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Unlocking Sorghum's Gene Bank

Climate change poses a major challenge to humanity's ability to feed its growing population. But a new study of sorghum, led by Stephen Kresovich and Geoff Morris of the University of South Carolina, promises to make this crop an invaluable advantage in facing that challenge. Just published in the *Proceedings of the National Academy of Sciences (PNAS)*, the paper puts genetic tools into the hands of scientists and plant breeders to help accelerate their ability to adapt sorghum to new conditions.

A hardy cereal crop that was first domesticated in the Horn of Africa some 10,000 years ago, sorghum is now cultivated worldwide, from Texas to China. Sorghum is a particularly drought-tolerant grain and an essential part of the diet for 500 million people.

A large international effort decoded the genome of the species cultivated for food, Sorghum bicolor. That genome represents the genetic accounting of a single individual of sorghum. But as individual humans have genetic differences that underlie physical differences such as eye color, so do individual plants of sorghum. The focus of the current effort was to establish the connections between gene differences and physical differences -- a detailed understanding of those connections will constitute a tremendous tool for plant breeders.

One subject in the paper was the genetic control of the panicle, the structure on the top of the plant that holds the grains. This structure is an important consideration for successful breeding, particularly when climate is a consideration. Closely packed grains, for example, are preferred for maximum crop yield in dry areas, but in places with abundant rainfall, more spacing is desirable to allow grains dry out more readily and reduce crop losses from moisture-caused disease.

The results will "provide resources for everyone around the world who breeds sorghum," Morris said. "The goal is to do it faster than the way it's been done traditionally, which takes years of growing and crossing and testing."

A further step forward will involve genomic selection. With that method, in which computers are used to select the most promising candidates to test in the field, "you might be able to take years off the breeding cycle," Morris said.

Adapted from Science daily, Stephen Kresovich and Geoff Morris Jan. 3th, 2013

Sum up this article and explain the main ideas using your scientific knowledge.