

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

Assessing the effects of different heavy metals on the development of poplar and willow clones: perspectives for dendroremediation

This is the author's manuscript

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1709081> since 2019-08-08T14:49:52Z

Published version:

DOI:10.1007/s42161-018-0130-y

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)



UNIVERSITÀ DEGLI STUDI DI TORINO

This is an author version of the contribution:

Questa è la versione dell'autore dell'opera:

*[L. Giordano, A. Giorcelli, P.M. Chiarabaglio, G. Lione, P. Gonthier, M.L. Gullino,
2018. Journal of Plant Pathology 100, 628-629]*

The definitive version is available at:

La versione definitiva è disponibile alla URL:

[<https://link.springer.com/article/10.1007/s42161-018-0130-y>]

Assessing the effects of different heavy metals on the development of poplar and willow clones: perspectives for dendroremediation

L. Giordano^{1,2}, A. Giorcelli³, P.M. Chiarabaglio³, G. Lione¹, P. Gonthier¹, M.L. Gullino^{1,2}

¹University of Torino, Department of Agricultural, Forest and Food Sciences (DISAFA), Largo Paolo Braccini 2, I-10095 Grugliasco (TO), Italy. ²University of Torino, Centre of Competence for the Innovation in the Agro-Environmental Field (AGROINNOVA), Largo Paolo Braccini 2, I-10095 Grugliasco (TO), Italy. ³Council for Agricultural Research and Economics, Research Center for Forestry and Wood, Strada Frassineto 35, I-15033 Casale Monferrato (AL), Italy. Corresponding author e-mail: luana.giordano@unito.it

The use of trees to preserve, improve or restore the structure and the functioning of soils contaminated by heavy metals represent a promising strategy (dendroremediation). In this context, fast-growing and high biomass-producing species showed interesting potentialities. This study was aimed at investigating the physiopathological effects of different heavy metals on 11 poplar and 8 willow clones. Furthermore, their tolerance, phytoextraction potential and the accumulation pattern were also assessed. Two-months-old sprouting-cuttings were cultivated in hydroponic system and treated with one of following salts: cadmium sulphate, lead nitrate, copper sulfate pentahydrate and zinc sulfate heptahydrate. Treatments were carried out in four replicates and untreated cuttings were included as controls. Biomass production variables were measured and phytotoxicity symptoms were assessed. At the end of the trial, the heavy metal accumulation was quantified in leaves, stems and roots. Clones were ranked and clustered based on biomass-production, phytotoxicity symptoms, pathogens and pests resistance, phytoextraction potential and accumulation pattern. Treated clones did not show substantial phytotoxic effects. However, the phytoextraction efficiency and the accumulation patterns displayed high variability depending on the heavy metal. While zinc was the most accumulated metal, cadmium, copper and lead were absorbed with lower concentrations. Although some heavy metals were more efficiently sequestered by leaves, some clones achieved good performances in the absorption at stem level. A first screening of the best scoring clones resulted in the selection of potential candidates for dendroremediation purposes, with special emphasis on clones with high accumulation of heavy metals in the woody tissues.

This work is supported by the Compagnia di San Paolo, within the agreement the Compagnia di San Paolo-University of Torino: grant number CSTO160891, "DENDROCLEAN: trees to clean up contaminated soils".