## Comparison of Semi-volatile Organic Compounds (SVOCs) Levels in Pine Needles Towards a Uniform Assessment Using Different Species

PP Env Monit #39

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Biomonitoring using vegetation is nowadays a common practice in environmental science, but depends a lot on the availability of the species able to be used in the target sampling points. Pine needles are one of the most used matrices in these types of studies, due to their ubiquitous nature associated with relatively long and stable life cycles, able to convey not only spatial but also temporal trends of contamination [1].

However, different species used are prone to show different uptakes of semi-volatile organic compounds (SVOCs) [2]. This makes the direct comparison of databases a very difficult, if not impossible task. The goal of this study is to raise awareness and be a starting point to deal with this important gap.

To achieve these purposes, samples of pine needles from several species (*Pinus (P.) pinea*, *P. pinaster*, *P. halepensis*, *P. radiata*, *P. sylvestris*, *P. nigra*, *P. canariensis* and *P. strobus*) were collected in 12 sites from different countries (Portugal, Spain, UK and Romania), where at least two species were planted under a similar environmental exposure (next to each other).

A multi-residue analytical protocol previously validated by our group [3] was employed to extract and quantify 4 classes of semi-volatile organic contaminants (SVOCs) - polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs) and organochlorine pesticides (OCPs) – in order to establish initially the differences between the levels of the target chemicals between them, and then try to produce statistically significant relationships between pine species for as many compounds as possible.

These were found ($p > 0.05$) for the sum of concentrations of the different classes of SVOCs and for some of the individual compounds, especially for the most volatile ones and between *P. pinaster* and *P. pinea* species. These uptake correlations seem to be transversal to the land uses (urban, rural, remote). They were also collected in different times of the year, although always with exposures between 1 and 2 years. For some species analysed, the number of samples was insufficient to draw correlations. But the general results point towards the following uptake trends: *P. pinaster > P. sylvestris > P. pinea > P. radiata P. halepensis > P. strobus > P. canariensis*.

**References**
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