



Sterile Sorghum Mutant for 2 Line Breeding OTT ID #1578

TECHNOLOGY

Joint inventors from UWM and USDA ARS have discovered new nuclear male sterile (NMS) mutants of sorghum which can be used to create an easier breeding system using a two-line system versus the current systems that use three lines. They are developing a three-component genetic construct comprising the capacity to produce pure male sterile plants, rescue the male fertility, ablate transgenic pollen, sort the transgenic seeds from non-transgenic seeds, and allow propagation of pure male sterile sorghum plants for hybrid breeding and maintenance of a maintainer line.



Some fundamental problems limit the wide application and further improvement of current hybrid breeding systems. Simultaneous development of all three lines in cytoplasmic male sterility (CMS) breeding systems is very complicated and expensive. Moreover, besides instability of male sterility and negative effect of abnormal cytoplasmic genes on performance of hybrids, the narrow germplasm resources of the lines severely restrict generating all possible hybrid vigor. Thus far, due to the difficulty of producing a large amount of pure male sterile lines, the NMS and NMS genes are not exploited for hybrid breeding. Thus, it is imperative to develop the new NMS two-line breeding system.

FEATURES/BENEFITS

- **Faster** – 2-line breeding system will allow for faster growth of new sorghum lines
- **Easier** – Currently breeders use 3-line systems making breeding cumbersome
- **Safer** – The transgenic seeds will be removed by molecular ablation and physical sorting to ensure the male sterile plants in the nursery are transgene-free
- **Cheaper** – Maintaining fewer lines should provide a savings in the breeding process
- **Versatile** – Male sterile sorghum plants can be created in diverse genetic backgrounds for hybrids

INTELLECTUAL PROPERTY

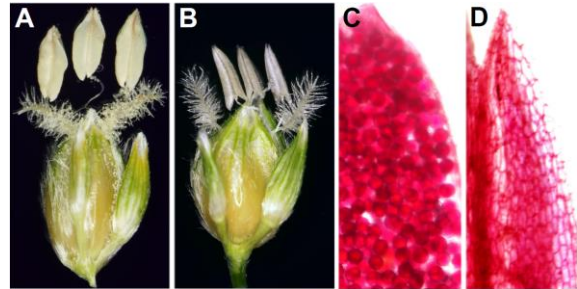
US Provisional Patent Application filed in January 2018.

This technology is part of an active and ongoing research program and is seeking partners for development of the final product. It is available for developmental research support/licensing under either exclusive or non-exclusive terms.



MARKETS

Transparency Market Research reports a growing demand for sorghum as an alternative sweetener for various alcoholic beverages is a major factor driving the global sorghum market worldwide. As a result of being a versatile crop, sorghum is also used expanding markets such as floral arrangements, fencing, building material, pet food and others, which is another major driving factor for global sorghum market. Manufacturers are offering innovative sorghum-based products to the consumers in order to remain in the competition in the market. Many sorghum producers are providing healthier product offerings based on the increasing demand for sorghum as a better substitute in a variety of food products. Sorghum's versatility gives it the elasticity to reach beyond traditional markets, further enhancing producer productivity. Hence, the global sorghum market is expected to observe robust growth.



PAPERS:

[Xin et al. 2017. Morphological Characterization of a New and Easily Recognizable Nuclear Male Sterile Mutant of Sorghum \(*Sorghum bicolor*\). PLOS ONE, <https://doi.org/10.1371/journal.pone.0165195>](https://doi.org/10.1371/journal.pone.0165195)

[Zhanguo Xin, et al 2018. Registration of BTx623_{ms8}, a New and Easily Identifiable Nuclear Male Sterile Mutant in Sorghum. J. of Plant Reg. <https://doi.org/10.3198/jpr2017.09.0063crgs>](https://doi.org/10.3198/jpr2017.09.0063crgs)

INVENTORS

Dazhaong (Dave) Zhao and Zhanguo Xin

Dave Zhao is currently a Full Professor of Biological Sciences at the University of Wisconsin-Milwaukee. He received his Ph.D. from the Institute of Botany, Chinese Academy of Sciences. His lab primarily focuses on studying molecular mechanisms of receptor kinase-linked signal transduction and microRNA-controlled auxin signalling network during plant sexual reproduction using molecular genetic, cell biological, and systems biology approaches. Dr. Zhao has been working on plant male sterility for a long time and uses genetic engineer to invent new tools for hybrid breeding in crops.

Zhanguo Xin is the Lead Scientist and a Research Molecular Geneticist at the Plant Stress & Germplasm Development Unit in USDA-ARS. His research focuses on sorghum genetics and breeding. He received his Ph.D. from University of Minnesota. His long-term goal is to revolutionize sorghum breeding with the modern genomic technologies. Dr. Xin will continue his research in discovering new traits to accelerate sorghum breeding.

For further information please contact:

Jessica Silvaggi, Ph.D.

Senior Licensing Manager

UWM Research Foundation

1440 East North Avenue

Milwaukee, WI 53202

Tel: 414-906-4654

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