Anti-oxidative enzymes and vigor of maize seeds induced by hydropriming

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Abstract

'PC' maize seeds subjected to either hydropriming or artificial accelerated aging were investigated. The relationship between germination and lipid peroxidation (indicated by malondialdehyde (MDA) content was monitored. The changes in germination, anti-oxidative enzyme activities, and hydrogen peroxide (H2O2) during hydropriming for 6-30 h were determined. The germination of the seeds treated by artificial accelerated aging for 4-8 days was gradually decreased. The MDA content was not significantly different from the control seeds. In contrast, germination of seeds hydroprimed beyond 24-30 h significantly declined with a reduction of MDA content. Therefore, the ambiguous MDA content might need to be intensively monitored during accelerated aging treatment, imbibition, or the re-drying processes. H_2O_2 decreased germination of seeds hydroprimed up to 24 h. Catalase (CAT) and superoxide dismutase (SOD) appeared to be the main anti-oxidative enzymes involved in germination loss of hydroprimed seeds. The activities of ascorbate peroxidase (APX) and peroxidase (POD) did not correspond to the changes in hydroprimed seed germination. When the hydroprimed seeds were subjected to stress conditions, the greatest germination observed was with the seeds primed for 6 h. Therefore, the activities of SOD and CAT could partly correspond to induce hydroprimed seed vigor. In contrast, the reduction in hydroprimed seed germination corresponded to the decline of SOD and CAT activities, and probably involved H_2O_2.