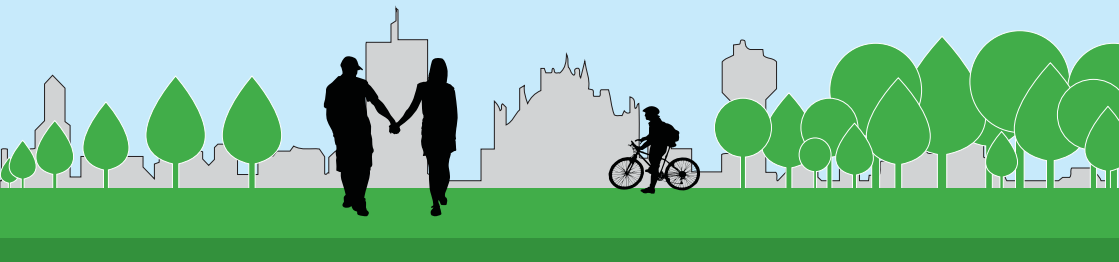


THE WALKING URBAN FOREST

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ABSTRACTS

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URBAN VEGETATION AS A FILTER FOR AIRBORNE PARTICLES: BRIEF STUDIES

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Abstract

Urban vegetation has been widely recognized for its capability to improve air quality. Vegetation absorbs air pollutants through leaf stomata and intercepts airborne particles on their foliar surfaces. To investigate the overall interaction between vegetation and airborne particles, PM10 measurements were carried out in a small Portuguese city (Bragança), under two distinct experimental designs. In the first one, PM10 concentrations were sequentially monitored in six different points, placed on two linear paths intersecting areas with contrasting plant cover and crossed by a low traffic urban road. Real time measurements were conducted throughout the growing season encompassing a total of twelve trials. In the second experimental configuration, diesel exhaust particles were released into the ambient air using an internal combustion engine while real-time measurements of PM10 were taken in different locations in front and behind a 2-meter-high by 1.5-meter-wide *Pyracantha* hedge. Results from both experiments showed the ability of vegetation in filtering air particles. Although no significant linear relationship was found between PM10 and foliar density, PM10 levels were predominantly lower in the path with higher foliar coverage. A good filtering performance was also found for the *Pyracantha* hedge when exposed to diesel exhaust particles, especially when the pollution source was positioned closer to the green barrier. Particle reductions up to 95% were measured, indicating that placing dense vegetation near pollution sources (e.g. roads) will certainly be an excellent choice for improving air quality in any urban system.

Key Words

Urban environments, Urban forestry, Air quality, Particulate matter, PM10 measurements.

Key References

- Beckett K.P., Freer-Smith P.H., and Taylor G. 1998. Urban woodlands: their role in reducing the effects of particulate pollution. *Environmental Pollution*, 99: 347-360
- Chan, L. Y., Kwok, W. S., Lee, S. C. and Chan, C. Y., 2001. Spatial variation of mass concentration of roadside suspended particulate matter in metropolitan Hong Kong. *Atmospheric Environment* 35: 3167-3176.
- Freiman, M.T., Hirshel, N., and Broday, D.M., 2006. Urban-scale variability of ambient particulate matter attributes. *Atmospheric Environment* 40: 5670-5684.
- Gromke, C., and Rucka, B., 2007. Influence of trees on the dispersion of pollutants in an urban street canyon—Experimental investigation of the flow and concentration field. *Atmospheric Environment* 41 (16): 3287-3302.
- Litschke, T. and Kuttler, W., 2008. On the reduction of urban particle concentration by vegetation – a review. *Meteorologische Zeitschrift*, 17 (3): 229-240.
- Nowak D. J., Crane D. E. and Stevens J. C., 2006. Air pollution removal by urban trees and shrubs in the United States. *Urban Forestry & Urban Greening* 4: 115-123.
- Yin, S., Shena, Z., Zhouc, P. , Zoua, X. , Chec, S. and Wang, W. 2011. Quantifying air pollution attenuation within urban parks: An experimental approach in Shanghai, China. *Environmental Pollution* 159: 2155-2163