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Hellenic Foundation for Research & Innovation

Description of the funded research project

1st Call for H.F.R.I. Research Projects to Support Faculty Members & Researchers and Procure High-Value Research Equipment

Title of the research project:
Allergenicity assessment of urban green spaces: the city of Thessaloniki as a case study

Principal Investigator:
Despoina Vokou

Reader-friendly title:
ALLEGREEN

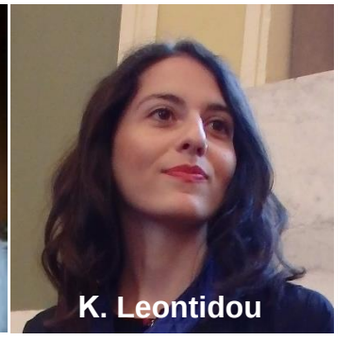
Scientific Area:
Environment and Energy

Institution and Country:
ELIDEK / Greece

Host Institution:
Aristotle University of Thessaloniki (AUTH)

PI

Research team



Voluntary participation of D. Paschalidou

Budget: 158,944.31 €

Duration: 36 months

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Research Project Synopsis

Urban areas constitute thermal heat islands, which means that conditions there are more arid than in their rural or natural surroundings. There exist various ways to mitigate the heat island effect, the most important of which is to increase the urban green. Urban green spaces are an essential component of friendly, sustainable cities, with climate regulation being one of the most important ecosystem services that they provide. Demand for this is expected to grow as climate change intensifies. Many factors must be taken into account in designing and managing green spaces so that they provide their valuable services. A very important one that was not recognized as such until recently is pollen allergenicity. Respiratory allergies, such as those caused by pollen from some plants that are mainly pollinated by the wind, affect a large part of the human population and have high social and economic costs; it is estimated that half of the EU population will be affected by 2025. Given this, actions aiming to reducing human exposure to allergenic pollen are necessary. These should be taken primarily in cities, where all or most of the urban green is man-made and where most of the human population lives. An assessment will be made of green spaces in Thessaloniki, Greece, regarding their allergenicity and an overall assessment of the situation in the city will be attempted. In parallel, apart from the specific information on the nature of the city's major green spaces, a considerable amount of new knowledge will be added in the fields of aerobiology, pollen production and flowering phenology. The project will be completed with the production of a manual with general instructions for the management of urban green spaces, special proposals for Thessaloniki, and a guide of plants to select or avoid.

Project originality

The urban green is mainly man-made, which allows us to change, if necessary, some of its characteristics. Taking into consideration the plants' allergenicity in the design and management of urban green spaces and seeking to minimize its impacts have a strong positive effect on human health. If the necessary information and knowledge to do this is not available, it should be acquired. This is the goal of this project, which aims at identifying elements that degrade the ecosystem services of the urban green and providing guidelines for their restoration. Research will be conducted at the level of aerobiology, vegetation structure, plant phenology and reproduction. The synchronized research in multiple fields is one of the originalities of the project. Most important is the mapping of spatial and seasonal airborne-pollen patterns, the quantification of the vegetation-pollen relationships on a local scale that will allow safe predictions on the type and magnitude of forthcoming changes in vegetation or pollen, when the size of one of the two variables is known, or the detection of airborne pollen sources. These research activities will be supplemented with collection of literature data on the allergenicity of pollen from woody plants tested so far and will be completed with the application of a quantitative index (allergenicity index; Cariñanos et al. 2014) that will capture the allergenic potential of each studied green space and enable assessment of the general situation in the city. Such assessments have not been made so far in Greece. Results will allow us to propose specific measures to improve, where necessary, the situation in the specific areas studied and the city overall. To this aim, we will produce a manual with guidelines for the selection of plants and the management of the city's green spaces.

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Expected results & Research Project Impact

New knowledge about the allergenicity of green spaces in Thessaloniki, such as parks, boulevards, abandoned camps and the campus of the Aristotle University of Thessaloniki, will complement the over thirty-year series of airborne pollen data that exist for the city, while offering necessary information and decision-making tools to improve the quality of life of the city's inhabitants. There will be important contributions also in the following areas: (a) adding new information on pollen production and flowering phenology of woody plants not studied so far; (b) checking hypotheses linking local vegetation characteristics to pollen concentrations in the air, expectedly enhancing the power of quantitative relationships already proposed; (c) collecting and evaluating available information on plants with allergenic pollen; (d) understanding the difference in air quality near the ground and at rooftop level; (e) mapping the spatio-temporal patterns of composition and concentration of airborne pollen in selected green spaces of the city; (f) identifying matches or mismatches of flowering times and pollen seasons for selected woody taxa, and detecting other potentially important relationships resulting from new questions that may rise during the execution of the project; and (g) acting as a guide for related research in other urban areas. The project is expected to have a high social impact as its results can contribute to a safer and healthier urban environment, with a very positive impact on the economy, if adopted by the competent authorities. It is reminded that this type of biological pollution negatively affects a large part of the human population and that it has high direct and indirect costs associated with the diagnosis and treatment of allergies, loss of working days, etc., while the tourism industry may be also affected, as tourists that are sensitive to pollen avoid places and periods of time associated with a high allergy risk.

The importance of this funding

Funding from the Hellenic Foundation for Research and Innovation allows the implementation of a project that is expected to provide important information on the quality of the environment in Thessaloniki and tools to improve it, while it can guide related research activity elsewhere. The planned publicity actions are expected to highlight a new dimension that should be taken into account by the competent authorities in decision-making for the design and management of urban green spaces, which is plants' allergenicity. On a wider scale, with a duration of 36 months, the project allows young researchers (postdoc) to continue their scientific work, to do creative and efficient research and be rewarded for the new knowledge that they produce. By doing so, it enables them to remain in the country and not exacerbate the existing 'brain drain'. Finally, with the financing of the project, the laboratory equipment of the academic unit responsible for the implementation of the project will be upgraded allowing research activities to be conducted under better conditions and contributing to a higher competitive ability of the research unit and team.

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