

NEWS & VIEWS

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Dr. Tom Bruulsema,
Northeast Director
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Research to Continuously Improve Nutrient Management

CROP NUTRIENTS are under continuing scrutiny. While their positive role in boosting yield and quality is well-known, it is also often taken for granted when the discussion turns to managing impacts on the environment. This brief review of research projects in the Northeast region reflects the industry's commitment to find solutions that protect water and air while continuing to improve crop yield and quality. These projects are supported by the Foundation for Agronomic Research (FAR), the Potash & Phosphate Institute (PPI), and the Potash & Phosphate Institute of Canada (PPIC), through financial and professional involvement.

Maryland



Building a Maximum Yield Cropping System for Corn, Wheat, and Doublecropped Soybeans

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Project Cooperator: William Kenworthy

The goal of this study is to develop a management program that increases crop yield, input efficiency, and profit potential in a predominantly no-till cropping system. This cropping system consists of four crops in 3 years: no-till soybeans in corn stubble, followed by minimum-till wheat doublecropped with no-till soybeans, and then no-till corn.

The rotation clearly improved corn and soybean yields compared to continuous cropping. Starting in 2000,

nitrogen (N) use efficiency has appeared to improve when ammonium sulfate (AS) was blended into the N source, either urea or ammonium nitrate. In 2003, in no-till and strip-till corn with AS supplying one-third of the N, corn yield increased by 30 bu/A, particularly with split application, compared to broadcast urea.

In 2004, doublecrop soybeans responded to N applied to the preceding winter wheat crop. Soybean yields were 4 to 5 bu/A higher where 120 lb N/A had been applied to the wheat, regardless of whether the N had been supplied as urea or a urea-AS blend. The same N sources applied directly to single-crop soybeans produced no yield response at all. Nitrogen applied to winter wheat increased yields by 26% in no-till and by 53% in a tilled soil, with an advantage of 3% to 6% from including AS in the blend.

Experiments comparing starter and broadcast fertilizers as sources of phosphorus (P), potassium (K), manganese (Mn), and sulfur (S) gave inconsistent results in the 2003 and 2004 seasons, but the highest yield resulted from applications that included all four of these nutrients.
MD-06F



Evaluation of Fertilizer Nitrogen Applications with and without Ammonium Sulfate in Selected Vegetable Crops

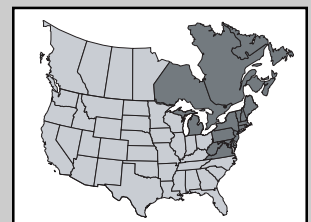
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The objective of this study is to measure the influence of AS blended with ammonium nitrate on the yield of irrigated sweet corn. In 1999, sweet corn yields increased from 1.6 to



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6.5 t/A in response to application of 120 lb of N/A. During the 2000 season, blending AS into the N supply increased the yield of sweet corn by 5%. Yields as high as 8.3 t/A were achieved when AS was applied at row closure. In 2002, top yields were about 5.8 t/A and were unaffected by N source. In 2003, strip-tilled sweet corn yielded as high as 9 t/A with a blend including AS...16% higher than when fertilized with urea alone. In 2004, poor growing conditions resulted in low yields, but blending AS into the N supply increased yields 10% compared to urea alone. Split application of N boosted yield by an additional 24%. MD-11F

New Brunswick



Nitrogen, Phosphorus, and Potassium Needs of Forages in New Brunswick

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Project Cooperator: Mike Price

Fertilizer recommendations for forages have been lower in New Brunswick than anywhere else in the Atlantic region. Since there is little recent data on soil test calibration, this study aimed to examine forage responses to N, P, and K at three sites with established forage.

In the first 2 years, responses to all three nutrients have been observed, but have varied from site to site, despite poor yields. In 2003, optimum levels of N were 90 lb/A at two sites and 45 lb/A at the third. Optimum levels of P₂O₅ and K₂O were 45 and 55 lb/A, respectively, regardless of soil test level.

Combined results from 2002 to 2004 suggest that optimum input levels for this type of forage are about 90 lb N/A, 45 lb P₂O₅/A, and 55 lb K₂O/A. NB-01

New Jersey



Color Images of Corn Rhizosphere pH

Project Leader: Dr. Joseph Heckman, Rutgers University, Plant Biology and Pathology Department, 59 Dudley Road, New Brunswick, NJ 08901. Telephone: 732-932-9711, 119. E-mail: heckman@aesop.rutgers.edu

The project is underway. Corn rhizosphere pH appears to react in the same manner as turfgrass to nitrate and ammonium sources of nitrogen. Efforts are continuing to obtain satisfactory images to illustrate the differences.

Color images of turfgrass rhizosphere pH effects are

available at: ><http://turf.rutgers.edu/extensionandoutreach/soilprofile14-15.pdf>< in the *Soil Profile Newsletter*. Color images of the corn rhizosphere will be made available in the near future. NJ-21F

New York



Managing Nitrogen and Potassium in Brown Midrib Sorghum-Sudangrass

Project Leader: Dr. Quirine Ketterings, Cornell University, Department of Soil and Crop Sciences, 817 Bradfield Hall, Ithaca, NY 14853. Telephone: 607-255-3061.

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Project Coordinators: Jerome Cherney, Tawainga Katsvairo

Brown midrib sorghum-sudangrass (BMRSS) forage compares favorably with corn silage as feed for dairy cows in terms of milk production per acre, particularly in late-planted or droughty situations. While it has been shown to respond well to N, little is known about its K requirements. This project aims to find the optimum rates of N and K for maximum yield and quality of BMRSS.

In 2002 and 2003, N applied at 100 lb/A for each cut increased yield 3-fold to 12 tons/A (at 35% dry matter) despite drought conditions. Applied K did not impact yield or quality. Milk production per acre was calculated to be optimized at the N rate for optimum forage yield...135 lb/A. The optimal N rate for BMRSS appears to be considerably higher than that of corn.

Additions of 200 lb K₂O/A per cut supplied considerably more K than was removed. It raised forage K concentration above 3%, but maintained soil test K at the high level. The 100 lb/A rate of K₂O supplied enough K to balance removal, but the soil test declined to the medium level. With no K applied, forage with low K levels suitable for dry cows was obtained, but soil tests declined rapidly to a rating of low.

In 2004, the project objectives shifted to more detailed examination of nutrient removal. Initial findings indicate that an average crop of 5.6 tons of dry matter would remove 70 lb P₂O₅/A. NY-05F

Ohio



Evaluating Site-Specific Soybean/Corn Management Systems in Ohio

Project Leader: Mr. Nathan Watermeier, Ohio State University, 26 Ag Admin Bldg., Columbus, OH 43210-1010. Telephone: 614- 688-3442. E-mail: watermeier.2@osu.edu

This project is evaluating application of site-specific technologies in a corn-soybean rotation system.

In 2003, the study field was in soybeans. Economic thresholds for soybean population levels for Ohio have been shown to perform best using 145,000 seeds/A for highly productive soils and 180,000 seeds/A for less productive soils. For this field, data sets of yield, soils, elevation, electrical conductivity (EC), and remote sensing over the past 5 years provided a high correlation of known field productivity levels. Three different soybean population levels, from 140,000 to 220,000 seeds/A, were replicated through various locations in the field. The yield means among each of the treatments for each of the field productivity levels differed by only 1 to 2 bu/A. The field received adequate rainfall, and yields ranged from 30 to 35 bu/A. Overall, with small differences in yield gain, there is a suggestion that lower seed rates were more profitable than those above 180,000 seeds/A. However, differences were small. It may be more important to reduce risk by ensuring adequate seeding rates around 180,000 seeds/A.

The educational objective of this project is to enhance the decision-making abilities of crop producers relative to the incorporation of precision agriculture practices into their operations. Data and information gathered from this project serve as the basis of an expanded educational program for precision agriculture in Ohio. *OH-15F*



Potassium Fertilizer Management in No-Till Soybean Production

Project Leader: Dr. Robert Mullen, School of Natural Resources, Ohio State University, 1680 Madison Ave., Wooster, OH 44691. Telephone: 330-263-3785. E-mail: mullen.91@osu.edu

Crop producers in the eastern Corn Belt often fertilize the rotation rather than the crop. Typically, in the fall prior to the corn crop, they supply enough P and K to satisfy the nutrient needs of both corn and soybeans in the rotation. This practice is probably a viable option for fields with more than adequate soil nutrient levels. But on marginal fields it may be limiting production, specifically with regard to K. In addition, K requirements may be increasing due to the trend toward earlier planting dates for soybeans.

The objectives of this new project beginning in 2005 are

to determine:

- 1) soybean yield response to spring-applied K;
- 2) whether early-planted soybeans need more K;
- 3) whether current critical levels for soybean tissue K are adequate for no-till production systems.

On-farm trials have been set up across the state and research station trials are in Hoytville and Wooster. The research study will be expanded to investigate crop rotation (corn-soybean) and K fertilization in the fall of 2005. *OH-16F*

Ontario



Kenneth M. Pretty Graduate Scholarship, 2004

University of Guelph, OAC Awards Committee, Ontario Agricultural College, Guelph, ON N1G 2W1.

On November 12, 2004, the Kenneth M. Pretty Graduate Scholarship was awarded to Mr. Chris Denys, whose research is on soil fertility and nutrient management. *ON-13F*



Yield Response of Intensively Managed Corn and Soybean to Potassium Fertilizer Rate and Placement

Project Leader: Dr. Bill Deen, University of Guelph, Department of Plant Agriculture, Guelph, ON N1G 2W1. Telephone: 519-824-4120, 3397. E-mail: bdeen@uoguelph.ca

Project Cooperators: John Lauzon, Greg Stewart

The goal of this project is to examine the variation across a field landscape in corn and soybean yield response to input intensity. The objectives are to identify parts of the landscape most responsive to increased input levels, and to determine the particular constraints to crop growth at these locations during various stages of crop development.

Seven strips of high-input treatments...comparing normal and high rates of K across normal and deep placement, and normal and high inputs—N, P, and plant density...were applied in the fall of 2001 across the full length of a large field, in preparation for corn and soybeans. The treatments were repeated for the 2003 and 2004 crops, rotating the corn and soybeans. Starting in the fall of 2004, tillage and fertility treatments were applied only to soybeans.

Intensive management has boosted crop biomass more than yields. High inputs boosted yields by about 4% in the first two years, increasing to 9% in 2004. Potassium boosted yields equally in grower and high input

levels...about 3% the first 2 years and 6% in 2004. Potassium reduced corn lodging at high input levels in 2003. The results demonstrate that the impacts of changes in input levels extend well beyond a single year.

The project is continuing in 2005. Since the soybeans have not responded to treatments as currently grown in twin 30-in. rows, they will be planted in narrower rows. *ON-24F*



Nitrogen and Phosphorus Needs for Tomatoes and Green Peppers

Project Leader: Dr. T.Q. Zhang, Agriculture and Agri-Food Canada, Greenhouse and Processing Crops Research Centre, Harrow, ON N0R 1G0. Telephone: 519-738-2251, 476. E-mail: zhangt@agr.gc.ca

Project Cooperators: C.S. Tan, A. Liptay, J. Warner, C.F. Drury, and D. Reynolds

Processing tomatoes and green peppers are examples of high-value food crops whose production may be impacted by the regulation of nutrient management. This experiment, initiated in 2002, aimed to determine the effects of N and P on yield and quality of the two crops, and on risk of nutrient losses. Drip fertigation was used for intensive management.

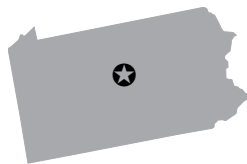
Results of the first 2 years indicated optimum rates of N of 180 to 190 lb/A, approximately double the current recommendations. Phosphorus fertilizer increased the marketable yield of peppers both years, despite soil test levels so high that no P would have been recommended.

Results from the 2003 season also showed the importance of balanced nutrition for protection of groundwater quality. Increasing levels of P fertilizer decreased the residual nitrate in the soil following harvest.

In the 2004 growing season, optimum marketable yields required 250 lb N/A for green peppers, and 260 lb N/A for

tomatoes. These rates exceed the current recommendations four-fold for peppers and two-fold for tomatoes. The optimum rates also exceed nutrient removals by the crops. *ON-27F*

Pennsylvania



Nitrogen Form Evaluation on Penn A-4 Creeping Bentgrass Putting Green Quality

Project Leader: Dr. Max Schlossberg, Penn State University, Agronomy Department, 0403 Ag Sci & Ind Bldg., University Park, PA 16802. Telephone: 814-863-1015. E-mail: mjs38@psu.edu

Nitrogen fertilizer impacts quality of putting greens. This project is designed to find the rates and forms of N that optimize vigor, color, rooting, and performance of Penn A4 bentgrass. It will also identify the nutrient ratios in leaf clippings associated with optimum N inputs, and examine the interactions with soils and environmental conditions at multiple sites, and with typical growth regulators.

At the Bent Creek site, on June 24, 2004, the treatments with a 9:1 ratio of AS to urea or ammonium nitrate appeared visually superior to all other treatments. The PRIMO growth regulator also improved color. *PA-10F* ■

Visit the Web site:

>www.ppi-ppic.org/Northeast<

Coming events:

July 19-21, 2005 — InfoAg 2005, Springfield, Illinois, U.S.A. ><http://www.infoag.org><

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