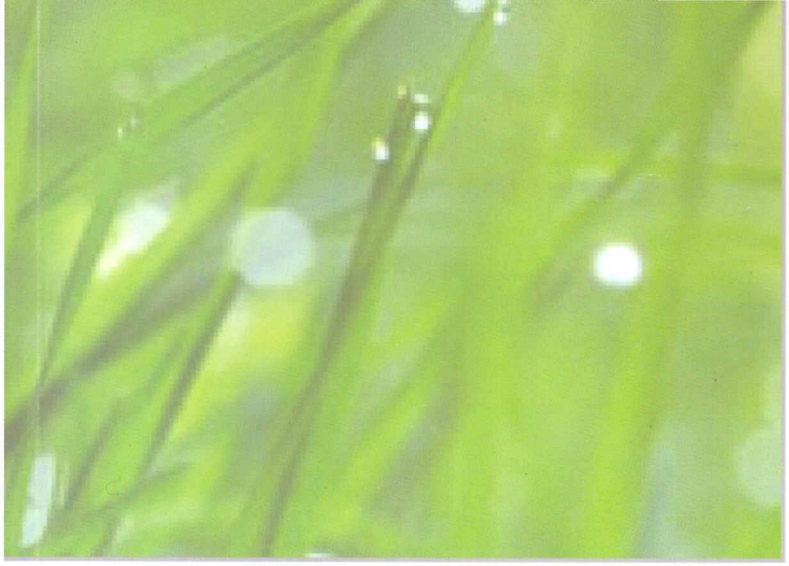

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The importance of hydrogen sulfide as a systemic priming agent in strawberry plants grown under key abiotic stress factors

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Hydrogen sulfide (H_2S) is an endogenous gasotransmitter which has been recently found to play a major signaling role in response to abiotic stress factors. In the present study we tested whether hydroponic pre-treatment of strawberry (*Fragaria x ananassa* cv. Camarosa) roots to a H_2S donor, NaHS (10 mM for 48 h) could induce long lasting priming effects and tolerance to subsequent exposure to 100 mM NaCl or 10% (w/v) PEG-6000 for 7 d, as well as to heat stress (42^0 C) applied for 8 h. This task was undertaken by employing a variety of physiological, biochemical and molecular approaches. Hydrogen sulfide pre-treatment of roots resulted in significantly increased leaf chlorophyll fluorescence, stomatal conductance and relative leaf water content as well as reduced ion leakage and lipid peroxidation levels in comparison with plants directly subjected to salt, PEG and heat stress, suggesting a systemic mitigating effect of H_2S pre-treatment to cellular damage derived from abiotic stress factors. In addition, root pre-treatment resulted in the minimization of oxidative and nitrosative stress in strawberry plants, manifested via the reduced *de novo* synthesis of NO and H_2O_2 in leaves and the maintenance of high ascorbate and glutathione redox states following subsequent salt and hyperosmotic stresses. Quantitative real-time RT-PCR data examining antioxidant, transcription factor, heat shock protein and ion transporter gene expression levels suggest that H_2S plays a key role in the regulation of multiple transcriptional pathways. Our results indicate that H_2S pre-treated plants managed to overcome the deleterious effects of salt, heat and hyperosmotic stress, by controlling oxidative and nitrosative cellular damage mainly through increased performance of antioxidant mechanism, thus proposing a novel role for H_2S in plant priming.

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