

TEXAS A&M PLANT BREEDING BULLETIN

October 2013

Our Mission: Educate and develop Plant Breeders worldwide.

Our Vision: Alleviate hunger and poverty through genetic improvement of plants.

New Sorghums Developed and Released by Texas A&M AgriLife Research and the Department of Soil and Crop Sciences

Dr. Bill Rooney, far right, at a press Conference in Guatemala in December, 2012 announcing the development and release of CI0947***bmr*** brown midrib dual grain and forage sorghum cultivar for Central America



Dr. Bill Rooney, sorghum breeder, collaborated with the Centro Nacional de Tecnología Agropecuaria and Forestal (CENTA) in El Salvador in an effort to develop a brown midrib (*bmr*), dual purpose sorghum cultivar adapted to low input farming/livestock operations in Central America. The result was the development and release of the first *bmr* sorghum cultivar for the region that will aid subsistence farmers and others in the region.

The productivity of the Central American livestock and dairy industries are hindered by the lack of financing, a lack of infrastructure, and a lack of appropriate forage cultivars that provide sufficient quantity and quality forage or silage. Most of the livestock producers in the region are small land holders with limited resources; thus most of the Central American countries import dairy and meat products to meet increasing demand. The environmental conditions in Central America make high quality forage production

challenging. The tropical environment is home to a significant number of pests and pathogens that attack all crop enterprises and the seasonality of rainfall means extended periods of little rainfall that severely limits forage production. Forage production is plentiful to acceptable from mid-May through November, with rainfall frequency decreasing after August. Not only is the quantity of forage an issue during much of the year, forage quality in Central America is less than desirable for livestock and dairy production.

The forage sorghum industry has meaningfully improved forage quality in many areas of the world through the introduction of *bmr* sorghum. The *bmr* trait, which is known to reduce lignin concentration and thus improve forage quality, has been successfully introduced into many areas of the world, but has not been deployed in Central America. A breeding initiative to integrate the *bmr* trait into locally adapted grain sorghum, thus producing a dual purpose - forage + grain – commodity, was initiated by CENTA in El Salvador in 2005 by crossing a local cultivar, Tortillero, with B03292*bmr* from Bill Rooney's program at Texas A&M AgriLife Research. The F₁ was backcrossed to Tortillero and selections made in San Andres based on agronomic appearance and stability of the *bmr* trait. The B03292*bmr* parent was the source of the *bmr* trait and was developed by Dr. Rooney from the cross of BTxArg-11/BTx623*bmr*/BTxArg-1. The resulting B03292 was selected for the *bmr* trait and agronomic adaptation to College Station, TX and Guayanilla, PR.

Cultivar CI0941*bmr* was selected after testing in six countries: San Andres, El Salvador; La Lujosa, Honduras; Zacapa, Guatemala; Managua, Nicaragua; Guanacaste, Costa Rica; and Azuero, Panama. The selection was based on grain yield and biomass yield. Biomass, or forage, was evaluated for acid detergent fiber, neutral detergent fiber, acid detergent lignin, crude protein, total digestible nutrients, and in vitro dry matter digestibility, i.e., for forage quality.

Ostilio Portillo, center, a former Ph.D. student with Bill, managed the evaluation and testing phase of the advanced lines and conducted the analyses that led to the selection of CI0947bmr.



CI0947bmr was released jointly by Texas A&M AgriLife Research and the National Agricultural Research Programs in Guatemala, El Salvador, and Nicaragua. Release by Panama is expected in the near future. Additional information can be obtained by contacting Dr. Bill Rooney at wlr@tamu.edu.



Field weathering resistant red grain sorghum (right) compared with a susceptible red sorghum (left). One of 44 weathering resistant germplasm lines developed by Dr. Gary Peterson.

Dr. Gary Peterson recently released 44 sorghum germplasm lines with resistance to grain weathering. These lines originated in the AgriLife Research – Lubbock breeding program of Dr. Darrell Rosenow (deceased). Breeding crosses were made at Lubbock and crossed seed grown in a Puerto Rico winter sorghum nursery. Selection and testing were conducted at Lubbock, Halfway, Corpus Christi, and Beeville for many years. Selections for resistance to grain weathering were made at Corpus Christi or Beeville in a humid, subtropical environment. These lines are resistant to grain weathering caused by diverse genera that include *Fusarium* spp., *Curvularia* spp., and *Alternaria* spp. They are of diverse pedigree and parentage and represent an array of grain color, plant color, and other agronomic traits.

The grain weathering resistance found in these lines was derived from several different and diverse genetic sources. Resistance of 33 lines is from published sources and 11 lines derive their resistance from internal breeding lines. These lines vary in their reaction to anthracnose with several exhibiting a high level of resistance. The lines are generally later in maturity, measured as days to flowering, than the commercial hybrids and plant height is similar to today's hybrids. All lines are either purple or tan in plant color with red, white or lemon yellow grain color. All have normal, i.e., non-yellow, endosperm, are awnless, and do not have pigmented testa. Fertility restoration has not been evaluated but the parents of most of these lines are known R-lines in A1 cytoplasm, indicating that most are suitable as R lines. Dr. Peterson expects that these lines will provide the seed industry with sources of grain mold resistance in elite genetic backgrounds for use as seed or pollinator parents for the production of commercial hybrids. Additional information can be obtained for Dr. Gary Peterson at gpeterso@ag.tamu.edu.

Field weathering resistant
white grain sorghum
germplasm lines (left and right)
compared with a field
weathering susceptible white
grain sorghum (center)



Continuing Education in Plant Breeding at Texas A&M University

Continuing education course modules in plant breeding and genetics, and related disciplines are available from Texas A&M University to clientele interested in gaining new information in plant breeding or simply seeking refresher courses. This program is designed for individuals employed in private industry, CGIAR centers, government

agencies, non-government organizations, and other agriculture professionals who need and desire additional knowledge and training in plant breeding but who are not interested in an additional academic degree. A professional certificate can be a part of this program. No campus visit is required. Course modules currently open for enrollment are (<https://scsdistance.tamu.edu/purchase/>):

Basic Plant Breeding: W. Smith

Unit 3: Cross Pollinated Crops (August 26 – November 1)

Advanced Plant Breeding: W. Rooney

Unit 2: Selection: Theory and Practice (September 30 – November 1)

Unit 3: Statistical Tools (November 4 – December 3)

Experimental Designs in Agronomic Research: A. Ibrahim

Unit 2: Factorial and Unbalanced Designs (September 30 – October 22)

Unit 3: Correlation, Regression, Covariance, & Biplot (October 24 – December 3)

Other Continuing Education courses in plant breeding and related disciplines that will be available include Host Plant Resistance; Selection Theory; Marker Assisted Selection; Genomic Analysis; Field Crop Diseases; Field Insects; Essential Nutrients in Crop Growth; and others. For more information visit <https://scsdistance.tamu.edu/> or contact LeAnn Hague, Distance Education Coordinator in Soil and Crop Sciences at leann.hague@tamu.edu or (979)845-6148.

Texas A&M AgriLife Research Plant Breeding Highlighted in European Publication, *International Innovation* (www.researchmedia.eu).

Our plant breeding efforts were highlighted in an interview article in *International Innovation*, a United Kingdom based publication that publishes articles across all field of Science, Research, and Technology. Our article is available at <https://scsdistance.tamu.edu/files/International%20Innovations%20Article.pdf>.

Please direct comments concerning this bulletin to Wayne Smith, cwsmith@tamu.edu or 979.845.3450.