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HIDDEN PLANT RESPONSES TO URBAN PARTICULATE MATTER

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In a world where more than 50% of the population lives in an urban environment and in a European Union where this percentage rises to more than 70%, particulate matter (PM) air pollution is one of the most serious problems for human health. Plant species can act as natural filters by intercepting and retaining particles on their leaf surfaces. Trees are considered one of the most appropriate solutions to reduce air pollution in urban areas. However, the genetic and molecular mechanisms occurring in plants underlying this very important property still remain largely unknown. At our knowledge no transcriptomic approaches have been applied to understand how the different plant species react to air pollution causing a great phenotypic variability among plant kingdom in terms of capability to tolerate, intercept and retain PM. The aim of this work is to gain insight into the gene regulatory networks underlying plant responses as well as clarify the role of plant microbiome in response to air particulate matter. The leaf transcriptome of two species (Photinia x fraseri and Laurus nobilis (L.)), commonly found in our gardens, were analyzed in response to high/low levels of air PM. Plants were grown in pot conditions for three months in two close-by areas with different air PM concentration (rural/urban; respectively low/high PM). The presence of different PM fractions was determined in the leaves: urban areas showed much higher levels than rural areas, as expected. An RNA-seq approach using Illumina Novaseq 6000 platform was used for both the two plant species. The leaf microbiome of Photinia x fraseri was analyzed using a metagenomic approach

(ITS1-ITS4 and 16S sequencing) to gain insight into the changes of bacterial and fungal community in relation to air pollution. We will show an overview of the main plant metabolic and molecular pathways using an integrated pipeline of different functional genomic data mining tools. Molecular players with a major role in response to air pollution will be highlighted.