

# NEWS & VIEWS

A regional newsletter published by the  
Potash & Phosphate Institute (PPI) and the  
Potash & Phosphate Institute of Canada (PPIC)



Dr. N.R. Usherwood,  
Southeast Director  
June 1999

## 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



#### 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, 253 Funchess Hall, Auburn University, AL 36830 (334-844-3999, fax 334-844-3945).*

The effect of boron (B) on rooting mass of three varieties of creeping bentgrass seedlings was studied in the greenhouse. Dry weight of bentgrass shoots was affected by both B rate and grass variety while no differences were noted for root weight. Treatment effects indicated that bentgrass did respond to increasing rates of B. A field study will be initiated in 1999 on a 4-year-old native soil bentgrass putting green to further evaluate the effect of B on bentgrass rooting. Measurements will include twice-monthly visual color and quality, twice-monthly clipping yield, twice a year tissue B analysis, and twice a year rooting mass measurement.



#### Response of Cotton to Sodium and Potassium Fertilizers on Alabama Soils

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

The objectives of this field study are to evaluate cotton response to sodium (Na) and potassium (K) and to determine if part of the K requirement is replaced with Na. During 1998, seed cotton yields tended to be slightly higher with K fertilization than with Na fertilization. Essentially no yield response to K (0, 30, 60 lb  $K_2O/A$ ) or Na fertilization (0, 20, 40 lb  $Na_2O/A$ ) was measured in either 1997 or 1998 at the Prattville location. Yields at Belle Mina increased slightly (about 200 lb/A of seed cotton) in response to either Na or K each year. Leaf and soil analysis data are being evaluated. Gin turn out and lint quality are being determined by the Auburn Textile Engineering Department.



#### Potassium Requirements for Ultra Narrow-Row Cotton

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

A field study was conducted at the Prattville Experiment Field. Potassium rates of 0, 30, and 60 lb  $K_2O/A$  were evaluated with cotton planted in 36 and 7.5 inch rows using conventional and no-till systems. Due to unfavorable planting conditions, the conventional row treatments were lost for 1998. Ultra narrow-row cotton (UNRC) plots were harvested for seed cotton on November 4. Yields were higher for no-tillage (1,897 lb/A) compared with conventional tillage (1,638 lb/A). Potash increased yield of no-till UNRC from 1,407 with no  $K_2O$  to 2,278 lb/A with 60 lb  $K_2O$ . Conventional tilled cotton increased from 1,248 to 2,043 for the same treatments, respectively.



**Dr. Noble R. Usherwood**  
Southeast Director (PPI)  
233 Kenilworth Circle  
Stone Mountain, Georgia 30083  
Phone: (404) 294-0137  
E-mail: [usherwood@ppi-far.org](mailto:usherwood@ppi-far.org)

---

## Florida



### **Evaluation of Ammonium Sulfate and Ammonium Nitrate Fertilization on Beef Cattle Stocking Rate, Animal Performance and Bahiagrass Forage Production and Quality**

*Project Leader: Dr. Michael Fanning and Dr. Jack Rechigl, University of Florida, 2686 State Road 29 N, Immokalee, FL 34142-9515 (941-658-3413, fax 941-658-3469), e-mail: mfanning@gnv.ifas.ufl.edu.*

The objectives are to evaluate bahiagrass response to nitrogen (N) and sulfur (S) fertilization and to determine the influence of these nutrients on pasture forage quality. Cattle growth rate and body condition as well as forage yield and quality will be determined for each fertilization treatment.

The project was delayed in 1998 due to construction of fencing and animal forage limitations essential for project initiation. Therefore, no cattle data were collected, but some forage samples were taken.

Fencing is now completed, and cattle are being sorted into treatment groups. Pasture fertilization began in late February 1999. Cattle were placed on forage one week later. Pregnant cattle are being utilized, and body condition score will be evaluated weekly throughout the study period. Forage samples will be collected from each forage fertilization treatment.



### **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).*

The objective is to evaluate crop response to applied phosphorus (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.

Three rates of P (30, 90, and 150 lb P<sub>2</sub>O<sub>5</sub>/A) and three rates of K (150, 225, and 300 lb K<sub>2</sub>O/A) were applied to producing grapefruit trees in three equal applications. A total of 150 lb N/A plus Mg and B was applied uniformly over the experimental area. Data collected are being processed and evaluated.



### **On-Farm Evaluation of the Influence of ESP Potassium Sulfate on Tomato Yield and Quality**

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

Field research is evaluating tomato response to different rates (0, 80, 120, and 160 lb K<sub>2</sub>O/A) and weekly applications of ESP potassium sulfate (K<sub>2</sub>SO<sub>4</sub>), potassium chloride (KCl) and potassium nitrate (KNO<sub>3</sub>) applied through a drip irrigation system. The objectives are to establish the potential for increased tomato yield and fruit quality using three K sources and to correlate soil tests and plant tissue analysis with tomato yield and quality.

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 increased from 2,247 25-lb 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 K<sub>2</sub>O/A rate. Yield and quality benefits from K in a balanced nutrient management program for tomatoes continues to be evaluated.



### **Phosphorus and Potassium Soil Test Calibration and Effects on Fresh Citrus Fruit Quality**

*Project Leader: Dr. Tom Obreza, University of Florida/IFAS, SW Florida Research & Education Center 2686 State Road 29 North, Immokalee, FL 34142-9515.*

Project objectives are to (1) calibrate a citrus soil test for P (and possibly K), (2) evaluate yield and quality response to P and K, and (3) develop fertilization recommendations to produce quality fresh fruit. The study will include a factorial combination of four P rates (0, 50, 100, and 200 lbs P<sub>2</sub>O<sub>5</sub>/A) and four K rates (0, 100, 200, and 400 lb K<sub>2</sub>O/A) to generate a wide range in soil test values. Both "Flame" grapefruit and "Hamlin" round orange yield and fruit quality will be determined. About 275 young trees of each citrus type were planted in 1997 in previously unfertilized Immokalee fine sand testing low in both P and K. Fertilizer treatments were applied in late 1998, and meaningful fruit harvest for yield and quality evaluation is expected within a three-year period.

---

## 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).*

Support is provided to encourage elementary school teachers to participate in the Summer Teacher Internship program and become familiar with agricultural research conducted by University of Georgia scientists. The objective is to increase teacher awareness of agriculture and to introduce agriculture based activities in the classroom.

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 that agriculture is truly high-tech. During 1998 Ms. Katherine Griffin of PPI and two Griffin-Spalding County, Georgia, teachers presented a program, "Partnering for Effective Education", during the American Society of Agronomy annual convention in Baltimore, Maryland. Other activities focus upon the development of instructional materials for use with school-aged children.



### 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 B to eight varieties of soybeans (maturity groups 4 to 8) at the R2, R3, R4, and R5 stages of growth. The objective was to determine soybean variety response to B and the optimum growth stage to apply the foliar insecticide/fertilizer treatment.

Soybean responses 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. Varietal differences in response to B have been measured.

Recommendations were established in Georgia to spray soybeans with 0.25 lb B with Dimilin when treating for the

velvet bean caterpillar. South Carolina adopted this recommendation for the 1998 production season.



### The Potential Interactions of Nitrogen and Boron in Cotton

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

The multi-state project to determine effects of B on cotton at three levels of N fertilization continued for a third and final year in 1998. In 1998, cotton lint yield was near the state average where no N was applied and nearly double with the application of 60 lb N/A. Lint yield did not significantly increase above the 60 lb N/A rate. Boron increased lint yield. No significant Nx B interaction was detected.



### 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).*

Objectives include (1) the development of a technology and information based system for growers, (2) monitoring crop yield variability, and (3) the dissemination of research based facts through an annual precision agriculture conference for growers and agribusiness. The fourth annual regional precision ag conference was held June 2-3, 1999 in Tifton, Georgia.

Commercial grain yield monitors were installed on two grower combines, and 43 fields have been yield monitored. Soil test results indicate the need for a sampling design which is more accurate than grid sampling and might consider topography, cation exchange capacity (CEC), organic matter, water relationships, cultural practices, soil type, etc. Cooperative field research was initiated with agribusiness to evaluate variable rate applications of lime, P and K to zone-sampled fields. Other studies focus on electronic scouting, mapping, and geographic positioning of weed, nematode, and disease zones in a field and programs for variable rate treatment of production problems.



**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 by sprigging. Sufficient coverage was attained by June of 1997, and then P and K treatments were initiated. Treatment measurements and evaluations were initiated in late 1997. The studies will be continued through 1999.

Seashore paspalum is well suited to a wide range of soil pH levels and tolerates both low and high temperature extremes and short mowing heights. During 1998, N was applied at 4 and 8 lb/1,000 sq. ft. and K at rates of 2 and 8 lb K<sub>2</sub>O/1,000 sq. ft. Preliminary results indicate that higher rates of N reduced wear injury and improved plant recovery by increased shoot growth. Response to K appeared to be more subtle.



**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, GA.*

The objective is to identify and quantify physical and chemical soil characteristics responsible for variability in cotton yield and quality. Soil type, landscape position, soil water relationships, and soil organic matter/CEC will be evaluated in relation to cotton yield variability.

The non-irrigated study field of 280 acres was soil mapped in 1997 prior to planting D&PL 90 cotton. Severe moisture stress allowed a measure of the affect of soil physical properties on cotton lint yield. Yield variability was determined to be due to differences in soil water holding capacity, subsoils having an acidic layer high in manganese (Mn) that restricted root growth, and where K was inadequate in very sandy soils for high yield cotton.

During 1998, the major factor controlling cotton yield appeared to be availability of water. Lowest yields were associated with sandy textured soils, eroded soils on convex slopes, and ponded areas. Highest yields were on soils in shallow, closed depressions with dark colored surface horizons. A second project dealt with soil organic matter mapping procedures with the potential to be more accurate and less expensive than grid sampling for mapping organic matter.

**Maryland**



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

*Project Leader: Mr. Ron Mulford, University of Maryland, Poplar Hill Research Center, P.O. Box 61, 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 then no till corn the third year. The goals of this study are to develop a systems management program that increases crop yield level, input efficiency, and profit potential.

In the first year, the rotation improved corn yield by 14 bu/A and soybean yield by 5 bu/A. Specifically, full season soybeans in the new rotation yielded 37 bu/A. Corn yielded 174 bu/A in the new rotation system, while corn in the conventional corn/soybean rotation yielded 144 bu/A.

In 1998 corn yield increased from 44 to 127 bu/A with the application of 120 lb N/A with no-till, while yield increased from 39 to 124 bu/A with 160 lb N/A under conventional tillage.



**Studies to Determine the Most Efficient and Cost Effective Row Spacing of No-till and Minimum-till Soybeans (Multi-Regional Project)**

*Project Leader: Mr. Ron Mulford, University of Maryland, Poplar Hill Facility, P.O. Box 61, Quantico, MD 21856 (410-548-7051).*

There was a significant row spacing effect in 1998 that was consistent across all soybean varieties in the conventional-tilled plots.

The 15- and 20-inch row soybean yields were in the 45 bu/A range, or 12 bu/A better than 30-inch rows. Row effect was not significantly different under no-till. Yields for the two narrow row treatments were again in the 45 bu/A range, or 4 bu/A better than the 30-inch rows.



**Optimizing Corn Management Systems Utilizing Narrow Rows, No-till and Fertility Practices to Achieve Yield Efficiency on Drought Prone Soils in Maryland (Multi-Regional Project)**

*Project Leader: Mr. Ron Mulford, University of Maryland.*

Reducing corn from 30-inch to 15 or 20-inch row spacing has generally increased grain yields from 5 to 15 percent.

The 1998 results were variable in a very dry growing season where top yields were in the 95 to 110 bu/A range. At low plant populations...15,500 plants per acre (ppa)...the 20-inch row spacing corn yields were 5 percent better than the 30-inch spacing. At high plant populations (24,000 ppa), the 30-inch row spacing yields were 7.5 percent higher. There was a significant yield response to N fertilizer up to the 150 lb/A rate.

---

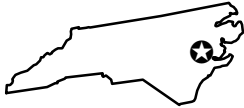
## North Carolina



### **The Potential Interactions of Nitrogen and Boron in Cotton (Multi-Regional Project)**

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

Cotton lint yields during 1998 were increased from 968 to 1,574 lb/A with 90 lb N/A and no applied B. With the application of 1.0 lb B/A, lint yields were increased from 1,082 to 1,519 lb/A due to the application of 90 lb/A of N. In general, field studies over three years and across locations indicate high lint yields result from the application of about 90 to 120 lb N/A and between 0.5 and 1.0 lb/A of B.



### **Variable Rate Nutrient Management for Corn-Wheat-Soybean Cropping Systems: A complementary study to the Mid-Atlantic Regional Interdisciplinary Cropping Systems Project (Multi-Regional Project)**

*Project Leader: Dr. Ron Heiniger, NCSU Vernon James Center, 207 Research Station Road, Plymouth, NC 27962.*

Plots have been established on two farms in the Albemarle-Pamlico estuarine system in North Carolina. The long-range goal is to develop nutrient BMPs that maintain or enhance cropping systems productivity, environmental quality, and the natural resource base.

The 1998 results showed increased N use efficiency with the variable rate treatment compared to a uniform N application. The advantage of the variable rate technology was primarily due to increasing corn yields on the more productive soils within the experimental block where higher N rates were used when compared to the uniform application. Variable rate fertilization of soybeans in 1998 resulted in significantly higher yields (greater than 10 bu/A) compared to uniform management in field zones where soil test P levels were in the very low range. The yield increase for the whole field was sufficient to cover the increased soil sampling, fertilizer and application costs, and still net nearly \$10/A more than uniform application.



### **Pest Management Systems in a Precision Agriculture Environment (Multi-Regional Project)**

*Project Leader: Dr. Gail Wilkerson, North Carolina State University, Crop Science Dept., Box 7620, Raleigh, NC 27695 (919-515-5816).*

A computer program has been developed to utilize weed scouting data based on grid sampling to determine variable rate herbicide applications based on threshold levels.

Trial runs in 1998 in soybean fields indicate that herbicide applications could be reduced and returns increased using this new technology. Further analysis will be undertaken and the technology utilized at the Main Study in Virginia.



### **Cotton Intensive Management with Ammonium Sulfate**

*Project Leader: Dr. Steve Hodges, Dept. of Soil Science, North Carolina State University, Raleigh, NC.*

The objectives are to attain high yield and quality of seed cotton and to evaluate cotton response to applied S as  $(\text{NH}_4)_2\text{SO}_4$ . In 1998, the project experienced severe establishment problems due to moisture stress brought on by El Niño and La Niña. The project objectives will be reviewed and the field study rescheduled for 1999.

---

## South Carolina

### **The Potential Interactions of Nitrogen and Boron in Cotton**

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

(refer to Virginia/regional project following)

---

## Virginia



### **The Potential Interactions of Nitrogen and Boron in Cotton**

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

Cotton nutrition requirements for N and B are being evaluated in a regional program involving scientists at Virginia Tech, Clemson University, University of Georgia, and North Carolina State University with Dr. Abaye at Virginia Tech as coordinator. Cotton varieties including

DPL-50 and others 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). A split plot experimental design is used with N as whole plots and B rates as subplot treatments.

Cotton responds well to N and B region-wide. However, the extent of the response varies from year to year. During 1998, there were no NxB interactions at the Virginia or South Carolina locations. However, there was an NxB interaction for leaf and petiole N and B levels. The highest yields at both locations were obtained with the combination of 60 to 90 lb N/A and 0.5 to 1.0 lb B/A. Findings support the recommendation for B rates between 0.5 and 1.0 lb/A for high yield cotton.



**Cropping Systems Evaluation:  
The Main Study Location for a  
Mid-Atlantic Regional Interdisci-  
plinary Cropping Systems  
Project (Multi-Regional Project)**

*Project Leader: Dr. Mark Alley, Virginia Tech, Crop & Soil Env. Sciences, Blacksburg, VA 24061 (540-231-9777).*

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 corn, small grain, and soybean production systems. The primary objective of the main study is to evaluate the profitability and sustainability of (1) a standard rotation of three crops in 2 years, (2) four crops in 3 years, all with no-tillage, and (3) four crops in 2 years all with no-tillage. The main study will use team-identified BMPs in field-scale plots utilizing the latest technology for variable rate and precision input applications.

Detailed soil water storage measurements in 1998 showed a wide variation across soil types in a very dry growing season. There was a strong relationship between soil water storage capacity and the yield and water use efficiency of corn and soybean. Corn yields on the various soil types ranged from 104 to 193 bu/A. Soybean yields ranged from 14 to 52 bu/A. These early results suggest that soil types could be an effective management zone for droughty Coastal Plains soils.

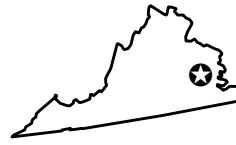


**Cultural Practices to Improve  
Yield Potential of Early Soybean  
Production Systems  
(Multi-Regional Project)**

*Project Leader: Dr. David Holshouser, Tidewater Agric. Research Center, 6321 Holland Road, Suffolk, VA 23437 (757-657-6450).*

The objective is to evaluate the effect of row spacing, plant population, and varietal selection on early full-season and double-crop soybeans.

No significant yield responses were obtained for the various growth factors. Vegetative growth measurements (leaf area index and light interception) were significantly increased with decreasing row spacing and increasing plant population.



**Criteria for Determining  
Late-Season Input Applications  
to Soybean (Multi-Regional  
Project)**

*Project Leader: Dr. David Holshouser, Tidewater Agric. Research Center, 6321 Holland Road, Suffolk, VA 23437 (757-657-6450).*

The objective is to determine if late season inputs of N and B will increase soybean yields under highly productive environments with no moisture limitations. Results indicated a slight trend for higher yields when 0.25 to 0.50 lb B/A was applied at the R3 or R5 growth stage. Similar yield increases were noted with 50 lb N/A applied at the R5 growth stage. Yields in the study averaged in the 75 to 80 bu/A range.



**Evaluation of Double-Crop  
Corn as Part of a Four Crop in  
Two-Year Rotation in Virginia  
(Multi-Regional Project)**

*Project Leader: Dr. Dan Brann, Virginia Tech, Dept. CSES, Blacksburg, VA 24061 (540-231-9800).*

The main objective of this study is to determine the best crops to use in an intensive cropping system where four crops are harvested in 2 years.

Short season corn hybrids have produced 2-year average yields up to 138 bu/A under irrigation. Top yields in 1998 without irrigation for 24 short season corn hybrids were in the 45 to 56 bu/A range. The importance of insect resistance and the effectiveness of the Bt gene were evident. The Bt gene hybrids averaged 40 to 56 bu/A, while non-Bt gene hybrids produced less than 10 bu/A. ■