Multi-state Organic Rice IPM Research Update

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Introduction

Organic rice production has increased in the U.S. over the last 20 years, with a majority of acreage being grown in Texas. Farmers are seeking new ways to capture value added markets such as organic rice to sustain farming and rural communities. Due to the warm and long growing seasons in the South, disease, weed and insect pests are among the primary factors limiting the expansion of the organic rice industry. With the support of a $1 million grant from USDA/NIFA Organic Agriculture Research and Extension Initiative (OREI), we take an interdisciplinary approach to develop effective management strategies to minimize ~~the~~ losses caused by disease, weed and insect pests. This is the 2nd year of this multi-state research project. This project involves ~~in~~ the disciplines of plant pathology, weed science, entomology, genetics and breeding, agronomy, nutrient management, agricultural economics, and outreach education. This project is guided by seven stakeholder advisory committee members consisting of organic farmers, millers, crop consultants, county extension agents and organic product salesmen in Texas, Arkansas, Missouri, Florida, and South Carolina.

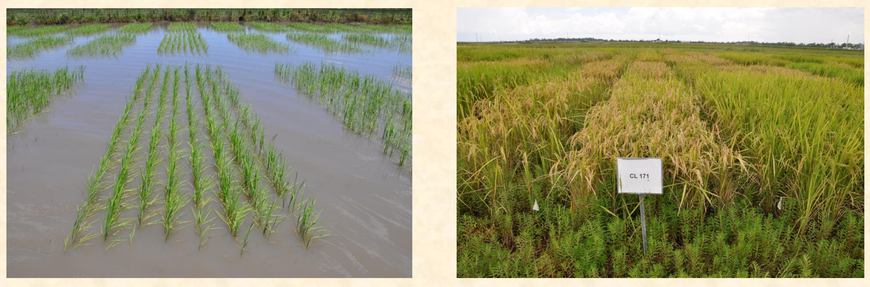

Fig. 1. Organic rice research plots at the Beaumont Organic Testing Site, Texas.

Objectives

1. Utilize green manure cover crops for weed, disease and insect pest and nutrient management;
2. Select the best rice varieties and elite lines for organic rice production;
3. Evaluate and optimize the use of gibberellic acid and biocontrol agents as a seed treatment for stand improvement and weed and disease suppression;
4. Identify cost effective pest management practices using partial budget analysis and develop interactive budgets that help producers better manage input costs and increase returns; and
5. Develop a multi-state outreach and extension program.

Research Accomplishments

1. **The 1st Center of Excellence for Organic Rice Research** in the U. S. has been established. The Center is led by Texas A&M AgriLife Research, Beaumont, TX and is in cooperation with USDA ARS Dale Bumpers National Rice Research Center, Stuttgart, AR; University of Arkansas, Pine Bluff, AR; and the Organic Center, Washington, DC.
2. **The 2nd Organic Rice Testing Site,** in addition to the Beaumont Testing Site (Fig. 1), is being established at the University of Arkansas, Pine Bluff, AR.

Fig. 2. Winter and summer green manure crops in Texas and Arkansas.

Research Accomplishments

3. **Green Manure Cover Crops**
   - **Growth Performance:** Annual ryegrass, white clovers and crimson clovers grow well as a winter cover crop at the Beaumont test site while brassica (mustard) does not provide sufficient aboveground biomass due to wet weather conditions and weed competition (Fig. 2); annual ryegrass, cereal rye, and oats grow well as a winter cover crop and cowpeas as a summer crop at the Pine Bluff test site (Fig. 2).
   - **Weed Suppression:** All the winter cover crops provide significant weed suppression at both test sites.
   - **Disease Suppression:** Use of annual ryegrass and white clovers reduces the severity of narrow brown leaf spot and brown spot at the Beaumont test site.
4. **Rice Variety Performance:** XL753, XL723, Rondo, Jasmine 85 and Tesanai 2 are among the best varieties showing good stand, aggressive growth, suppression of weeds (Fig. 3A) and narrow brown leaf spot disease (Fig. 3B and C), and high yield potential.
5. **Seed Treatment:** Seed treatment with gibberellic acid improves stand establishment and seed treatment with the biocontrol agents Sonata (*Bacillus pumilus*), Integral (*B. subtilis*), and BioEnsure (a fungal endophyte mixture) reduce seedling diseases.
6. **Economic Analysis:** The Economic Optimum Seeding Rate (EOSR) for Presidio is 71 lb/A, which is comparable to the conventional optimum rate for Presidio. However, the EOSR for XL753 is 42 lb/A, which is larger than the conventional optimum rate for XL753. Organic production expenses are less than conventional production expenses ($2,019 vs. $1,280) in Texas. The main barriers to entry into organic rice production are the 3-year waiting period required for organic certification of rice ground.

Fig. 3. Suppression of weeds (A) and narrow brown leaf spot disease (B, resistant; C, susceptible) in rice varieties at the Beaumont Testing Site, Texas in 2016.

Dissemination of Findings

Our accomplishments have been disseminated to communities of interest through an organic rice symposium, two organic rice workshops, one organic rice field tour, two field days, two stakeholder advisory board meetings, and eight local, national and international meetings. Our project also has reached the public through a variety of social media including website (http://bit.ly/299L2W5), Twitter, Facebook and Google Ad Words. The project has reached a national and global audience with more than 5,672 people. most of whom are in Arkansas, California, Missouri, and Texas. Information from this project has also been disseminated to other states in the US, Cuba and Latin America. We have seen approximately 1% increase in acreage of organic rice in the southern US over the funding period of this project.

Training

This project has provided mentoring, hands-on experience, workshops, and research opportunities to support and train 13 undergraduate students, one master graduate student, two PhD graduate students, four post-doctoral research associates, and four technical support staff for their professional development.

Acknowledgement

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