Effects of Lawn Care Management on Soil Organisms

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The widespread use of chemical treatment regimes employed by the turfgrass management industry has caused environmental organizations, citizen's groups, and some regulatory agencies to ask questions about how these chemicals affect the environment. The objective in managing turf is to provide a monoculture of healthy, productive, aesthetically-pleasing grass. Turf presents a habitat much different than that in forage and row crops. Physical characteristics, such as the dense populations of plants with some thatch and an extensive root system contribute to a unique microbial ecology. The health and productivity of a turf is interconnected with that of the soil. The soil biota are perhaps the most important singular indicator and determinate of soil health. Any management regime which negatively impacts the soil acts to prevent achieving the very goal the regime intends to reach: a healthy, resilient turf.

This project will address certain environmental concerns by evaluating, through physical, chemical, and biological testing the status of the turfgrass soil biota subjected to chemical and organic management programs. The overall objectives for this study are: 1) to determine the biological status of treated, organically treated, and untreated lawns; 2) establish a long-term research study at the Hancock Research Center at Michigan State University; and, 3) establish the basic procedures for better analyzing the microbiology of turf. This study is supported by the TruGreen/ChemLawn Corporation.

The first year of this study consisted of characterizing samples from turf plots and a nearby agricultural field located at the TruGreen/ChemLawn Research Center in Columbus, OH. The turf plots measured 4' by 8' and consisted of eight different commercial treatments plus a control plot. Six three-quarter inch diameter cores per treatment were combined into one sample. The cores were separated into thatch, 0-7.5, 7.5-15, and 15-22.5 cm layers before being combined. The cropland samples each consisted of six combined core samples from six sampling sites located approximately 50 yards from the turf plots. Direct counts of bacteria and fungi using fluorescent microscopy and computerized image analysis, as well as, carbon and nitrogen mineralization potential determinations and carbon-nitrogen ratio determinations were completed. Results of the initial course of samples produced somewhat unexpected results. It was thought that carbon and nitrogen mineralization potentials for the turf plots would be higher than the cropland samples. However, no significant difference was observed between any of the different turf treatments and the only significant difference shown was between the cropland samples and all of the turf treatments ($\alpha = 0.05$). Data show in figures 1a and 1b that the turf samples exhibit approximately 2 to 3 times the mineralization potential of both carbon and nitrogen than was observed in the cropland samples. These sites will be sampled again in 1997. Procedures for studying earthworm populations and monitoring the decomposition of added organic material are now being tested with the intent of applying these techniques to the characterization of lawn sites in the spring of 1997.

The results of this project at its completion should better help us understand the impact of various maintenance practices on the soil biological activity. These studies will serve to support current maintenance practices or recommend alternatives as appropriate.