P48 – Abscisic acid and proline are not equivalent markers for heat, drought and combined stress in grapevines

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Abstract

Background and Aims: Viticulture will be particularly affected by increasing drought and heat waves in the future. It is of interest to find traits that indicate stress before symptoms become apparent. We investigated whether the commonly used traits, proline and abscisic acid (ABA) biosynthesis, are suitable markers for heat, drought or combined stress and whether gene expression of key enzymes of ABA biosynthesis is regulated in grapevine leaves under these stress conditions.

Methods and Results: Plant growth and gas exchange were measured to evaluate plant reactions to increased temperature and water deficit. Proline and ABA concentration in leaf material was measured, respectively, photometrically and with GC/MS. Gene expression analysis of NCED1, NCED2 and P5CS was done by real-time quantitative reverse transcriptionpolymerase chain reaction. Drought stress had a stronger effect on growth, gas exchange, proline, and ABA biosynthesis than heat stress. An interaction between heat and drought stress was observed for gas exchange and for proline biosynthesis.

Conclusions: Proline concentration and gene expression of P5CS are good markers for combined stress. The concentration of ABA is a suitable marker for drought stress and might be a suitable marker for combined stress. Gene expression of NCED1 in leaves was a good marker for drought stress and might be a suitable marker for combined stress, whereas NCED2 was not suitable.

Significance of the Study: These results provide insight into the response of grapevines to heat, drought and combined stress and show the suitability of ABA and proline as stress markers.

Keywords: abscisic acid, grapevine, heat and drought stress, NCED, P5CS, proline, *Vitis vinifera*