Volatile Organic Compounds Emitted by Cut Grass:
A Potentially Significant Regional and Global Source of Atmospheric Aerosols.

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The mechanical wounding of green leaf vegetation stimulates the release of a cocktail of volatile organic compounds (VOCs), known to be responsible for the characteristic odor associated with freshly cut grass and leaves. These compounds, collectively referred to as green leaf volatiles (GLVs), consist primarily of oxygenated five-carbon (C_5) and six-carbon (C_6) compounds. GLVs are of central importance to the chemistry and physical composition of the atmosphere, as their reactivity leads to the production of secondary organic aerosols (SOA), i.e. aerosols that are formed in the atmosphere via the oxidation of VOCs, which have the potential to affect regional air quality, modify climate patterns, and influence human health.

Thermal desorption-gas chromatography coupled with mass spectrometric detection (TD-GC-MS) was used to quantify GLV emissions from freshly cut grass from a typical suburban lawn under atmospherically relevant conditions spanning the duration of a typical green-leaf growing season. Together with ambient growing condition data logged using a hobbyist-grade weather station, GLV emission measurements were used to identify potential correlations between seasonal growing conditions and the observed GLV emission profile. Non-linear multivariable regression analysis revealed strong Pearson correlations (≥ 0.900) between several of the observed weather parameters and the measured yields of three predominant GLVs, *cis*-3-hexenylacetate, *cis*-3-hexenol, and 1-penten-3-ol. These correlations pointed toward fluctuations in atmospheric pressure, relative humidity, UV index, and incident solar energy as being potentially significant predictors of regional and global SOA formation.

Results from this experiment establish the groundwork for the characterization of correlations between seasonal growing conditions and GLV emissions, ultimately leading to the identification of the optimal ambient growing conditions under which GLVs are generated. The preliminary strides made by this work will be of great utility to the atmospheric research community, aiding in their efforts to identify, characterize, and quantify potentially influential factors to the formation of atmospheric SOA.