Gregory C. Phillips, PhD
Dean of the College of Agriculture & Technology
Director of Agricultural Research
Professor of Plant Biotechnology
Arkansas State University
Phone: 870 972 2085
Email: gphillips@astate.edu

Academic interests: Plant metabolic engineering.
Research Focus & Techniques of Expertise: Agrobacterium and Biolisitics mediated gene transfer into crop plants; Nutritional enhancement of crops; Metabolic engineering of plant biosynthetic pathways; Genetic engineering of crops to improve resistance to stresses.

Current Research Projects:

- **Genetic Engineering and Cloning of Crop Plants:** My research program is aimed at the development and application of *in vitro* culture techniques toward the improvement of crop plants. Both undergraduate and graduate students in my lab have been involved in plant tissue culture and cell culture research. Examples of how tissue culture research is used include cloning or mass propagation of horticultural plants of commercial value (such as Mexican weeping bamboo), and for conservation of endangered species (such as cacti). A major research activity in my lab in the past includes the development of recombinant DNA transfer techniques for genetic engineering of rice, tomato, chile pepper, onion, peanut, alfalfa, and other crop plants with improved traits such as disease resistance and abiotic stress tolerance. The primary method of genetic engineering used in our lab involves DNA transfer by exploiting *Agrobacterium tumefaciens* vector systems. Our specialty is in the optimization of plant tissue/cell culture and regeneration protocols for specific applications.

- **Role of Lipoxygenase in Rice Grain Quality and Storage:** The major research activity in my lab at present focuses on the potential role of rice seed- or bran-specific lipoxygenases in the development of rancidity during grain storage. A genetic strategy to inhibit lipoxygenase activity in the grain is hypothesized to lengthen grain storage ability for rice, and to suppress the reduction of nutritional quality associated with the development of grain rancidity. We are using a stable RNAi transformation strategy to specifically inhibit two seed-specific lipoxygenase genes (*r9LOX1* and *L2*) in comparison with a plastid-specific lipoxygenase gene (*RCI-1*). Bioinformatics tools have been used to identify short regions within coding sequences appropriate for constructing RNAi inserts into the pANDA vector designed for monocot RNAi studies. Taipei-309 is the model rice variety used for stable transformation. In addition, our

lab collaborates with Dr. Argelia Lorence (ASU-ABI), Dr. Karen Moldenhauer (UA-RREC), and Dr. Helen Miller (USDA Dale Bumpers Rice Research Center) on related projects to develop elite rice germplasm for transformation and *in vitro* regeneration studies, and related metabolic engineering strategies to improve rice quality and productivity.