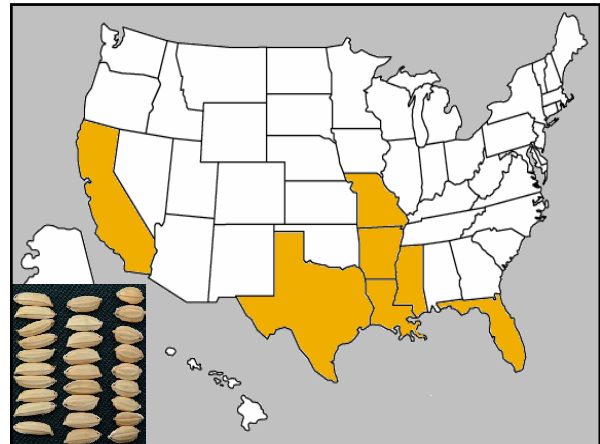


## Yield advantage of hybrid rice over conventional and Clearfield® long-grain rice in the southern United States

Xueyan Sha, Steve D. Linscombe, S. Brooks Blanche, and Donald E. Groth

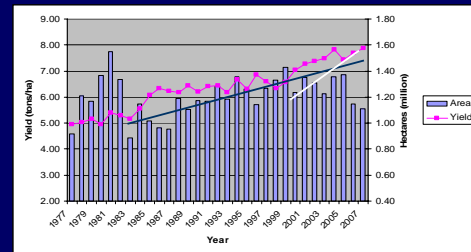
Rice Research Station, Louisiana State University AgCenter, Rayne, LA 70578, U.S.A.



Rice production in U.S. is a high-input and high-mechanized system



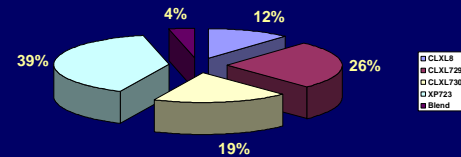
## U.S. Rice Acreage and Yield (1977-2007)



## Hybrid Rice Production and Research in the U.S.A.

- Hybrid rice has been commercialized since 2000 by RiceTec, Inc. (Alvin, Texas). The first hybrid XL6 was an indica/indica cross.
- The first Clearfield® hybrid CLXL8 was marketed by RiceTec in 2003.
- In 2007, RiceTec hybrids account for about 18-20% of the southern rice acreage or 14-16% of the U.S. rice acreage.

## Hybrid Rice Acreage (%) Breakdown by Cultivar, 2007.



## Hybrid Rice Production and Research in the U.S.A.

- In 2007, Bayer CropScience announced its plan to develop hybrid rice in U.S.
- Currently, no public rice breeding program is developing commercial hybrid rice.
- Research conducted at UC Davis in the 1970s by Dr. Neil Rutger found a 16-67% heterosis under the space-transplanted condition.
- At the USDA-ARS Dale Bumpers Center, Dr. Rutger conducted research on the development of male sterile line (S-lines) through the mutation of U.S. long-grain cultivars.

## Prospective and Challenges

- Hybrid rice will continue to expand.
- However, further increase depends on:
  - Improving seed production efficiency to further reduce the seed cost.
  - Further improvement on quality, esp. milling stability and grain appearance.
  - Seed quality (stability of S lines); pubescent leaf and sheath; lodging susceptible, etc.

What is the yield advantage of hybrids over inbred cultivars in the U.S.?

## Previous Reports

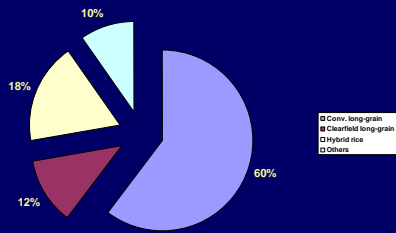
- RiceTec claims that its hybrids have a 21-40% yield advantage over the best inbred cultivars in their trials.
- Very few yield comparison studies were conducted by public researchers, in which hybrids XL8, CLXL8, and XL723 were reported to have about 17-21% more than the highest yielding cultivars.



Clearfield® rice was invented at the LSU AgCenter's Rice Research Station



## Distribution of different types of rice cultivars in the southern U.S., 2007



## Objective

To compare hybrid rice with leading inbred cultivars (CL and LG cultivars) for grain yield, milling yield, plant height, lodging susceptibility, maturity, and disease reactions to sheath blight and bacterial panicle blight.

## Four hybrids tested in 2006 and five tested in 2007

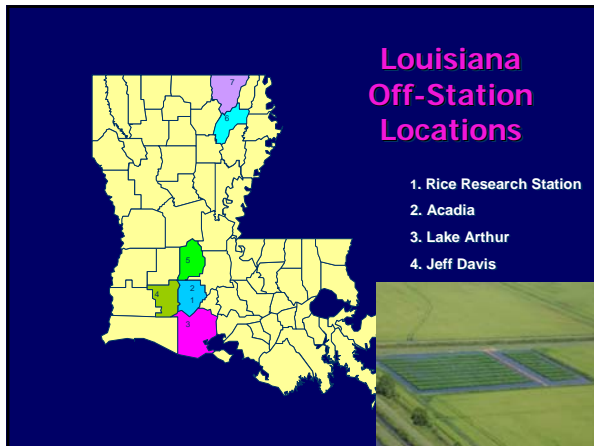


## Three Clearfield® cultivars

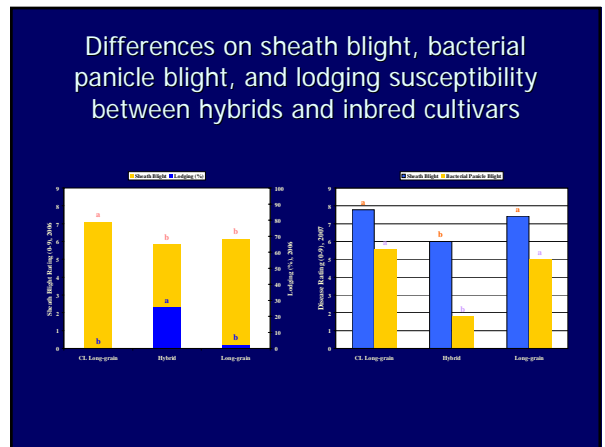
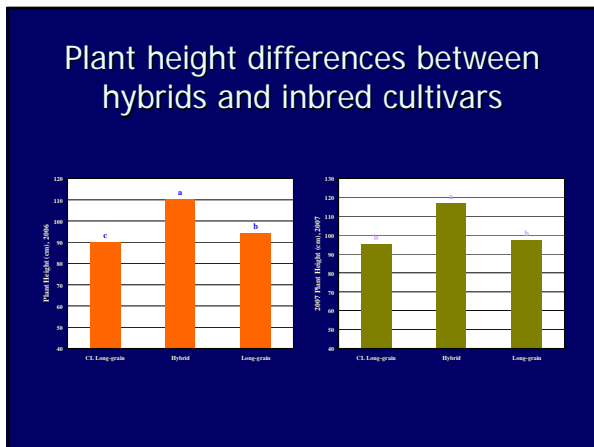
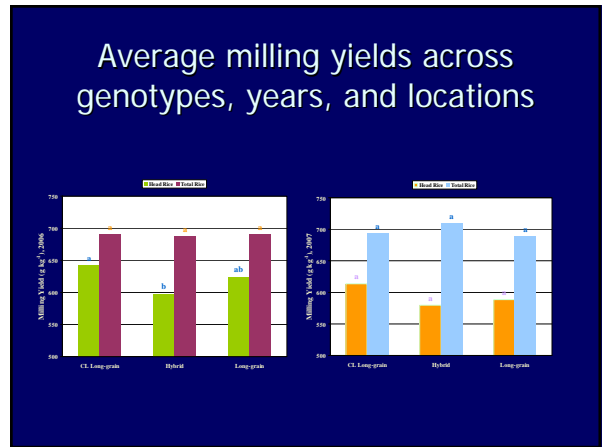
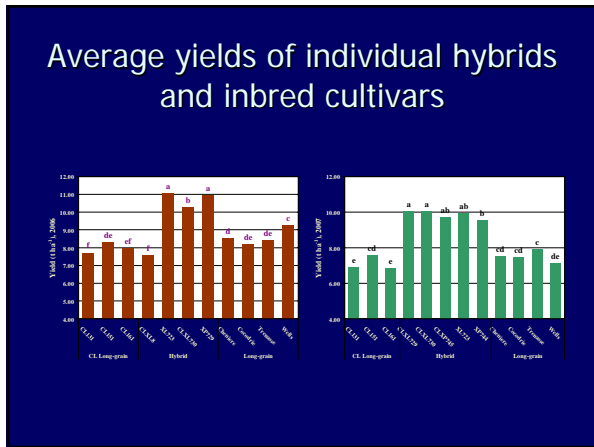


## Four conventional long grains





## Results



## Conclusions

- Hybrid rice had a 15.9 to 39.2% grain yield advantage over inbred cultivars.
- However, head rice recovery of hybrids was 1.4 to 7.0% lower than inbred cultivars.
- Hybrid rice had similar maturity but was 16 to 20 cm taller than inbred cultivars and more susceptible to lodging.
- Nevertheless, hybrid rice had higher levels of resistance to both sheath blight and bacterial panicle blight.

