

Abstract:

Thorium is an element belonging to heavy metals, which is characterized by its radioactivity similarly to uranium and radon. Thorium is not commonly used in industry, but because of its radioactive properties it has a great potential for future use in nuclear energetics. Thus, increasing release of Th into the soil, water and atmosphere can be expected in near future and through plant biomass it could become a part of food chains and webs and, thus, to represent a considerable health risks to humans. Studies devoted to research on thorium and its effects on plants has not been published much yet. The majority of these studies focus mainly only on plant abilities to accumulate thorium and/or monitoring distribution of thorium in plant body. But till now, a study is still missing, which would monitor the effect of thorium on the physiological characteristics of plants.

Plants of *Nicotiana glutinosa* (L.) medium Thorium accumulatin were hydroponically cultivated Hoagland nutrient media differed in the presence of thorium, tartaric acid, putrescine and phosphates. In first part of the present study I monitored accumulation of thorium by tobacco plants under the influence of the above-mentioned modifications of media. In the second part, I studied the Th effect on the photosynthetic apparatus (contents of photosynthetic pigments, rapid fluorescence PSII,) and on detoxification mechanisms: activity of enzymes (ascorbate peroxidase, catalase, peroxidase, glutathione-s-transferase) and proline accumulation. In the third part I observed the effect of different modifications of the above-mentioned media on the above listed physiological parameters.

Deficiency of phosphorus in the medium caused about 10-times higher Th accumulation in plants. However, the selected species – *N. glutinosa* does not have ability to accumulated Th enough for phytoremediation of contaminated environment. the application of putrescine on leaves lead to higher Th translocation to shoots but the effect of tartaric acid on Th accumulation was not observed. The presence of thorium in plants caused an increase in contents of photosynthetic pigments and a decrease in values of selected fluorescence parameters. Also an increase in accumulation of free proline and a decrease in the activity of antioxidant enzymes were observed as a consequence of Th presence in the media. Exogenous application of putrescine showed a potential in phytoremediation methods to support translocation of heavy metals to shoots.

Key words: antioxidant enzymes, chlorophyll, fluorescence, phytoremediation, proline, putrescine, ROS, stress physiology, tartaric acid, Thorium