Cloning the First Nuclear Male-Sterile Gene in Sorghum

Hybrid vigor, the ability of hybrids to outperform the best inbred line parents, probably the most important strategy to increase grain yield in many crops. At present, cytoplasmic male sterility (CMS) is the predominant strategy to produce male-sterile parents in the three-line (A/B and R) hybrid breeding system. Simultaneous development of all three lines is time-consuming, expensive, and complicated. Furthermore, widespread use of a single cytoplasm source, such as the A1 cytoplasm in sorghum, could make sorghum hybrids prone to severe diseases (like what happened to maize hybrids made with T-cytoplasmic male sterility in 1970s) and other biotic and abiotic stresses.

In a new article in The Plant Genome, researchers isolate a novel nuclear male sterility (NMS) mutant, *male sterile 9* (*ms9*), and identified the first sorghum NMS gene, *Ms9*, as a plant homeotic domain (PHD)-finger transcription factor. Mutations of the *Ms9* gene cause no pollen production at anthesis and male sterility of the *ms9* mutant plant.

The NMS has been used in the development of a two-line breeding system in rice hybrid production. The results showed that the two-line hybrid breeding system using NMS not only simplifies the hybrid seed production procedure but also can dramatically expand the possibilities for making hybrids between accessions that cannot be generated with the current three-line breeding system. The identification of the *ms9* mutants, *Ms9* gene, and its causal mutations provides new genetic tools to engineer controllable male sterility and an opportunity for developing a two-line breeding system in sorghum hybrid production.

Adapted from Chen, J., Y. Jiao, H. Laza, P. Payton, D. Ware, and Z. Xin. 2019. Identification of the first nuclear male sterility gene (Male-sterile 9) in sorghum. Plant Genome 12:190020. View the full open access article online at http://doi.org/10.3835/plantgenome2019.03.0020

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**Society Science**

**Characteristics and Communication Influence Student Risk Tolerance**

Students who are afraid to take chances may miss valuable opportunities for personal and professional growth. Recognizing characteristics that influence risk tolerance, and the impact of simple classroom communication, can inform the efforts of college agriculture instructors to encourage student success.

A newly published article in *Natural Sciences Education* describes a year-long study at Illinois State University where students in a farm management class assessed their own risk tolerance. Through the use of “cheap talk” (a non-binding, non-verifiable message), approximately half of the class was informed that people generally say they are willing to take more risk than they actually take in real-life situations.

Male students were significantly more risk tolerant than their female classmates; risk tolerance also increased among transfer students, seniors, and those from farm backgrounds. However, the cheap talk statement led to lower reported risk tolerance, suggesting that simple messages may affect students’ perceptions.

When instructors understand the characteristics that affect students’ risk tolerance, they are better equipped to help their students navigate the challenges that college presents both in and out of the classroom. This study also suggests that professors should be mindful of their words as casual phrases matter in classroom communication.


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Phenotypic differences of BTx623 wild-type (left) and *male sterile 9* (*ms9*, right) panicles (A and B), spikelets (C to F), and anthers (G to J) at the anthesis stage, showing the pollen containing mature yellow anthers of BTx623 and the empty pale small pale anthers of *ms9*. doi:10.2134/csa2019.64.S046

Phenotypic differences of BTx623 wild-type (left) and *male sterile 9* (*ms9*, right) panicles (A and B), spikelets (C to F), and anthers (G to J) at the anthesis stage, showing the pollen containing mature yellow anthers of BTx623 and the empty pale small pale anthers of *ms9*. doi:10.2134/csa2019.64.S045