WWTF Project ESR17-027

Urban trees and air pollution: Effect of drought and salt stress on the production of VOC and absorption of ozone by different city trees

Abstract

Ozone is a serious health problem in many cities during hot summer days. Ozone causes breathing problems as well as heart disease and WHO has lately lowered the recommended limit of the exposure concentration. City trees can both increase and decrease ozone levels depending on the environmental conditions. Trees absorb ozone but trees can also, especially on hot days, release volatile organic compounds (BVOC), which produce ozone at moderate concentrations of NOx. In a future with higher temperatures and lower emissions from cars and thereby less NOx, ozone production facilitated by biogenic VOC may actually increase in areas, which are heavily polluted today. The tree's influence on both production of ozone and absorption depends on species identity, radiation and temperature but also on the physiological status of the tree, such as the degree of drought or salt stress, which are common in urban environments. By measuring the BVOC production as well as the ozone reduction of species commonly used as street trees under different light and temperature and different stressed conditions we can identify species that on hot days have a large capacity to decrease ozone concentrations. The results will be used to model the trees net effect on the sources and sinks of ozone in Vienna under different tree stress scenarios. The findings and the improved models can in the future be used as decision tools for planning the urban landscape to minimize ozone peaks.

Scientific disciplines:
106031 - Plant physiology (55%) | 207107 - Air pollution control (35%) | 106030 - Plant ecology (10%)

Keywords:
Urban trees, VOC. Isoprene, Ozone, NOx, drought, salt stress, heat stress

Principal Investigator:	Hans Sandén
Institution:	University of Natural Resources and Life Sciences, Vienna
Collaborators:	Heidrun Halbwirth (Vienna University of Technology) (Co-Principal Investigator)
Further collaborators:	Heidelinde Trimmel (University of Natural Resources and Life Sciences, Vienna)

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Further links about the involved persons and regarding the project you can find at
https://archiv.wwtf.at/programmes/environmental_system/ESR17-027