



COMPARING THE EFFECTS OF 12-0-0 + FE AND 12-0-0 + TRUESOLUM® ON TURFGRASS APPEARANCE AND QUALITY

Objective

TrueSolum® is composed of signaling molecules that proliferate soil microbes that facilitate iron uptake in plants. This study compared the effects of this approach versus the traditional approach of applying chelated iron to turf to improve turf quality and color. Two research trials were performed to compare the effect of 12-0-0 + TrueSolum® versus 12-0-0 + iron (Fe) on visual appearance and quality of turfgrass. Plots were evaluated using Normalized Difference Vegetation Index (NDVI) and visual quality ratings every week following the initial treatment application.

Introduction

Iron nutrition is crucial for turfgrass management due to its essential role in chlorophyll synthesis, giving turfgrass its green color and enhancing photosynthesis. Iron also participates in vital enzymatic processes, aiding in respiration and energy transfer within plant cells. Insufficient iron can lead to iron chlorosis, causing yellowing leaves and reduced turfgrass health. Ensuring proper iron nutrition can enhance turfgrass resistance to diseases and pests, contributing to a lush, green appearance and overall vitality. Often iron is present in the soil but trapped due to high pH or poor water quality. Research was conducted to evaluate the effectiveness of TrueSolum to improve native soil iron availability versus the use of external iron supplementation by evaluating turfgrass quality and health.

Trial Design

Field trials were conducted in the 2024 growing season through third-party researchers to compare the effectiveness of TrueSolum and iron on enhancing appearance in turfgrass. The trials were located at West Lafayette, IN and Fresno, CA. Turfgrass species, type, and treatment application date for each site are listed in Table 1.

Property	West Lafayette, IN	Fresno, CA
Grass species	<i>Agrostis stolonifera</i>	<i>Festuca sp.</i>
Common name	Creeping bentgrass	Tall Fescue
Grass variety	L-93	
Application date	August 13, 2024	October 4, 2024

Plots were 3 feet in width and 6 feet in length and the entire plot area was treated. There were four replications at the West Lafayette, IN site and five replications at the Fresno, CA site. Treatments are listed in Table 2. Each treatment was applied twice at the West Lafayette, IN site and once at the Fresno, CA site. Both treatments were applied to the foliage of the turfgrass in a total spray application volume of 2 gallons/1,000 ft².

Treatment Number	Treatment	Rate
1	12-0-0 + Fe	6 fluid oz/1,000 ft ²
2	12-0-0 + TrueSolum	6 + 3 fluid oz/1,000 ft ²

Turfgrass quality, color, and uniformity were evaluated visually at 0, 7, 14, 21, 28, 35, and 42 days after treatment application. Turfgrass canopy reflectance (NDVI) was collected at the same sample times as the visual data collection.

Results

Ratings for turfgrass quality, color, uniformity, and reflectance combined over locations are presented in regression curves shown in Figures 1 – 4 over the 6-week data collection. Regression curves were the best way to present the data because there were differences between the plots prior to trial initiation. The regression curves were calculated based on evaluations using a 1 to 9 rating scale (1=brown/dead, 9=highest quality) of turfgrass quality, color, uniformity, and reflectance.

a) Quality

Turfgrass quality is a measure of aesthetics (*i.e.* density, uniformity, texture, smoothness, growth habit and color) and functional use. The combination of 12-0-0 + TrueSolum had the best quality parameters compared to 12-0-0 + Fe. The decline in turfgrass quality after 21 days is typical following an application of a urea-iron foliar fertilizer. The addition of TrueSolum to 12-0-0 reduced the decline in visual appearance compared to 12-0-0 + Fe.

Regression Curve of Turf Quality, Turfgrass quality (1-9, 1=brown/dead, 9=highest quality)

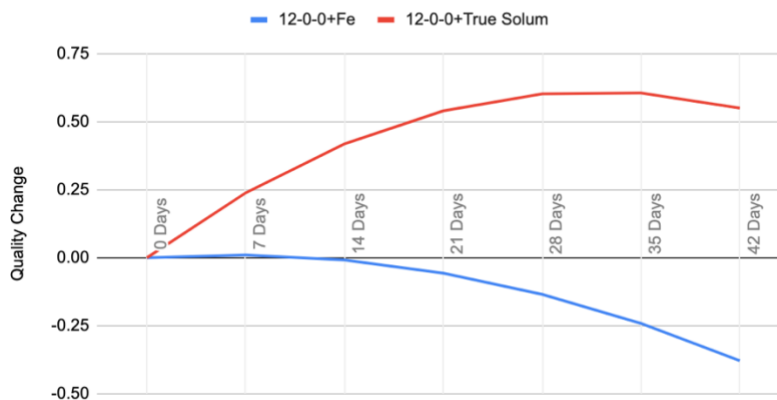


Figure 1. Regression curve of turfgrass quality.

b) Color

Turfgrass color can be a measure of overall health and proper nutrition, particularly adequate iron uptake of the turf. It is based on a visual rating scale with 1 being least desirable and 9 being most desirable. Color ratings will vary depending on the genetic type of turf. The treatment with TrueSolum improved color compared to 12-0-0 + Fe over the 42-day evaluation period.

Regression Curve of Turf Color, Turf color(1-9, 1=brown/dead, 9=highest quality)

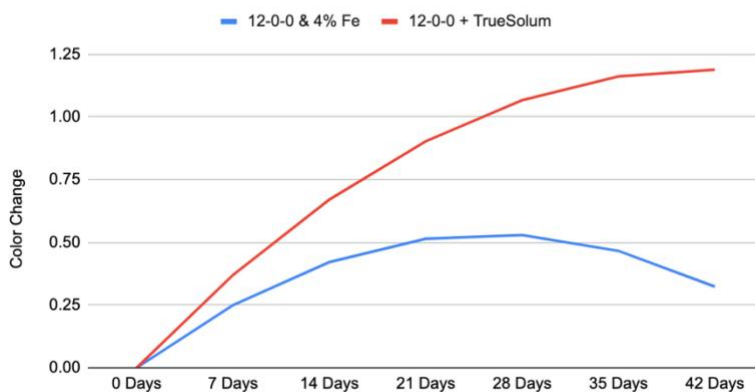


Figure 2. Regression curve of turfgrass color.

c) Uniformity

Turfgrass uniformity refers to how even and consistent the appearance of the turfgrass is, with minimal variation in color, density, texture, and growth habit across the plot. The 12-0-0 + TrueSolum treatment had better turf uniformity for the entire study compared to 12-0-0 + Fe (Figure 3). Uniformity improved for the entirety of the study in this treatment while the 12-0-0 + Fe treatment had an overall reduction in turf uniformity.

Regression Curve of Turf Uniformity, Turf Uniformity (1-9, 1=brown/dead, 9=highest quality)

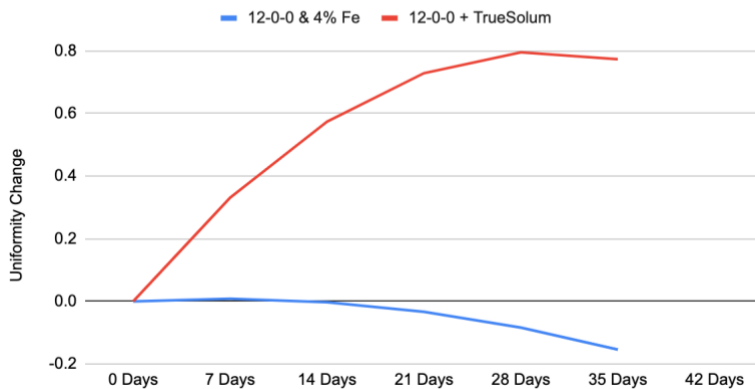


Figure 3. Regression curve of turfgrass uniformity.

d) Reflectance

Turfgrass reflectance is measured as the Normalized Difference Vegetation Index (NDVI) that measures the greenness and density of vegetation in a digital image. NDVI utilizes near-infrared and red light and is recorded as a value between 0 and 1. Turfgrass reflectance generally increased for both treatments over the length of the data collection period (Figure 4). The 12-0-0 + TrueSolum treatment had better greenness and density (NDVI) compared to 12-0-0 + Fe for the entire study.

Regression Curve of Turf Reflectance, Turf Reflectance(1-9, 1=brown/dead, 9=highest quality)

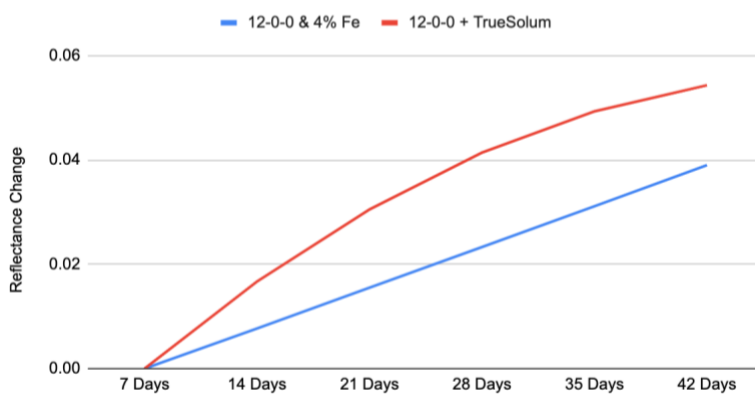


Figure 4. Regression curve of turfgrass reflectance.

Summary

The treatment including TrueSolum improved turfgrass color, uniformity, and reflectance compared to the 12-0-0 + Fe treatment. These results lasted the entirety of the study which is considerably longer lasting than the 12-0-0 + Fe treatment. Previous research has shown that TrueSolum increases siderophore production in the soil. Siderophores are chelating agents which bind to iron and make it more transferable to the plant. TrueSolum outperformed external iron addition across all trial parameters, proving TrueSolum as a natural alternative to iron supplementation.