

# Stomatal closure prevents xylem transport of green leaf volatiles and impairs their systemic function in plants

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## Abstract

Plants perceive environmental stresses as whole organisms via distant signals conveying danger messages through their vasculature. In parallel to vascular transport, airborne plant volatile compounds, including green leaf volatiles (GLVs), can bypass the lack of vascular connection. However, some small volatile compounds move through the vasculature; such vascular transport is little known about GLVs. Here we illustrate GLV alcohols as solutes move within xylem vessels in *Zea mays*. We describe GLV alcohols, including Z-3-hexenol and its isomer E-3-hexenol, which is not synthesized in maize, is mobilized through the transpiration stream via xylem vessels. Since transpiration is mediated by stomatal aperture, closing stomata by two independent methods diminishes the transport of GLV alcohol and its isomer. In addition, lower transport of GLV alcohols impairs their function in inducing terpenoid biosynthesis suggesting xylem transport of GLV alcohols plays a significant role in their systemic function. Our study not only shows that GLV alcohols can be transported in the xylem but points to stomatal regulation as a mechanism that climatic factors such as drought, heat, flooding, and high CO<sub>2</sub> levels affect systemic signaling functions of GLVs.

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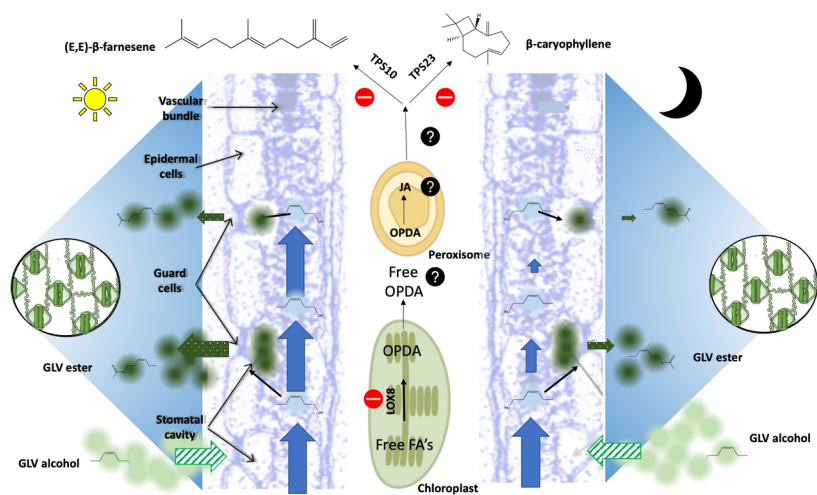


Figure 1: This is a caption