Evaluation of Compost Properties and Soil Mix Ratios for Turfgrass Establishment

RFR-A2039

Ben Pease, research scientist
Grant Thompson, assistant professor
Adam Thoms, assistant professor
Department of Horticulture

Introduction

Compost is commonly added to remediate soils decimated by construction activity or neglect prior to establishing the area to turfgrass. The compost is usually incorporated into the existing soil on a volume:volume basis, but determining the correct usage ratio can be difficult. Young turfgrass seedlings are often sensitive to salts. Electroconductivity (EC) is an integrated way to measure salt and nutrient content of a compost. Due to compost variability, methodology to quickly determine acceptable thresholds of nutrient and EC levels needs further investigation.

Materials and Methods

This trial was conducted at the Iowa State University Horticulture Research Station, Ames, Iowa, in a high tunnel and was seeded September 1, 2020. Experimental units were 10 in. tall by 4 in. diameter PVC tubes. Soil treatments were soil:compost ratios of 100:0, 80:20, 70:30, 60:40, 50:50, 40:60, and 0:100, determined by bulk density, and turf treatments were two cultivars of perennial ryegrass (*Lolium perenne* L.), one salt-sensitive and one salt-tolerant. All treatments were replicated five times. Compost was sourced from the Iowa State University Compost Facility, and was comprised of dairy/equine manure and lawn/leaf waste (0.8 g cm^{-3} bulk density). Soil was a previously undisturbed native Iowa topsoil (1.3 g cm^{-3} bulk density). Overhead irrigation was provided to ensure optimal turfgrass performance.

Digital images were taken three times/week starting seven days after seeding (DAS). Digital images were captured with a light box to ensure consistent lighting. Images were processed using Turf Analyzer for percent green cover (1-100%). Leachate was collected once weekly beginning at seven DAS to measure leachate pH, EC, and nitrate content.

Results and Discussion

Electroconductivity measurements declined over time for all treatments (Figure 1A), likely due to leaching through irrigation and through data collection processes. Compost percentages of 30 percent+ had EC levels above the 4 dS m^{-1} threshold through 21 DAS.

Nitrate levels also declined over time for all treatments (Figure 1B), likely due to leaching, plant uptake, or microbial mineralization. By 28 DAS, all treatments had similar nitrate levels.

Treatments were not different by percent cover (PC) through 14 DAS (Figure 1C). At 16-28 DAS, the 100 percent soil treatment had the lowest PC but ended the trial similar to all other treatments. The 100 percent compost treatment had lower PC than other compost-containing treatments during 16-21 DAS. All treatments ended the trial with similar PC of greater than 93 percent.

A second phase of this trial was initiated late November 2020, using a clay subsoil in place of the native topsoil.

Acknowledgements

Appreciation is extended to Colin Laswell, Ethan DenBeste, and Nathan Underwood for help with data collection.

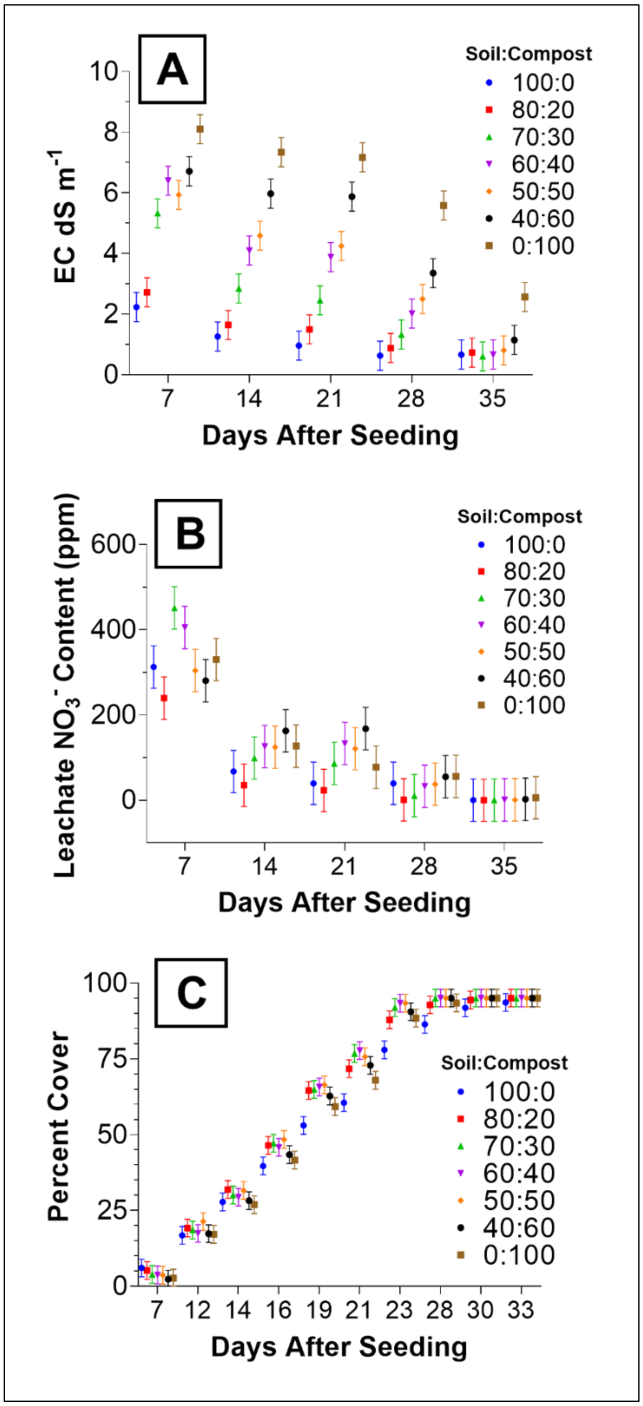

Figure 1. A. Soil treatment-by-days after seeding interaction for EC (dS m^{-1}). B. Soil treatment-by-days after seeding interaction for leachate NO_3^- levels. C. Soil treatment-by-days after seeding interaction for percent cover (0-100%).