

## ABSTRACT

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Title of Thesis: Cytostatic pharmaceuticals in the environment, methods for their elimination

Recently there is an increasing interest in studying the effects of drugs used in human and veterinary medicine on the environment. Pharmaceuticals and their metabolites are excreted by patients into wastewater in considerable amounts. Conventional methods of wastewater treatment are often unable to fully eliminate these substances. Pharmaceuticals and their metabolites can get into the environment and affect the ecosystem. One way to streamline wastewater treatment is the application of phytoremediation technology in the form of root plants. In this work, the ability of plants to accumulate and degrade the cytostatic drug doxorubicin was studied. At the same time phytotoxic effects of this substance were monitored. For this purpose different systems of cultivation of plants were used: hydroponics in common reed (*Phragmites australis* (Cav.) Steud.), *in vitro* cultivation for Grey rushes (*Juncus inflexus* L.) and Arabidopsis (*Arabidopsis thaliana* L.) and cell culture suspension of linseed (*Linum usitatissimum* L.). Concentrations of doxorubicin were administered in the range of 5 – 50 μmol/l according to the culture system. Ecotoxicity was characterized by the test based on inhibition of elongation of primary roots 3 days-old mustard seedlings. Doxorubicin content in the culture solutions and plant extracts were analyzed by HPLC with fluorescence spectrophotometer. For identification of metabolites of doxorubicin in cell suspensions of flax a mass spectrometry was used. Accumulation of doxorubicin was observed in all the plant species and types of cultivation. In the case of cell suspensions doxorubicinol was detected as a biotransformation product and also several photodegradation products were detected. Using two-dimensional electrophoresis 11 proteins significantly affected by the presence of doxorubicin in culture medium was found in samples from plants Arabidopsis.