ABSTRACT

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Title of diploma thesis: **Modulation of expression and activity of selected plant detoxifying enzymes by anthelmintic**

Anthelmintics represent risk to environment as they may impact non-target organisms including plants, which come into contact with these pharmaceuticals in fields by fertilization with dung from treated animals or in pastures by excrements of treated animals. After uptake, these substances can increase the production of reactive oxygen species in plants, with the risk of oxidative stress and plant damage, and also affect the antioxidant enzymes.

The aim of this work was to investigate the effect of two widely used anthelmintics ivermectin and fenbendazole on the activity and expression of selected antioxidant enzymes in soybean (*Glycine max*). Soybean was cultivated in a greenhouse and watered with a 10 μM solution of the selected drug. The changes of activity and gene expression of antioxidant enzymes were measured in root, leaf, pod and seed samples.

Results showed that both anthelmintics caused significant decrease of superoxide dismutase, ascorbate peroxidase, glutathione peroxidase and glutathione S-transferase activity in roots. Decreased activity of glutathione reductase and ascorbate peroxidase were also detected in pods. Both anthelmintics caused decrease of ascorbate peroxidase activity in seeds as well. In addition, activity of superoxide dismutase, peroxidase and glutathione S-transferase was increased in leaves of plants cultivated with fenbendazol.

Significant changes of gene expression of antioxidant enzymes were observed as well. Increased expression of ascorbate peroxidase in leaves, increased expression of catalase in pods and decreased expression of superoxide dismutase in roots was detected in plants treated with fenbendazol. Decreased expression of catalase was observed in the leaves od plants treated with ivermectin.

The results showed, that both anthelmintics used in this work have an effect on activity and expression of antioxidant enzymes, which can lead to oxidative damage of plant.