

Modulation of Alternative Respiration Pathway under Salt Stress in Exogenous Estrogen-Treated Maize Seedlings

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Abstract : Soil salinity is one of the major abiotic stress factors that restricts arable land and reduces crop productivity worldwide. High salt concentration adversely affects plant growth and development inducing water deficit, ionic toxicity, nutrient imbalance, and lead to oxidative stress. Although the stimulating role of mammalian sex hormones on various biological and biochemical processes under normal and stress condition have been proven, there is no study regarding with these hormone's effect on modulation of the alternative respiration pathway and AOX gene expression. In this study, changes in alternative respiration pathway in leaves of maize seedlings under salinity and the possible modulating effect of estrogen on these changes were investigated. Maize seedlings were grown in a hydroponic media for 11 days and then were exposed to salt stress for 3 days after being sprayed estrogen. The data obtained from oxygen consumption revealed that salt stress elevated cellular respiration value in the leaves. In addition, a marked increase was observed at alternative respiration level in salt-stressed seedlings. Compared to salt application alone, supplementation with estrogen resulted in a significant rise in alternative oxidase (AOX) activities. Similarly, while salt stress caused to rise in expressions of AOX gene compared to control seedlings, estrogen application resulted in further activation of these genes' expression compared to stressed-seedlings alone. These data revealed that mitigating role of estrogen against the detrimental effects of salt stress is linked to modulation of alternative respiration pathway.

Keywords : alternative oxidase, estrogen, Ssalt stress, AOX, maize

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