NEWS & VIEWS

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Dr. N.R. Usherwood, Southeast Director
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Science-based Research and Education...Essential for a Productive, Profitable and Environmentally Sound Agriculture in the Southeast

THE Potash & Phosphate Institute (PPI) and the Foundation for Agronomic Research (FAR) provide both financial and technical support for a broad spectrum of agricultural research and education programs. The following research and extension education programs received support from PPI/FAR during the 1997 cropping season. A brief description of each project is provided.

Alabama

Response of Cotton to the Source and Timing of Nitrogen Fertilization on a Sandy Coastal Plain Soil

Project Leader: *Dr. Greg Mullins, Department of Agronomy and Soils, 202 Funchess Hall, Auburn University, AL 36849-5412.*

The field study was conducted at the Wiregrass Substation in Headland, Alabama, on a sandy coastal plain soil. Nitrogen (N) as urea ammonium nitrate (UAN) solution, ammonium thiosulfate (ATS), urea, ammonium nitrate (NH_4NO_3), and ammonium sulfate [$(NH_4)_2SO_4$] were applied at a rate of 90 lb N/A. The primary purpose was to evaluate cotton response to source and timing of fertilizer N applied with and without sulfur (S) and potassium (K). Bollgard 35 was irrigated. Average lint yield was 1,418 lb/A. Lint quality was not affected by any of the N treatments.

During the 1997 season, the lowest lint yields were obtained when urea was applied preplant without S. The highest yields resulted from a combination of UAN applied preplant plus S. With UAN solution (32 percent N) applied at a rate of 90 lb/A, the addition of S increased seed cotton yield from 3,267 to 3,985 and lint yield from 1,324 to 1,618 lb N/A. The highest treatment (N plus S) yielded 3,985 lb/A of seed cotton and 1,618 lb/A of lint.

Boron Effects on Bentgrass and Bermudagrass Rooting and Grow-in on U.S. Golf Association Recreational Greens

Project Leader: *Dr. E.A. Guertal, Department of Agronomy and Soils, 202 Funchess Hall, Auburn University, AL 36849-5412. (334-844-4100; fax: 334-844-3945).*

A greenhouse study evaluated the response of three bentgrass varieties to weekly applications of B applied at rates of 0, 0.5, 1.0, 2.0 and 3.0 ppm in the nutrient solution. Plants were grown for 12 weeks and then evaluated for root and shoot growth. The objective was to determine the influence of B on rooting mass. Treatment effects indicated that bentgrass shoot weight increased with increased rates of B.

Florida

The Influence of Various Rates of Ammonium Sulfate and Ammonium Nitrate of Limpograss and Water Quality

Project Leader: *Dr. Jack Rechcigl, University of Florida, Rt. 1, P.O. Box 62, Ona, FL 33865-9706. (941-735-1314; fax: 941-735-1930 ; e-mail: na@gnv.ifas.ufl.edu).*

A 3-year study in central Florida is evaluating pasture (limpograss) response to 0, 75, 150 and 300 lb N/A/year applied in three split applications as either NH_4NO_3 or $(NH_4)_2SO_4$. All treatments receive 500 lb/A of 0-10-20.

Dry matter yields were increased from 1.4 to 8.5 tons/A as the rate of N increased from 0 to 300 lb/A. Forage yields were consistently higher when fertilized with

Dr. Noble R. Usherwood
Southeast Director (PPI)
233 Kenilworth Circle
Stone Mountain, Georgia 30083
Phone: (404) 294-0137

$(NH_4)_2SO_4$ compared with the same rate of N as NH_4NO_3. The difference is believed to be due to S in $(NH_4)_2SO_4$. As the N rate increased from 0 to 75, 150, and 300 lb/A, the yield difference between the two N sources increased from 0 to 0.3, 0.7, and 1.2 tons/A, respectively.

Nutritional Requirements for Optimum Cotton Yield and Quality

Project Leaders: *Dr. David Wright and Dr. Fred Rhoads, North Florida Research and Education Center, University of Florida, Rt. 3, Box 4370, Quincy, FL 32351. (904-627-9236).*

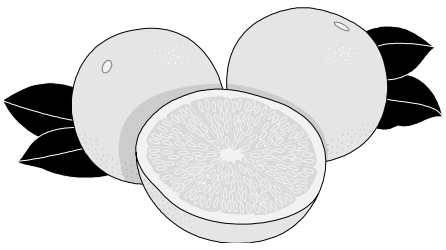
Twelve replicated treatments evaluate time, rate and method of application of N, K, Mg, B, and S for optimum yield and quality of irrigated Paymaster 1244 cotton.

Cotton lint yields ranged from 1,337 to 1,476 lb/A during 1996. On sandy, less fertile soils, 1997 lint yields ranged from 315 to 843 lb/A. Cotton lint yields with only residual soil N averaged 325 lb/A. As N rate increased to 20, 95 and 145 lb/A, lint yields increased to 447, 662 and 843 lb/A, respectively. Under 1997 growing conditions, lint yield was not improved by KNO_3 applied in 4 weekly foliar applications. Although not significant at the 5 percent level, lint yields tended to be higher for treatments which included S sources such as $(NH_4)_2SO_4$ and sulfate of potash magnesia ($K_2SO_4 \cdot 2MgSO_4$).

Effects of Phosphorus and Potassium on the Size and Quality of Grapefruit

Project Leader: *Dr. Brian Boman, University of Florida, 2199 South Rock Road, Ft. Pierce, FL 34945. (407-462-1660).*

Three rates of P (30, 90, 150 lb/A P_2O_5) and three rates of K (150, 225 and 300 lb/A K_2O) were applied to producing grapefruit trees in three equal applications of 50-10-50-3 lb/A. A total of 150 lb/A of N plus Mg and B were applied uniformly over the experimental area. The objective is to evaluate crop response to applied P and K for improved fruit sizing and acid/sugar ratios required to meet fruit export specifications. Parameters include leaf analysis for NPK, fruit size, percent juice, acid, solids/box, brix, maturity and yield.



On-farm Evaluation of the Influence of Potassium Sulfate on Tomato Yield and Quality

Project Leaders: *Dr. Stephen O'Hair and Mr. J.F. Carranza, University of Florida, Tropical Research & Education Center, 18905 S.W. 280 St., Homestead, FL 33031. (305-246-7044).*

This research is evaluating tomato response to different rates (0, 80, 120 and 160 lb/A K_2O) and weekly applications of K_2SO_4, KCl and KNO_3 applied through a drip irrigation system.

Soil tests in the experimental plots were medium to high in K. Marketable and total large tomato yields were similar for each of the three sources. Marketable fruit yield (25 lb cartons) increased from 2,247 ctn/A to 2,646 ctn/A with the application of K. Total large fruit yield tended to increase from a control yield of 2,029 ctn/A to 2,440 ctn/A with the 80 lb/A K_2O rate.

Georgia

Teacher's Internship Program

Project Leader: *Dr. Jerry Johnson, University of Georgia, Department of Crop and Soil Sciences, 1109 Experiment Street, Griffin, GA 30223-1797. (770-228-7273, fax: 770-229-3215.*

A children's outdoor agricultural science classroom was developed which included the creation of a notebook to assist in establishment of theme gardens involving corn, cotton, peanuts, and vegetables. The program increases teacher awareness of genetic engineering, molecular biology, digital imaging, plant nutrition, and other high-tech aspects of modern agriculture.

The Impact of Nutrient-Insecticide Sprays on Yield and Insect Populations in Soybeans

Project Leader: *Dr. Gary Gascho, Dept. of Agronomy Coastal Plain Experiment Station, University of Georgia, P.O. Box 748 Tifton, GA 31793-0748. (912-386-3329).*

The insecticide, Dimilin, was foliar-applied with 0.25 lb/A B to eight varieties of soybeans (maturity groups 4 to 8) at the R2, R3, R4, and R5 stages of growth.

Soybean response to late-season foliar applications of N and B occur most often on deep sands (about 5 bu/A) and to a lesser extent on heavier textured loam soils (about 2

bu/A). Field studies support the hypothesis that response is due to supplying late-season nutrition for pod fill which is not being provided by the soil.

In 1997, recommendations were established in Georgia to spray soybeans with 0.25 lb/A B with Dimilin when treating for the velvet bean caterpillar. This recommendation is to be adopted by South Carolina for the 1998 production season.

Precision Farming Systems for Southeast Agriculture

Project Leader: *Dr. Craig Kvien, University of Georgia, Coastal Plain Experiment Station, NESPAL Program Director, P. O. Box 748, University of Georgia, Tifton, GA 31793-0748. (912-386-7274).*

Objective of this project includes the development of a technology and information based system for growers to better manage resources while optimizing yields and profit. Forty-three fields have been yield monitored ...representing 500 acres of corn, 334 acres of soybeans, 77 acres of wheat, 86 acres of oats, and 84 acres of canola. Corn grain yields in excess of 300 bu/A have been detected through yield monitoring of well managed, irrigated fields. Soil test results indicate the need for a sampling design which is more accurate than grid sampling and might consider topography, CEC and organic matter, water relationships, past cultural practices, soil type, etc.

Phosphorus and Potassium Requirements of Seashore Paspalum for Establishment and Grow-in, Over-Wintering and Overseeding Cool Season Species

Project Leaders: *Dr. Robert Carrow and Dr. Ronny Duncan. Dept. of Crop & Soil Sciences, University of Georgia, Griffin Station, Griffin, GA 30223. (770- 228-7277; fax: 770-229-3215).*

Seashore paspalum was established in the summer of 1996 by sprigging due to limited availability of planting material for this ecotype. Sufficient coverage was attained by June of 1997, and then P and K treatments were begun. Treatment measurements and evaluations were initiated in late 1997.

Use of Enhanced Soil Survey to Optimize Fertilizer Application in Precision Farming

Project Leader: *Dr. David Kissel, Department of Crop and Soil Sciences, University of Georgia, Athens.*

The non-irrigated study field of 280 acres was soil mapped prior to planting D&PL 90 cotton. Cotton lint yields of 200 lb/A were harvested from the droughty Grady and Blanton soil locations while the heavier Norfolk and Orangeburg soils yielded 739 and 620 lb/A of lint, respectively. Lint yields were proportional to aerial infrared image densities taken in early September. Yield variability was determined to be due to differences in soil water holding capacity, subsoils having an acidic layer high in Mn, that restricted root growth, and where K was inadequate in very sandy soils for high yield cotton.

Maryland

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

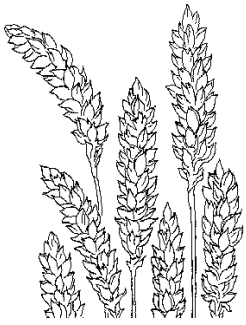
Project Leader: *Mr. Ron Mulford, Poplar Hill Research Center, Rt. 1, 61A, Quantico, MD 21856. (410-548-7051).*

A four crop/three-year cropping system consists of no-till soybeans in corn stubble, followed by minimum till wheat, no-till soybeans, and no-till corn the third year. In the first year, the rotation improved corn yield by 14 bu/A and soybean yield by 5 bu/A above yields of established rotation systems. Full season soybeans in the new rotation yielded 37 bu/A. Soybeans rotated with no-till corn yielded 32 bushels. Corn yielded 174 bu., while conventional tilled corn in a corn/soybean rotation yielded 144 bu/A. In the no-till corn/soybean rotation, corn yielded 153 bu/A. A record yield of wheat was harvested during 1997...151 bu/A ...compared with the Maryland state average of 60, the highest farmer yield of 85 bu/A, and the highest previous research yield of 125 bu/A.

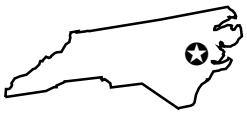
Developing a High Yield Management System for No-Till, Soft Red Winter Wheat

Project Leader: *Mr. Ron Mulford, Poplar Hill Research Center, Rt. 1, 61A, Quantico, MD 21856. (410-548-7051).*

Wheat yields greater than 100 bu/A are common in conventional tillage and almost never achieved with no-till. The 1997 study looked at the influence of fall starter N (0, 21 and 63 lb/A) on no-till versus conventional tillage. As the N rate increased, yields in the no-till plots were 83, 88 and 94 bu/A compared to 84, 93 and 99 bu/A for conventional tillage.



North Carolina



Variable Rate Nitrogen Management for Corn-Wheat-Soybean Cropping Systems

Project Leader: *Dr. R.W. Heiniger, Cropping Systems Specialist, North Carolina State University, James Research & Extension, 207 Research Station Road, Plymouth, NC 27962. (919-793-4428).*

This is one of eight complementary studies to a four-state regional project. Specific objectives are (1) to compare effects of uniform or variable N-management in corn-wheat-soybean cropping systems on yield, nitrogen recovery, and nitrogen loading into drainage waters; (2) to estimate the impact of producer adoption of variable rate N-management on water quality by extrapolating the field-scale database to the whole-farm; and (3) to develop N-BMPs that can be utilized at the Main Study location for the development of improved cropping systems for the Mid-Atlantic Region.

Virginia

Cropping Systems Evaluation: The Main Study Location for a Mid-Atlantic Regional Interdisciplinary Cropping Systems Project

Project Leader: *Dr. M.M. Alley, Dept. of Crop and Soil Environ. Sciences, Virginia Tech, Blacksburg, VA 24061.*

A team of over 20 scientists from four states (MD, NC, PA, and VA) are cooperating in a regional project to improve yield, profitability, and environmental integrity of rain-fed soybean, corn and small grain production systems. The Main Study will use Team identified BMPs in field-scale plots utilizing the latest technology such as GPS/GIS for variable rate and precision input applications. A detailed order-one soil survey by the Natural Resources Conservation Service (NRCS) has been completed. Small grains were established on all plots last fall and equipment is in place to begin the study.

Soil and Foliar Potassium Fertilization of Cotton

Project Leader: *Dr. A.O. Abaye, Dept. Crop and Soil Environ. Sciences, Virginia Tech, 332 Smyth Hall, Blacksburg, Virginia 24061-0404. (540-231-6305; fax: 540-231-3431).*

Boron, N and K are essential for profitable cotton production. The objective is to develop information on the effect of soil- and foliar-applied K on yield and quality of DPL-50 cotton.

Four rates of K_2O applied as KCl (0,50,100,150 lb/A) were applied to the soil pre-plant incorporated and as split applications with half at planting and half side-dressed at first bloom. Potassium nitrate at 2,4,and 6 lb/A was foliar applied at each rate at first bloom and then weekly compared to applications at 3,5 and 7 weeks after first bloom. Over a three year period, K applied pre-plant to the soil increased lint yield by 115 lb/A (150 lb/A in two of the three years). Lint yield response was increased by 138 lb/A when the K rates were split with half applied pre-plant and the remainder at first bloom. Weekly foliar K applications did not improve lint yield over soil application treatments in two of the three years. However, in the third season, the 4 lb/A KNO_3 treatment increased lint yield by 175 lb/A, indicating the importance of plant available K at the time of boll filling and that response to foliar applied K is crop season specific. Scientists reported no differences in lint yields between N rates. The greatest yield was obtained with 1 lb/A B treatment. No interaction was noted between B and N. Lint yields in the study ranged from 1,070 to 1,138 lb/A.

The Potential Interactions of Nitrogen and Boron in Cotton

Project Leaders: *Dr. A.O. Abaye, Dept. of Crop and Soil Environ. Sciences, Virginia Tech, Blacksburg, VA 24061-0404. (540-231-6305; fax: 540-231-3431).*

South Carolina Project: *Dr. Bob Lippert, Department of Agronomy, Clemson University, Clemson, SC (864-656-3511).*

North Carolina Project: *Dr. Steve Hodges, Dept. of Soil & Crop Sciences, North Carolina State University, Raleigh, NC. (919-515-7307).*

Georgia Project: *Dr. Gary Gascho, Department of Agronomy, Coastal Plain Experiment Station, P. O. Box 748, University of Georgia, Tifton, GA 31793-0748. (912-386-3329).*

Cotton nutrition requirements for B and N are being evaluated in a regional program involving scientists at VPI, Clemson University, University of Georgia, and North Carolina State University, with Dr. Ozzie Abaye at VPI as coordinator. The variety DPL-50 and other cotton varieties are being evaluated for response to four levels of N (0,30,60,90 lb/A) and four levels of B (0,0.5,1.0, and 2.0 lb/A). Cotton responds well to N and B region-wide. However, the extent of the response varies from year to year. In both 1996 and 1997, cotton yield response to B applied at the rate of 0.5 lb/A was favorable. However, lint yields declined at the 2 lb/A rate and tended to decline less when applied with higher rates of N. ■

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