Diminishing Control Units Do Not Preclude Universal Estimations of Organic N Fertilizer Residual Availability from Days after Application

M.J. Schlossberg, Center for Turfgrass Science, Dep. of Plant Science

Justification

Many turfgrass managers seek results of applied, replicated agronomic research conducted by Land-grant University personnel. Enhanced heritable color and shoot density traits of newer creeping bentgrass cultivars limit the resolution of visual turfgrass color and/or quality ratings. Employ of multispectral radiometry by research scientists to characterize turfgrass canopy color, density, N status, and/or a/biotic stress is increasing. Justifications for adoption include rapid, repeatable measures of canopy reflectance by any number of operators. Furthermore, said measures generate continuous, ratio data readily complemented by current GIS platforms and emerging automated sampling technologies.

Objective

To systematically evaluate, under an array of field conditions, creeping bentgrass canopy response up to 12 months following single 61 kg N/ha applications of natural organic granular fertilizer (16% N) made from late May to late July to assist the development of responsible application rate thresholds by regional agencies.

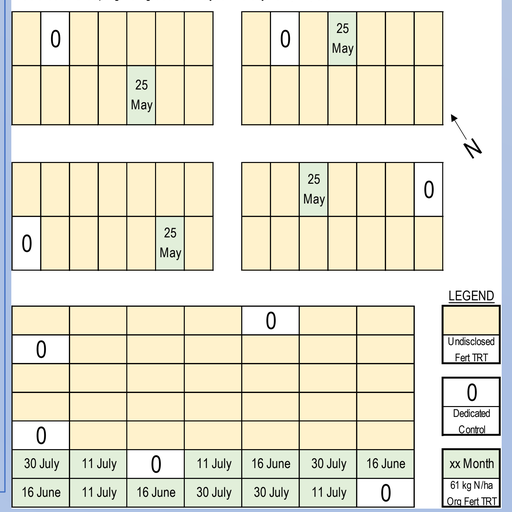
Methodology

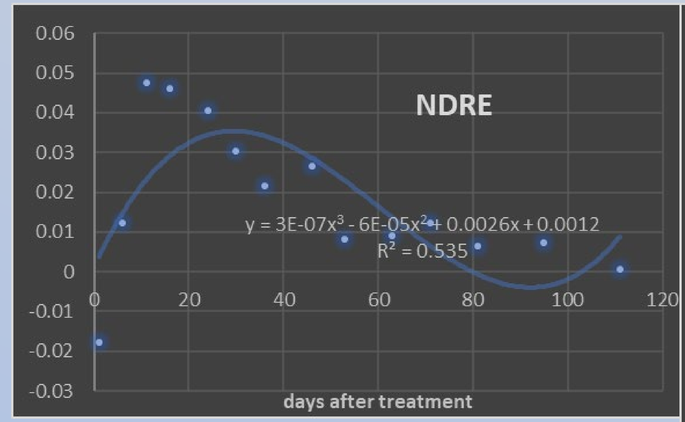
In May 2018, single 61 kg N/ha applications of natural organic granular fertilizer (16% N) were repeatedly made to originally control plots through late July. Following the first treatment application, a passive multi-spectral radiometer (CropScan MSR87, Rochester, MN) was used to measure canopy reflectance relative to simultaneous irradiance in the 460, 510, 560, 610, 660, 710, 760, and 810 ±5-nm wavebands. Per manufacturers recommendations, a porcelain-enameled steel tile was used for white standard calibration of upward- and downward-facing silicon photodiodes twice annually. Operation of the radiometer required cloudless conditions and orientation of its downward-facing sensors perpendicular to the plot surface.

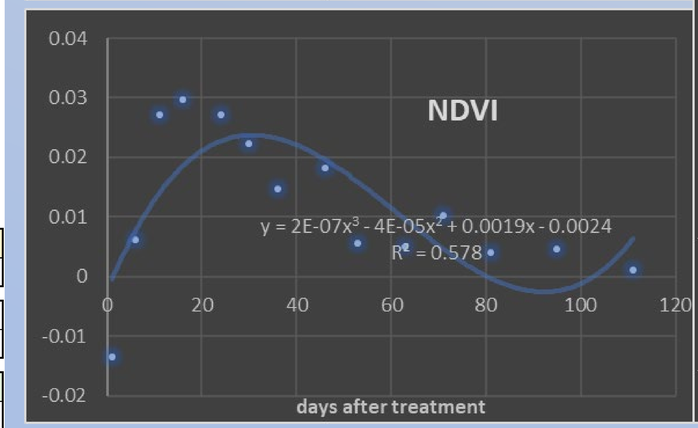
On days conditions permitted, two rounds of plot scans were collected at a 0.7-m height, providing for unique, 0.1-m^2 sample areas. Reflectance measures were made in the ±3-h interval around solar noon every 6±4-d. Percent reflectance at each waveband was averaged per plot for statistical analysis. Mean percent reflectance in the 660- or 810-nm waveband was used to calculate the normalized diff. vegetative index (NDVI), mean percent reflectance in the 710- or 810-nm waveband was used to calculate the normalized diff. red edge (NDRE) while mean percent reflectance in the 460-, 560-, or 660-nm waveband was used to calculate the dark green color index (DGCI). Differences between a dynamic number of fertilized or unfertilized plots was modelled by days after fertilizer application.

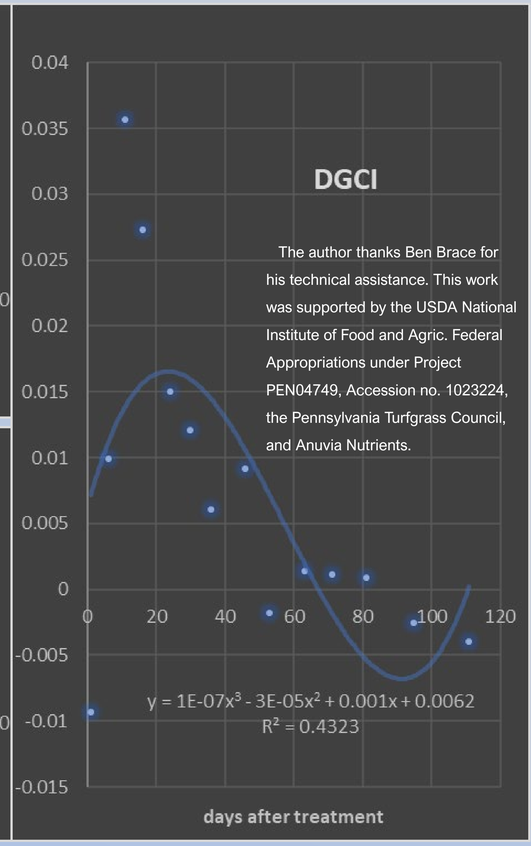
Data collection period		Experimental units	
Begin	End	Org. N Fert.	Control
25 May 2018	15 June	4	21
16 June	10 July	8	17
11 July	29 July	12	13
30 July	2 Aug.	16	9
3 Aug.	11 June 2019	12	9

Declaration Creeping Bentgrass Fairway, University Park, PA, USA









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