Cell Death of Rice Roots under Salt Stress May Be Mediated by Cyanide-Resistant Respiration

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Treatment with solutions containing high concentrations of NaCl (200 or 300 mM) induced cell death in rice (Oryza sativa L.) roots, as well as the application of exogenous hydrogen peroxide (H\textsubscript{2}O\textsubscript{2}). Moreover, the pretreatment with dimethylthiourea (DMTU), a scavenger of H\textsubscript{2}O\textsubscript{2}, partially alleviated the root cell death induced by 200 mM NaCl. These observations suggest that the cell death of rice roots under high salt stress is linked to H\textsubscript{2}O\textsubscript{2} accumulation in vivo. NaCl stress increased the level of cyanide-resistant respiration to some extent and enhanced the transcript levels of the alternative oxidase (AOX) genes $AOX1a$ and $AOX1b$ in rice roots. High-salt-stressed (200 mM NaCl) rice roots pretreated with 1 mM salicylhydroxamic acid (SHAM), a specific inhibitor of alternative oxidase, exhibited higher levels of cell death and H\textsubscript{2}O\textsubscript{2} production than roots subjected to either 200 mM NaCl stress or SHAM treatment alone. These results suggest that cyanide-resistant respiration could play a role in mediating root cell death under high salt stress. Furthermore, this function of cyanide-resistant respiration could relate to its ability to reduce the generation of H\textsubscript{2}O\textsubscript{2}.

Key words: Cell Death, Cyanide-Resistant Respiration, Salt Stress