MODIFICATION OF NaCl-INDUCED CALCIUM SIGNALING BY POLYAMINES THROUGH SCAVENGING HYDROXYL RADICALS

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Salt stress is a major problem facing agriculturists the world over. NaCl (>40 mM) induces growth retardation and decreases productivity of agricultural plants. Concentrations of NaCl over 100 mM in the soil solution are lethal for most plants. Cytosolic calcium activitiy ($[Ca^{2+}]_{cyt}$) regulates plant response and adaptation to salinity (through SOS system of Na^+-extruding and protection proteins). Activity of calcium influx channels in the plasma membrane was shown to be regulated by Reactive Oxygen Species (ROS). At the same time, cytosolic Ca^{2+} (when its concentration increases) can activate NADPH, forming a self-amplifying loop. Here we have shown that NaCl induced transient increase of $[Ca^{2+}]_{cyt}$ is modified (decrease of amplitude and duration) after application of submillimolar and millimolar levels of key plant stress protectors polyamines (spermine and spermidine). Interestingly, putrescine was no effective. We have also demonstrated that this effect is related to the scavenging of hydroxyl radicals by polyamines (as measured by EPR spectroscopy and fluorescent microscopy with Amplex Ultra Red and Amplex Red). Thus, we provide here, for the first time, the evidence that polyamine may cause protective action through the effect on hydroxyl radical production and Ca^{2+} signals.