Geophysical Research Abstracts
Vol. 21, EGU2019-19197, 2019
EGU General Assembly 2019

MEDITERRANEAN CITY ORNAMENTAL TREES FOR MITIGATING AIR POLLUTION: a simulation chamber study

Mila Ródenas, Esther Borrás, Teresa Vera, Vicent Calatayud, Tatiana Gómez , Esperanza Calvo, and Amalia Muñoz

Fundación CEAM, EUPHORE, Valencia, Spain

Urban population all over Europe is exposed to high levels of pollutants and some of them exceed the EU standards set to protect human health. In addition to policies for reducing transportation and energy emissions in cities, there are studies that have identified ecosystems in urban environments as a tool for reducing pollution due to dry vegetation deposition, for regulation of temperature and for carbon sequestration. For example, in the atmosphere, nitric oxides are converted into nitric acid, which trees absorb through their pores, or stomata, at non-negligible nitrogen oxide (NO_x) reduction levels.
In this experimental pilot study, the large outdoor European Photoreactor (EUPHORE), equipped with state of the art instruments, has been used for studying the depolluting effect of a Mediterranean variety of orange trees (Citrus Aurentium), commonly used as ornamental trees in cities. Experiments have been conducted introducing known amounts of anthropogenic gas phase pollutants (included NO_x and aromatic compounds), organic and inorganic particles in order to assess the depollution capacity of the orange trees in different environments (urban/rural) under realistic conditions.
Besides the well-known deposition effect of pollutants - especially particles - on plants, our results show that the combination of anthropogenic pollutants, organic particles and biogenic tree emissions significantly affect the secondary chemistry yielding in a decrease of the SOA and O_3 formation, for instance.
These pilot tests at large volume chambers illuminated with sunlight, contribute providing useful insights about the suitability of using specific tree varieties (or plants) in order to reduce pollution in cities. In fact, at EUPHORE, it is possible to study plant emission (Biogenic-VOCs) interactions within a polluted urban environment (NO_x, O_3...), including the potential formation of secondary pollutants (e.g. particles, aldehydes, etc). Besides, it is also possible to estimate the plant pollutant removal capacity. Hence, the results of this type of studies can provide new insights into the suitability of different plant combinations for polluted cities contributing to the selection of environmentally sustainable strategies against urban air pollution.

Acknowledgements
This project/work has received funding from the European Union's Horizon 2020 research and innovation programme through the EUROCHAMP-2020 Infrastructure Activity under grant agreement No 730997 and from DESESTRES- Prometeo II project. F. CEAM is partly funded by the GVA.