عنوان مقاله:

Differential Expression of NADH Oxidase, Superoxide Dismutase, and Catalase in Wheat Seedling in Response to Zataria multiflora Essential Oil Incorporated into Polyvinyl Alcohol Dispersion

محل انتشار:

مجله علوم و فناوری کشاورزی, دوره 19, شماره 1 (سال: 1395)

تعداد صفحات اصل مقاله: 11

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خلاصه مقاله:

Enhancement of antioxidant capacity of plants by natural antioxidants obtained from medicinal plants can be a simple way to produce stress tolerant plants. Zataria multiflora essential Oil (ZO) is one of the useful antioxidants with potent antioxidant activity. ZO is insoluble in water and can be degraded by light, oxygen, and high temperature. Incorporation of ZO into Poly Vinyl Alcohol (PVA) dispersion is a simple way to improve its stability. In this research, the antioxidant activity of PVA/ZO dispersion was measured by studying the effect of the Hydrogen peroxide (H۲O۲) and Hydroxyl radical (HO•) scavenging of the dispersion. The efficiency of the PVA/ZO dispersion on the production of Nicotinamide adenine dinucleotide phosphate Oxidase (NOX), SuperOxide Dismutase (SOD), and Catalase (CAT) mRNAs in the wheat seedlings in hydroponic condition was investigated too. PVA/ZO dispersion had a non-Newtonian shear-thinning liquid behavior with the negative zeta-potential (-۱۲ mV) and nanoscale particle size (۱۳۴ nm). PVA/ZO dispersion had effective H۲O۲ and HO• scavenging in a dose dependent manner with IC۵۰ value of ۲۲۰ and ۱۷۰ µg mL-۱, respectively. PVA/ZO dispersion up-regulated NOX (۲ folds, at ۳۰ µg mL-۱), SOD (۱۰ folds, at ۳۰ µg mL-۱) and CAT (۸ folds, at ۲۵۰ µg mL-۱) mRNAs production. Thus, there was a potent cooperation between NOX and SOD activity and low cooperation between SOD and CAT activity. The potent antioxidant activity of PVA/ZO dispersion implies that it can effectively be used as a promising natural antioxidant to reduce oxidative stress in the plants under stress.

کلمات کلیدی:

Essential oil, CAT, NOX, SOD, Oxidative stress