Abstract

Today a lot of attention is focused on compounds called endocrine disrupters (EDs) among substances released to environment by humans. They are a group of substances which can disturb function of hormonal system of organisms including humans. Their poor removal at wastewater treatment plants (WwTP) were shown at various studies, thus they can reach the environment in water. A prospective way for the degradation of EDs at WwTP can be their removal by ligninolytic fungi. They are able to degrade lots of lignin-like aromatic substances because of their highly nonspecific enzymes. In this work growth and enzyme production capability of four ligninolytic fungal strains were monitored on three solid substrates (straw pellets, poplar sawdust mixed with straw pellets, oak sawdust with straw pellets), which may be suitable substrates for fungal growth in bioreactors for wastewater treatment. Ability of these enzymes to degrade EDs were tested in *in-vitro* degradation experiment. *Trametes versicolor* was found as best degrading strain with 20 μg/ml of bisphenol A, 17 α-ethynylestradiol and nonylphenol degraded below a quantification limit within 24 hours. Fungal strains degraded EDs well on all of the three substrates but wood sawdust seemed to be a better substrate for fungal growth because straw pellets showed rapid depletion during the cultivation. A correlation between the enzymatic activities and the degradation of EDs were assessed by principal component analysis (PCA). Main degrading enzymes differed among the fungal strains. *T. versicolor* degraded EDs probably with activity of laccase, while *Lentinus tigrinus* showed a correlation between the degradation and mangan dependent peroxidase. The presence of the enzymes did not lead to degradation every time, which shows that different isoformes of the enzymes with diverse degradation abilities were produced according to the fungal strains and the substrates. It is possible that some nonligninolytic enzyme activities played a role in the ED degradation.

Keywords: Endocrine disrupters, degradation, ligninolytic fungi, solid substrates, bisphenol A, 17 α-ethynylestradiol, irgasan, nonylphenol, straw pellets, poplar sawdust, oak sawdust, ligninolytic enzymes, enzyme activities, laccase, mangan peroxidase