

Green's Brushing: When Does Physiological Stress Occur?

Gail Gu, Matt Williams, David Gardner, and Karl Danneberger
Department of Horticulture and Crop Science
The Ohio State University

The objective of this study is to quantify the fluctuations in physiological benefits or stress due to brushing creeping bentgrass greens throughout the growing season.

Methods & Materials

Our study was initiated on May 19, 2014 on a 'Penncross' creeping bentgrass turf maintained on native soil located at the Ohio Turfgrass Foundation Research and Educational Facility, Columbus, Ohio. The creeping bentgrass turf was maintained at 0.125 inches with 0.25 lbs of Nitrogen per 1000 square feet applied every 14 days. Trinexapac-ethyl (Primo MAXX) was applied weekly at 0.125 fluid ounces per 1000 square feet. A light topdressing (dusting) was done weekly during the study. These practices were continued through 2015.

In 2014 the treatments consisted of 1) brushing once a week, 2) brushing three times a week, and 3) control. On August 18, 2014 the brushing treatment once a week was changed to 5 times a week. In addition, we set the brushing unit to 0.000 inch and ran the brushes in reverse (initially the brushes were set in the forward position at 0.100 inch). The treatments were applied using a Jacobsen Eclipse 2 walk behind mower.

In 2015, the brushing once a week was dropped and replaced with a double cut mowing treatment. The treatments consisted of 1) single cut (untreated), 2) double cut, 3) double cut with brushing 3 times a week, and 4) double cut with brushing 5 times a week. The brushing treatments consisted of brushing in reverse set at 0.000 inch.

Treatments were evaluated visually for color and injury. Malondialdehyde (MDA) levels were measured as an indicator of plant stress. Malondialdehyde forms when reactive oxygen species (ROS) degrade membranes (lipid peroxidation). During periods of environmental stress (ex. heat, light) ROS can increase dramatically resulting in damage to cell structure.

During 2015 we made multiple measurements of photochemical efficiency (chlorophyll fluorescence) through the summer as an indicator of stress.

Results – 2015

Through October 15, 2015 we found improvement in leaf (turf) texture with brushing. No significant differences ($P=0.05$) occurred among the treatments for 6 out of the 7 sampling dates between July 23rd and October 15th.

In 2014 we observed a thinner leaf blade that appeared to have less leaf moisture in the brushed treatment compared to the un-brushed treatment. In 2015 we quantified the amount of cuticle on the leaf blade among the treatments which is shown in Table 1. Double cutting had the greatest effect ($P=0.05$) on reducing the amount of cuticle wax from the leaf blades. Brushing had no effect.

Treatments	Cuticle Wax (mg/g) October 1, 2015	Cuticle Wax (mg/g) November 17, 2015
Single cut	7.4053	5.6605
Double cut	5.4598	5.1946
Double cut + 3x brushing	5.6072	5.0614
Double cut + 5x brushing	5.2996	5.2614
LSD ($P=0.05$)	1.7171	NS
LSD ($P=0.01$)	NS	NS

Conclusion

Our study over the last two years demonstrates the benefits of improving leaf texture through brushing. Under the conditions of the study, native soil green, mowed at 0.125 inches with a brushing unit positioned in front of the cutting unit, we found no detrimental effect either visually or physiologically from brushing.