

TECHNICAL BULLETIN

USING GRIGG[™] PK PLUS[®] FOLIAR NUTRITION FOR DISEASE MANAGEMENT USING IPM

GRIGG is an industry leader in foliar nutrition science, research and education. One area of focus in GRIGG[™] research is how phosphites, and specifically GRIGG[™] PK Plus[®], improve plant health and how they can be used as a component to in nutritional integrated pest management (IPM).

What is nutritional IPM?

Nutritional IPM (Integrated Pest Management) is a turfgrass management strategy that focuses on optimizing plant health and its natural defense mechanisms, particularly during periods of environmental stress. Nutritional IPM involves maintaining complete and balanced mineral nutrition, while using technologies such as GRIGG[™] Elicitor[®] technology to enhance a plant's resistance to biotic and abiotic stress. The primary goal of nutritional IPM is to maintain optimum plant vigor while using pesticides correctly, this allows turf managers to save money and minimize environment impact.

What Makes GRIGG[™] PK Plus so Effective?

Not all phosphite products are created the same and turf managers should select products that have proven results. GRIGG[™] PK Plus[®] is part of the GRIGG[™] Proven Foliar[®] product line. It contains 14% phosphite as well as GRIGG's proprietary Elicitor[®] technology, which promotes efficiency, performance and compatibility.

More than 10 years of research and field results verify that routine use of GRIGG PK Plus is an effective stress and pest management tool, and provides mineral nutrients required for healthy, high and dependable turf. PK Plus is the only foliar nutrition product scientifically documented as an effective tool for managing the summer decline of cool season grasses, anthracnose (*Collectotrichum cereale*), microdochium patch (*Microdochium nivale*), pythium (*Pythium spp.*), and root-knot nematodes (*Meloidogyne sp.*).

Additional research documents that GRIGG[™] Proven[®] Foliar nutrients are the most effective, efficient and safe phosphite source on the market today (Gaussoin et al., 2009).

Field Trial: Using GRIGG PK Plus as a Component in Microdochium Patch Management

2011. Corvallis, OR and Naas, Ireland.

Objectives

This specific study focuses on the use of GRIGG PK Plus in the management of Microdochium patch (*Microdochium nivale*), in locations where the disease occurs chronically during cool, wet weather. An important research objective was to determine the correct tank mix partners for GRIGG Proven Foliar nutrients, including fungicides applied at low label rates.

Results

This study showed that GRIGG PK Plus, when applied alone or with a fungicide, significantly enhanced turf quality compared to the untreated check and turf treated with fungicide alone (Figures 1, 2 & 3).

Figure 1. Untreated plot from Corvallis, OR.

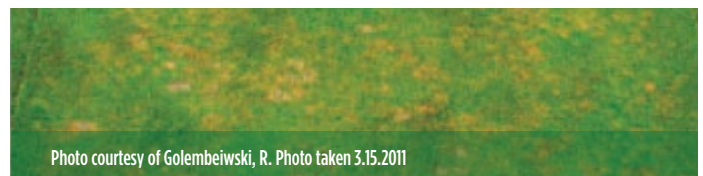


Figure 2. Plot from Corvallis, OR. treated biweekly with 6 fl. oz./M PK Plus[®]

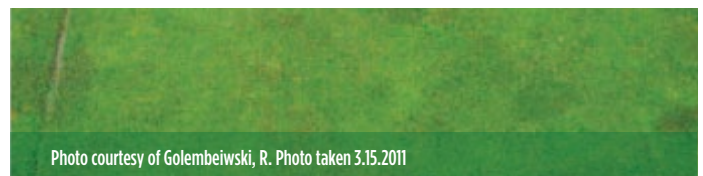


Figure 3. Trial site in Naas, Ireland. * Iprodione was applied at the recommended label rate biweekly



Field Trial: Using GRIGG™ Proven Foliar® Nutrients to Manage Anthracnose

2010-2011. New Brunswick, NJ. Rutgers University, Clarke, BB.

In this trial, turf treated with GRIGG™ Proven Foliar® nutrients was compared to a control as well as turf treated with fungicide alone (Daconil Ultrex®) (Medallion®).

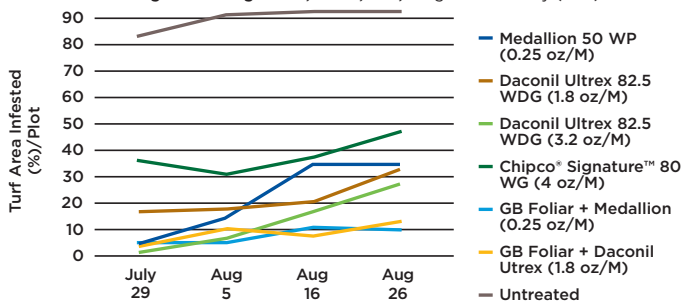
GRIGG Proven Foliar nutrient program included:

- GRIGG™ Gary's Green Ultra® (13-2-3) applied at a 12 oz/M rate
- GRIGG™ NutraGreen™ (5-10-5) applied at a 4 oz/M rate
- GRIGG™ PK Plus® (3-7-18 + 14% phosphite) applied at a 6 oz/M rate

The results of this study showed that GRIGG Proven Foliar nutrients used in combination with a fungicide at a low label rate provided excellent suppression of anthracnose. The level of control of this treatment was significantly better than each fungicide applied alone (Figure 4). Similar results were found in 2007-2010.

Figure 4. Percent (%) turf area infested with anthracnose disease after treatment with different fungicides or foliar fertilizer programs plus fungicides.

Preventive Control of Anthracnose with Selected fungicides and Biorational Products on an Annual Bluegrass Putting Green, Clarke, B.B., Rutgers University (2011)



Field Trial: Using GRIGG™ Proven Foliar® Nutrients to Manage Summer Stress

2011. Michigan State University. East Lansing, MI. Annual Bluegrass (*Poa annua*) Putting Green. Vargas, J. and N. Dykema.

The same GRIGG Proven Foliar nutrient program used in the Rutgers University trial was used in this trial. GRIGG's foliar program was compared to an untreated control; to a low rate fungicide application (Daconil Ultrex®, 1.8 oz/M); and a combined application of GRIGG foliar nutrients with a fungicide at a low label rate.

The study showed that turf treated with GRIGG Proven Foliar nutrients had consistent quality throughout the summer and that the nutrition program had a positive impact on summer stress symptoms.



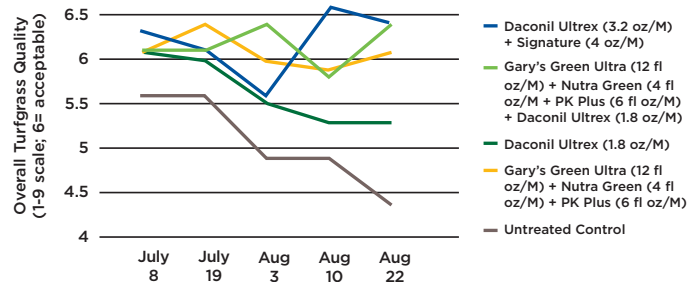
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The Michigan State trial results also proved that turf quality was significantly better when GRIGG Proven Foliar nutrients were used in combination with a fungicide, compared to turf treated with fungicide alone and the untreated control (Figure 5).

Figure 5. Overall quality of greens height *Poa annua* on five rating dates after treatment with different fungicides or foliar fertilizer programs plus fungicides for summer stress management.

Summer Stress Management of an Annual Bluegrass Putting Green with Fungicides and Biorational Products. Vargas, J. and N. Dykema, Michigan State University (2011)



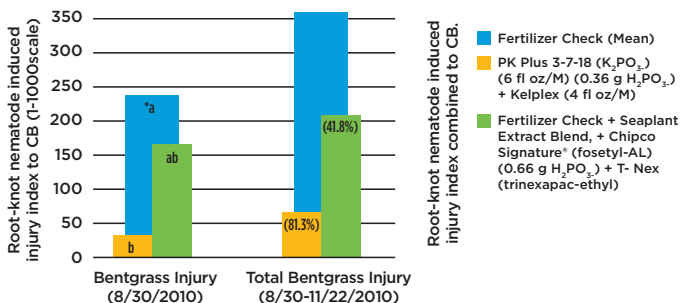
Independent Trial: Using GRIGG™ Proven Foliar® Nutrients and Biorationals for Nematode Prevention

2010. Creeping Bluegrass. Mahady, M.M.

In this trial, turf treated with GRIGG™ PK Plus® and GRIGG™ Kelplex® had significantly less nematode induced injury to creeping bentgrass compared to the fertilizer control. GRIGG Proven Foliar nutrients was the only treatment to provide statistically better quality compared to each control treatment on one rating date (30-Aug) (Figure 6).

Figure 6. Treatment effects on total (8/30 to 11/22/2010) root-knot nematode induced injury to creeping bentgrass and percent (%) suppression. *Means followed by the same letter are not significantly different (P=0.05) using Student-Newman-Keuls and apply only to data taken from August 8/30/2010.

Preventative Mangement of Root-Knot Nematodes using Biorationals and Fertilizers. Mahady, M.M. (2010)



Summary

- GRIGG PK Plus is more than a phosphite and is formulated differently from other phosphite fertilizers, which makes it more effective.
- Utilize all options of nutritional to build plant health, maximize fungicide efficacy, minimize environmental impact.
- An important discovery is the benefit of using GRIGG™ PK Plus® to manage microdochium patch where it occurs chronically.