

ARKANSAS RICE CHECK-OFF



In the fall of 2016, the Arkansas Rice Research and Promotion allocated \$3,877,000 of Colombian TRQ funds to enhance the rice breeding program of the University of Arkansas Division of Agriculture, and \$766,000 to create a Rice Demonstration Program through the Cooperative Extension Service. The Board feels strongly that TRQ funds be invested in programs that will directly and promptly produce returns for Arkansas' rice producers. A summary of those efforts follows.

Breeding Program

The tariff rate quota (TRQ) funds that have been given to the Rice Breeding program at the University of Arkansas System Division of Agriculture's Rice Research and Extension Center (RREC) will benefit the entire breeding program as well as the agronomy, physiology, cereal chemistry and pathology programs.

The high-nighttime temperatures in 2010 and 2016 had a significant effect on rice production in Arkansas. The effect of the heat is impossible to consistently evaluate under rice field conditions. The only way to study the effects of high humidity and high-nighttime temperatures during heading is to have growth rooms where plants can be screened in controlled conditions to precisely determine: 1) the exact duration and actual temperature that has a detrimental effect on rice at a specific growth stage, 2) whether light or day length also has an effect in this equation, 3) the role of relative humidity

under high-nighttime temperatures, and 4) how high-nighttime air temperatures prior to, during and just after heading effect plant physiology and morphology causing pollen shed, pollen germination and/or pollen sterility.

The rice breeding and physiology program plans to screen thousands of varieties and lines in these growth rooms where temperature, humidity and light can be strictly controlled and monitored to determine the environmental parameters and discover those plants which respond best under these stress conditions. This year it appeared that there were genetic differences in how lines responded to the heat. Such observations must be confirmed through conclusive studies using growth chambers where the heat and humidity can be accurately regulated.

Additional greenhouses as well as the growth rooms will allow the group to screen material year round. The greenhouses are especially important to the hybrid program which currently has had to scramble looking for greenhouse space. In the hybrid breeding program it is very important to be able to grow plants year round in Arkansas for generation advance, crossing, and to test male sterile plants with specific temperature and day length.

The five-year commitment to add a supplemental research associates to work in each of the breeding programs as well as a Post

Doctorial Researcher will provide stable research assistance to carry out these various studies and the Post Doc will be assigned to study the genetics of the heat effects. This research will be conducted utilizing the equipment in the RREC molecular genetic laboratory purchased by the Arkansas Rice Research and Promotion Board to develop trait linked markers through real time technology for use in screening plants which will be imperative to solving the heat problem in the future. This person will also be able to work on markers for male sterility as well as other traits.

Marker assisted selection is extremely important for the plant breeding program and the purchase of additional non-trait linked markers will be critical for the classification of varieties and lines. These markers will be used to identify the position of integral genes associated with agronomic quality traits. The RREC molecular laboratory is constantly utilized by plant breeders, pathologists, and extension agents to address their needs. Keeping a maintenance budget for service contracts on the equipment as well as chemicals and expendable products is imperative to the operation of the laboratory and the ability to utilize the markers we have now as well as those that will be acquired and developed in the future.

We have had a space for 12,000 rows per year at the winter nursery at Puerto Rice for years. Presently, there are four breeding efforts underway at the RREC instead of two, (medium and semi-dwarf, long-grain, hybrid and aromatics). We require more space at the winter nursery in Puerto Rico to advance all of the material so that all of the programs have access to as much space as they require. The commitment to fund this expansion for the next 5 years will help with faster generation advance allowing new varieties to come to the market faster.

The weather stations and data loggers which will be placed at the Arkansas Rice Performance Trial and on farm Prep test locations means that the weather conditions at the locations are monitored and can be linked to yields and quality at many locations around the state. This will relate directly to the test site and also help understand what is happening in the surrounding fields. Being able to place small weather monitors throughout the rice canopy will help in understanding how temperature effects throughout the day and night effect the growing plants.

Demonstration Coordinator & Program

Small-plot replicated research is the backbone of developing applied research recommendations for the University of Arkansas System Division of Agriculture. These studies are conducted at many locations throughout the state to evaluate cultivars and practices under a wide range of growing conditions and account for variability in producer practices and field conditions. However, there remains a disconnect between grower acceptance of recommendations based on small-plot research and how it relates to large-scale, whole field production situations.

The tariff rate quota (TRQ) funds given to establish a Rice Demonstration Coordinator position and the Rice Grower Research And Demonstration Experiment (GRADE) program will benefit the research efforts of the Division's various rice programs.

The goal of the program is to coordinate and demonstrate large-scale plot performance of rice recommendations and cultivars in commercial production fields across the Arkansas rice production regions.

The objectives are to 1) conduct large-scale replicated trials on commercial rice farms; 2) accumulate large-plot research data on cultivar performance, seeding rate, nitrogen rate and timing, etc.; 3) accumulate data to support development of rice budgets, computer-assisted management programs, agronomic practices, resource utilization, and statewide rice extension programs; and 4) the program will provide hands-on training of agents, consultants, and growers.

The benefits of larger-scale demonstrations include allowing more growers opportunities to evaluate and provide input on practices at a larger scale than small-plot research, impact more counties, and provide supplemental information to the verification program. A demonstration program of this type would also allow more hands-on participation by county agents, consultants, and others while providing many more sites for educational “seeing is believing” field events. Long term, the success of this program should result in adoption of lower risk recommended practices, lessen year to year “disasters”, and increase whole farm profit.