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Northcentral Research Report

CHANGE is the theme of this issue of *INSIGHTS*. Effective January 1, 2007, the Potash & Phosphate Institute changed its name to the International Plant Nutrition Institute (IPNI) and we changed the name of this publication from *News & Views* to *INSIGHTS*.



This issue of *INSIGHTS* features the brief Interpretive Summaries related to research projects supported by IPNI in the Northcentral Region. This information and even more detail on each project can be found at the research database at our

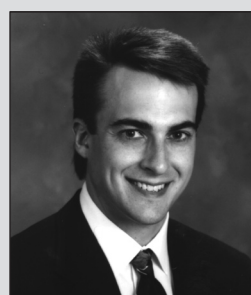
website: >www.ipni.net/research<.

Iowa

Removal of Phosphorus in Corn and Soybean Grain as Related to Long-Term Crop Yield and Soil-Test Phosphorus

Project Leader: Dr. Antonio Mallarino, Iowa State University, Department of Agronomy, 3216 Agronomy Hall, Ames, IA 50011. Telephone: 515-294-6200. Fax: 515-294-2458. e-mail: apmallar@iastate.edu

In many soil P management strategies, an estimate of P removal by harvested grain is used to determine maintenance fertilizer application rates. These rates are intended to keep soils at desired levels by simply replacing what is removed from the field through crop harvest. Relatively little recent work has been done to check the standard removal estimates used in university recommendations. At Iowa State University, archived grain samples from the last 12 years have been analyzed for P concentration. Analyses are showing that the current P removal estimate for soybean is fairly accurate, but the rate for corn is about 16% too high. Examination of changes in soil tests over time has revealed that reliance on these P removal estimates does a good job of maintaining soil test levels if average yields are used in the estimates. Basing maintenance estimates on yield goals that are unattainable in most years leads to application rates that build soil test levels, rather than maintain them. *IA-10F*



Dr. T. Scott Murrell
*Northcentral Director
International Plant Nutrition
Institute (IPNI)*
2422 Edison Dr.
West Lafayette, IN 47906
Phone: 765-463-1012
Fax:
e-mail: smurrell@ipni.net
website: www.ipni.net

Foliar Fertilization and Fungicide Application for Soybean

Project Leader: Dr. Antonio Mallarino, Iowa State University, Department of Agronomy, 3216 Agronomy Hall, Ames, IA 50011-0001. Telephone: 515-294-6200. Fax: 515-294-0730. e-mail: apmallar@iastate.edu

Soybean disease control and management is getting more attention with farmers' growing concern over Asian rust. A side benefit of fertilization is that it can sometimes help the plant suppress or withstand diseases. This study is investigating whether or not foliar fertilization provides any increased disease protection beyond what is possible with a fungicide application. In 2006, high incidences of brown spot and bacterial blight were observed at all sites of this experiment. Fungicide reduced incidence and severity of brown spot at two sites, and only severity at the third. Fungicide also reduced incidence and severity of bacterial blight at two sites. Foliar applications of fertilizer had little measurable effect on disease. Preliminary conclusions to date are that fungicide has good potential for reducing both incidence and severity of soybean diseases and increasing yields, while foliar fertilization does not. *IA-15F*

Evaluation of Alfalfa Response to Sulfur Fertilizer in Iowa

Project Leader: Dr. John Sawyer, Iowa State University, Dept of Agronomy CSES, 2104 Agronomy Hall, Ames, IA 50011. Telephone: 515-294-1923. e-mail: jsawyer@iastate.edu
Project Cooperators: Brian Lang and Steve Barnhart

Interpretations of sulfur (S) soil tests have been elusive in the Midwest. Historically, the greatest chances of S deficiencies have been on low organic matter, coarse textured soils. However, S deficiencies are now being observed in northeastern Iowa on soils that have higher organic matter

content and more clay minerals. This study is investigating the need for S fertilization for alfalfa in this part of the state. The results from 2006 indicate that the S soil test did not reliably predict S need. However, plant analysis was effective. Concentrations below 0.25% indicated a need and a good chance of a profitable response to S in the year of application. More research will need to be conducted to confirm the 2006 results and improve S recommendations in the future. *IA-16F*

Evaluation of 13-33-0-15S for Corn Production

Project Leader: Dr. John Sawyer, Iowa State University, Dept of Agronomy CSES, 2104 Agronomy Hall, Ames, IA 50011. Telephone: 515-294-1923. e-mail: jsawyer@iastate.edu

Project Cooperator: Daniel Barker

In northeast Iowa, S deficiencies are becoming more prevalent. Research is underway to determine the management practices best able to rectify the problem. In this study, ammonium sulfate and a new product containing equal proportions of elemental and sulfate-S forms were tested at two sites where corn was grown. Corn responded to S additions at only one site, although plant concentrations of S were below sufficient levels at both locations. Where the response occurred, both S sources performed equally well. This project is in its first year and will be continued to further evaluate the probability of corn response to S as well as the efficacy of both products. *IA-17F*

Illinois



Nutrient Management Effects on Soybean Rust

Project Leader: Dr. Stephen Ebelhar, University of Illinois, Dixon Springs Agriculture Center, Rt 1 Box 256, Simpson, IL 62985. Telephone: 618-695-2790. Fax: 618-695-2492. e-mail: sebelhar@uiuc.edu

Project Cooperator: C.D. Hart

This project is part of a multi-state effort examining the effects of mineral nutrition on the incidence and severity of soybean diseases, including Asian rust. Several elements, including soil applied potassium chloride (KCl), foliar manganese (Mn), and foliar boron (B), are being studied to see how they compare or interact with a fungicide treatment. In Illinois, Asian rust has not yet been observed at the research sites studied. Frogeye leaf spot has been the primary disease.

Foliar application of B and/or Mn caused some phytotoxicity problems in 2005 at each of the two locations studied, but was less of a problem in 2006. This could be related to limited rainfall at these locations around the time of foliar application in 2005 compared to 2006. The fungicide application at one location in 2005 significantly increased the level of phytotoxicity and reduced grain yield, but no problems were observed with the different fungicide used in 2006. At the other location, the fungicide treatment reduced the incidence of frogeye leaf spot, but there was no effect on yield in 2005. In 2006 there was a positive yield response to fungicide application at both locations.

None of the fertilizer treatments significantly affected soybean grain yield in either year. Variety differences were varied and there were few interactions between variety and fungicide or between variety and fertilizer treatment. The foliar application of B usually increased soybean leaf B and the application of Mn usually increased leaf Mn, but neither affected yields. Application of other nutrients such as K or S usually did not significantly increase leaf levels of these nutrients compared to the check plots, presumably because of the adequate nutrient supplying power of the soil. *IL-32F*

Indiana



Impact of Mineral Nutrition on Soybean Plant Health

Project Leader: Dr. Shawn Conley, Purdue University, Agronomy Department, 915 W State St., West Lafayette, IN 47907-2054. Telephone: 765-494-0895. e-mail: conleys@purdue.edu

Project Cooperators: Don Huber, Lance Murrell, and Scott Murrell

This project is part of a multi-state effort examining the effects of mineral nutrition on the incidence and severity of soybean diseases, including Asian rust. Several treatments, including soil-applied potassium chloride (KCl), foliar manganese (Mn), and fungicide are being studied. Fungicide applications are the most commonly used approach to combatting Asian rust.

In 2006, no Asian rust was observed, but septoria brown spot was present. Fungicide, applied alone or in combination with KCl, reduced brown spot incidence significantly, although infection rates were low across the site. No differences existed among treatments for grain yield, protein, oil, or fiber content. *IN-24F*

Minnesota



Crop Responses to Soil Amended with Turkey Manure Incinerator Ash

Project Leader: Jeff Strock, University of Minnesota, Dept of Soil, Water and Climate, 23669 130th St., Lamberton, MN 56152. Telephone: 507-752-5064.

e-mail: jstrock@soil.umn.edu

Turkey production generates a large amount of manure throughout the year. Incineration of this manure generates additional energy and reduces storage space. A by-product of the incineration is ash. This ash contains sufficient quantities of nutrients to be used as a fertilizer, but how effective is it compared to traditional fertilizer sources? In this study, three crops were studied: corn, soybean, and alfalfa. Turkey manure ash was compared to combinations of potassium chloride (KCl) and triple superphosphate (TSP).

In 2006, corn showed no response to any nutrient source. Soybean yielded more with ash than with commercial nutrient sources. Alfalfa responded favorably to both commercial fertilizer and turkey manure, with both nutrient sources being equally viable. *MN-25F*

South Dakota



Impact of Potassium, Chloride, and Manganese Fertilizer Amendments on Soybean Rust in Eastern South Dakota

Project Leader: Dr. Howard Woodard, South Dakota State University, Plant Science Dept., Box 2207A, Brookings, SD 57007. Telephone: 605-688-4774. Fax: 605-668-4024. e-mail: howard_woodard@sdstate.edu

Project Cooperators: Anthony Bly and Robert Berg

This project is part of a multi-state effort examining the effects of mineral nutrition on the incidence and severity of soybean diseases, including Asian rust. Proper nutrition has been shown to be an important component of disease management in other crops in the Great Plains, such as corn and small grains. The primary emphasis of this study is to isolate the effects of chloride (Cl⁻) and manganese (Mn) on disease incidence and severity and soybean yield. Both of these nutrients are known to be important to a plant's ability to fight off or withstand disease.

In 2006, a site was chosen with low soil Cl levels. Conditions in May, June, and July were hot and dry. No Asian rust was observed on the soybean crop, so effects could not be determined. However, yield data indicated no significant effects of fungicide or foliar Mn. Applications of Cl suppressed yields significantly. *SD-14F*

A Decision Aid for Fertilizer Placement With Seed

Project Leader: Dr. Ronald Gelderman, South Dakota State University, Plant Science Department, Box 2207A, Brookings, SD 57007. Telephone: 605-688-4770. e-mail: ronald.gelderman@sdstate.edu

Placement of fertilizer with the seed is a convenient option for those wishing to apply fertilizer at the time of planting. However, this practice must be used with caution since fertilizer can cause seedling damage if applied at rates that are too high. Traditionally, university recommendations have been vague or overly simplistic in their guidance for this practice. A new project at South Dakota State University reviewed many studies of seed-placed fertilizer. Summaries and statistical analyses of various crops and fertilizer sources were performed. The result is a new spreadsheet decision aid that is currently under review. The spreadsheet tool allows users to input a few key pieces of information and get back a suggested rate for a specific crop and nutrient source. *SD-15F*

Wisconsin



Improving Nitrogen Management for Corn on Irrigated Sandy Soils

Project Leader: Dr. Larry Bundy, University of Wisconsin–Madison, Department of Soil Science, 1525 Observatory Drive, Madison, WI 53706-1299. Telephone: 608-263-2889. Fax: 608-265-

2595. e-mail: lgbundy@wisc.edu

Are there ways of improving N management for intensive, irrigated corn production on sandy soils? A major concern in such situations is the large potential for economic and environmental N losses through leaching. This project explores a variety of N sources, rates, and application timings on a Plainfield loamy sand soil in Wisconsin. The 2006 growing season was relatively dry with all months having below normal rainfall, except May, which was about 1.7 in. above normal. In this drier year, corn response to N topped out at about 100 to 150 lb N/A. At the 150 lb N/A rate, no differences between sources and application times were detected. Growing conditions this year favored using a single preplant application of polymer coated urea (ESN) compared to using that source at later application times.

WI-25F ■



IPNI

Send address changes or inquiries to:

**INTERNATIONAL PLANT
NUTRITION INSTITUTE**

655 Engineering Drive, Suite 110

Norcross, GA 30092-2837

Phone: 770-447-0335

Website: www.ipni.net

INSIGHTS

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