Effect of Compost Amendment On Productivity of a Seattle Glacial till Soil.

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Introduction:

In the Puget Sound lowland of Washington State, most residential housing developments are sited on the Alderwood soil series, which is a glacial till soil characterized by a compacted subsurface, due to the wide distribution and inherent geological background in the region.

The results of previous studies of the same site show that compost amendment alters soil properties including water holding capacity, porosity, bulk density, as well as increasing soil C and N.

The effect of compost-amended soil on productivity following the planting of commercial turfgrass has shown to increase growth rate and achieved 100% coverage much more rapidly than unamended soils. Bare spots with exposed soil were still visible over time at the sites that did not receive compost amendment. However, compost amendment is likely to change in chemistry and structure over time. Understanding the long-term effects of compost-amended soil could provide better strategies and options for improving and maintaining productivity of residential-scale lawns on till soil.

The object of this study is to evaluate the effects of past compost-amended glacial till soil on biomass and N-content of commercial turfgrass. The hypothesized outcome of the study suggests compost-amended glacial till soils should increase the biomass and N-content of commercial turfgrass.

Figure 1. Treatment Plot layout in field at CUH.

Site, Methods and Materials:

This soil amendment study was part of the Improved On-Site Residential Stormwater Management study performed at the University of Washington Center for Urban Water Resource Center (UWRC). We utilized the UWRC project site at the University of Washington's Center for Urban Horticulture (CUH) for conducting the study.

From December, 1994 to June, 1995, seven 8 ft. x 32 ft., 30cm depth; 5% slope beds (plots) were constructed out of plywood lined with plastic and filled with Alderwood subsoil or mixtures of soil and compost. The system includes two different (different sites) Alderwood till soils that were transported to the site, and mixtures of the till soils and compost readily available in the Seattle area. These are shown in Table 1. Plots were planted to a commercial turfgrass mixture during the Spring, 1995 season.

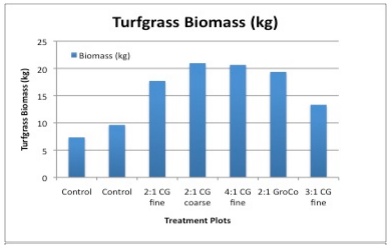
Turfgras biomass samples were collected weekly from May to July 2010 for both biomass and nitrogen concentration analysis.

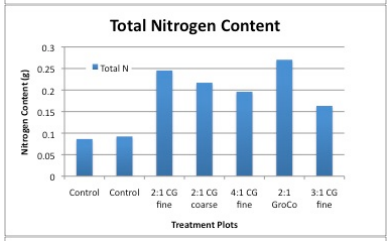
Total biomass was determined by using hanging scale to weigh the total turfgrass trimmed down by the mower and collected into durable garbage bag. Subsamples of the grasses were oven dried, and weighed to determine moisture content. The subsamples of the grass were then grind and sent to the Soil Chemistry Laboratory of the School of Forest Resources for total elemental (CNH combustion analyzer) analysis.

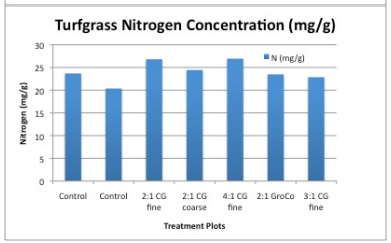
Table 1. Till soil and compost mixtures of each treatment plot.

Plot	Mix (till: compost by volume)
1	Control (no compost)
2	2:1 Cedar Grove fine
3	2:1 Cedar Grove coarse
4	4:1 Cedar Grove fine
5	Control (no compost)
6	2:1 GroCo
7	3:1 Cedar Grove fine

Results:
In graphs: from May to July, 2010.

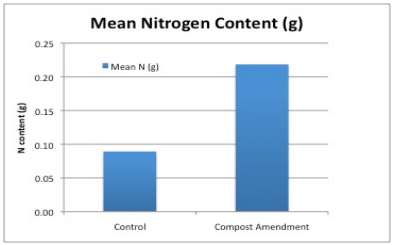






Results:

- The nitrogen concentrations are similar among treatment plots.
- The turfgrass biomass and nitrogen content was higher from compost-amended plots.
- Mean nitrogen content in turfgrass is lower in control plots than those from compost-amended plots.



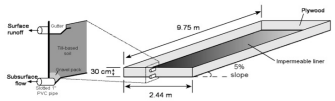


Figure 2. Treatment plot design layout.

Conclusions:

The results demonstrate that using compost to amend a lawn on till could still improve turfgrass growth and productivity after more than a decade. Soil organic matter and nitrogen should be further studied for each treatment plot to determine the nutrient availability in soil.

Reference:

Harrison, R., Grey, Mark., Henry, Charles., Xue, Dongsen., 1997. Field test of compost amendment to reduce nutrient runoff. City of Redmond Public Works, Redmond, Washington.

Burges, S., Kolsti, K., Jensen, B., 1995. Hydrological response of residential scale lawns on till containing various amount of compost amendment. Water Resources Series Technical Report No. 147.

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