

Abstract

In recent years, the study of drug residues in the environment, which appear to be responsible for a number of adverse ecotoxicological effects, has become increasingly important. Psychopharmaceuticals have a prominent place among the pharmaceuticals, the consumption of which is increasing dramatically and it is appropriate to look for ways to remove them from the ecosystem and to assess the possibility of contamination of food chains. This work concerns the study of phytoextraction of psychopharmaceuticals mianserin and olanzapine. Mianserin belongs to the tetracyclic antidepressants (TCAs). It is mainly used to treat depression, anxiety and sleep disorders. Olanzapine belongs to the group of atypical antipsychotics. It is used to treat psychotic conditions such as schizophrenia and schizoaffective disorders. Phytoextraction is an environmentally friendly process that allows the removal of residual concentrations of pollutants from aquatic ecosystems. These pollutants can be released into the environment even after passing through a wastewater treatment plant. Unfortunately, even the treatment of water for drinking purposes cannot completely remove residual concentrations of pharmaceutical substances. This has led to a constant search for new methods of wastewater decontamination. In this work, seed corn (*Zea mays* L) plants were used for phytoextraction experiments. Cultivation experiments showed that at a starting concentration of both substances of 5 mg/l, the concentration of mianserin decreased to 7% of its original concentration in the medium in 48 h, while for olanzapine, within 96 h, its concentration dropped below 1% of the original value. Concentrations were determined by HPLC. In a study of extractable residues, it was found that significantly higher translocation to aerial parts occurs with mianserin.

Furthermore, the effect of mianserin and olanzapine on plant metabolism was investigated. The activities of free and membrane-bound peroxidases were determined and mostly showed an increase compared to the control plant. Guaiacol peroxidase and ABTS-peroxidase activities in both leaves and roots showed an increase again compared to the uncontaminated control. Furthermore, the amount of proteins was determined according to Bradford assay and electrophoretic separation was performed under native conditions to determine the activity of glutathione transferase and free peroxidases. Most glutathione transferase isoforms were found in the leaves of mianserin-contaminated plants.