AFLP Analysis and Improved Phytoextraction Capacity of Transgenic *gsh*I-Poplar Clones (*Populus* × *canescens* L.) for Copper *in vitro*

Gábor Gyulai[a,b,c,*], Mervyn Humphreys[c], András Bittsánszky[a], Kirsten Skøt[c], József Kiss[a], Leif Skøt[c], Gábor Gullner[d], Sue Heywood[c], Zoltán Szabó[a], Alan Lovatt[c], László Radimszky[e], Hywel Roderick[c], Heinz Rennenberg[f], Michael Abberton[c], Tamás Kőmíves[d], and László Heszky[a,b]

[a] St. Stephanus University, Department of Genetics and PB, Gödöllő, 2103, Hungary. E-mail: gyulai.gabor@mkk.szie.hu
[b] HAS-SIU Research Group for Molecular Plant Breeding, Gödöllő, 2103, Hungary
[c] IGER, Plas Gogerddan, Aberystwyth, SY23 3EB, United Kingdom
[d] Plant Protection Institute, Hungarian Academy of Sciences, Budapest, 1525, Hungary
[e] Soil Science Institute, Hungarian Academy of Sciences, Budapest, 1525, Hungary
[f] Albert-Ludwigs-Universität, Institut für Forstbotanik und Baumphysiologie, 79085 Freiburg, Germany

* Author for correspondence and reprint requests

Z. Naturforsch. **60 c**, 300–306 (2005)

Clone stability and *in vitro* phytoextraction capacity of vegetative clones of *P.* × *canescens* (2n = 4x = 38) including two transgenic clones (*ggs*11 and *lgl*6) were studied as *in vitro* leaf disc cultures. Presence of the *gsh*I-transgene in the transformed clones was detected in PCR reactions using *gsh*I-specific primers. Clone stability was determined by fAFLP (*f*luorescent *a*mplified DNA *f*ragment *l*ength *p*olymorphism) analysis. In total, 682 AFLP fragments were identified generated by twelve selective primer pairs after *Eco*RI–*Mse*I digestion. Four fragments generated by *Eco*AGT–*Mse*CCC were different (99.4% genetic similarity) which proves an unexpectedly low bud mutation frequency in *P.* × *canescens*. For the study of phytoextraction capacity leaf discs (8 mm) were exposed to a concentration series of $ZnSO_4$ (10^{-1} to 10^{-5} M) incubated for 21 days on aseptic tissue culture media WPM containing 1 μM Cu. Zn^{2+} caused phytotoxicity only at high concentrations (10^{-1} to 10^{-2} M). The transgenic poplar cyt-ECS (*ggs*11) clone, as stimulated by the presence of Zn, showed elevated heavy metal (Cu) uptake as compared to the non-transformed clone. These results suggest that *gsh*I-transgenic poplars may be suitable for phytoremediation of soils contaminated with zinc and copper.

Key words: Phytoextraction, cyt-ECS (*ggs*11), chl-ECS (*lgl*6)