

PLANT SCREENING FOR FIBERBANKS *EX-SITU* PHYTOREMEDIATION

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Abstract

In the last century, unregulated wastewater discharge from the vigorous Swedish pulp and paper industry has led to the creation of large deposits of fibrous sediments on the Baltic Sea floor, lakes and rivers throughout Sweden. Fibrous sediments comprise: “fiberbanks” (fibrous residues and wood chips) and “fiber-rich sediments” (naturally deposited sediments mixed with fibrous residues). Fibrous sediments are mostly polluted by toxic elements (metals and metalloids) and persistent organic pollutants (PCBs, chlorinated pesticides & PAHs, among others), and they are often located in shallow waters, entailing a serious threat both to human and ecological welfare.

BioRem Fiber is a public-private partnership research project, whose main goal is to develop methods for the biological remediation of dredged fibrous sediments and the reuse of detoxified materials for market-adapted processes and products. Phytoremediation is one of the technologies to be tested. As far as we know, there is no references in the scientific literature about the use of plants for the remediation of fibrous sediments. Thus, several questions need to be answered before going to the next level: Which plants can be used for fibrous sediments phytoremediation, since it is a multi-elemental and POPs polluted material? How toxic are these sediments for the selected plants? Will these plants grow properly in a potting media prepared with fiberbanks and efficiently remove or degrade target pollutants?

To look for answers, we have developed a stepwise plant screening study, consisting of a profuse literature survey for plants selection, an acute fiberbanks toxicity test on selected plant seeds, and a greenhouse bench-scale experiment to assess plants growth and development in soilless potting media prepared with the polluted material. Subsequently, the task will be to unravel toxic elements removal efficiency and the probability of reaching target organic pollutants degradation during plant growth in fiberbanks.

Keywords: Fibrous sediments, multi-elemental pollution, POPs, phytotoxicity.