Tackling climate change from plant biotechnological perspective

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Nowadays, we are witnesses of environmental degradation, which significantly disrupts the ecological balance. For millennia, the Earth was powerful enough to neutralize the negative effects of human activities, but since the beginning of industrial revolution and acceleration in technological development, insufficiently developed ecological awareness led to rapid depletion of natural resources and environmental degradation. Climate change, global warming, environmental pollution and biodiversity loss may be one of the greatest threats facing our planet. Moreover, over the last decades, changes in climatic conditions and pollution have caused intensive decline especially in conifers vitality and fertility. All these facts emphasize the importance for the immediate development of long-range strategies, both biotechnological and conventional ones, for sustainable development of forestry and forestry-based industry also in Europe. Therefore, we need consistent production of the genetically superior trees over time; flexibility of rapidly deploy suitable clones given changing breeding goals and/or environmental conditions; and ability to manage genetic diversity and genetic gain in plantation forestry. Forestry today is on the threshold of the widespread introduction of biotechnology into its operational practices – mainly thanks to the progress with the biotechnological methods of vegetative propagation – micropropagation (organogenesis and somatic embryogenesis). Somatic embryogenesis is an important biotechnological technique which can be used in studies related to environmental stress.

The aim of this work was to set up a test system for investigation of the ability of silver fir and Norway spruce to undergo somatic embryogenesis under the heavy metal stress. Early somatic embryos (ESEs) of different cell lines of both species were grown on media enriched with three different concentrations (50, 250, and 500 µM) of cadmium (Cd^{2+}) and lead (Pb^{2+}). Thus, the response was observed during proliferation, maturation and germination stages. The analysis showed that a simple *in vitro* laboratory test might be an indicative tool to evaluate phytoremediation potential of a considerable number of cell lines in a short period. Moreover, experimentation on tolerance to a metal is the first step towards identification of potential species for phytoremediation.

Keywords: cadmium, lead, somatic embryogenesis, silver fir, Norway spruce