



## Developing Heat-Tolerant Rice to Protect U.S. and Global Harvests

Cereals Lab partnership turns rice diversity into breeding resources for American farmers

U.S. farmers produce a rice crop worth roughly \$3 billion annually, but heat waves can threaten both harvest size and grain quality. For example, in Louisiana alone, drought and excessive heat imposed approximately \$155 million in economic losses and additional costs on rice production in 2023. Developing heat-tolerant varieties could help farmers protect their investment and maintain production during hot seasons. Heat damages rice in different ways. At flowering, it can disrupt pollination, leaving empty hulls instead of grain. During grain filling, high temperatures can produce chalky, fragile kernels that break during milling, reducing the recovery of higher-value whole rice. Protecting fertility and maintaining grain quality are therefore critical priorities for safeguarding crop value.

Through a partnership between Texas A&M University and the Bangladesh Rice Research Institute (BRRI), the Cereals Lab is targeting heat tolerance at the flowering stage. Led by principal investigator Dr. Michael Thomson at Texas A&M and co-principal investigators at BRRI, the project explores underutilized diversity in *aus* rice, a group of traditional rice varieties that grow under high temperatures in Bangladesh. The Cereals Lab partnership combines complementary expertise at Texas A&M and



Bangladesh rice farmers inspecting the *Aus* Diversity Panel in the field in the heat stress region of Lalpur, Natore, Bangladesh. Photo submitted by Michael Thomson, PhD, Texas A&M University



Michael Thomson, PhD, with Bangladesh rice farmer Md. Kamal Hossain and BRRI co-Principal Investigator Md. Akhlasur Rahman, in front of the *Aus* Diversity Panel, growing in the heat stress region of Lalpur, Natore, Bangladesh. Photo submitted by Michael Thomson, PhD, Texas A&M University

BRRI to accelerate the discovery and validation of genes and alleles conferring heat tolerance, advancing rice improvement for farmers in both countries.

The team will combine heat-stress testing with whole-genome DNA analysis across a set of over 340 rice varieties to identify heat-tolerant alleles, followed by transfer of key genetic targets into breeding lines to verify their benefits. The intended outputs are validated genetic resources and DNA markers that will enable breeders to introduce and track these heat-tolerant alleles in rice cultivars. These resources promise to provide American breeding programs new options for developing varieties that can better withstand heat waves. The long-term opportunity is to deliver heat protection through improved varieties farmers plant, helping stabilize harvests and farm income. At the national scale, preserving the production equivalent of just 4% of the annual rice crop value would represent approximately \$120 million annually. This illustrates the potential scale of benefits; actual returns would depend on performance, adoption, heat exposure, and prices. By turning discoveries in Bangladesh into resources for rice breeders, the Cereals Lab can strengthen harvest security for Bangladeshi farmers, while simultaneously helping to protect U.S. agricultural productivity.



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