# Emission of Herbivore-induced Volatiles in Absence of a Herbivore – Response of *Zea mays* to Green Leaf Volatiles and Terpenoids

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Green leaf volatiles (GLV), a series of saturated and monounsaturated six-carbon aldehydes, alcohols, and esters are emitted by plants upon mechanical damage. Evidence is increasing that intact plants respond to GLV by activating their own defense mechanisms, thus suggesting that they function in plant-plant communication. The present paper demonstrates that exposure of maize plants to naturally occurring GLV, including (*Z*)-3-, (*E*)-2- and saturated derivatives, induce the emission of volatile blends typically associated with herbivory. Position or configuration of a double bond, but not the functional group of the GLV influenced the strength of the emissions. (*Z*)-3-Configured compounds elicited stronger responses than (*E*)-2- and saturated derivatives. The response to (*Z*)-3-hexen-1-ol increased linearly with the dose between 200 and 1000 nmol per plant. Not only the naturally occurring (*E*)-2-hexenal, but also (*E*)-2-pentenal and (*E*)-2-heptenal induced maize plants, although to a lesser extend. Externally applied terpenoids [(3*E*)-4,8-dimethyl-1,3,7-nonatriene, $\beta$-caryophyllene, and (*E*)-$\beta$-farnesene] did not significantly increase the total amount of inducible volatiles in maize. Of three tested maize cultivars Delprim and Pactol responded much stronger than Attribut. Recovery experiments in the presence and absence of maize plants demonstrated that large proportions of externally applied GLV were assimilated by the plants, whereas (3*E*)-4,8-dimethyl-1,3,7-nonatriene was recovered in much higher amounts. The results furthermore suggested that plants converted a part of the assimilated leaf aldehydes and alcohols to the respective acetates. We propose that GLV not only can alert neighboring plants, but may facilitate intra-plant information transfer and can help mediate the systemic defense response in a plant.

*Key words:* Plant-plant Signaling, Green Leaf Volatiles, Herbivore-induced Volatile Organic Compounds