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Medina Veliu, Joeri Kaal, Asier Goñi-Urtiaga, Tiago De Oliveira, Giuseppe Picca, et al.. Application of analytical pyrolysis for the molecular fingerprinting of polymers (PE, PET, PP, PS and PVC) within natural organic matter matrices used for rooftop farming. Suitma 12th Conference on Soils of Urban, Industrial, Traffic, Mining and Military Areas, Sep 2023, Santiago de Compostela, Spain. . hal-04134050

**HAL Id: hal-04134050**

**<https://univ-eiffel.hal.science/hal-04134050>**

Submitted on 15 Sep 2023

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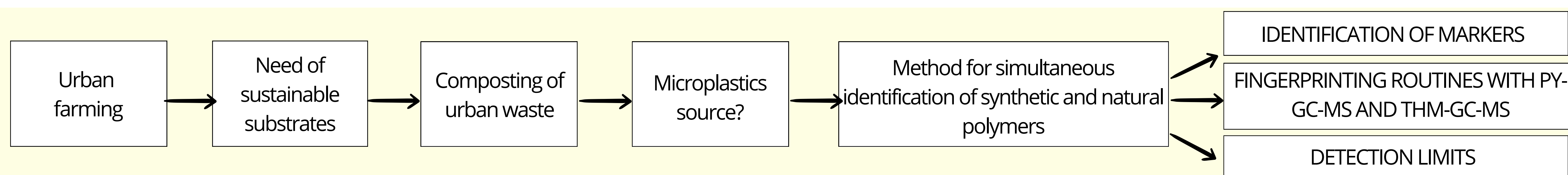
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# Application of analytical pyrolysis for the molecular fingerprinting of polymers (PE, PET, PP, PS and PVC) within natural organic matter matrices used for rooftop farming

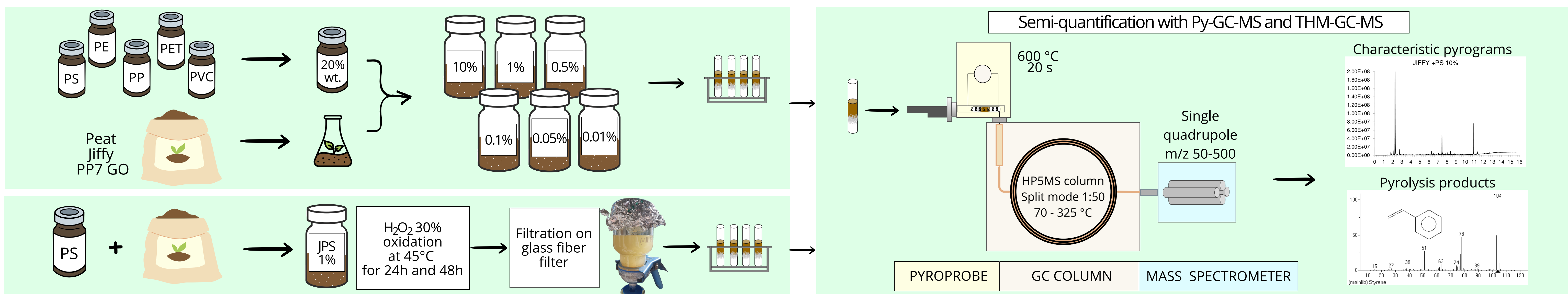
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## INTRODUCTION



## MATERIALS AND METHODS



## RESULTS

### Pyrolysis products proportions in mixtures of synthetic polymers and natural organic matter

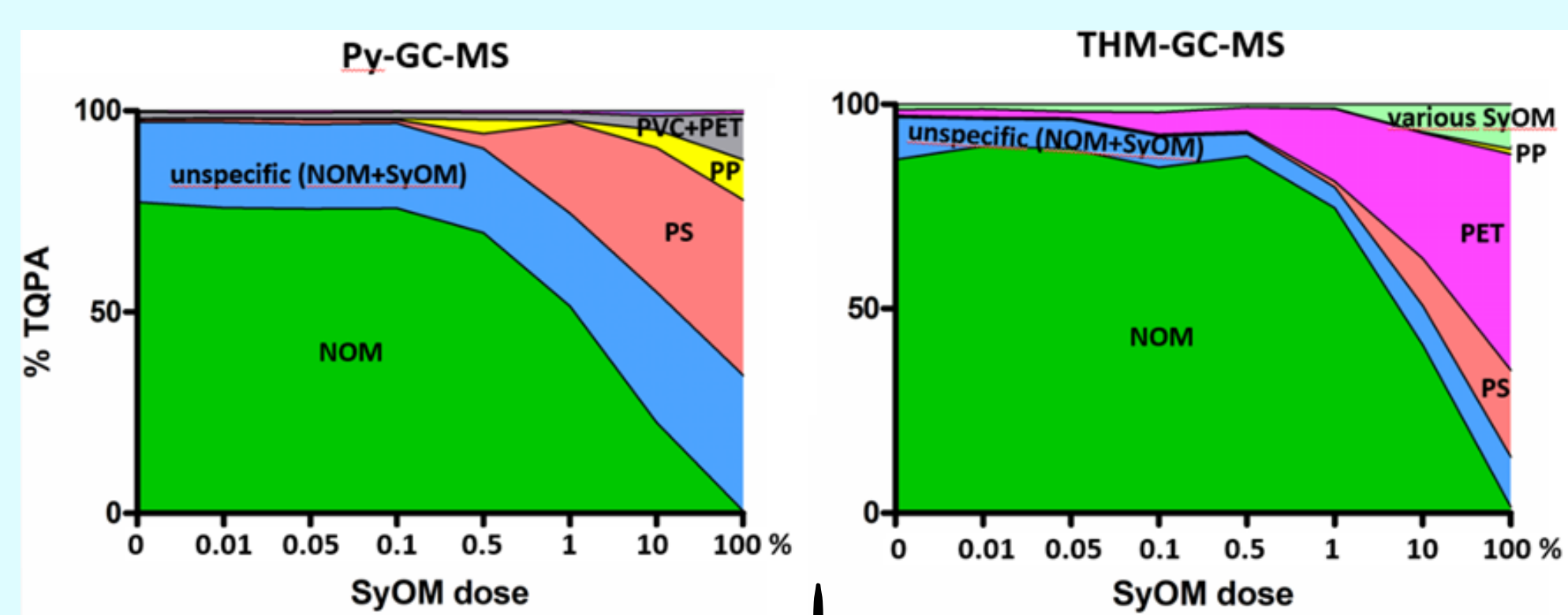


Figure 1. Balance between plastics concentration in the mixtures of synthetic polymers and natural organic matter (x-axis, log scale) and the proportions of the peak areas for Py-GC-MS (left) and THM-GC-MS (right). (Kaal et al. 2023, Under review)

### Synthetic polymers Detection Limits with PY-GC-MS and THM-GC-MS

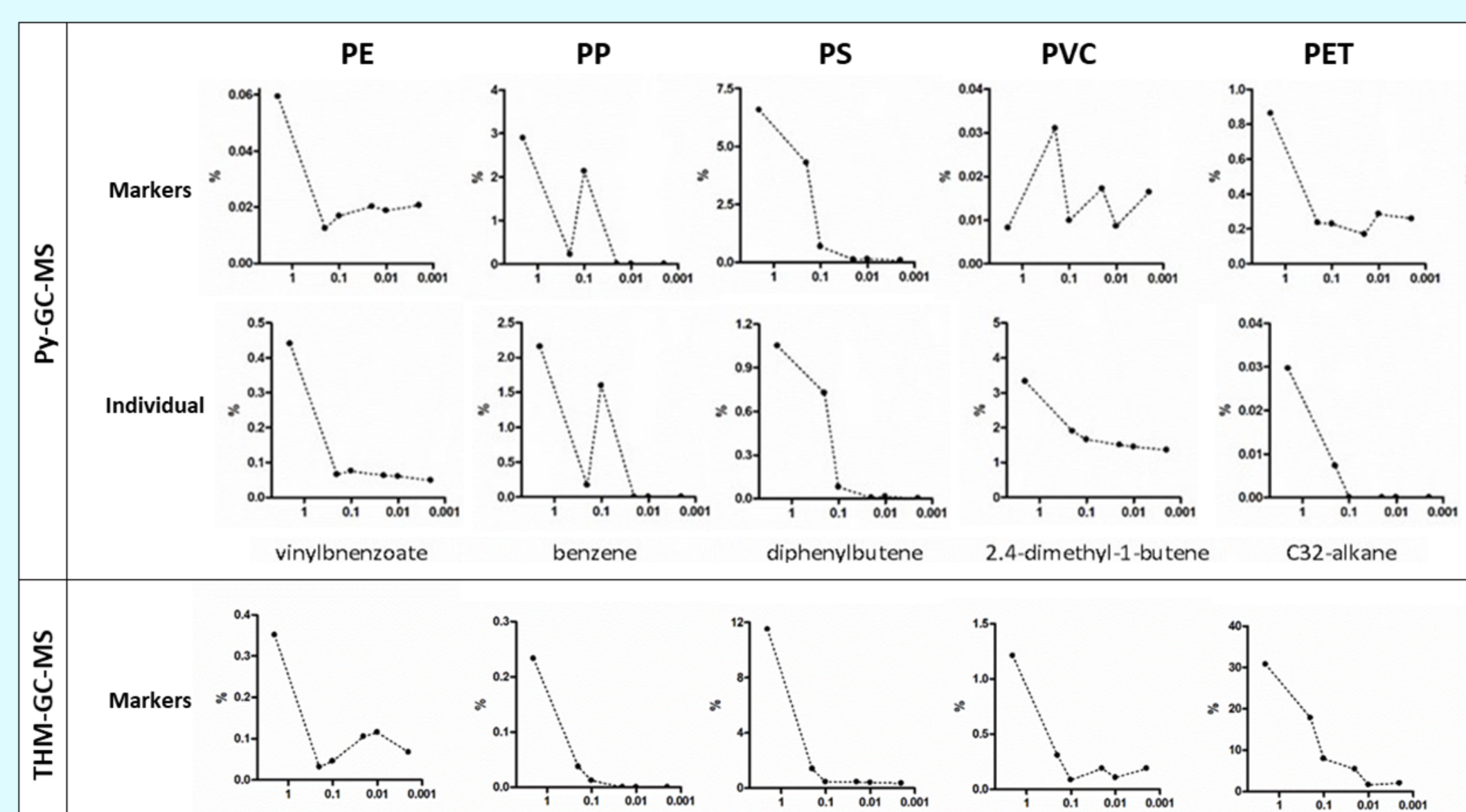


Figure 2. Summary of Py-GC-MS and THM-GC-MS data for the five synthetic polymers in NOM matrix. (Kaal et al. 2023, Under review)

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- Pérez-Rodríguez, M. et al. 2023. Explicit microrelief-controlled decoupling of initial aerobic (in hummocks) and anaerobic (in hollows) decay in superficial layers of Sphagnum-dominated peatlands.
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### H<sub>2</sub>O<sub>2</sub> 30% oxidation at 45°C for 24 h and 48 h on Jiffy peat + PS 1% (JPS1)

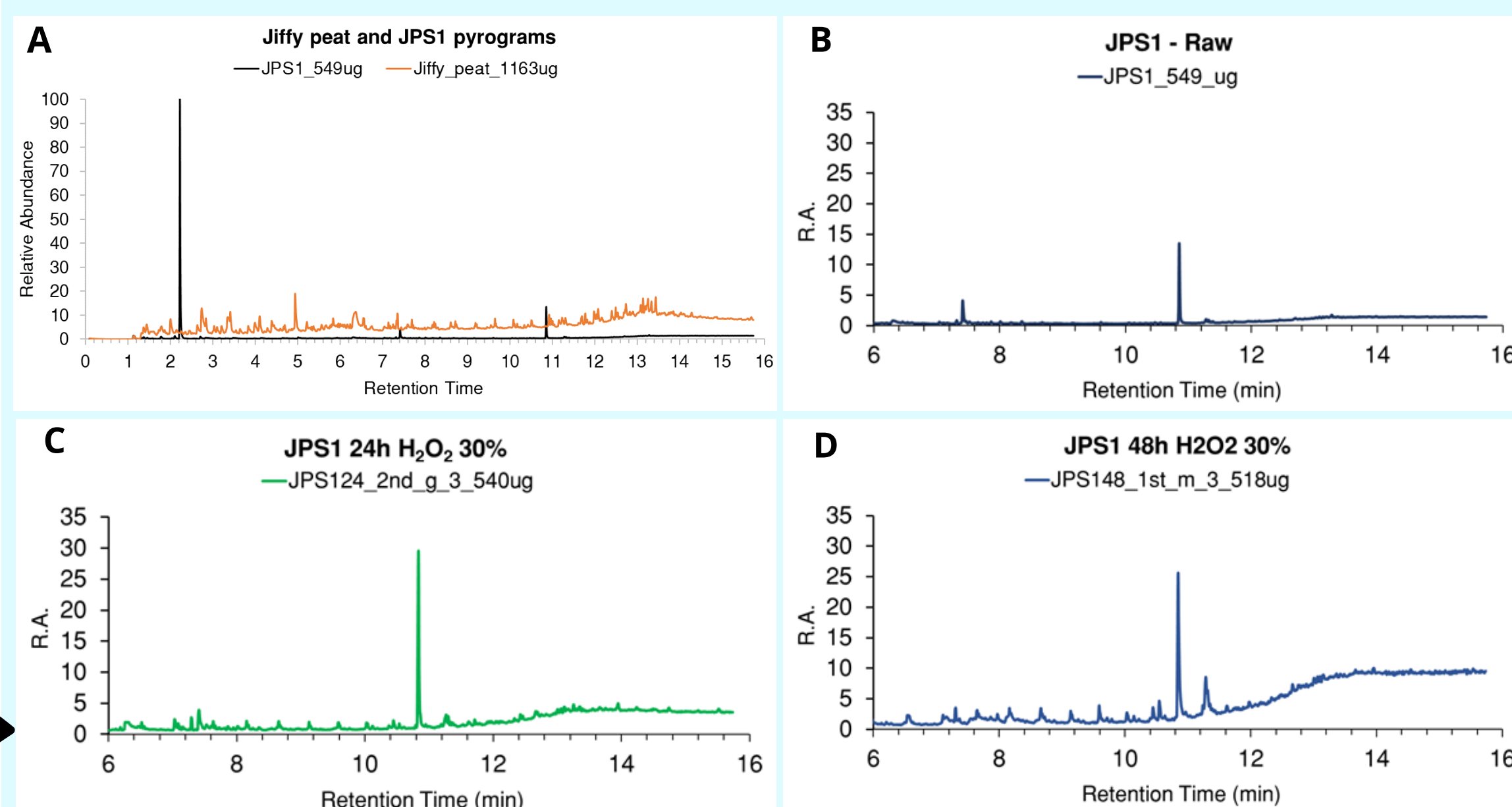


Figure 3. Py-GC-MS pyrograms of pure Jiffy peat (orange) and PS 1% mixture in Jiffy peat (black) (A); pyrograms of styrene trimer peak (10.8 min) in non-treated JPS1 (B) and in JPS1 oxidized for 24 hours (C) and 48 hours (D).

Selected PS characteristic peaks (styrene monomer, dimer and trimer) more abundant after oxidation treatment. Improved detection limits? PS stability was expressed as styrene trimer/dimer ratio: values are comparable before and after oxidation (JPS1: 3.2 ± 0.5; JPS124: 3.5 ± 1.5).

## CONCLUSIONS

- OM fingerprinting approach can be used to identify SyOM when present in significant amounts (0.01-2% depending on the polymer)
- Oxidation with H<sub>2</sub>O<sub>2</sub> 30% enhances PS molecular fragment peaks in JPS1 pyrograms

## PERSPECTIVES

- Detection limits of synthetic polymers in peat samples after H<sub>2</sub>O<sub>2</sub> oxidation
- Application of oxidation protocol and Py-GC-MS analysis to composts of urban rooftop



Algae-based compost

