RT-PCR Analysis and Stress Response Capacity of Transgenic *gsh*I-Poplar Clones (*Populus* × *canescens*) in Response to Paraquat Exposure

András Bittsánszky[a], Gábor Gyulai[a,*], Mervyn Humphreys[b], Gábor Gullner[d], Zsolt Csintalan[c], József Kiss[a], Zoltán Szabó[a], Richárd Lágler[a], Zoltán Tóth[a], Heinz Rennenberg[e], László Heszky[a], and Tamás Kőmíves[d]

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

* Author for correspondence and reprint requests

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Stress response capacity (Fv/Fm at 690 nm and F690/F735 at F_{max}) of untransformed hybrid poplar, *Populus* × *canescens* (*P. tremula* × *P. alba*), and two transgenic lines overexpressing γ-ECS (γ-glutamylcysteine synthetase) either in the cytosol (cyt-ECS) or in the chloroplast (chl-ECS) was studied in response to the herbicide paraquat (4.0×10^{-9} to 4.0×10^{-6} M) for 21 days. Significant differences at sublethal (4.0×10^{-7} M) and bleaching (4.0×10^{-6} M) concentrations of paraquat were observed with about a two-fold and eight-fold decrease in the photosynthetic activity (Fv/Fm at 690 nm and F690/F735 at F_{max}), respectively. None of the *gsh*I transgenic lines (cyt-ECS, chl-ECS) with elevated GSH content exhibited significant tolerance to paraquat.

Semiquantitative RT-PCR of the cyt-ECS clone was used for gene expression analysis of the nuclear encoded *rbcS* gene and the stress responsive *gst* gene. Expression of the constitutively expressed *26SrRNA* ribosomal gene was probed as a control for all RT-PCR reactions. The relative intensities of gene expressions normalized to the level of *26SrRNA* intensity showed a 50% decrease in the nuclear encoded *rbcS* expression and a 120% increase in the stress responsive *gst* gene expression of the paraquat treated (4.0×10^{-7} M) samples of the transgenic poplar line (cyt-ECS).

Key words: cyt-ECS (*ggs*11), chl-ECS (*lgl*6), Paraquat Stress, *Populus* × *canescens*