Effect of silicon on increasing plant tolerance to oxidative stress by powdery mildew in pumpkin (*Cucurbita pepo,* var*. styriaca*)

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(Received: 26 Oct. 2014 ; Accepted : 5 July 2015)

Abstract

Silicon (Si) can protect some plants from biotic and abiotic stresses. In this research, effects of three exogenous Si levels (0, 0.85 and 1.7 mM) on growth, lipid peroxidation, lipoxygenase activity, proline content, H_2O_2 accumulation, and activity of non-enzymatic and enzymatic antioxidants (catalase and ascorbate peroxidase) under powdery mildew disease stress by *Sphaerotheca fuliginea* on pumpkin (*Cucurbita pepo*, var. *styriaca*), under hydroponic conditions, were investigated. The results revealed that effect of Si in reduction of powdery mildew was significant ($P\leq 0.05$) and application of 1.7 mM of this element decreased the severity of disease symptoms up to 35%. Increasing the Si concentration in the nutrients solution elevated the amount of this element in roots and shoots of pumpkin plants. The concentration of H_2O_2, lipid peroxidation and lipoxygenase activity were increased by disease stress. But these parameters were decreased with application of Si. The activity of enzymatic and non-enzymatic antioxidants was significantly enhanced ($P\leq 0.05$) by the application of Si. Based on the present work, it can be concluded that concentration level of 1.7 mM Si was more effective than the other two treatments in alleviating disease stress, which could be related to the effect of this element on prevention of membrane lipid-oxidation.

Keywords: Biotic stresses, Antioxidants activity, Cell membrane, Lipid peroxidation.

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[DOR: 20.1001.1.20089082.1395.7.3.4.4]
[DOI: 10.18869/acadpub.ejgcst.7.27.53]