

Research Development Fund – FALL FY17 Cover Page Template  
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**Application Title:** Enabling Crop Translational Genomics

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**Key Participating Units:** AgriLife Research and TAMU: SCSC, ENTO, PLPA, HORT, ESSM, and others

**Anticipated Request Amount (\$):** \$1.8 million

**Executive summary of the intended application to utilize Research Development Funds.** Advances in high-throughput genotyping and next-generation sequencing have caused sweeping changes in genome mapping, integrative genetics, genomics, molecular breeding, and diagnostics. Scientific ramifications have been extensive in agriculture, natural sciences, engineering and medicine. Equally revolutionary ramifications are expected from genome editing, new methods of which enable increasingly precise modification of target genes. Moreover, the legal pathways to commercialization of crop organisms are far simpler, faster and cheaper for many gene-edited products than comparable transgenic ones, prospectively removing long-standing transgene-related impediments to academic competitiveness in Ag-bio commercialization and IP. Combined, these technologies enable unprecedented opportunities to translate genomic discoveries into practical applications and products of local and global significance. If at the cutting edge, TAMUS, Brazos County, and Texas could benefit immensely.

Biotechnologies are very fast-paced, so rapid progress now will significantly affect downstream competitiveness and the ability to implement a vision where Texas A&M and Brazos County are recognized centers of excellence for translational genomics and enabling technologies. We propose immediate investments toward world-class facilities in crop genome editing and molecular breeding. This project has three objectives: (1) a flagship Crop Genome Editing Lab, as part of a larger initiative for a Texas A&M AgriLife Genomics Technology Center; (2) AgriGenomics Laboratory improvements for high-throughput DNA extraction and SNP genotyping for molecular breeding applications; and (3) to establish a Crop Analysis and Translational Genomics (CATG) Coordination Team to work with breeders to target and apply genome editing and molecular breeding technologies. These investments will uniquely augment current campus capacities, including the AgriLife Research Genomics and Bioinformatics Service, which provides NGS applications, and the TIGSS Core facility in the Vet. Med. Research building, and allow for a strategic realignment of the plant genomics efforts at Texas A&M. Moreover, this expansion of crop genome editing and molecular breeding technologies will synergistically complement concurrent or future analogous efforts by nearby groups focused on animal, microbial, engineering and medical applications, potentially fostering extensive regional excellence.

The vision for the Crop Genome Editing Lab is to optimize gene editing technologies for use in crop improvement across a number of major crop species, and to establish a routine gene editing service as the editing and transformation pipelines are established for each species. Likewise, cutting-edge automated platforms are needed for rapid and low-cost services for DNA extraction and molecular marker genotyping for diverse crops, tissues, sample numbers and “plex” levels. The CATG Coordination Team will help target developments toward results of high relevance and value to Texas A&M researchers and AgriLife Research breeding groups, thereby expediting product development and improved competitiveness for external funding. The proposed objectives will complement TAMUS high-throughput phenotyping efforts, enhance recruitment of top scientists and enhance graduate education.