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ABSTRACTS

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Ecophysiological response in some *taxa* of the urban ecosystem of Genova

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Urban air pollution is one relevant environmental issue. All plants are able to remove pollutants from air, but some of them are more efficient, depending on their morpho-functional, and species-specific characteristics, such as: structure of the leaves (thickness, shape, density and morphology of the stomata) and seasonal persistence (1). The present study assesses the ecophysiological response in relation to air pollutants of 4 plant *taxa* commonly used for greening urban areas in the city of Genova. This research aimed at: a) identifying the most performing of the 4 *taxa*; b) understanding the possible influence of leaf exposure time to air pollutants in relation to ecophysiological parameters; c) verifying the possible difference in each *taxon* within and among the sampling areas with different levels of air pollutants.

The 4 *taxa* were: *Photinia x fraseri* Dress, *Pittosporum tobira* (Thunb.) W.T. Aiton, *Hedera helix* L. and *Cedrus libani* A. Rich. The different plant disposition in space when exposed to the pollutants, plant size and heights of exposition respect to the ground level (from 0.5 to 3 m), and their *habitus*, have allowed to study the effect of air pollution on the ecophysiology of each *taxon*.

The study area includes two urban green sites in the metropolitan city of Genova, one with high level of car traffic in the district of San Martino (A) and one with 'background' level of air pollutants in the residential district of Quinto (B). Both sites have similar climatic conditions, and are close to "Liguria Region Environmental Protection Agency (ARPAL, Agenzia Regionale per la Protezione dell'Ambiente Ligure) station" for air quality monitoring.

The samplings were carried out on the leaves at different exposure time to air pollutants (i.e., "young", 0-3 months or "old", > 6 months), following the protocol described in a previous study (2). All the samples were measured with Handy PEA (Photosynthesis Efficiency Analyzer) direct fluorimeter to measure the polyphasic curve of Kautsky O-J-I-P (which describes the passage of electrons between the two photosystems of the photosynthetic apparatus), the photosynthetic efficiency (Fv/Fm) (3), and the Performance Index (P.I., an overall indicator of the vitality of the plant).

Data analysis was performed with PEA Plus Application and Minitab 15 Statistical software. The t-test for the comparison between the non-paired samples mean (two sample test) was used. Differences were considered significant at $p < 0.05$ using one way ANOVA.

The ecophysiological parameters revealed that the 4 *taxa* perform differently as far as air pollutants are concerned, in the order: *P. tobira* > *P. x fraseri* > *H. helix* > *C. Libani* (A site), and *P. tobira* > *C. libani* > *H. helix* (B site). The ecophysiological response in both sites of 'old' and 'young' leaves revealed that longer exposures does not affect the photosynthetic apparatus, with the exception of *H. helix*. The comparison of all parameters between the two sites highlighted a significant difference in the performance of all *taxa*, with those of sites B subjected to lower stress, due to lower concentration of air pollutants, as described in the monitoring carried out by ARPAL (4). The behaviour of *H. helix*, albeit in contrast to the other *taxa*, is consistent in the response to environmental stresses in B site; this may indicate that this species is more sensitive to other air pollutants limited to B site (e.g., O₃).

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- 2) E. Roccotiello, S. Romeo, L. Cannatà, M.G. Mariotti (2017) International Conference on Urban Comfort and Environmental Quality URBAN-CEQ, 137-141
- 3) F. Bussotti, M. Kalaji, D. Rosanna, P. Martina, T. Loboda (2013) Firenze University Press
- 4) Agenzia Regionale per la Protezione dell'Ambiente Ligure - ARPAL (2016) Valutazione della qualità dell'aria della città di Genova