Abstract:

Phytoextraction of psychopharmaceuticals is an important model for studying contamination of food chains and its impact on ecosystems. These substances, often excreted in wastewater, can be absorbed by plants, leading to their accumulation in the food chain. The ability of plants to absorb and accumulate psychopharmaceuticals is important for reducing ecotoxicological risk. Standard wastewater treatment plants are not sufficiently effective in removing these substances. In view of the emerging requirements to reduce the contamination of organic compounds in wastewater treatment plant discharges, methods for post-treatment of discharged water are being intensively studied.

The aim of this thesis is to analyze the phytoextraction of the drugs trazodone and escitalopram, which belong to antidepressants, and also buspirone, which belongs to anxiolytics. The extraction efficiency study was carried out in an in vitro sterile culture model system of maize (*Zea mays* L.) plants with an initial contaminant concentration of 5 mg/L. After cultivation for 5-8 days, a decrease of 22.8% in the initial concentration was found for trazodone, 30% for escitalopram and 22.7% for buspirone. Contaminant concentrations were continuously monitored by HPLC with UV detection.

Selected biochemical parameters of plant metabolism, such as the effect of the presence of drugs on antioxidant, biotransformation and defence systems of plants, were further investigated in plants cultured on contaminated medium. In plants, the drugs significantly affected the content of phenolic compounds, antioxidant capacity, selected enzyme activities, especially protease activity, and the content of heat shock protein (HSP70), which may be due to the increased induction of defense mechanisms against abiotic stress induced by the drugs. The presence of phenolic compounds, antioxidants and proteins, which were probably secreted by the plants in response to this abiotic stress, was also detected in the culture medium.

Keywords: antidepressants, buspirone, trazodone, escitalopram, phytoextraction, Zea mays, ecochemistry, plant stress, antioxidant system, biotransformation.