Texas Rice Research Update

Presented by Lloyd T. (Ted) Wilson
Texas A&M AgriLife Research

Shyamal Talukder, Omar Samonte, Lee Tarpley, Fugen Dou, Lina Bernaola, Shane Zhou, Muthu Bagavathiannan, Sam Rustom, Mithila Jugulam, and Yubin Yang

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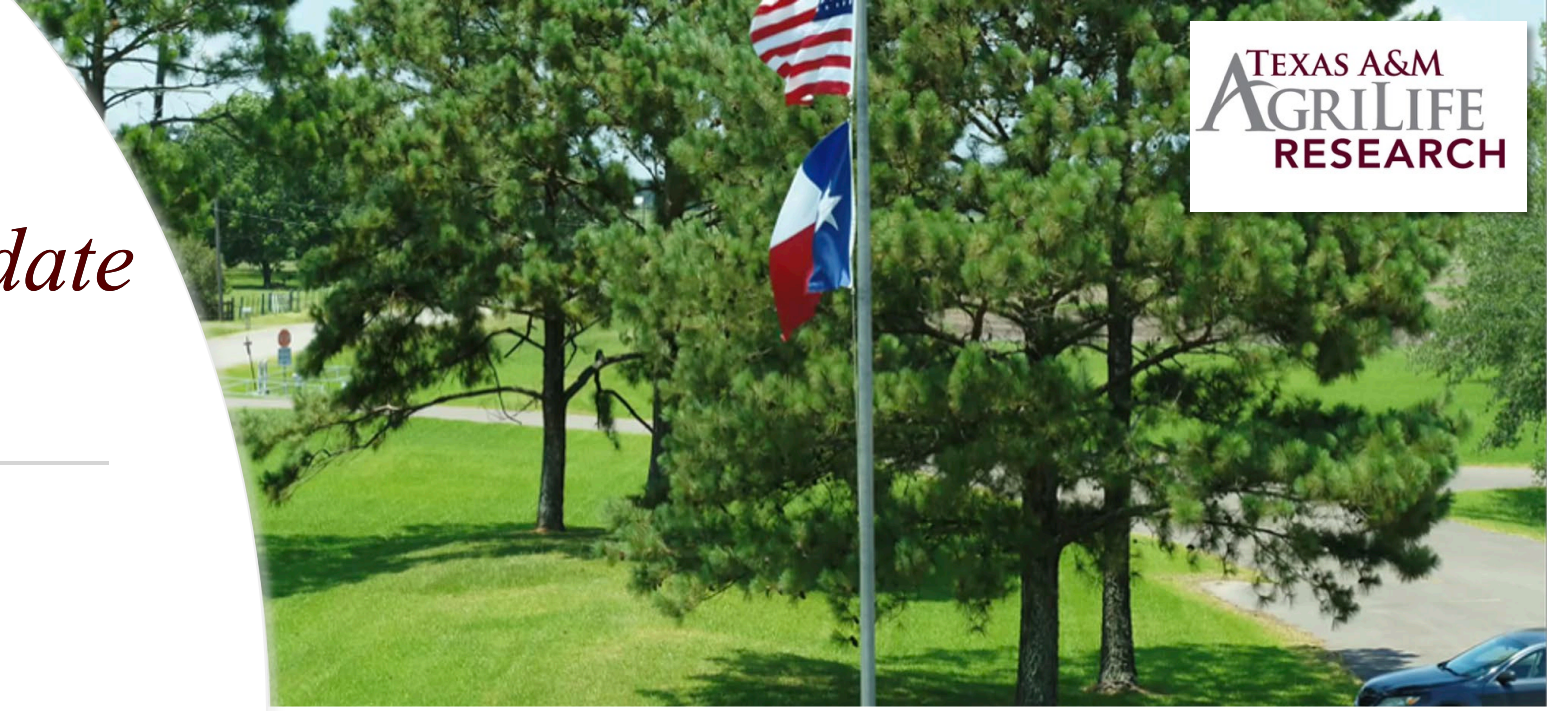
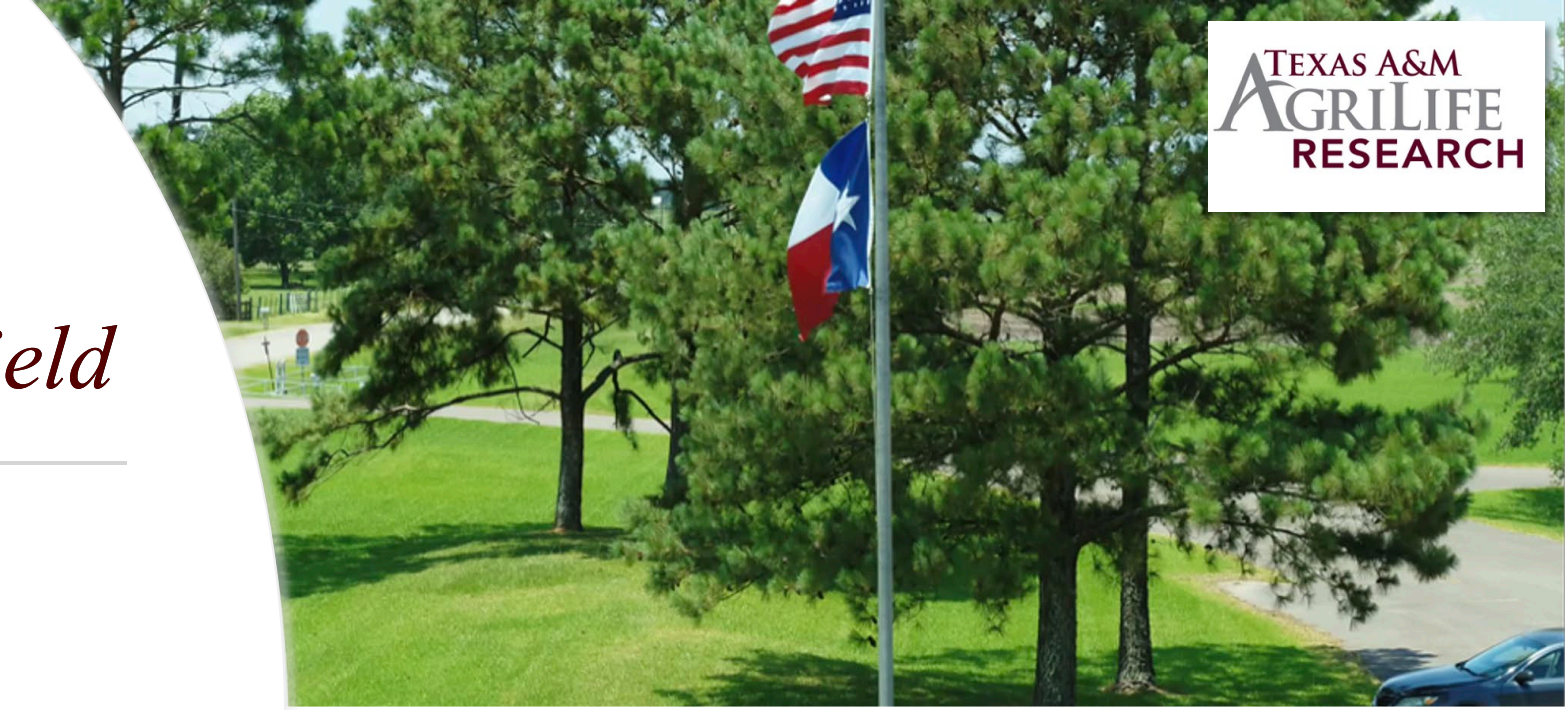
Texas Rice Research Update Overview

- *Acreage and preliminary yield*
- *Summary of on-going research*
  - *Shyamal Talukder – Inbred Rice Breeding*
  - *Omar Samonte – Specialty Rice Breeding*
  - *Ted Wilson – Systems Approach to Rice Breeding*
  - *Lee Tarpley – Rice Plant Physiology*
  - *Fugen Dou – Plant Nutrition*
  - *Lina Bernaola – Entomology*
  - *Shane Zhou – Disease Management*
  - *Muthu Bagavathiannan and Shane Zhou – Weed Management*
  - *Sam Rustom – Agronomic and Weed Management*
  - *Mithila Jugulam – Weed Molecular Biology*
  - *Yubin Yang – Integrated Cropping Systems*



Texas Rice Research Update - Acreage

Texas Rice Research Update – Preliminary Yield



Inbred Rice Breeding and Genetics - Shyamal Talukder

- *Restructuring the inbred rice breeding program to increase the efficiency of field operations, integrating speed breeding, high throughput phenotyping, and genomic selection to enhance genetic gains for yield, quality, disease resistance, and ratooning*

Specialty Rice Breeding and Genetics - Omar Samonte

- *Breeding high grain quality Jasmine-type, Basmati-type, low glycemic index, and high anthocyanin rice*
- *Integrating DNA-marker development and genomic selection for grain quality, disease resistance (with Dr. Zhou), and stress tolerance with ideal plant type breeding and high throughput grain quality screening*

Darlene Sanchez
Assistant Rice Breeder

Systems Approach to Rice Breeding - Ted Wilson, Omar Samonte, Shyamal Talukder, and Yubin Yang

- *Determine effects of climate and management changes on rice yield and grain quality*
- *Develop improved parental lines for inbred and specialty rice varieties*
- *Identify plant traits that when combined produce an ideal plant type that increases grain yields and requires 30% less time to develop*

Rice Plant Physiology - Lee Tarpley

- *Plant growth regulator (PGR) applied at panicle differentiation increases profitability by $15-59/ac. The PGR can be tank-mixed*
- *Showed that plant growth retardant cannot be used to reduce nitrogen fertilizer rate in rice the way it can in some other crops*
- *Developing off-the grid, free-air setup for rice field high night temperature studies that can be used to screen breeding populations*

Agronomic and Nutrient Management - Fugen Dou

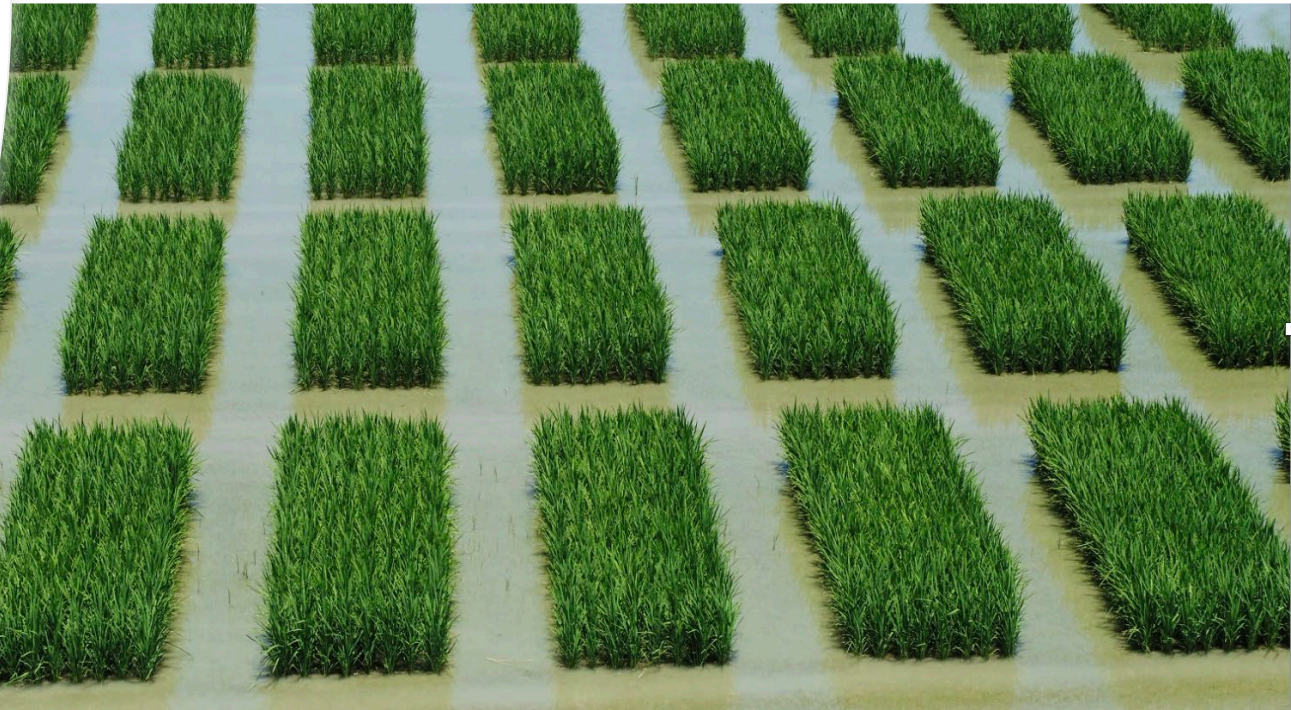
- *Alternative wetting and drying on rice production and GHG emissions*
- *N use efficiency and loss due to ammonia volatilization and deep percolation*
- *Greenhouse gas emissions, N and C soil sequestration*
- *Nanomaterials application on rice production and soil health*

Rice Integrated Insect Pest Management and Host Plant Resistance - Lina Bernaola

- *The pest management aspect focuses on rice delphacid, stem borers, rice water weevil, and rice stinkbug*
- *The host plant resistance aspect focuses on mechanisms of resistance to stem borers and rice delphacid*
- *Efficacy of commercial and experimental insecticides and soil microorganisms as potential contributors to insect mortality*

Rice Disease Management - Shane Zhou

- *Develop UAV remote sensing, AI, and Raman spectroscopy tools for detection of rice kernel smut and other diseases*
- *Use spore trapping to monitor season-long spore release for precision timing of fungicide for kernel smut control*
- *Develop improved fungicide and varietal resistance management practices for kernel smut, sheath blight and narrow brown leaf spot*



Weed Management - Muthukumar Bagavathiannan and Shane Zhou

- *Develop drone-based weed mapping and herbicide spraying technology for precision weed control*
- *Develop weed biology and ecology knowledge for advancing integrated weed management in rice*
- *Annually evaluate the efficacy of a wide range of herbicides applied at different rates and timings*

Rice Agronomy and Weed Management – Sam Rustom

- *Developing a comprehensive research and extension program that directly addresses production issues faced by Texas rice farmers*
- *Investigating production strategies aimed at improving on-farm profitability and efficiency*
  - *Resistant barnyardgrass management strategies and new herbicide screening*
  - *UAV pesticide application performance*
  - *Commercial variety performance trials*
  - *Long-term date of planting research*

Weed Molecular Biology – Mithila Jugulam

- *Identify sources of natural tolerance to herbicides in rice*
  - *Screen a wide collection of germplasm for herbicide tolerance*
  - *Physiological and molecular characterization of tolerance*
  - *Utilize in introgression breeding*
- *Confirm and characterize herbicide resistance in weed species in rice crop*
  - *Level of resistance in weed species*
  - *Physiological and molecular mechanisms of weed resistance to herbicides*

Integrated Cropping Systems – Yubin Yang

- *Co-Lead development of web-based rice management decision aids and databases*
  - *Rice Development Advisory*
  - *Rice Post-Harvest Grain Management*
  - *Rice Water Conservation Analyzer*
  - *Texas Rice Crop Survey*
  - *Global Climatic Database*
  - *U.S. Cropland and Soil Database*
- *UAV-Based Rice high-throughput phenotyping system*
- *International modeling of rice response to increasing temperature and CO_2*

Special thanks for supporting the research discussed during this presentation!

- *Texas A&M AgriLife Research*
- *The Texas Rice Research Foundation*
- *The Texas Rice Producers Board*
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- *US Department of Energy BETO program*
- *Foundation for Food and Agriculture Research*