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ES_I.4
Investigation on the air pollutants of biological origin and its impact on human health

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Objectives: India, is known as a climatically diverse country. Different types of pollen grains, fungal spores and other materials of biological origin are loaded in air as pollutants. That's why the aims of the research work were: i) to determine the peak concentration of dominating airborne pollen grains and their impact on human health, ii) to prepare a health survey report to note allergenic symptoms. iii) to identify the bio pollutants responsible for allergy.
Methods: Aerobiological-sampling and survey were done in a site very near to Kolkata city (22°82'N, 88° 20'E) with the help of Burkard Sampler. 200 people around the site were asked about their health following a questionnaire. Skin Prick Test (SPT), SDS-PAGE, IgE specific Immunoblotting were done.
Result: The calendar showed 42 types of pollen grains prevailing in air, where pollen grains of Poaceae were in highest number followed by Lantana camara, Meliaceae, Asteraceae, Trema orientalis, Cocos nucifera, Areca catechu, Phoenix sylvestris, Borassus flabellifer, Petlophorum pterocarpum, Mangifera indica, Carica papaya etc. A number of herbs and shrubs like Amaranthus viridis, Parthenium hysterophorus, Cyperus sp, Justicia simplex, Chenopodium album, Catharanthus roseus grow abundantly in that area. Four distinct seasons namely summer (March to May), monsoon (June to September), post monsoon (October to November), winter (December to February) have been recognized in West Bengal. The temperature fluctuates from 24-38°C during summer whereas 12-27°C in winter. Annual average rainfall is about 1,582 mm per annum (June-September). In health survey, the graph showing age group of 11-30 years was found to be more susceptible to seasonal changes rather than the rest. The females were more susceptible than males. It was noted that there was a positive correlation between the peak concentration of pollen grains and seasonal increase of allergy. The type of fuels, used may affect increasing of allergy symptoms and respiratory troubles. Frequent sneezing, coughing were in highest condition. SPT was done with Lantana pollen as this plant grows abundantly in the locality and also recorded to be present in high concentration in the air. SPT and ELISA were done with Lantana pollen extract which showed +2/+3 response among patients and high antibody titer in ELISA. IgE specific immunoblotting with positive patient sera showed the 38 kDa protein band to be most reactive.
Conclusions: There are number of pollen grains & fungal spores in high concentration in air as pollutants causing human health hazards. Results from bio-monitoring showing the significant presence of the exotic Lantana sp. associated with other pollen types in air. Biochemical tests showed its allergenic properties and highly reactive proteins causing mild to severe type-1 hypersensitivity. The missing factors like the way of living, poor knowledge of sanitation, awareness about health hazards etc., led to promote severe level of hypersensitive symptoms to the people. The survey and bio-monitoring results ultimately prove that the pollen grains were also promoting respiratory troubles and allergic symptoms in the locality and Lantana is a highly allergenic plant.

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ES_II.5
Airborne pollen levels of the eleven most planted tree species in the streets of Barcelona and sensitization of the population

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Objectives: The selection of the plants used as ornamental in streets, parks and gardens is based, usually, on aesthetic criteria and resistance to contamination, among other characteristics, but rarely on public health aspects such as the capacity of their pollen to elicit sensitization or allergy in the population. The objective was to determine the prevalence of sensitization of the inhabitants of Barcelona to the pollen of the eleven most planted ornamental trees in the streets of the Barcelona city.
Methods: The list of the 11 most abundant trees in the streets of Barcelona was provided by Parks and Gardens of the City Council and resulted in: Platanus, Celtis, Sophora, Ulmus, Tipuana, Robinia, Brachychiton, Populus, Melia, Ligustrum and Palm trees. Not included in this list because not used in streets but in gardens and squares and also abundant in the city were Olea and Cupressus. 427 patients older than 18 years and visiting the Units of Allergy at eight Hospital Units in Barcelona with a suspicion of asthma or rhinitis were enrolled. Prick tests were performed with standard extracts when existing and with extracts prepared for this study. The sampling and analyses of the Barcelona airborne pollen from 1994 to 2011 followed the methodology proposed by the Spanish Aerobiological Network (Red Española de Aerobiología, REA).
Results: Four of the most planted trees (Sophora japonica, Tipuana tipu, Brachychiton populneus, Melia azedarach) did not appear in the airborne pollen spectrum [aps] and it was really difficult to obtain pollen from their flowers, thus it was impossible to determine the sensitization. The rest of the trees showed sensitization capacity [sen] to rhinitis [rh] and/or to asthma [as]: Platanus(37% sen (39% rh-32% as); 34% pt; 37% aps), Olea (37% sen (30% rh-37% as); not Known pt; 3% aps), Ligustrum (22% sen (23% rh-27% as); 2,2% pt; 0,04% aps), Cupressus (14% sen (16% rh-0% as); not known % pt; 16% aps), Palm trees (6% sen (7% rh-10% as); Celtis (6% sen (6% rh-7% as); 11,6% pt; 0,06% aps), Robinia pseudoacacia (6% sen (6% rh-5% as); 4% pt; 0% aps), 1,7% pt; 0,5% aps), Ulmus (5% sen (5% rh-5% as); 4,4% pt; 0,3% aps); Populus (3% sen (3% rh-2% as); 3% pt; 0,8% aps). Almost all (97%) of the patients sensitized to Ligustrum were sensitized also to Olea, suggesting the importance of Ole e 1. All but one of the patients sensitized to Robinia pollen showed polisensitization (Olea, grasses and Platanus pollen), suggesting the role of profilin, polcalcin and 1-3 β-glucanase in this sensitization. All but two of the patients sensitized to Palm pollen showed polisensitization (Olea, grasses and Platanus pollen), suggesting the role of profilins in this sensitization.
Conclusions: There was a positive association between the detection of airborne pollen and the percentage of sensitizations. The use of Sophora, Tipuana, Brachychiton and Melia as ornamental trees is highly recommended. Palm trees, Celtis, Robinia, Ulmus and Populus could be used as ornamental if avoiding important concentrations. Platanus, Olea, Ligustrum and Cupressus should be avoided near the human settlements.

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ES_II.6
Index of allergenicity of urban green zones: a new tool for planning and designing

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Objectives: As Urban Green Zones are of strategic importance for the quality of life in today´s urbanized societies, it is necessary to adopt measures to make them places of recreation, amenities and well-being. This work outlines an index to quantify the potential allergenicity of urban green zones by considering both intrisic plant factors and parameters and other elements dependent on the landscape and urban design. To show the application of the index, an urban park of the city of Granada, south-eastern Iberian Peninsula was selected.
Methods: The index has been constructed by considering the following parameters: allergenic potential, pollen emissions linked to strategy of pollination, duration of the pollination period, surface occupied by species and number of individuals per species. The index is a function of the maximum values of allergenicity that could be recorded in a place of similar characteristics. Lanscaping and architectural features in and around the park has been evaluated as they might influence the accumulation of pollen.
Results: The Index of Allergenicity of Urban Green Zones (I UGZA) for the case-study considered is 0.117, resulting from a combination of species with taxonomic (771 trees from 65 different taxa), morphological (form, size) and biological (different strategy of pollination, different pollination period) diversity. Some of the negative aspects is the presence of several genera of the same family as cross-reactions may occur due to the presence of shared allergens. Other aspects to be considered are the formation of plant screens and monoespecific tree-lined avenues due to they act as important sources of pollen emissions. The built-up environment of the park also determines the extent to which biological particles can join the airflow and thus, be dispersed.
Conclusions: The index for quantifying allergenicity proposed constitutes an useful tool at time to estimate potential allergenicity of urban green zones. The index also allows the establishment of corrective measures driven to minimize the impact of pollen allergy. The index permit as well the comparisons between green spaces of similar characteristics in the same city, and even between spaces in different cities.

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Assessing the effects of the meteorological conditions on the pollen wall by EPMA

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Objectives: Nowadays, air quality is a major concern. Pollutant emissions are aggravating respiratory diseases and increasing pollen allergies. Platanus, Acer and Pinus are three plant genera whose pollen is abundantly present in the atmosphere of Porto in early spring, having different levels of allergenicity. Porto city is bounded on the west by the Atlantic Ocean. The aim of this study was to characterize and compare the chemical changes that the wall of the three pollen types undergoes while in the atmosphere, using EPMA.
Methods: We compared pollen that was collected directly from the anthers to pollen that was captured from the atmosphere. For the airborne sampling, we used a 7-day Hirst-type volumetric spore trap, set on the roof of the Faculty of Sciences of Porto. Samples from four days, with different weather conditions, were studied. Analyses were performed with a Field Emission Electron Probe Microanalyser (EPMA) JEOL JXA-8500F. The chemical elements (N, O, Na, Mg, Si, P, S, Cl, K, Ca) were chosen by EDS qualitative analyses and WDS quantitative analyses were then performed at 6kV, 15nA.
Results: The control Pinus pollen wall showed major differences in chemical composition when compared to the other two pollen types. Control Platanus and Acer pollen did not present significantly different compositions, except for the amount of Mg and Ca. Airborne pollen showed alterations in elemental proportions, compared to the control pollen. These alterations consisted mostly of an increased amount of Mg, Cl, Na, Si, K and P. On the other hand, no Ca was added to the pollen wall while airborne. Mg, Cl and Na contents increased with relative humidity and decreased with temperature. On the studied days, wind blew predominantly from North/East or Southwest and it was on this latest situation that Si contents were higher. In spite of K and P increased contents in airborne pollen, no relation was found between the amount of these elements and meteorological conditions. S only increased in Acer and Platanus pollen and just in the 2 days when relative humidity was higher and temperature was lower. The deposition of sea spray ions (Mg^{2+}, Cl^-, Na^+ and SO_4^{2-}) on the pollen wall was more evident on the days with higher relative humidity/lower temperature, regardless of wind speed or direction. This indicates that, in Porto city, the pollen wall composition may be affected by the sea and that this effect is highly influenced by relative humidity and/or temperature.
Conclusions: The chemical composition of the pollen wall is altered when pollen grains circulate in the atmosphere. Changes are more significant when the meteorological conditions are favorable: high relative humidity/low temperature and prevailing wind direction from the shore. Platanus and Acer pollen walls tend to adsorb external elements in a greater extent than Pinus pollen wall.
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