the Unit were concentrated on developing inoculation techniques to uniformly infect corn ears with A. flavus. This led to the development of the side-needle and spray techniques that can uniformly infect plants with A. flavus spores. Once artificial inoculation techniques were developed, we were able to identify corn genotypes with resistance to A. flavus kernel infection and aflatoxin contamination. Through the use of conventional breeding techniques, our research unit has released four germplasm lines (Mp313E, Mp420, Mp715, and Mp717) that contain some of the highest levels of aflatoxin resistance that have been identified. We have also recently made progress in the area of insect resistance. Germplasm line Mp716 was released as a source of resistance to southwestern corn borer and fall armyworm. When plants in the field were infested with southwestern corn borer, hybrids with Mp716 as a parent suppressed aflatoxin contamination. We are also in the process of identifying molecular markers that are associated with aflatoxin resistance. An analysis of the mapping population Mp313E × B73 identified quantitative trait loci (QTL) on chromosomes 2 and 4 of Mp313E that contributed significantly to reduced aflatoxin contamination. An analysis of the population Mp717 × NC300 identified three additional QTL on chromosomes 1, 5, and 10 associated with reduced aflatoxin. Both Mp717 and NC300 contributed to aflatoxin resistance. Our research unit has cooperated with commercial seed companies to evaluate experimental hybrids for aflatoxin resistance. Hybrids developed from our germplasm by these companies were found to have significantly lower aflatoxin levels than currently available commercial corn hybrids. These joint efforts with the seed industry will expedite the production of commercial corn hybrids with aflatoxin resistance.

11th Annual National
Conservation Systems Cotton & Rice Conference

PRECISION AG. PRESENTATIONS

Using Precision Agriculture And On-Farm Research To Fine-Tune Production Practices

Presented by Dr. Terry Griffin
Asst. Professor, Extension Economist, University of Arkansas

Each year, many farmers conduct field-scale on-farm experiments to test new products and fine-tune their production practices using precision agriculture technologies such as yield monitors and global positioning system (GPS) guidance. Three of the most important and least understood steps in conducting on-farm research include: designing the experiment, collecting site-specific data, and analyzing the data for farm management decision-making.

Farmers desire experiments that lead to quality data being collected while not requiring excessive time and efforts to implement. Experiments that are time intensive to implement or harvest may interfere with the completion of other field operations. Designs conducive to farmer-managed field-scale trials will be discussed including strip-trials, split-field, paired field, and other designs. There is no "one-size fits all" when it comes to field-scale experimental designs. Experiments are designed based upon field characteristics, experimental treatments to test, preferences of individual farmers, and available machinery. Once the experimental design is chosen, GPS guidance and automated controllers can reduce the in-field management required to implement the experiment while increasing the likelihood of accurate execution of the design.

Additional factors specific to on-farm trials should be kept in mind prior to harvest. It is recommended that the harvester's GPS equipment is checked to make sure it is working, that differential correction is being received, and that the GPS firmware version is current. For most trials, it is important for weeds in field-scale experiments to be adequately controlled as to not interfere with harvester operation and moisture sensor measurements. It is especially important that the yield monitor be properly calibrated prior to harvest, after all it is not the field average yield that is of interest but the within field yield and variability that will be analyzed.

Once yield data has been recorded, most farmers desire the results of the experiment as quickly as possible in order to plan for the next production season and make input orders soon enough to secure early order discounts. Some farmers may analyze the data themselves while others opt to rely upon third party analysts. Either way, the appropriate spatial analysis technique is necessary to make adequate production recommendations and farm management decisions. Although it is expected that the majority of yield data analysis is conducted by visual comparison of maps, quantitative data analysis has become more prevalent with advances in farm-level mapping software.

Discussions will address why appropriate spatial analysis techniques are necessary and include results of a three-year case study of how farmers have used their yield monitor data from on-farm trials to enhance farm management decisions.

References

Griffin, T.W., Brown, J.P., and Lowenberg-DeBoer, J. 2007. Yield Monitor Data Analysis Protocol: A Primer in the Management and Analysis of Precision Agriculture Data. Site Specific Management Center Publication. 43 pages. Available online at: http://www.purdue.edu/ssmc

Griffin, T.W., Dobbins, C.L., and Lowenberg-DeBoer, J. 2007. Case study of on-farm trials, spatial analysis and farm management decision making. In J.V. Stafford (ed.) Precision Agriculture '07 pp 745-752. Proceedings of Sixth European Conference on Precision Agriculture. Skiathos, Greece, June 3 - 6, 2007.

Griffin, T., Lowenberg-DeBoer, J., and Erickson, B. 2007. A Primer for On-Farm Experiments Using Yield Monitor Data. Site-Specific Management Center Newsletter, Fall 2007. 4 pages. Available online at: http://www.purdue.edu/ssmc

Cotton Crop Vigor And Tarnished Plant Bugs – Should Management Change Across Variable Fields?

Presented by Dr. Tina Gray Teague

Professor of Entomology, Arkansas State University - University of Arkansas Agricultural Experiment Station

With availability of site-specific, variable rate application technology in cotton, producers in the Midsouth are interested in whether these new tools can be used to reduce crop protection costs for insect pests. Unlike variable rate applications made with plant growth