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Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Phytoscreening of BTEX and chlorinated solvents by tree coring

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**Tree coring**

Phytoscreening by tree coring is a low-cost and easy method, for screening of shallow pollution, over large areas. It can be used to focus other more advanced and cost-intensive screening methods, to make site characterization more efficient.

Subsurface pollutants are taken up by the root system and transferred to the wood. Cores from the stem are sampled by a hand drill and analyzed. The extend and level of the contamination is mapped. The method has shown to be well suited for chlorinated solvents, but the current application at BTEX contaminated sites is limited.

The purpose of this study was:
- To test the feasibility of the method as a BTEX screening tool.
- To compare tree coring as an initial screening method with soil gas sampling.

**Sampling procedure**

1) The Suutu borer: Core extractor, borer and handle.
2) Screwing in the borer to the stem.
   Correct sampling point: 1 m height, 6 cm in depth.
3) Insertion of the core extractor.
4) Removing of tree core sample.
5) The tree after sampling.

**Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)**

**Application:**
- **Purpose:** Test method feasibility.
- **Test site:** Former Air base in Szprotawa, Poland.
- **Tree species:** Pine, birch, willow and asp.
- **Contamination level:**
  - High risk areas: 50–70 mg BTEX/kg.
  - Outside high risk areas: 2–2.3 mg BTEX/kg.
- **Comparison sampling:** Soil samples.

**Outcome:**
- BTEX can be detected in the wood.
- The high risk area was located, however some discrepancies (including non-detected) occur when comparing with soil samples.
- The method depends on the tree species; willow and asp are preferred, pine may be useful for toluene, birch is not recommended.

**Conclusion:**
- Tree coring willow and asp can be suitable as initially screening tool to locate high risk areas for BTEX.
- More investigations are needed.

**Chlorinated solvent (PCE)**

**Application:**
- **Purpose:** Method comparison of tree coring ans soil gas sampling.
- **Test site:** Former industrial production in Jutland Denmark.
- **Tree species:** Beech, oak, pine and others.
- **Contamination level:** 5-3210 μg PCE/m².
- **Comparison sampling:** Soil gas sampling.

**Outcome:**
- Chlorinated solvents can be detected in the wood and high risk area were located.
- Evaluation of data and comparison with other methods should be based on ranked data.
- A positive trend is observed between ranked soil gas and tree coring results.

**Conclusion:**
- Tree coring is well suited screening tool for locating of PCE (and TCE) contamination in the shallow subsurface and particularly to identify source/high risk areas.
- Good supplement to soil gas sampling.

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**Literature:** [http://www.timbre-project.eu/](http://www.timbre-project.eu/)

**Acknowledgement:** Financial support by the European Community’s Seventh Framework Programme FP7 project TIMBRE.