

MICROBIAL VOLATILES ORGANICS COMPOUNDS (mVOCs) EMITTED FROM SOILS AMENDED WITH ORGANIC WASTES

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ABSTRACT

Volatile organic compounds (VOCs) have a central role in environmental pollution. They influence the chemistry and the composition of the atmosphere. In particular, biogenic volatile organic compounds (bVOCs) contribute 90% to global VOCs emissions¹. Microorganisms contribute to bVOCs emissions and their emissions could be affected by different type of organic waste in soil². The aim of this study is focused on determining the effect of organic wastes on VOC emitted by microorganisms in soils.

The technique used for mVOC detection is the Proton Transfer Reaction-Time of Flight-Mass Spectrometry*(PTR-TOF-MS). PTR-TOF-MS technique provides on-line detection of VOC with two main advantages: rapidity and the detection limit as low as 0.1 ppt by volume³.

Five sample of the same soil with 4 different organic waste contributions were analyzed: (1) Municipal solid waste, (2) Green waste and sludge, (3) bio-waste, (4) farmyard manure and a control sample without organic waste. We also compared dry and humid conditions for each sample.

Results show that VOC emissions are higher in humid samples than dry ones. Different VOCs such as acetone, Methyl Ethyl Ketone, acetaldehyde, toluene, ethanol and monoterpenes contribute between 60% and 80% of total emissions. Furthermore, other compounds emitted in smaller quantities are analyzed in order to identify a VOC profile belonging to each type of organic waste in soil.

Finally, perspectives concerning the study of the correlation between mVOC emissions profiles with microorganism diversity and activity in soil will be discussed. Also analysis of soils genetic content and manipulation of genetic diversity of soils will be performed.

¹ Roger Atkinson, 'Atmospheric Chemistry of VOCs and NOx', *Atmospheric Environment*, 34.12–14 (2000), 2063–2101 <[http://dx.doi.org/10.1016/S1352-2310\(99\)00460-4](http://dx.doi.org/10.1016/S1352-2310(99)00460-4)>.

² Mallard P. *et al.*, 'Impacts environnementaux de la gestion biologique des déchets : bilan des connaissances' (2005).

³ Christos Soukoulis and others, 'PTR-ToF-MS, A Novel, Rapid, High Sensitivity and Non-Invasive Tool to Monitor Volatile Compound Release During Fruit Post-Harvest Storage: The Case Study of Apple Ripening', *Food and Bioprocess Technology*, 6.10 (2012), 2831–43 <<http://dx.doi.org/10.1007/s11947-012-0930-6>>.

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