

Willow trees are cost-efficient cleaners of contaminated soil

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Using broad-leaved trees such as willow trees in the phytoremediation of contaminated soils constitutes a cost-efficient method for restoring mining areas and landfills, according to a research project led by the University of Eastern Finland. Funded by the EU, the project studied willow tree growth in contaminated soils in Finland and Russia.

"This is a cost-efficient solution for purifying and restoring contaminated soils. There is no need for earth-moving, as harmful materials can be extracted from the soil naturally, with the help of plants. Furthermore, the wood biomass grown in the process can be used for energy production and as a raw material for biorefineries," says Researcher Aki Villa of the University of Eastern Finland.

In Finland, the field experiments were carried out in the Pyhäsalmi Mine in Pyhäjärvi. In Russia, on the other hand, heavy metal loads were studied in greenhouse experiments at Petrozavodsk State University and at the Karelian Research Centre of the Russian Academy of Sciences, as well as in a field experiment set up in a mining combine in Kostomuksha.

"Monitoring the soil's restoration ability takes several years of research; however, in the light of the results we have so far, it can be anticipated that [willow trees](#) may clean the soil from zinc in six years, from nickel in ten years, and from chromium and copper in 15-50 years in favourable conditions," Villa explains.

Willow trees can grow in soil that is high in acidity (pH3.7-4) and that is contaminated by heavy metals such as copper, zinc, nickel, chromium or lead.

"The acidity of [contaminated soil](#) can be reduced and its growing ability improved with the help of by-products from other processes. For example, wood ash and side products high in nitrogen and calcium can be used to control acidity," Villa says.

There are differences in the phytoremediation capacity between different willow tree species. After a two-year growing period, the best survival rate was observed in *Salix schwerinii*. A hybrid of *Salix schwerinii* and *Salix viminalis*, on the other hand, was the best producer of wood mass with 2.9 tonnes of solid matter per hectare. High soil acidity is detrimental to growth; however, mixing wood ash or quicklime into the surface soil (around 20 cm depth) enhances plant survival and boosts growth.

Provided by University of Eastern Finland

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