Proceedings of the 51st Italian Society of Agricultural Genetics Annual Congress
Riva del Garda, Italy – 23/26 September, 2007
ISBN **978-88-900622-7-8**

Poster Abstract – C.12

THE *BRASSICA JUNCEA* TRANSCRIPTION FACTOR BjCdR15 ENHANCES CADMIUM TOLERANCE, ACCUMULATION AND TRANSPORT TO THE SHOOT IN TRANSGENIC PLANTS

FARINATI S., DAL CORSO G., MICHELETTO L., FURINI A.

Department of Science and Technology, University of Verona, Strada Le Grazie 15, 37134 Verona (Italy)

Brassica juncea, bZIP transcription factor, Cadmium tolerance, phytoremediation

Phytoremediation is considered as a cost effective and environmentally friendly technology to remove toxic metals from polluted soils and waters. Molecularly, our knowledge about metal tolerance and hyperaccumulation in plants remain limited, and the investigation is still needed to understand the genetic mechanisms responsible for metals accumulation and detoxification.

Previous analysis showed that BjCdR15, a gene isolated from *B. juncea*, is up-regulated in plants treated with cadmium. Hence, the aim of this study was to investigate wheather BjCdR15 is involved in Cd tolerance and accumulation. This gene shows high similarity to the *Arabidopsis* TGA3 bZIP transcription factor (nucleotides and amino acids identity of 89% and 95% respectively) therefore, *tga3* mutant line was also analysed. Expression analysis showed that BjCdR15 is immediately induced after Cd, Ni and Pb exposure indicating a general function in response to heavy metals. Moreover, cell harboring BjCdR15::dsRED fusion protein indicated that BjCdR15 is a nuclear-localized protein and *in situ* localization showed that BjCdR15 transcript is mainly present in epidermis and vascular tissues.

Arabidopsis and tobacco plants over-expressing BjCdR15 were greener than control plants and showed enhanced tolerance, measured as shoot fresh weight and chlorophyll content when exposed to Cd. Furthermore, BjCdR15-over-expressing plants accumulated more Cd in shoots than control plants. It was also found that in *tga3* mutant line the long-distance transport from root-to-shoot is inhibited and Cd accumulates in the roots; when the function of TGA3 is restored by BjCdR15 the level of Cd in shoots and roots is comparable to the accumulation of the over-expressing lines. Since phytochelatins are rapidly synthesized in response to toxic level of heavy metals, the expression of the *Arabidopsis* phytochelatin synthase (AtPCS1) was measured in 35S::BjCdR15 and control lines. It was observed that, as expected, Cd induced an increase of AtPCS1 in control lines whereas its level is not affected by Cd treatment in transgenic lines. This study provides several lines of evidence to implicate BjCdR15 in Cd tolerance in plants and accumulation to the shoots and demonstrates the biotechnological potential of removing heavy metals from contaminated soils by growing transgenic plants with enhanced capacity to accumulate toxic metals in their above ground.