

Air quality assessment by using pine needles and moss

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Persistent organic pollutant (POPs) are toxic organic compounds those are capable of long-range transport and can accumulate in living organisms. Development of new useful methods for POPs sampling is necessary. Effective way of determination organic pollutants is the biomonitoring. Analysis of plants has many advantages in comparison with traditional analysis of abiotic matrices (water, soil). In addition, the best way to determine the extent and threat of contamination in the environment for living organisms is by measurement of the levels of contaminants in the organisms themselves. Plants indicators are used extensively. Electricity is not needed, evergreen plants are still available and it is easy way of sampling technique also in remote and poor accessible sites. Pine needles stand out as effective biomonitors due to the excellent uptake properties of their waxy layer. They are deciduous trees with a long lifetime. For these reasons, needles can accumulate POPs over long periods of time. Also, moss have a high surface to volume ratio enabling particles to be trapped, a high cation exchange capacity, and a lack of a well-developed cuticle in their tissues, leading to accumulation of large amounts of chemicals.

Here presented doctoral study contains of five different studies. Research started by development of methodology of sampling and analysis of pine needles (Study n.1). Long-term trends of selected POP groups in needles were essence of Study n.2. Studies n.3 and n.4 were focused on sapling needles in high mountain habitats and ski areas in Slovakia and Norway. We provide innovated standard operating procedure of analysis and sample newly-used types of bioindicator – *Pinus mugo*. Last study (Study n.5) paid attention to sampling of moss *Pleurozium schreberi* and analysis of PBDEs in heavily contaminated industrialized areas in Poland.

Doctoral research clearly proved that pine needles and moss are suitable types of bioindicators of ambient air and brought many interesting results which are published in impacted journals.