

# Antioxidative response in pepper leaves to salt stress

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## Abstract

In greenhouse growing, plants are often exposed to unfavorable growth conditions due the salt stress. The aim of this research was to examine the influence of NaCl applied into the substrate on the physiological stress response parameters in leaf tissue of pepper cultivar "Quadrato d'Asti Rosso". All the examined stress parameters were significantly influenced by NaCl treatment. Guaiacol-peroxidase total activity and peroxide concentrations were increased proportionally with the intensity of the salt stress and the maximum values determined at 200 mM NaCl. Lipid peroxidation level, total catalase and glutathione-reductase activity increased up to 100 mM NaCl. Treatments with 100 mM NaCl and 200 mM NaCl did not show any statistically significant differences. The highest proline content was determined at 200 mM NaCl, while at 50 mM NaCl, proline content was significantly higher as compared to the control and 100 mM NaCl. Specific activity of catalase was significantly enhanced with 100 and 200 mM NaCl. The highest specific activity of the guaiacol-peroxidase was seen in the treatment with 200 mM NaCl, and significantly higher than the values measured at levels up to 100 mM NaCl. The specific activity of the glutathione-reductase increased significantly at 50 and 100 mM NaCl, with an unexpected decrease in activity at the highest level of stress. These results suggest that the short exposure of pepper plants to salt stress in the root zone, activates different physiological mechanisms of defense against oxidative stress in the leaf tissue.

Key words: salt stress, NaCl, pepper, antioxidative enzymes, lipid peroxidation

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# Antioksidativni odgovor u listovima paprike na solni stres

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## Sažetak

U plasteničkom uzgoju, biljke su često izložene nepovoljnim uvjetima rasta, uslijed solnog stresa. Cilj ovog istraživanja bio je ispitati utjecaj NaCl-a, primijenjenog u supstrat, na fiziološke pokazatelje reakcije paprike sorte „Quadrato d'Asti Rosso“, u tkivu lista. Svi ispitivani pokazatelji stresa su bili pod značajnim utjecajem tretmana NaCl-om. Ukupna aktivnost enzima gvajakol-peroksidaze i koncentracija peroksida su se proporcionalno povećavale s intenzitetom solnog stresa, te su maksimalne vrijednosti utvrđene na tretmanu s 200 mM NaCl. Razina lipidne peroksidacije, ukupna aktivnost enzima katalaze i glutation-reduktaze povećavala se do 100 mM NaCl. Između tretmana 100 mM NaCl i 200 mM NaCl nisu utvrđene statistički značajne razlike. Na 200 mM NaCl utvrđen je i najveći sadržaj prolina, koji je na 50 mM bio značajno viši u odnosu na kontrolu i 100 mM. Specifična aktivnost katalaze je bila značajno povećana pri 100 i 200 mM NaCl. Najviša specifična aktivnost enzima gvajakol-peroksidaze utvrđena je na tretmanu s 200 mM NaCl, što je bilo značajno više od vrijednosti izmjerenih na razinama do 100 mM NaCl. Specifična aktivnost enzima glutation-reduktaze značajno se povećala na 50 i 100 mM NaCl, uz neočekivano smanjenje aktivnosti na najvišoj razini stresa. Dobiveni rezultati sugeriraju da se u listu paprike, pri kratkotrajnom izlaganju biljke solnom stresu u zoni korijena, aktiviraju različiti fiziološki mehanizmi obrane od oksidacijskog stresa.

Ključne riječi: solni stres, NaCl, paprika, antioksidativni enzimi, lipidna peroksidacija

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