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Assessment of the soil microbial status of urban parks in Plovdiv, Bulgaria

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Statement of the Problem: Soil microbiology is a key component in urban ecosystems. Bacterial communities take part in different soil processes as mineralization of the organic matter, humus synthesis, nutrient supply and nitrogen fixation. They are of primary importance for soil quality and natural productivity. Urban infrastructure and development are one of the most severe threats for microbial communities' structure and well-being. Anthropogenic pressure results in pollution of all components of the urban environment, damaging the soil properties. The purpose of this study is to assess the microbial status of soils from urban parks on the basis of total viable count of bacteria (TVC22 and TVC37), actinomycetes and fungi, combined with the presence of *Escherichia* coli, fecal coliforms (FC) and fecal streptococci (FS) as a pollution indicator.

Methodology & Theoretical Orientation: Soil samples are taken from 8 urban parks in the city of Plovdiv with different degree of anthropogenic pressure - 4 big and 4 small, situated in the urban and suburban zone. All samples are dissolved into sterile saline and incubated at room temperature for 30 min on 200 rpm in order to free the microorganisms from soil particles. Standardized methods are used for studied parameters evaluation.

Findings: Maximum of TVC22 and TVC37 were found in the big city parks in suburban zone. Fungi were also more abundant into soil samples from big parks and less presented into small parks in the west and central urban zone. Actinomycetes have not been found in two of the big parks which indicated their bad quality. Pathogenic forms were prevailing in the big parks, especially in the central urban zone.

Conclusion & Significance: Statistical evaluation confirmed the relationship between the anthropogenic pressure and microbial status of urban soils, both with the influence of the wind rose as a factor.

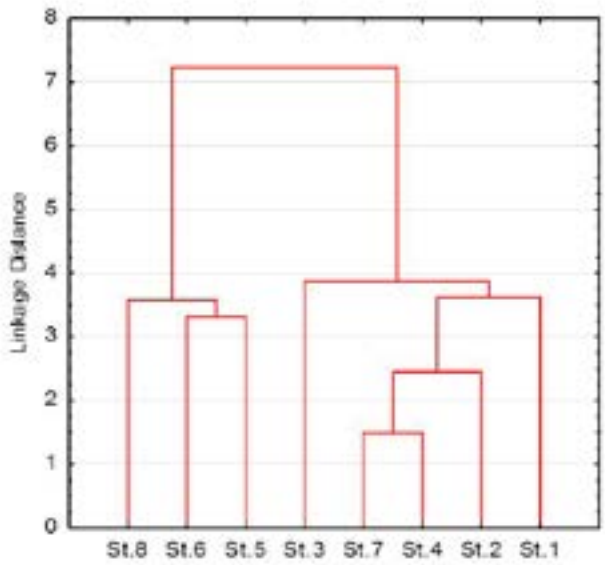

Figure 1: Dendrogram from the cluster analysis:
Big parks – St. 1, St. 3, St. 5, St. 8;
Small parks – St. 2, St. 4, St. 6, St. 7

Recent Publications:

1. Anderson T (2003) Microbial eco-physiological indicators to assess soil quality. Agric. Ecosyst. Environ. 98:285–293.
2. EEA (2010) 10 messages for 2010. Urban ecosystems. European Environment Agency, Copenhagen
3. Klumpp A, Hintemann T, Lima J, Kandeler E (2003) Bio indication of air pollution effects near a copper smelter in Brazil using mango trees and soil microbiological properties. Environ. Poll. 126:313–321.
4. Von Lützow M, Leifeld J, Kainz M, Kögel-Knabner I, Munch, J. C. (2002): Indications for soil organic matter quality in soils under different management. Geoderma 105: 243–2585.
5. Rawlins B, Vane C, Kim A, Tye A, Kemp S, Bellamy P (2008) Methods for estimating types of soil organic carbon and their application to surveys of UK urban areas. Soil Use and Management 24(1):47-59

Biography

Slaveya Petrova has her expertise in bio monitoring of the urban air pollution. She is currently working on construction of the model for assessing the ecological status of the urban landscapes.

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