

Effect of heavy metals ions on the antioxidant activity of Norway spruce tissue cultures

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Abstract

Heavy metal contaminations of land resources continue to be the focus of numerous environmental studies and attract a great deal of attention worldwide. Plants experience oxidative stress upon exposure to heavy metals that leads to cellular damage and disturbance of cellular ionic homeostasis. Our work was aimed at investigation of cadmium influence on Norway spruce explant culture and its effect on antioxidant activity.

Keywords: Norway spruce, heavy metals, antioxidant activity, cadmium

Introduction

Heavy metals still represent a group of dangerous pollutants, to which close attention is paid. However, all metals, especially cadmium are toxic at high concentration because of disrupting enzyme functions, replacing essential metals in pigments or producing reactive oxygen species. (Babula et al. 2008; Stratil et al. 2006; Supalkova et al. 2007)

Materials and Methods

Our work was aimed at investigation of influence of cadmium on early somatic embryos of Norway spruce. The plants were exposed to the metal ions concentrations of 0, 50, 250 and 500 μM for 11

days. The Petri dishes with embryos were sampled at 4th, 6th, 8th, 10th and 11th day of experiment and subsequently analysed using electrochemistry. We focused our attention on observing of growth characteristics, the content of heavy metals in embryos and antioxidation activity.

Results and Discussion

In the first part of the experiment, a significant inhibitory effect at all concentrations of cadmium on growth of spruce tissue cultures was observed (Fig 1).

In the second part, we observed the influence of cadmium on antioxidant activity. To determine antioxidant activity the methods FRAP and DPPH was used. The obtained results show that group

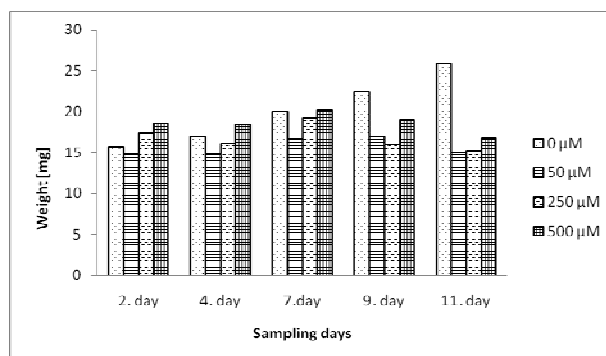


Figure 1: Average weight of tissue cultures of Norway spruce during the experiment

treated by cadmium compared to control group increased the antioxidant activity.

Conclusion

The obtained results show that heavy metals (in our case represented by cadmium) affect the metabolic cycles of living organisms and therefore it is important to pay our attention to this kind of research.

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