

H₂O₂/ABA signal pathway participates in the regulation of stomata opening of cucumber leaves under salt stress by putrescine

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Abstract

The stomatal-aperture is imperative for plant physiological metabolism. The function of polyamines (PAs) in stomatal regulation under stress environment largely remains elucidate. Herein, we investigated the regulatory mechanism of exogenous putrescine (Put) on the stomatal opening of cucumber leaves under salt stress. The results revealed that Put relieved the salt-induced photosynthetic inhibition of cucumber leaves by regulating stomatal-apertures. Put application increased hydrogen peroxide (H₂O₂) and decreased abscisic acid (ABA) content in leaves under salt stress. The inhibitors of diamine oxidase (DAO), polyamine oxidase (PAO), nicotinamide adenine dinucleotide phosphate oxidase (NADPH) are AG, 1,8-DO and DPI, respectively and pre-treatment with these inhibitors up-regulated key gene NCED of ABA synthase and down-regulated key gene GSHS of reduced glutathione (GSH) synthase. The content of H₂O₂ and GSH were decreased and ABA content was increased and its influenced trend is AG>1,8-DO>DPI. Moreover, the Put induced down-regulation of ABA content under salt stress blocked by treatment with H₂O₂ scavenger (DMTU) and GSH scavenger (CNDB). Additionally, the application of DMTU also blocked the increase of GSH content. Collectively, these results suggest that Put can regulate GSH content by promoting H₂O₂ generation through polyamine metabolic pathway, which inhibits ABA accumulation to achieve stomatal regulation under salt stress.

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