

## Abstract

Laccases are one of the oldest enzymes ever studied. For the first time laccase was mentioned by Yoshida in 1883 (Yoshida H, 1883). Laccases (EC 1.10.3.2, p-diphenol-O<sub>2</sub> oxidoreductase), are copper-containing enzymes and are part of a larger group of enzymes termed polyphenol oxidase. Laccases catalyze oxidation of a broad range of substrates e.g., polyphenols, substituted phenols, diamines, but also some anorganic compounds with the concomitant reduction of oxygen to water. The source of electrons in these redox reactions are usually four copper atoms. Fungal laccases, so far the most extensively studied group, are known for their roles in lignin degradation, bioremediation, morphogenesis and pathogenicity. Despite many years of research, the physiological function of laccases in plants remains largely unknown. Plant laccase have been proposed to be involved in lignification. It participates mainly in the synthesis of lignin, maintenance of the cell wall integrity and structure and wound healing. Laccases can catalyze a wide variety of enzymatic reactions and apparently have a role in plants response to stress. Plant laccases have been described especially in *Arabidopsis* (*Arabidopsis thaliana*), corn (*Zea mays*), wheat and rice (*Oryza sativa*). Laccases have not been yet characterized in any others agricultural important plants. Our research have been focused on the characterization of laccase gene in barley (*Hordeum vulgare* L.), as one of the most important crops.

According to the latest research it shows up that laccases are expressed as a response to the presence of free phenolic substrates or as a protection against reactive form of oxygen as it participates in the polymerization of monolignols. Beside stress factors, to which barley plants under field condition are exposed, it is possible that young sprouted grains are exhibited to a relatively significant abiotic stress even during malting. Furthermore malting leads not only to oxidative stress, but also to changes in the content of phenolic compounds, which are characteristic for a plant response to stress.

The aim of this dissertation was to expand current knowledge about plant laccase, especially for barley and the study of the relative expression of laccase gene during malting.