

2017-05-615

**Title:** Solvita® Soil Test Kits to Categorize Golf Course Fairway Responsiveness to Nitrogen Fertilization

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**Objectives of the Project:**

Objective 1: Determine if Solvita® Soil CO<sub>2</sub>-Burst and Soil Labile Amino N tests are correlated to bentgrass fairway turf quality, color, density, thatch accumulation, divot recovery, and traffic tolerance.

Objective 2: If test results are correlated to bentgrass fairway turf responses in Objective 1, then categorize the responsiveness to N fertilization as a function of Solvita® soil test results.

**Start Date:** 2017

**Project Duration:** 3 years

**Total Funding:** \$90,000

**Summary**

**Need for the Study:**

The ability to predict the N mineralization potential of any turfgrass site and its expected response to N fertilization would be a valuable tool in nutrient management. Turfgrass soils often accumulate organic matter over time, and this increases their mineralization potential. However, assessing this mineralization potential is not routine due to the lack of mineralization tests offered with many labs, cost of the tests, and the long-term requirements (a week to months) of these tests for reliable results. Solvita & Woods End Laboratories offers two test kits that have been developed to rapidly measure the biologically-active C and N fractions in soil organic matter: the Soil CO<sub>2</sub>-Burst (SCB) and Soil Labile Amino Nitrogen (SLAN) test kits. These labile C and N fractions are correlated to soil microbial activity, and therefore, the Solvita® soil tests should be able to estimate the mineralization potential of turfgrass soils.

**Methods:**

The study site is located in Storrs, CT with creeping bentgrass as the fairway species, and was initiated in August, 2017. The experiment was set out as a split-block design with traffic (with/without) as the horizontal factor and compost (10 rates, in 0.25-lb increments from 0 to 2.25 lbs available N per 1000ft<sup>2</sup>) as the vertical factor with three replicates. Compost was incorporated throughout the 0 to 4-inch soil profile by rototilling. Beginning in 2018, an organic fertilizer will be applied to the compost plots at the same rates as the initial compost rates. In addition to the organic fertilizer treatments, a standard fertilizer regime treatment with 0.2 lbs

N 1000ft<sup>-2</sup> will be applied every 21 days as urea in spring and summer and greater amounts applied in September and October, for a seasonal total of 2.45 lbs N 1000ft<sup>-2</sup>, will serve as the standard fertilization treatment. The fall of 2017 will be used as the establishment period. Full implementation of the proposal treatments and data collection will begin in 2018.

Beginning in the spring 2018, turf response measurements (Visual Quality, NDVI, green cover, DGCI, clippings yield, clippings N concentration) and soil samples will be collected monthly from April to November from each plot. Soil samples will be analyzed using the Solvita<sup>®</sup> SCB and SLAN tests. Fairway performance will be determined by measuring thatch accumulation, divot recovery, and traffic tolerance. Turf responses and fairway performance measurements across the season will be correlated to the Solvita<sup>®</sup> soil test results to determine if any relationship exists between the variables using regression analyses. If correlations are found, binary logistic regression will be applied to determine the probability of response to N fertilization in relation to a given soil test value, using the standard N fertilization practice response as the benchmark value.

#### Results to Date:

The field study was initiated in August 2017. As of late November 2017, the plots are establishing well (percent green cover 90 to 94%). To date, there is no significant ( $P > 0.05$ ) difference between treatments for NDVI (0.6297 to 0.656), hue (76.9 to 78.6), and DGCI (0.356 to 0.369).

#### Future Expectations:

If our hypothesis that the Solvita<sup>®</sup> soil test kits results are correlated to bentgrass fairway turf responses is valid, then golf course superintendents would be able to easily and quickly assess the mineralization potential of any fairway on their course. These tests will be site specific, and will give the superintendent an objective guidance for N fertilization. Using a more site-specific, objective means to guide N fertilization will maintain optimum turf quality and function, while reducing fertilizer costs, reducing turf loss due to certain N-related diseases, reducing the risk of water pollution caused by N losses, and reducing the greenhouse gas emission footprint (especially with N<sub>2</sub>O) of the golf course by not applying N when it has a low probability of response due to high mineralization potential, or not applying the full rate of N when mineralization potential is moderate. The value of using the Solvita<sup>®</sup> soil test kits also would be seen on fairway areas where mineralization potential is low, and where they could benefit from N fertilizer applications. An additional advantage of the Solvita<sup>®</sup> soil test kits is that these could be conducted on-site by the superintendent, if desired, without the need to send samples to a laboratory.

#### Summary Points

- Compost has been applied and bentgrass seeded into plots.
- Bentgrass grow-in and establishment continuing on schedule.
- No significant differences in percent green cover, NDVI, hue, or DGCI during the grow-in period.



Figure 1. Compost application on plots prior to incorporation.





Figure 2. Incorporation of compost into plots.





Figure 3. Establishment of plots, 10 Nov. 2017. Plots seeded on 17 Aug. 2017.