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Metabolic Regulation of Rhizobacteria for Cool-Season Grass Tolerance to Heat Stress

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Abstract : Stress-induced accumulation of ethylene exacerbates drought damages in plants, and suppressing stress induction of ethylene may promote plant tolerance to heat stress. The objective of this study was to investigate the effects of endophytic bacteria (Paraburkholderia aspalathi) with 1-aminocyclopropane-1-carboxylic acid (ACC) deaminase enzymes in suppressing ethylene production on plant tolerance to heat stress and underlying physiological mechanisms of P. aspalathi-regulation in creeping bentgrass (Agrostis stolonifera). A novel strain of P. aspalathi, 'WSF23', with ACC deaminase activity was used to inoculate the roots of plants (cv. 'Penncross') subjected to heat stress in controlled-environment chambers. Inoculation with WSF23 bacteria resulted in improved shoot and root growth during heat stress. The differential changes in metabolite regulation due to the bacterial inoculation could contribute to ACC deamination bacteria-improved heat tolerance in cool-season grass species.

Keywords : rhizobacteria, grass, heat, plant metabolism, soil bacteria
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