

Investigations of Metals and Metal-Antibrowning Agent Effects on Polyphenol Oxidase Activity from Red Poppy Leaf

Authors : Gulnur Arabaci

Abstract : Heavy metals are one of the major groups of contaminants in the environment and many of them are toxic even at very low concentration in plants and animals. However, some metals play important roles in the biological function of many enzymes in living organisms. Metals such as zinc, iron, and copper are important for survival and activity of enzymes in plants, however heavy metals can inhibit enzyme which is responsible for defense system of plants. Polyphenol oxidase (PPO) is a copper-containing metalloenzyme which is responsible for enzymatic browning reaction of plants. Enzymatic browning is a major problem for the handling of vegetables and fruits in food industry. It can be increased and effected with many different futures such as metals in the nature and ground. In the present work, PPO was isolated and characterized from green leaves of red poppy plant (*Papaver rhoeas*). Then, the effect of some known antibrowning agents which can form complexes with metals and metals were investigated on the red poppy PPO activity. The results showed that glutathione was the most potent inhibitory effect on PPO activity. Cu(II) and Fe(II) metals increased the enzyme activities however, Sn(II) had the maximum inhibitory effect and Zn(II) and Pb(II) had no significant effect on the enzyme activity. In order to reduce the effect of heavy metals, the effects of metal-antibrowning agent complexes on the PPO activity were determined. EDTA and metal complexes had no significant effect on the enzyme. L-ascorbic acid and metal complexes decreased but L-ascorbic acid-Cu(II)-complex had no effect. Glutathione-metal complexes had the best inhibitory effect on Red poppy leaf PPO activity.

Keywords : inhibition, metal, red poppy, poly phenol oxidase (PPO)

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