



Sorghum Germplasm from Overseas Builds Profits for U.S. Farmers

Many American producers of sorghum now plant improved varieties developed through a sorghum research program sponsored by USAID. The new varieties were developed by the International Sorghum and Millet Collaborative Research Support Program (INTSORMIL), a research program managed by the University of Nebraska in collaboration with other land-grant universities from 1979 to 2013. It then transitioned to become the Feed the Future Innovation Lab for Sorghum and Millet, now managed by Kansas State University.

A major focus of the lab is development of sorghum varieties with resistance to biologically and economically damaging insect pests. In the 1980s, the greenbug aphid emerged as a serious threat to sorghum farming in the United States. Through the use of germplasm collected by INTSORMIL from many parts of the world, one of the INTSORMIL researchers, Gary Peterson of Texas A&M University, worked with a group of researchers to screen thousands of sorghum lines in search of greenbug aphid resistance. The outcome was the development and release of new varieties that greatly reduced damage from the greenbug aphid.

Research collaboration with the private sector increases U.S. benefits

Mutually beneficial collaboration with private seed companies was a feature of the INTSORMIL program. The researchers needed up-to-date information on sorghum traits desired by farmers, and Crosbyton Seed Company of Crosbyton, Texas, shared insights on the agronomic challenges faced by its customers in Central America, Africa, and the United States. INTSORMIL researchers at Texas A&M University then set out to develop new breeding lines possessing the targeted traits, using germplasm collected through INTSORMIL. After the lines were developed, the university and company entered into a "material transfer agreement," and INTSORMIL became a prime source of germplasm for Crosbyton for use in its own commercial seed breeding. By 2006, INTSORMIL had released 213 sorghum breeding lines to private industry, and 60 percent of sorghum hybrids grown in the United States had a least one parent from INTSORMIL.

While conducting INTSORMIL-funded research in Africa over a 30-year period, Peterson had become familiar with the sugarcane aphid, a pest causing damage in both sugarcane and sorghum. A Botswanan student at Texas A&M University conducting dissertation research on sorghum had identified a breeding line, Tx2783, that is resistant to the sugarcane aphid. Although this pest had not previously been a problem in U.S. sorghum production, in 2013, a massive sugarcane aphid outbreak on sorghum fields in Texas and other states caused yield losses of up to 50 percent and an estimated economic loss of \$8 million in 2013 alone. Since then, the sugarcane aphid has spread to all major sorghum-producing states. Knowing that Tx2783 is resistant to the aphid, Peterson and his colleagues at Texas A&M University brought their expertise to bear in fighting it. Research conducted by these INTSORMIL-supported scientists laid the groundwork for understanding the genetics of sugarcane aphid resistance. In 2018, 19 new sorghum lines with sugarcane aphid resistance were released, 15 of which were derived from Tx2783.

High returns on USAID investment in crop research

A recent study estimated that the sorghum and millet research sponsored by USAID through INTSORMIL generated an average annual rate of return on investment of 49 percent, based on impacts in the United States and developing countries.

USAID-funded agricultural research at U.S. universities generates economic benefits for the U.S. agriculture sector. The sorghum research CRSP, INTSORMIL, first received funding from USAID in 1979. An economic impact study found that INTSORMIL's greenbug aphid-resistant sorghum varieties saved American farmers \$389 million in 1989 alone. At that point, INTSORMIL had received a total of \$44 million (in constant 1989 dollars) in USAID support since its founding. Therefore, in a single year, the sorghum research generated nine times its total cumulative cost, and the benefits can reasonably be expected to have continued for many subsequent years.



U.S. foreign agricultural assistance investments bring substantial economic, health, and security benefits to the United States. This brief highlights a report commissioned by the Board for International Food and Agricultural Development (BIFAD) on how the United States benefits from agricultural and food security investments in developing countries. The full report is available for download at: <https://doi.org/10.2499/p15738coll2.133419>

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