Salicylic acid induces H₂O₂ production and endochitinase gene expression but not ethylene biosynthesis in Castanea sativa in vitro model system

Antoine L. Harfouche a, 1, Eddo Rugini a, Fabio Mencarelli b, Rinaldo Botondi b, Rosario Muleo a,*

a Dipartimento di Produzione Vegetale, Università degli Studi della Tuscia, Via S.C. de Levis, Viterbo 01100, Italy
b Dipartimento di Scienze e Tecnologie Agroalimentari, Università degli Studi della Tuscia, Viterbo 01100, Italy

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Summary
Salicylic acid (SA), ethylene (ET), and wounding are all known to influence plant defense response. Experiments attempting to determine SA’s relation to ET biosynthesis and defense gene expression have shown conflicting results. To confront this, we developed an in vitro model system to investigate how SA affects ET biosynthesis, hydrogen peroxide (H₂O₂) production and endochitinase gene expression in the European chestnut. ET measurements of in vitro shoots indicated a critical time point for SA exogenous application, enabling us to study its effects independent of ET. In addition, ET measurements demonstrated that its own increased biosynthesis was a response to wounding but not to SA treatment. Application of the ET biosynthesis inhibitor, aminooethoxyvinylglycine (AVG), on wounded and SA-treated shoots blocked ET production. Interestingly, SA inhibited ET production, but to a lesser extent than AVG. Additionally, SA also induced the accumulation of endochitinase transcript level. Likewise, a sensitive tissue-print assay showed that SA further increased the level of H₂O₂. Yet, SA-induced endochitinase gene expression and SA-enhanced H₂O₂ production levels were independent of ET. The cumulative results indicate that SA acts as an inducer of endochitinase PR gene expression and of H₂O₂ oxidative burst. This suggests that SA is a component of the signal transduction pathway leading to defense against pathogens in chestnut. Further, the model system developed for this

*Corresponding author. Tel.: +39 0761 357532; fax: +39 0761 357531.
E-mail address: muleo@unittus.it (R. Muleo).
1 Present address: Department of Horticulture and Landscape Architecture, Center of Plant Environmental Stress Physiology, Purdue University, 625 Agricultural Mall Dr., West Lafayette, IN 47906, USA.

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