

# INTRODUCING A POTENTIAL CANDIDATE FOR PHYTOEXTRACTION OF TOXIC METALS FROM FIBERBANKS

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## **Abstract**

It is estimated that around 10.8 million tons of polluted fiber material were discharged into the aquatic environment in Sweden until more stringent regulations emerged in 1969. An estimated area of 2.5 million m<sup>2</sup> is covered by fiberbanks (thick deposit that consists mainly of fibrous residues and wood chips) and around 26,5 million m<sup>2</sup> consist of fiber-rich sediments (fiber material mixed with natural clayey sediments) within the northern five counties of the country. These anthropogenic sediments are not only variably polluted by toxic elements and persistent organic pollutants, but also the potential for CH<sub>4</sub> and CO<sub>2</sub> production from surveyed fiberbanks could correspond to 7% of Sweden's total known GHG emissions, according to a recent study.

Current discussions revolve around whether to leave the material under water applying in-situ capping and long-term monitoring or dredging for treatment and potential reuse. Both options will have pluses and drawbacks and probably be case-specific. However, any management alternative needs to be validated prior to the time for decision comes. Phytoremediation is a solar energy-driven, nature-based solution with low cost that can be applied for fibrous sediments detoxification. A greenhouse study was developed to assess the uptake efficiency for target metals and metalloids (Hg, As, Cd, Cr, Pb, Cu, Zn, Ni, Ba, Co) of five metal-accumulating plant species grown in substrates with fiberbanks collected from the Baltic sea.

Among tested species, *Poa annua* or annual meadow grass, developed a high aerial biomass yield which positively impacted in the uptake efficiency of most of the toxic elements present in fiberbanks. *P.annua* is a common and rustic grass that can easily grow in Swedish climatic conditions with successive shoot regrowth after harvest. These attributes make this grass a prospective candidate to test in real-scale experiments for fiberbanks phytoremediation feasibility assessments.

**Keywords:** Fibrous sediments, multi-metal pollution, *Poa annua*, phytoremediation