

The Germplasm Enhancement of Maize (GEM) project: A Public-Private Partnership (PPP) to increase genetic diversity in US maize

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ABSTRACT:

The Germplasm Enhancement of Maize (GEM) Project is a mission-oriented, cooperative research effort of the United States Department of Agriculture – Agricultural Research Service (USDA-ARS), land grant universities, private industry, and international agricultural research centers to broaden the germplasm base of maize cultivated within the United States. The GEM project is a successor in the United States to the Latin American Maize Project (LAMP), which was funded largely by Pioneer Hybrid Co. and coordinated by the USDA-ARS in the early 1990's. The goal of LAMP was to evaluate the agronomic potential of maize germplasm held in collections throughout the Americas, and the goal of GEM is to conduct pre-breeding based on the results of the evaluations conducted in LAMP.

The GEM project is coordinated from two US locations: Ames, Iowa (the "US Cornbelt" in the Midwest) and Raleigh, North Carolina (the Southeastern US). The Raleigh location focuses on identifying new exotic sources of maize germplasm and on developing 50% exotic/50% temperate germplasm, while the Ames location focuses on developing 25% exotic/75% temperate germplasm with high yield potential and resistance to common foliar, stalk and ear diseases which can be incorporated directly into commercial maize breeding programs. The temperate component of the breeding crosses is often proprietary germplasm that is provided as in-kind support by private industry, while the "exotic" germplasm is usually landraces identified in LAMP as well as improved germplasm from tropical and subtropical origins (CGIAR centers, NARs, etc.). In addition to developing germplasm for use in maize breeding programs, the GEM project is also focused on developing new resources that will allow the introgression of useful alleles from agronomically inferior exotic sources. This is known as the Allelic Diversity project, and involves crossing and backcrossing accessions from all of the races of maize to two temperate inbreds and subsequently inbreeding the backcrosses to develop a panel of lines that represent the diversity of maize and that are adapted to the Midwestern US. This panel can be used to screen for alleles of interest that would otherwise be unavailable to maize researchers due to the poor adaptation of most exotic accessions to the US.