



AIR POLLUTANTS AND ALLERGENS IN THE CITY OF ROME: AN INTEGRATED APPROACH FOR THE AIR QUALITY ASSESSMENT

PhD Student: Alessandro Di Menno di Bucchianico / Supervisor: Dr. Alessandro Travaglini

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The aim of this project is to improve knowledge and methods to address a public health problem and prevent cardiovascular and respiratory diseases caused by the combined effects of air pollutants and allergenic pollen. Nowadays a substantial part of the Union population remains exposed to levels of air pollution, exceeding the standards recommended by the World Health Organization, moreover, air pollution and the seasonal emission of allergenic pollens are progressively affecting human health and can cause severe allergic reactions, particularly when air pollution combines with pollen allergen spikes.

While exposure to air pollution is largely a multi-pollutant process, a "single pollutant effect" approach is adopted in both WHO guidelines and EU legislation. A better approach, based on an integrated air quality index, is needed to prevent additive, synergistic or antagonistic effects between air pollutants and other factors (Di Menno di Bucchianico, 2019).

During this project, the comparison of the trends of these two different forms of air pollution will be systematically examined calculating concentration trends, duration of the pollen season (Di Menno di Bucchianico, 2020) and the annual pollen integral (APIn).

On the basis of the air concentration data from the Air quality monitoring network of Rome (ARPA Lazio) and from the Aerobiological Monitoring Center of Tor Vergata, it will be analyzed the periods in which emissions and dispersion phenomena lead them to be present together in the air and those in which the total diversity of sources prevails over the meteorological conditions, reducing their correlation until the phenomena are out of phase.

Unlike atmospheric pollutants of anthropogenic origin, pollen sources have a pulsating trend that leads to high values in the flowering period and zero in the rest of the year. This aspect makes essential the definition of data coverage standards for the main allergenic taxa.

In preliminary studies can be seen that, in the same area, the pollens also show a certain correlation between them but this does not seem due to the spatial homogeneity of the concentrations but more to the similar climatic conditions that stimulate them. Specifically, in the Rome area, there is an ecosystemic gradient that leads to different concentrations in the air (Di Menno di Bucchianico, 2018). This aspect will also be investigated during the project even with use of meteorological data and the pollen roses analysis will be carried out to understand if air concentration peaks have local source or come from remote areas.

Di Menno di Bucchianico A. *et al.* Studio della presenza contemporanea di alti livelli di inquinanti atmosferici e di pollini nella città di Roma, Proceedings of PM2018, IAS, p. 56, 2018, ISBN 978-88-942135-1-5.

Di Menno di Bucchianico A. *et al.*, Combined effects of air pollution and allergens in the city of Rome, Urban Forestry & Urban Greening, Volume 37, 2019, Pages 13-23, ISSN 1618-866.

Di Menno di Bucchianico A. *et al.*, Temporal trends of allergenic pollens and pollen seasons in the city of Rome, Proceedings of the 7th European Symposium on Aerobiology - Bioaerosols and Environmental Impacts, European Aerobiology Society (EAS), p. 56, 2020.