



Research Driven,  
Proven Results®

## TECHNICAL BULLETIN

# NUTRIENT UPTAKE AND EFFICIENCY OF GRIGG PROVEN FOLIAR® NUTRIENTS

Not all foliar nutrients are created equal. GRIGG Proven Foliar nutrients are formulated based on years of plant nutrition research and are manufactured with the highest quality ingredients. GRIGG is committed to turf science and validating GRIGG product performance in research trials.

### Factors Affecting Nutrient Uptake

Foliar nutrients are absorbed by turfgrass through hundreds of micro-pores on the leaf surface. Neutral molecules have the best opportunity to be absorbed by turfgrass leaves. Other factors that affecting nutrient uptake include:

- Size and thickness of cuticle
- Concentration of nutrients in the nutrient
- Temperature
- Light Intensity
- Metabolic efficiency

Research documenting the percent absorption of each applied nutrient will provide turfgrass managers with a higher degree of control over their nutrient management programs and the ability to fine tune fertilizers inputs.

### Key Advantages of GRIGG Proven Foliar Nutrients

Improving plant health requires the correct formulation, nutrient concentration, and ratio of natural occurring amino acids and biostimulants. GRIGG Proven Foliar nutrients are designed to enhance nutrient uptake and assimilation, and improve plant health, through the use of naturally occurring chelating agents.

GRIGG Proven Foliar nutrients are highly compatible and contain buffering agents designed to stabilize spray tank pH, and have a very low burn potential. They also contain essential plant nutrients that are organically chelated, as well as a micronutrient package and the optimal concentration of amino acids and biostimulants, which improve plant health.

The naturally occurring chelating agents in GRIGG Proven Foliar nutrients substantially improves the uptake of applied nutrients by effectively eliminating their charge. This prevents the nutrients from reacting with other charged particles in the soil and correctly positions them for assimilation into a plant usable form.

GRIGG Proven Foliar nutrients also contain natural plant stimulants that have been documented to increase plant metabolism, photosynthesis and antioxidant production. They have also been proven to enhance rooting and improve cell membrane thermostability (Kauffman III et al., 2007). By increasing these metabolic responses before and during periods of stress, turf is able to better tolerate environmental extremes.

### When to Apply GRIGG Proven Foliar Nutrients

The benefits of frequent foliar nutrient applications in low doses are well documented. This management strategy improves turfgrass color, uniformity, and overall quality, and should result in lower nutritional inputs during a given growing season due to increased nutrient use efficiency. In addition, there are specific soil and growing conditions where the benefits of light and frequent foliar feeding can be enhanced.

Applications are most beneficial when:

- Root growth is compromised or has a low cation exchange capacity (i.e. high sand content greens)
- Nutrient deficiencies are difficult or inefficient to correct with soil based applications
- Soil has high leaching potential
- Turfgrass is being established or is under extreme stress due to mowing, traffic, and environmental factors including drought, heat, or salinity

### Application Tips for Maximum Nutrient Uptake

- Utilize foliar nutrients with a naturally occurring chelated technology
- Apply GRIGG Proven Foliar nutrients after mowing
- Apply GRIGG Proven Foliar nutrients in 1-2 gal water per 1000 ft<sup>2</sup>
- Avoid applying GRIGG Proven Foliar nutrients when weather conditions could cause excessive drying, such as high heat and high wind conditions

# FIELD TRIALS: NUTRIENT UPTAKE AND EFFICIENCY OF GRIGG PROVEN FOLIAR® NUTRIENTS

University of Nebraska, Michigan State University and Clemson University

## Key Advantages of GRIGG Proven Foliar Nutrition Programs

GRIGG nutrition programs are designed for efficiency, performance, and compatibility. They are also designed to enhance turfgrass color and quality, and improve plant health without promoting excessive growth. Nutrition programs increase a turf manager's control over nutrient availability and nitrogen release, while providing the essential plant nutrients needed for optimum turfgrass quality.

## Objectives

GRIGG's primary research objective in these trials was to measure the percent of nutrient absorption after the application of a GRIGG Proven Foliar nutrition program that contained each essential plant nutrient. The data allows GRIGG to better understand the efficiency and performance of these nutrients.

The following applications were made:

- GRIGG Gary's Green®
- GRIGG P-K Plus®
- GRIGG Sili-Kal B™
- GRIGG Magnesium Complex

## Results

Results in each trial indicated rapid (often within 2 hours) and efficient absorption of GRIGG Proven Foliar nutrients, which reflects the reliability of these products.

Most nutrients, regardless of species, showed absorption in excess of 50% and often exceed 90%. In addition, the measured intake of nitrogen (N), phosphorus (P), and potassium (K) after application to Champion Bermudagrass resulted in 97% absorption after 12 hours. Temperature also affected some nutrients, while exhibiting little or no effect on others.

Figure 1.

Creeping Bentgrass (L-93) University of Nebraska

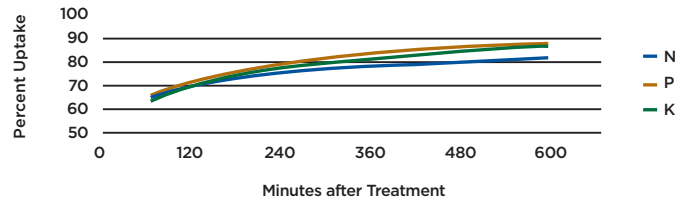


Figure 2.

Annual Bluegrass Michigan State University

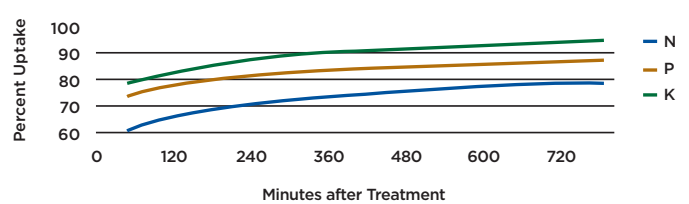


Figure 3.

Champion Bermudagrass Clemson University

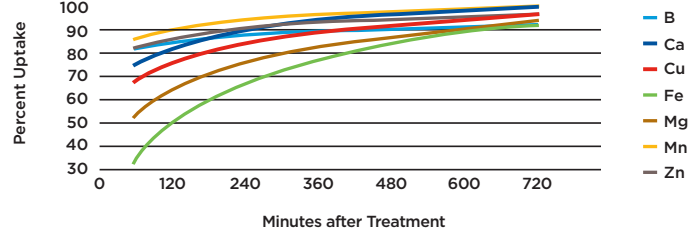
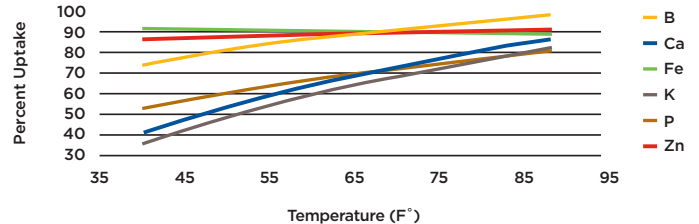


Figure 4.

Creeping Bentgrass (L-93) University of Nebraska



### Literature Cited

1. Kauffman III, G.L., D.P. Lmeival, T.L. Watschke, 2007. Effects of biostimulant on the heat tolerances associated with photosynthetic capacity, membrane thermostability, and polyphenol production of perennial ryegrass. *Crop Sci.* 47: 261-267



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