

Activities of Antioxidant Enzymes, Efficiency of PSII, and Lipid Peroxidation in Mowed Creeping Bentgrass

*M.J. Howieson and N.E. Christians**

ABSTRACT

The objective of this study was to determine if multiple cuttings damage creeping bentgrass (*Agrostis stolonifera* L) growth and development more than single-cutting or rolling. Formation of reactive oxygen species (ROS) is a common response of plants to wounding. Accumulation of ROS may damage macromolecules, reduce rates of photosynthesis and respiration, and eventually cause cell death. Because of the highly toxic nature of ROS, plants have developed enzymatic systems to scavenge ROS and protect cells from oxidative damage. Catalase (CAT), ascorbate peroxidase (APX), glutathione reductase (GR), and superoxide dismutase (SOD) are important ROS-quenching enzymes. Activities of APX, CAT, GR, and SOD were assayed over time following rolling, single-cutting, and double-cutting. Efficiency of PSII and lipid peroxidation were measured to quantify oxidative injury. Activities of APX and CAT were transiently reduced in rolled, single-cut, and double-cut grasses, which may result in accumulation of hydrogen peroxide (H₂O₂). However, accumulation of H₂O₂ was not sufficient to cause lipid peroxidation, likely because of increased GR reductase activity. Decreases in efficiency of PSII were observed in rolled, single-cut, and double-cut grasses, suggesting reduced efficiency and inhibition of photosynthesis. Duration and level of changes observed in antioxidant enzyme activities and efficiency of PSII of double-cut grasses suggest that multiple cuttings are more injurious to plant growth than rolling or single-cutting.