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Stomata closure and pre-exposure to low-level O_3 protect leaves against high-level O_3-induced damage in *Phaseolus vulgaris*

Shuai Li[1], **Peter C Harley**[1] and **Ülo Niinemets**[1, 2]

[1]Estonian University of Life Sciences, Estonia

[2]Estonian Academy of Sciences, Estonia

Exposure to acute ozone (O_3) concentrations result in elicitation of key stress volatiles methanol, products of lipoxygenase (LOX) pathway and methyl salicylate (VOC), but it is unclear how different ozone doses, later the timing and rate of elicitation of emissions of different stress volatiles, and how priming responses can modify the magnitude and kinetics of stress volatile emissions in short and long term. Our work reveals that methanol and LOX product emissions were induced rapidly after O_3 exposure, but no MeSA emission and lower LOX emissions were detected in plants, first pre-exposed to lower O_3 concentration, and the maximum emission rates and the total amount of emissions of LOX products and both methanol emission bursts were quantitatively correlated with stomatal O_3 uptake, but elicited MeSA emissions did not depend on O_3 dose. Timing of elicitation was only moderately altered by O_3 dose with LOX emissions elicited earlier in the most severe treatment and secondary emission elicited later for O_3-priming treatment. The stomatal closure due to darkness and pre-exposure to low-level ozone protect leaves against high-level ozone-induced injury in *Phaseolus vulgaris*, suggesting the important implications for understanding plant response to O_3 in natural environments where both light and ozone concentrations strongly vary during the day and among the days, and could drive ecological success of different sensitive groups in response to environmental changes.

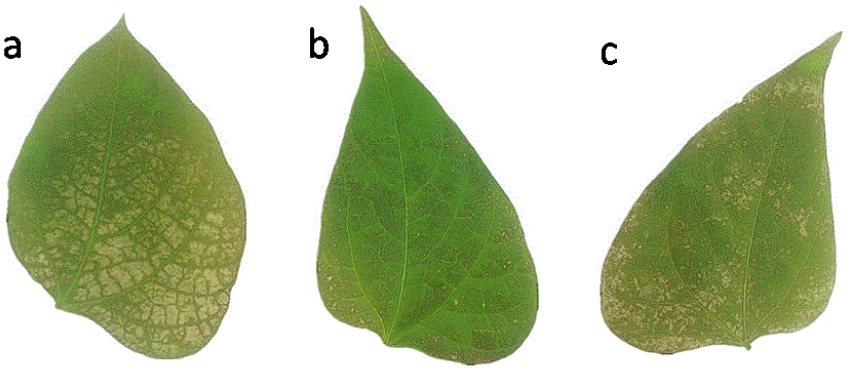

Figure 1: Illustration of visible leaf injury in representative O_3-fumigated leaves. (a) illuminated leaves fumigated with 600±33 nmol mol-1 of O_3 for 30 min, (b) leaves exposed to 600±30 nmol mol-1 of O_3 for 30 min in darkness and (c) illuminated leaves exposed first to 200±11 nmol mol-1of O_3 for 30 min and then to 600±32 nmol mol-1 of O_3 for an additional 30 min.

Biography

Shuai Li is currently working as a Junior Researcher at the Estonian University of Life Sciences. His research focuses on the impact of abiotic stress such as ozone, heat stress on the emissions of volatile organic compound (VOC) from leaves and flowers.

lishuai0620@gmail.com