NEWS & VIEWS

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

Dr. C.S. (Cliff) Snyder, Southeast Director

August 2005
Part 2 of 2

2004 Research Program Summaries—Southeast Region: Cotton, Forages, Forestry, Citrus, and More

THE Potash & Phosphate Institute (PPI) and Foundation for Agronomic Research (FAR) program in the Southeast Region continues to investigate and expand the knowledge of optimum plant nutrient management practices. This *News & Views* includes reports from a portion of the twenty-nine projects supported in the region in 2004. **Please refer to the first *News & Views* (part 1) for a report from other studies conducted in the Southeast region in 2004.**

The summaries that follow provide only a brief overview of each project. For more details, please consider contacting the research project leader. You can also view the full annual reports of each project (current and past), when available, at the website: >**http://www.ppi-far.org/research**<. Once at this website, research project information can be viewed by state abbreviation and project title, or by a topic area.

Florida

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

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Project Cooperator: Robert Rouse

Phosphorus (P) fertilizer is regularly applied to Florida citrus, but responses are rare because residual soil P usually supplies tree requirements. Environmental concerns regarding off-site P movement emphasize the importance of judiciously using P fertilizer. Florida has no reliable soil test P calibration that confidently indicates soil P sufficiency for citrus. Conversely, testing sandy soils for potassium (K) is of little value because K readily leaches. So, a positive response to K fertilization is common. The objectives of this project are to calibrate a citrus soil P test and to determine the effects of K fertilizer rate on yield and fresh fruit quality of grapefruit and oranges. A field trial was planted in November 1998 and has been monitored annually. Phosphorus was applied in the first 2 years to establish a range of soil-test P for subsequent citrus crops, and four K fertilizer rates have been applied yearly. All trees received recommended N fertilization. For the 2003-04 fruit crop, increasing soil test P resulted in slightly increasing leaf tissue P concentration, while juice brix and lycopene slightly decreased. No other yield or quality factors have correlated with soil test P during the 6-year study. In 2004, additional P was applied to the highest soil test P plots to ensure that the 2004-05 fruit crop has a non-limiting P treatment. It appears that a correlation between leaf P and soil test P is beginning to develop. As K fertilizer rate increased, leaf tissue K concentration, fruit yield, fruit size, fruit peel thickness, b-carotene, vitamin C, juice brix, and total sugars increased, while lycopene and juice chroma decreased. Citrus continues to be sensitive to K, but not to P. As the trees grow, we anticipate an eventual true Florida citrus P deficiency in the low-P plots. *FL-19F*

Influence of Tillage Systems, Lime, and Potassium Applications on Cotton

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The objective of this 2004 study conducted on a Dothan loam at the North Florida Research and Education Center,

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Quincy, was to evaluate the influence of tillage systems, calcium (Ca), and K applications on cotton yield, quality, and hardlocking. Two tillage treatments (strip-till, harrow + turn-plow), two Ca treatments (0, 1,000 lb hydrated lime/A), and two K rates (0, 180 lb K_2O/A) were evaluated using DP 555 BG/RR cotton. Calcium and K did not influence cotton plant height (1.67 to 2.64 ft.), yields (298 to 600 lb/A), or lint percent (40.5 to 42.9%). Plants were shorter, seed + lint and lint yield were greater, and lint percent was less for the harrow + turn-plow treatment compared to strip-till. Generally, there was no influence of tillage, Ca, and K applications on the lint quality, except the tillage influence on the lint length (longer with harrow + turn-plow). The incidence of hardlocking in 2004 was insufficient to develop an evaluation of treatments. *FL-20F*

Nitrogen Fertilizer Sources for Warm Season Grass Pastures

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Project Cooperators: H.K. Pant and J.E. Rechcigl

Three trials were conducted on private ranches and one at the Ona Range Cattle REC (RCREC) in Florida to compare the response of grazed bahiagrass pastures to ammonium nitrate (AN), ammonium sulfate (AS), and calcium nitrate. A second objective was to study the response of N sources on limpograss (hemarthria) forage cut for hay. Each year four fertilizer treatments...1) control (no fertilizer), 2) AN, 3) AN + elemental sulfur (S), 4) AS, and 5) calcium nitrate...were applied once in May to supply 50 lb N/A/year to Argentine bahiagrass pasture on Stokes Ranch in Lake Wales and to similar pastures on Butler Oak Dairy in Okeechobee. In the third and fourth experiments, fertilizer and control treatments were applied to non-grazed hemarthria pastures in May and September (50 lb N/A per application)...one on Butler Oak Dairy and the other at the RCREC at Ona.

In 2004 at Stokes Ranch, only the AS treatment yielded more bahiagrass (5.7 t/A) than the control (5.0 t/A). Bahiagrass dry matter yield averaged 5.6 t/A regardless of N treatment on Butler Oak Dairy pasture. Bahiagrass forage digestibility (TDN) and crude protein (CP) content were improved equally by all fertilizer treatments compared to the control (55% vs. 49% for TDN and 11% vs. 9% for CP). Due to disruption from hurricanes in 2004, hemarthria dry matter yield at the Ona RCREC was only 1.1 t/A for the control, 2.3 t/A for AN, 2.8 t/A for calcium nitrate, 3.3 t/A for AN + S, and 3.6 t/A for AS. Bahiagrass tissue S concentration at the beginning of the trials approached deficiency (0.16%) at both sites, and averaged 0.32% across treatments on Stokes Ranch, probably due to the history of sludge application. Bahiagrass tissue S averaged 0.24% on Butler Oak Dairy, regardless of N source, but hemarthria tissue S concentration at this site increased from 0.16 to 0.23% in response to S. Sulfur inclusion could significantly enhance hemarthria hay production. *FL-21F*

Soil Fertilization of Perennial Pasture Systems

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Project Cooperator: Cheryl Mackowiak

The increased demand for high quality hay for the Florida equine and dairy industries has resulted in an expanding regional forage industry. Poor forage quality and increased disease incidences due to low soil fertility provide an opportunity for improving forage fertility requirements without compromising on environmental quality. Field studies were initiated in spring 2004, at three Florida locations, using three prevalent forage species (bermudagrass, bahiagrass, and perennial peanut) to compare K with and without supplemental potassium magnesium sulfate (K-Mag™) on forage yield, quality, and tissue mineral content. Additionally, soil cores up to 48 in. deep were sampled to investigate the effect fertilization treatments have on nutrient bioavailability and leaching losses. All plots, excluding the check plots and perennial peanut plots, received an initial 100 lb N/A as AN and triple superphosphate per recommendation from soil testing. Fertilizer was reapplied following each clipping, based on the estimated dry tonnage removed. The five treatments consisted of a check (no fertilizer), low K (40 lb/A initial and 24 lb/ton/A harvested biomass following each clipping), high K (80 lb/A initial and 48 lb/ton/A harvested biomass following each clipping), low K with 25% provided as K-Mag, and high K with 25% provided as K-Mag. The N was reapplied at 60 lb/ton/A, except for the check plots and the perennial peanut plots.

Preliminary results from the first study year indicated that N fertilization had a significantly positive effect on grass hay yields, with increases of more than 300% for bermudagrass and 100% for bahiagrass. While K fertilization with or without K-Mag had no significant effect on grass yields, the K-Mag treatments tended to have the highest numerical yields for most clippings. Potassium fertilization had no effect on perennial peanut yields. Forage quality data, tissue mineral content, and soil core samples were not available for this reporting period, but are presently being analyzed. *FL-22F*

Georgia

Enhancing Pine Straw Production, Wood Volume, and Product Class Distribution with Fertilization of Old-field Planted Slash and Loblolly Pine Stands

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Project Cooperator: David Moorhead

Response of slash and loblolly pine to fertilization with N, P, K, Mg, S, copper (Cu), and boron (B)....in treatments comparing no fertilizer (control), N+P, N+P+K, and N+P+K+Mg+S+Cu+B...under intensive management was evaluated at three locations in Georgia. The 2-year and 3-year growth and yield responses of slash (Dodge County and Toombs County) and loblolly (Washington County) pine trees to fertilization were determined. Mortality following the one-time fertilizer treatment was much greater on the fertilized plots (9 to 21%) than the control at the Dodge County site, but only slightly greater than the control plots at the Toombs and Washington County sites.

Some trends that are starting to express themselves after just two- and three-growing seasons on these old-field sites (control vs. fertilizer treatment): 1) an increased diameter growth increment with the NP and NPK treatments at the Dodge County site or all three fertilizer treatments at the Washington County site; 2) An increased height increment for two of the three fertilizer treatments at the Dodge County site or all three fertilizer treatments at the Washington County site; and. 3) An increased volume/tree growth increment of 17 (Washington County site, NPKMgSCuB treatment), and 18% (Dodge County NPK treatment). The Toombs County unthinned slash pine site growth response to fertilization appears to be negligible 2-years post application. This is most likely due to the high site fertility from previous farming practices. This study will be carried on for 2 more years, and hopefully for a full 8 years post-treatment, to determine the longer-term benefits of fertilizing old-field planted loblolly and slash pine. To draw any major conclusions at this point would be premature, although initial trends and significant differences between unfertilized and fertilized plots are apparent. Diameter distribution changes will be quantified 4- and 5-years post treatment. *GA-21F*

Agricultural and Environmental Studies between the University of Georgia and Costa Rica

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Project Cooperators: Ann Nunan, Katherine Griffin

The goal of this Agricultural and Environmental Studies project is to provide sound, agronomic educational materials and experiences for teachers and students. The project objectives are to develop: 1) an interdisciplinary, agricultural staff development course for teachers, and 2) effective agronomic learning resources with a "real world" and relevant perspective. The project significantly contributes to PPI/PPIC/FAR endeavors wherein teachers and students have been provided agronomic educational materials and experiences. The program provides students a factual, practical, and realistic understanding of the use of P and K in agriculture.

Education on industry-supported research with soil testing and proper use of P and K helps put in perspective concerns about the so-called "devastating" effects of agriculture on the rain forest and waterways of Costa Rica. Accomplishments in 2003 included development of an educational unit of study about the production and consumption of bananas, the collection of information and data for agricultural and environmental educational resources in Costa Rica, the development of the interdisciplinary/agricultural teaching model for providing staff development opportunities for teachers, and a presentation at the 2003 American Society of Agronomy (ASA) Annual Meetings in Denver, Colorado.

Accomplishments in 2004 include a presentation at the ASA Annual Meetings in Seattle, Washington, a hands-on workshop at the Georgia Science Teachers' Conference in Columbus, Georgia, revision and classroom field testing of the educational unit *Oh! Bananas* (a study about the production and consumption of bananas), field testing of additional hands-on activities to accompany the PPI publication *Fun with the Plant Nutrient Team,* and field testing in classroom (sixth grade) situations of specific pages of the PPI publication *There's WHAT in My Food?* An agricultural and environmental studies booklet concerned with an integration of Costa Rican culture and agriculture is being written. This "learner friendly" booklet with a real world perspective is a high interest publication that can be used in informal, non-academic settings as well as academic settings. GA-*22F*

Sulfur Nutrition of Cotton in the Southeast

Project Leader: Dr. Glen Harris, University of Georgia, Crop and Soil Sciences, 0227 Rural Development Center, Tifton, GA 31793-1209. Telephone: 912-386-3194. E-mail: gharris@arches.uga.edu

The current University of Georgia (UGA) extension recommendation for S fertilization of cotton is 10 lb S/A. The objectives of this research are to determine the optimum S application rate, timing, and source for high-yielding cotton in Georgia. Research was conducted in 2003 at the Sunbelt Expo site in Moultrie under center pivot irrigation on a Dothan loamy sand, and the UGA Southeast Experiment Station in Midville on a Fuquay sand. In 2004, new sites were used near Tifton: a center-pivot irrigated Tifton loamy sand, and a dryland Tifton loamy sand. Treatments evaluated each site-year were: 1) 0, 2) 10, 3) 20, and 4) 30 lb S/A using ammonium sulfate (AS) at planting; 5) 20 lb S/A using 5-10-15 at planting, 6) 10, 7) 20, and 8) 30 lb S/A using AS at sidedressing; and 9) 20 lb S/A using ammonium thiosulfate at sidedressing. All plots received 26 lb N/A at planting, and the N not provided in the S treatment was made up with ammonium nitrate. Sidedressed S (treatments 6-9) were accomplished using an 8-0-0-9(S) liquid made with AS and urea-ammonium nitrate (UAN) solution. The balance of N on these treatments was made up by using 32% UAN. All plots also received 80 lb K_2O/A preplant.

There were no significant lint yield responses to S at any location in either year. In 2003, yields averaged 1,230 lb lint/A at the irrigated site in Moultrie and 601 lb/A at the Midville site. Both locations received excessive rainfall during the growing season, which likely caused the lack of response and which reduced yields at the Midville site. In 2004, yields averaged 1,508 lb lint/A at the irrigated site and 1,766 lb/A at the dryland site. Previous cropping history on the dryland site was approximately 30 years of pearl millet and may explain the higher yields compared to the irrigated site where the previous crop was corn in a corn-cotton-peanut rotation. Possible reasons for the lack of yield response to S at the Tifton sites in 2004 include S mineralized from organic matter, S accumulated in subsoil clay, and S from atmospheric deposition, or a combination of all three. *GA-23F*

Enhancing Thinned Slash Pine Volume Production and Product Class Distribution with Competition Control and Fertilization on Flatwoods Spodosols

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Project Cooperators: David Moorhead, Coleman Dangerfield

Two studies were established in 2003 to evaluate the effects of mid-rotation mechanical (M) and chemical (H) competition control, fertilization (F), dolomitic liming (L), and combinations of M+F, H+F, and L+F in thinned slash pine stands on common flatwoods soils. Slash pine mean diameter at breast height (d.b.h), total height, live crown ratio, volume/ tree, volume/A, diameter distributions and product class distributions are being determined for each treatment at each site over time in 2-year intervals. Treatments were installed in thinned slash pine stands (4th or 5th row + select), one each in Wayne and Ware counties, Georgia. At the Wayne County site, there was a significant 2-year post treatment diameter increment increase for the NPK fertilization, herbicide+NPK fertilization, and mow+NPK fertilization treatments compared to the control. While there were no other significant growth factor (basal area, volume/A, chip and saw volume/A, pulpwood volume/A) differences 2-years post treatment, some trends are starting to occur. Generally, the herbicide+NPK fertilizer, mow+NPK fertilizer, and NPK fertilizer-only treatments had produced more total volume (114, 51, and 13 ft^3/A, respectively), more chip and saw volume/A (1.6 cords, 2.6 cords, and 1.9 cords, respectively) and less pulpwood volume/A (0.9, 2.5, and 2.4 cords, respectively) than the control. Growth data from the Ware County site will be collected in the spring of 2005. Treatment effects should be quantified over a 5- to 8-year period (time to next thin or clearcut). *GA-24F*

Development of an Internet-Based System for Forest Productivity Information

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Project Cooperator: E. David Dickens

Since May 2004, project leaders and partners discussed a template for the internet website and the URL address was purchased. It is >**www.forestproductivity.net**< The site architecture was discussed and suggestions were made to

enhance the design. Content of the website developed and written at this stage includes the **About Us** section, which includes **Audience**, **Who We Are**, and **Purpose** categories. A peer-review process was developed for primary research-based articles that had not received any previous peer-review. At least two external subject-matter expert reviewers were chosen for each article. These experts were asked to return comments within 30 days. The first of the peer-reviewed articles were returned to authors for editing and were placed online.

Other materials such as current and relevant Extension, USDA, and forest industry articles that have either been peer-reviewed in the past or were written from peer-reviewed materials were placed online, without the peer-review requirement previously described. To date, the following publications have been placed online:

- Forest Soils and Site Index
- Site Preparation Methods and Contracts
- Care and Planting of Southern Pines
- Forest Regeneration Methods: Natural Regeneration, Direct Seeding, and Planting
- Planting Southern Pines: A Guide to Species Selection and Planting Techniques
- Fertilize to Optimize Your Forest's Timber Production Potential
- Straw Raking in Southern Pine Stands and Fertilization Recommendations
- Phosphorus Fertilization at Establishment in Loblolly and Slash Pine Stands on Atlantic and Gulf Coastal Plain Sites: Why Fertilize?

Future plans include placement of more publications on the website (via researchers and Extension specialists), marketing and advertising the site, and collecting information on use of information from the site. The site is now set up to handle publications from a variety of sources, scientific researchers, and Extension specialists. *GA-25F*

Loblolly Pine Stand Fertilization at Mid-rotation to Increase Small and Large Sawtimber Volume

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Private non-industrial forest (NIPF) landowners are interested in fertilization of their pine plantations. Many NIPF landowners want to shift wood to the more valuable product classes as well as grow more wood for good economic returns. Many loblolly and slash pine plantations in the South have nutrient limitations. To address some of the pine nutrition questions, a fertilizer trial was planned for installation early in 2005 in a thinned loblolly pine plantation at the Charlane Plantation near Bullard, Georgia, owned and managed by Chuck Leavell. Prospective pine stands and soils for the study were evaluated in the winter of 2004-2005. The fertilizer treatments planned are: 1) control (nonfertilized), 2) N (200 lb/A) and P (115 lb P_2O_5/A), 3) NP and copper (Cu, 5 lb Cu/A), 4) NPCu and K (90 lb K_2O/A), 5) NPKCu and S (60 lb S/A). The N sources are urea and diammonium phosphate (DAP), the P source is DAP, the K source is KCl, the Cu source is copper sulfate, and the S source is ammonium sulfate. The major objectives are: 1) quantify the magnitude and duration of wood volume response to the fertilizer combinations, 2) determine changes in product class distribution, 3) the cash flow and rate of return for each fertilizer combination compared to unfertilized control plots, and 4) discern when fertilizers are to be re-applied to maintain wood volume gain. *GA-26F*

Chloride and Chloride Sources for Reducing Foliar Diseases and Improving Onion Yield and Flavor

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Onions are among the top five vegetable crops in the U.S. with production at nearly 145,000 acres and a farm-gate value of $750 million. Optimum mineral nutrition plays an important role in maintaining onion productivity, quality, and plant health. Recent data and observation suggests that chloride (Cl) and K nutrition may be under-utilized or mis-applied. The objectives of this study are: 1) determine the effects of chloride (Cl) on disease reduction in onion, 2) determine if late applications of K improve sugar content of onions without interfering with Ca uptake and utilization., and 3) determine how Cl affects bulb pungency and bulb yield. This project was initiated in the winter of 2004-2005, but data were not available at the time of this reporting. *GA-27F*

Missouri

Fescue Sulfur Fertilization—Hay and Pasture

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Project Cooperator: David Dunn

In the last decade, coal burning power facilities have significantly reduced sulfur dioxide emissions into the atmosphere. This has resulted in less S in rainfall for agricultural crops. A study was begun in 2004 at West Plains, Missouri, to determine the effects of S fertilizer on fescue hay and pasture and to study the economics of short-term P and K soil build-up programs vs. a standard Missouri 8-year build-up program. Four rates of S were evaluated (0, 9, 12, and 24 lb S/A) in an 8-year P and K build-up program. Fescue hay with no S yielded 2.33 t/A from three (spring, summer, and fall) cuttings. Fescue with 9 lb S/A yielded 2.63 t/A and fescue with 12 lb S/A yielded 2.67 t/A. No additional yield response was found with 24 lb S/A. After deducting an estimated ammonium sulfate cost, 12 lb S/A increased economic returns $8/A above the untreated check. A 1-year P and K buildup with 9 lb S/A was the most expensive...but highest yielding...treatment in the study. Relatively long-term build-up programs help farmers manage their financial resources by spreading fertilizer costs over many years. However, growers need information concerning the magnitude of yield loss that may occur early in an 8-year build-up as compared to shorter build-up (1 to 4 years). We will follow the profitability and soil nutrient levels of these treatments over time. In 2005, the only P and K that will be applied to the 1-year buildup will be an amount to offset annual crop removal. *MO-27F*

Mississippi

Determination of Potassium, Magnesium, and Sulfur as Limiting Factors in Cotton Production on Blackland Prairie Soils

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The objectives of this study are: 1) determine individual response functions of cotton leaf K, Mg, and S levels and lint yield to varying rates of K_2O, Mg, and S; and 2) compare combined K, Mg, and S response (K-Mag treatment) to individual nutrient responses. This project was established in April 2004 and the proposed length of study is through the 2006 growing season. Treatments include 0, 36, 72, and 108 lb K_2O/A as muriate of potash (MOP); 0, 9, 18, and 27 lb Mg/A as magnesium nitrate; 0, 18, 36, and 54 lb S/A as ammonium sulfate (AS); and K-Mag supplying lb/A rates of K_2O-Mg-S of 0-0-0, 36-9-18, 72-18-36, and 108-27-54 with 50% of the K derived from MOP. Total N applied to all treatments was 120 lb N/A.

Lint yield increased from 1,128 lb/A up to 1,333 lb/A with an increase in fertilizer K_2O from 0 to 72 lb/A. Response to Mg was inconsistent, but the highest rate of 27 lb/A yielded 1,245 lb lint/A compared to 1,160 for the no Mg check. Yield did not respond to increasing S rates from either source. A combined response to K_2O, Mg, and S using K-Mag was not evident. Leaf tissue K levels increased above a critical level of 1.25% for K rates greater than 72 lb K_2O/A using MOP. Leaf tissue Mg levels declined at Mg rates of 9 and 18 lb/A, but increased at the highest rates compared to the no Mg check, while K-Mag increased leaf Mg up to the 18 lb/A rate. Tissue S levels increased up to 36 lb S/A from AS, while with K-Mag maximum leaf S occurred at 18 lb S/A. *MS-13F*

South Carolina

Potassium Uptake, Distribution, and Yield Response by Modern Cotton Cultivars

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Project Cooperator: James Camberato

The objectives of this research were to determine: 1) K requirements of newly-released modern cotton cultivars with heavy boll loading tendencies, and 2) if current soil testing procedures and recommendations are still valid. Potassium fertilization rates were 0, 50, 85, 120, 155, 190, and 225 lb K_2O/A applied broadcast to a sandy Norfolk-Bonneau soil prior to planting. Five modern cotton cultivars were evaluated: DPL 555BR, ST 5599BR, FM 989BR, DPL 444BR, and PM 1218BR. Leaf and petiole samples were obtained July 14 (2 weeks after first flower) and July 27 to monitor K status of the cotton plant. Defoliation was visually estimated on August 12 and 26.

Mehlich 1 soil test K in the surface soil (Ap-horizon) ranged from 15 to 135 lb/A, and depended on prior year K application rates and differences in soil properties. Defoliation, leaf and petiole K, and lint yield were strongly correlated with soil test K in plots receiving no K fertilizer. Potassium fertilization decreased premature defoliation and increased tissue K levels and lint yields. Defoliation was nearly 100% on August 12 for low soil test K without fertilization, in contrast to nearly 0% defoliation in treatments receiving 120 lb K_2O/A. Leaf K ranged from 0.4 to

1.59% on July 14 and was highly dependent on soil test K and fertilizer K rate. Petiole sap K ranged from 2,100 to 9,500 parts per million (ppm) on July 14 and was also highly dependent on soil test K and fertilizer K rate. Seed cotton yields ranged from 72 to 3,734 lb/A. Increasing soil test and fertilizer K dramatically decreased premature defoliation of cotton and increased leaf and petiole K levels, thereby substantially increasing seed cotton yield. Cultivars had somewhat different responses to K supply and more details will be included in the full annual report. *SC-13F*

Tennessee

Effect of Soil Phosphorus Level on Magnesium Content in Tall Fescue Forage

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Project Cooperators: Gaylon Morgan, Hugh Savoy, Lee Ellis, Sally Mueller

Research in Missouri has indicated that adequate soil P levels may improve the Mg content of tall fescue forage. To investigate this in Tennessee, a 33-acre field of Kentucky 31 tall fescue was divided into 100 ft^2 grids. Soil samples were taken from each grid in late November and early December. Soil pH, P, and K were analyzed and 45 grids were selected, based on the results, to provide grids with various combinations of soil fertility characteristics. In early February, the field was fertilized with 60 lb N/A as ammonium nitrate. Forage samples were handclipped from each grid in late March, and analyzed for Mg level. Regression analysis was used to determine the most influential factor affecting tall fescue Mg level.

Soil pH was the most influential factor affecting tall fescue tissue Mg level. The best equation to predict tall fescue Mg level at this site included the single predictor of soil pH. However, the R^2 value for this equation was 0.185 (low). The regression equation for the model was: % plant tissue Mg = -.0266 + .00434*soil pH. Mehlich 1 extractable P and K levels did not have a significant effect on the Mg content of the tall fescue. *TN-16F*

Nitrogen and Potassium Effects on Physiology and Yield Components of Contrasting Cotton Varieties

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Project Cooperators: C.C. Craig, Jr., Carl Michaud, Tracy Bush

Physiologically determinate cotton varieties may require more available K than relatively indeterminate varieties to achieve optimum yields, due to differences in photosynthate partitioning. Three interrelated studies were conducted in long-term no-till N and K fertility plots on a Memphis-Loring silt loam at Jackson, Tennessee: 1) variety response to K (60 and 120 lb K_2O/A/yr); 2) variety response to N at different K levels; and 3) response of an indeterminate variety to extremes of K fertility. All plots received 60 lb P_2O_5/A preplant. The cultivars PM1218 BG/RR and DP555 BG/RR were planted in 4-row plots on May 5, 2004, and picked twice with a spindle picker, at 145 and 173 days after planting (DAP). Earliness was measured as percent of total yield picked at first harvest.

In Experiment 1, total plant dry weight did not differ between cultivars at 69 or 112 DAP, but more biomass was partitioned to reproductive structures in PM1218 than in DP555 at either K rate. At the higher K rate, DP555 partitioned more dry weight to stem tissue, and less to reproductive organs, than did PM1218 between 69 and 112 DAP. Total lint yields of PM1218 were significantly higher with 120 lb than with the 60 lb K_2O/A, but not with DP555. The higher K rate tended to delay maturity slightly with the formation of additional yield in late season. In Experiment 2, N rates of 80 or 160 lb N/A/yr did not significantly affect lint yield or earliness in either cultivar, regardless of K rate. The higher K rate (90 lb K_2O/A/yr) significantly increased total lint yields of both cultivars over the 30 lb K_2O/A rate. Earliness was not significantly influenced by N or K treatments in Experiment 2. DP555 had higher total yields and matured later than PM1218 at either N or K rate. In Experiment 3, lint yields of DP555 increased significantly with 30 lb K_2O/A/yr relative to no K, but yield differences were not significant above the 30 lb K_2O/A rate. The 150 and 180 lb K_2O/A rates significantly delayed maturity of this indeterminate cultivar. With no killing freeze before final harvest, the later maturity induced by very high K fertility in DP555 did not incur a weather-related yield loss in 2004. Results suggest that the maturity delay with high K fertility is related to greater biomass partitioning to vegetative tissue in the more indeterminate cultivar. *TN-19F* ■

Continued...from Part 1...
Additional summaries with information on other crops in the Southeast Region appear in a separate issue of *News & Views: 2004 Research Summaries—Southeast Region: Soybeans, Site-Specific Management, and Rice*.

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Part 2 of 2

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