*, and a lower repression of a jasmonate marker *COI1* was associated with higher relative fructose contents. We concluded that fructose relative content was both a constitutive and induced marker of symptoms in a range of environments. Small variations of fructose content among the sugar pool are unlikely to affect pathogen growth by itself. Our data strongly suggest that the adjustment of relative fructose content is required for enhanced defense against *B. cinerea*.

ABSTRACT BOOK

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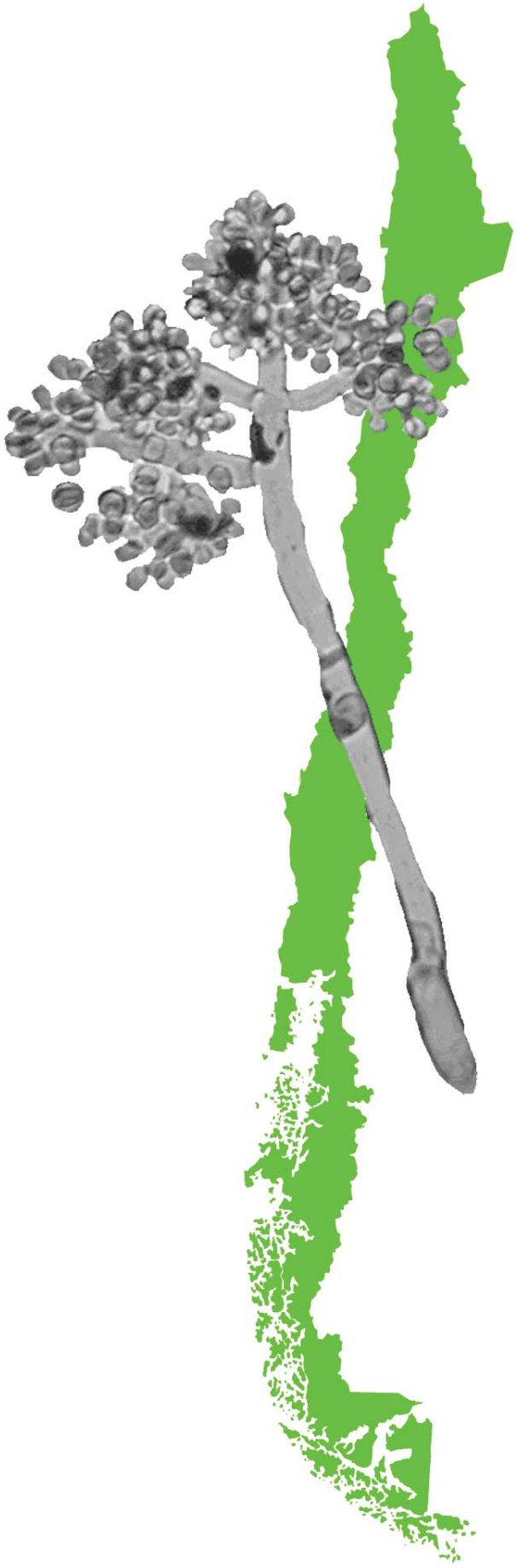

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