The Induction of Heat Stress Tolerance in Creeping Bentgrass through Pre-treatment with Potential Second Messengers. (C05-larkindale132026-Oral)

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Abstract:

Heat injury in cool-season grasses has been associated with a range of different types of intracellular damage, and ultimately plant death. In this study, we investigated the heat induced damage in creeping bentgrass (Agrostis palustris) subjected to heat stress (35 C for 1 month). Heat stress resulted in decreases in membrane integrity, increases in oxidative damage to membranes, decreased photosynthetic rate, photochemical efficiency, and chlorophyll content. Lipid and protein content and chlorophyll a/b ratios were not significantly affected by heat. Prior work in Arabidopsis has shown that certain potential second messengers can induce thermotolerance. The effects of these substances on creeping bentgrass were investigated in this study. In particular, we have studied which subsets of these compounds protect specific systems affected by heat stress: for example, 1-amino-cyclopropane-1-carboxylic acid (ACC) and calcium pre-treatments induced antioxidants more rapidly than controls (water) while salicylic acid (SA) and abscisic acid (ABA) did not. However, SA and ABA had a greater effect on the maintenance of chlorophyll. Hydrogen peroxide affected both parameters. These results have allowed us to localize the effects of those compounds both within the cell, and into groups representing possible pathways.

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