GRIGG®

Research Driven,
Proven Results®

TECHNICAL BULLETIN

GRIGG AGRONOMIC SOLUTIONS, INNOVATION AND TECHNOLOGY

GRIGG has been synonymous with quality, compatibility and performance. GRIGG recognizes that research, development and innovation are vital to providing the best turfgrass products and agronomic solutions. GRIGG is committed to this research and conducts numerous field and greenhouse trials each year.

GRIGG Research Objectives

GRIGG has developed annual turfgrass research protocols designed to assess the use and efficiency of GRIGG Proven Foliar® nutrients and to document GRIGG product performance and dependability.

These research objectives include, but are not limited to:

- Determining the efficiency of Proven Foliar nutrients
- Determining how Proven Foliar nutrients influence plant health
- Evaluating potassium phosphite ($K_2PO_3^-$) as a component of integrated pest management programs
- Gaining a broader understanding of the synergy between foliar nutrition and fungicides

GRIGG Proven Foliar Nutrition Programs

The most researched, effective and simple Proven Foliar nutrition program includes the use of GRIGG Gary's Green® (18-3-4), GRIGG Ultraplex® (4-0-3), and GRIGG P-K Plus® (3-5-17).

This program offers:

- Nitrogen (N) as part of a spoon feeding approach
- A micronutrient package
- Non-ionic surfactant and buffering agent
- Biostimulant package
- Potassium phosphite ($K_2PO_3^-$) for plant health and integrated disease management

Key Advantages of GRIGG Proven Foliar Nutrients:

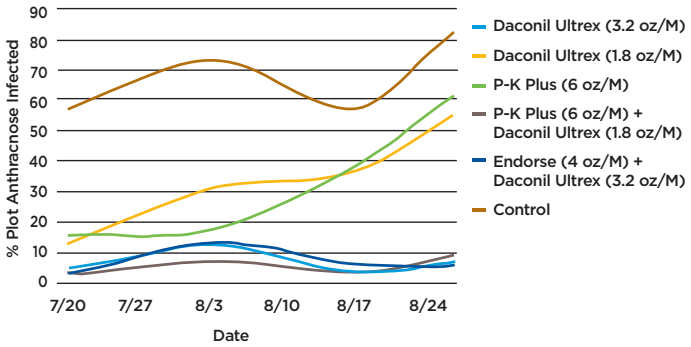
- Increased plant health
- Documented efficiency
- Compatibility
- Non-ionic surfactant and buffering properties

Key Advantages of GRIGG P-K Plus:

- Plant available phosphate (PO_4^{3-}), which improves plant health
- Proven field effectiveness and 8+ years of extensive researched with consistent results

Phosphite works both directly and indirectly to enhance disease suppression and should be used in combination with fungicide as part of a preventative disease management program. Past and current research substantiates the benefits of phosphites ($H_2PO_3^-$), and specifically GRIGG P-K Plus, for use as part of an anthracnose and/or pythium management program (Figure 1).

Figure 1. *GRIGG P-K Plus: % Anthracnose After Treatment Rutgers University, Clarke, B. 2007*



Percent (%) anthracnose foliar blight after treatment with potassium phosphite (P-K Plus) alone, low label fungicide (Daconil Ultrex 1.8 oz/M) alone, a combination of P-K Plus and Daconil Ultrex, and two fungicides at high label rates (Rutgers University, Clarke, B., 2007)

UNIVERSITY RESEARCH ON GRIGG PROVEN FOLIAR NUTRIENTS

GRIGG Proven Foliar nutrients are formulated to enhance leaf absorption, which makes them more efficient than granular and other liquid fertilizers. Research conducted at the University of Nebraska, Michigan State (MSU), and Clemson have documented and confirmed the high level of nutrient absorption in both field and greenhouse trials.

Observations

Trials indicated that there was a significant difference in nutrient uptake between foliar fertilizers and soluble/raw source materials, specifically for nitrogen and many micronutrients (including manganese, iron, zinc and boron), see Table 1.

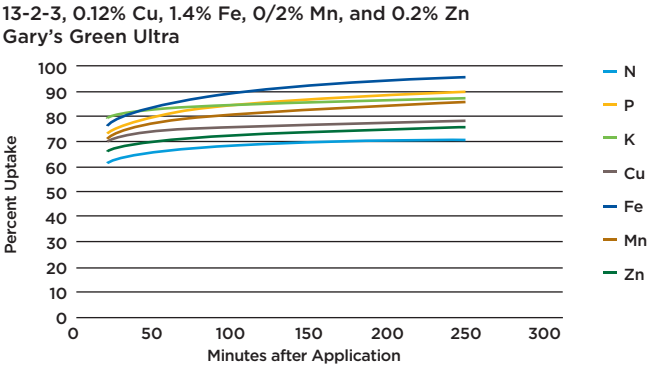
Table 1. *Efficacy of Foliar Nutrients vs. Soluble Nutrients*

	N	Fe	Mn	Cu	B
Bentgrass, UNL	4.4x	1.3x	2.8x	1.4x	19.2x
Bentgrass, MSU	1.3x	5.3x	3.5x	NS	4.0x
Pao grass, MSU	1.4x	8.0x	7.9x	NS	4.0x
Bermuda grass, Clemson	1.1x	1.6x	9.8x	NS	3.0x

Increase in nutrient absorption for foliar v. soluble nutrients. For all elements, the increase in efficiency was always attributed to the foliar product (of the products tested).

In addition, over 60% of GRIGG Proven Foliar nutrients were absorbed within 15 minutes of application, which further highlights efficiency and subsequent plant use (Figure 2).

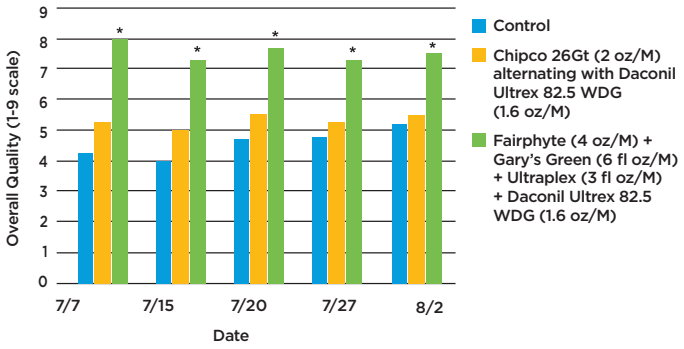
Figure 2. *GRIGG Gary's Green Ultra® % Nutrient Uptake and Efficiency*



Foliar nutrient absorption (% uptake) over time

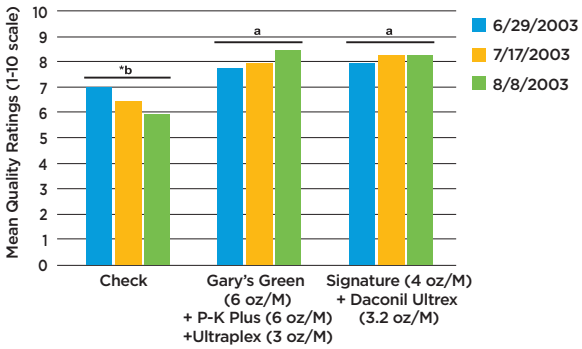
Figure 3. *Impact of GRIGG Proven Foliar Nutrition with Fungicides on Turf Quality*
University of Kentucky, 2004

GRIGG program: GRIGG Gary's Green, GRIGG P-K Plus, GRIGG Ultraplex



Influence of spray programs with fungicides and foliar fertilizers on overall turf quality in a mixed bentgrass/poa annua soil based green (University of Kentucky, Vincelli, P., Dixon, E., Williams, D., and Burrus, P., 2004)
**Foliar plus fungicide treatment significantly different from fungicide treatment alone and control.*

Figure 4. *Turf Quality Impact of GRIGG Proven Foliar Nutrition Fungicide During Summer Stress*
Michigan State, 2003, Creeping Bentgrass



Mean quality of creeping bentgrass exposed to summer stress (Michigan State University, Vargas, J., 2003)

**Means followed by a different letter are significantly different*

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