

Title The ornamental tree *Picea glauca* “Conica” as a model plant for uptake studies with the environmental pollutant trinitrofluorene

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Text: Most of German former military sites (2.8% of the entire territory) are covered by woodlands dominated by conifers. On large areas of these sites soils are contaminated with explosive's residues, mainly with 2,4,6-trinitrotoluene (TNT). To explore the decontamination potential of conifers with radioanalytical methods, model plants are needed which show all features of adult trees. The dwarf mutant of Canadian white spruce, *Picea glauca* ‘Conica’ combines low space requirements with easy handling. Therefore *Picea glauca* ‘Conica’ is suited for uptake studies with ¹⁴C-radio-labelled TNT using glass fibre wick application systems for precisely quantifiable input of water-solved, bioavailable TNT to soil/tree systems.

Evaluating the mass distribution of radio-labelled compounds showed that *Picea glauca* is able to reduce the content of ¹⁴[C]-TNT in quartz sand. Substrates containing conifer plants clearly indicate that less ¹⁴[C]-TNT equivalents (TNTEq) than unplanted variants and TNTEq are accumulated in spruces. The highest concentrations of ¹⁴[C]-TNT eq are found in roots where concentrations up to 261 mg TNTEq kg⁻¹ root dry matter were determined. 96% of ¹⁴[C]-TNT eq taken up remain in roots. Only a very small percentage is transported to above-ground tree compartments, i.e. wood (3%) and needles (2%).

For ultrasonic extraction procedures different extractants were tested. Extraction efficiency for TNT eq is given by the following range: 50% (v/v) acetic acid > methanol > acetonitrile.. Extractability of TNTEq was very low in roots (c. 10%) but higher in wood (25–30%) and highest in needles (30–40%). This leads to the conclusion that the bulk of TNTEq is non-extractable bound in root tissue, and only very low amounts of ("non-bound") metabolites are translocated to above-ground tree parts.

¹⁴C-TNT-uptake experiments with *Picea glauca* show that conifers are excellent helper components to reduce the content of TNT in contaminated coniferous forest soils.