Effects of CoRoN® Slow-Release Foliar Nitrogen Fertilization On Corn Growth

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Abstract

In modern crop production, if one can increase the efficiency of nitrogen fertilizer utilization by plants, the potential exists to decrease production costs and improve environmental stewardship. CoRoN® 25-0-0-.05B is a slow- release foliar applied nitrogen fertilizer that has been shown to promote uniform plant growth and efficient nutrient utilization with little crop injury. This poster examines the effects of CoRoN® applied to corn at various stages of growth. Treatments consisted of three gallons per acre as a foliar application at V-6 to V-8 for use as a partial replacement for side-dress nitrogen application. Data collected included growth stages, plant height, stalk diameter, projected grain yield, and plant tissue analysis.

Introduction

CoRoN® 25-0-0-.5B is a slow-release foliar applied nitrogen fertilizer, containing .30 kilograms of actual nitrogen per liter of solution. Foliar applied nitrogen alleviates some of the need for ground applications. It also may allow for lower amounts of initial and late-season nitrogen to be applied. Nutrient pollution, has ranked as one of the top causes of degradation in some U.S. waters. Excess nutrients lead to significant water quality problems including harmful algal blooms, hypoxia and declines in wildlife and wildlife habitat (U.S. EPA). Less nitrogen in the ground and more on the leaf can lead to more efficient farming practices and reduced total costs.

The use of synthetic nitrogen fertilizers has increased steadily in the last fifty years (Glass). As early as 1957, foliar applications of urea solutions were shown to increase wheat grain protein by as much as 4.4% (Finney et al., 1957). The most efficient time to apply foliar nitrogen is from the V8 leaf stage through tasseling. During this time, nitrogen uptake is 1.8 to 3.6 kilograms per day (Mengel). A study conducted at the University of Missouri in 2009 found the average yield with foliar applied nitrogen was decreased by 554.65 kilograms per hectare (Missouri State Agronomy Department). Results from two years of university research trials showed a foliar application increased yields an average of 616.28 kilograms per hectare. The results were compiled from 22 comparison studies at three Midwestern universities in the 2008 and 2009 crop seasons.

Objective

- To investigate the effect of CoRoN® on stalk girth, plant height, leaf tissue nutrient concentrations.
- To determine the efficacy of CoRoN® for improving corn growth and grain yield.

Experimental Design

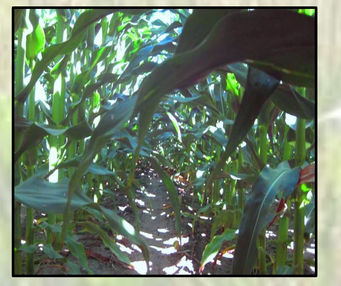
- The experiments took place in Morrison, Benton, Stearns, Wright, and Sherburne Counties, located in Central Minnesota.
- These counties were chosen for the experiment because vastly different soil textures were apparent.

Experimental Design (Cont.)

- Split field trials were used comparing foliar nitrogen application versus no foliar application using hybrid field corn varieties.
- Treatments:
  - Foliar treated corn (11.4 liters CoRoN® per acre)
  - Control (No foliar nitrogen applied)
- Right side of sprayer boom (13.7 meters) was shut off on first pass around field (control strip).
- Ten plants were used to measure plant height, stalk diameter, and estimated yield (measured fifty days after application).
- Ten leaves were used from treated and control field for leaf tissue analysis (collected ten days after application).
- Hybrids, planting dates and soil applied fertilizer rates:
  - Wright County
    - DKC 50-35
    - Planted 4/23/2010
    - Fall anhydrous at 61.4 kilograms
    - 45.5 kilograms actual N in spring
  - Sherburne/Stearns County
    - DKC 36-34
    - Planted 4/28/2010
    - 65.9 kilograms actual nitrogen in spring
  - Benton/Morrison County
    - Krueger K-1295RR
    - Planted 4/21/2010
    - 68.2 kilograms actual nitrogen in spring
- All fields received 3.48 liters per hectare SureStart® pre-emerge herbicide,1.63 liters per hectare RoundUp PowerMax® and .49 liters per hectare Hel-Fire® for second pass herbicide
- Treated plots received 28.17 liters per hectare of CoRoN® as foliar application
- Complete randomized block method used to determine significance

Results

Control



Treated with 28.17 liters CoRoN®

Control

Treated with 28.17 liters CoRoN®

Notice split in field

Treated with 28.17 liters CoRoN® Control

Results (Cont.)

- Leaf tissue analysis taken ten days after application showed significant differences between amount of Nitrogen, Potassium, and Boron in leaf (Figs. 1 through 3). Stalk girth was also statistically different (Fig. 4).
- Plant height and estimated yield showed no significant differences (Figs. 5 and 6).
- Slight nitrogen burn on tip of leaf was seen four days after application.
- Actual yield results for Krueger K-1295RR showed 25.4 kilogram gain for treated fields (Data not shown).

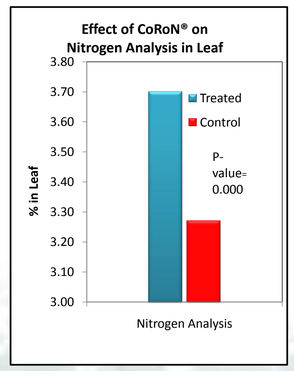


Figure 1

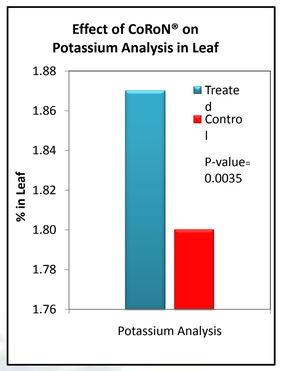


Figure 2

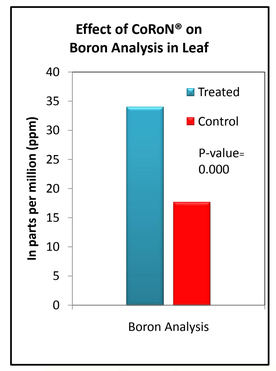


Figure 3

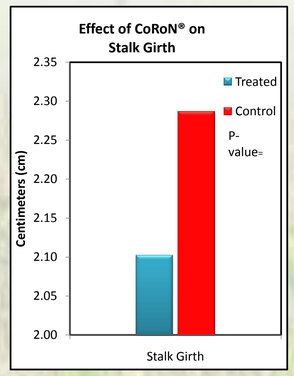


Figure 4

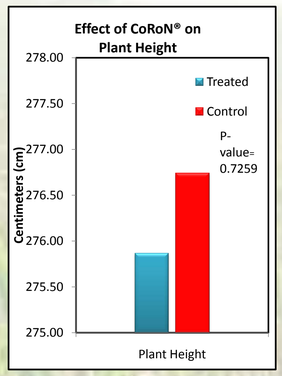


Figure 5

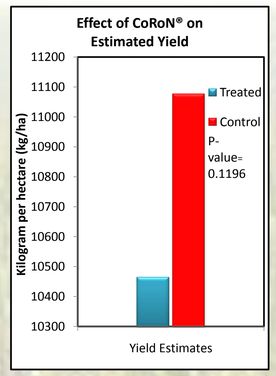


Figure 6

Discussion/Conclusions

The use of CoRoN® in this experiment gave corn plants a significant amount greater of nitrogen, potassium, and boron in the leaves. It also increased stalk girth, though this may not have been instrumental to increasing yields. The CoRoN® made the leaves greener and decreased the amount of firing on the bottom leaves of the plants. In past experiments varying data and results have been found. Further experiments need to be done to determine if applications of CoRoN® are efficacious.

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Acknowledgements

This research would not have been possible without the hard work, dedication, and time of the following people:

Dr. Dennis Cosgrove, Steve Carter, Steven Huff, Keith Hackett, Donald Kloss, John Dearing, Kenneth Plumski, Michael Plumski, Dr. Larry Baumann, Bill Smith and Dr. Gregory Willoughby.

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