

# **Dominant multiple tiller (*mtl-D1*) as a promising trait for forage sorghum**

**Zhanguo Xin**

# Water Is a Limiting Factor for Forage Production in Southern Plains

- Irrigation efficiency is vital
- Drought-tolerant and water efficient crops provide alternatives
- As a drought and high temperature tolerant crop, sorghum holds promise for forage production in the future climate
- We isolated a sorghum dominant multiple tiller (*mtl-D1*) that may transform forage sorghum production

# *Mtl-D1* Is a Stable Trait across Environments

A



B

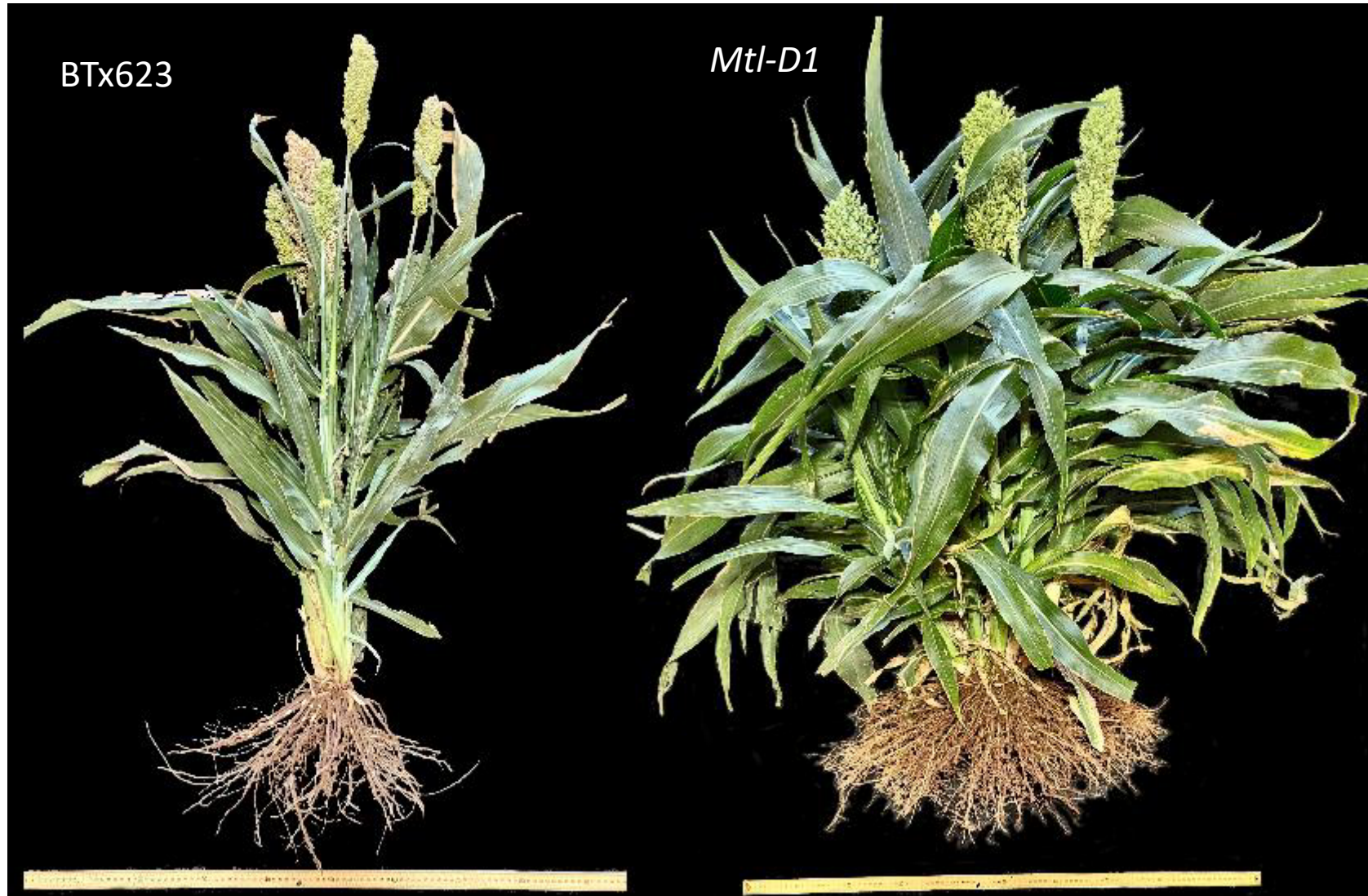


C



- Early tiller development
- Late flowering
- Shade tolerant

# Genetic Potential Under No Space Limitation



# Individual Main and Tiller Stalks



# Biomass and Grain Yield under no Space Limitation

	BTx623	Mtl-D1
Anthesis (days)	52	64
Plant height (cm)	101.5	105.9
Leaf number	20	27
Total tiller	6.8	12.6
Effective	2.6	10.2
Ground	2.5	10.2
Nodal	4.8	4
Noneffective	4.4	2.4
Total biomass yield (g)	528	1660.2
Main shoot	125.8	93.1
Tillers	149.1	827.1
Total grain yield (g)	194.5	442.1
Main shoot	127	57.7
tillers	65.2	384.4

# BTx623 and *mtl-D1* under Field Condition



BTx623

*Mtl-D1*

# UAS Image of BTx623 and *Mtl-D1*



BTx623

*Mtl-D1*



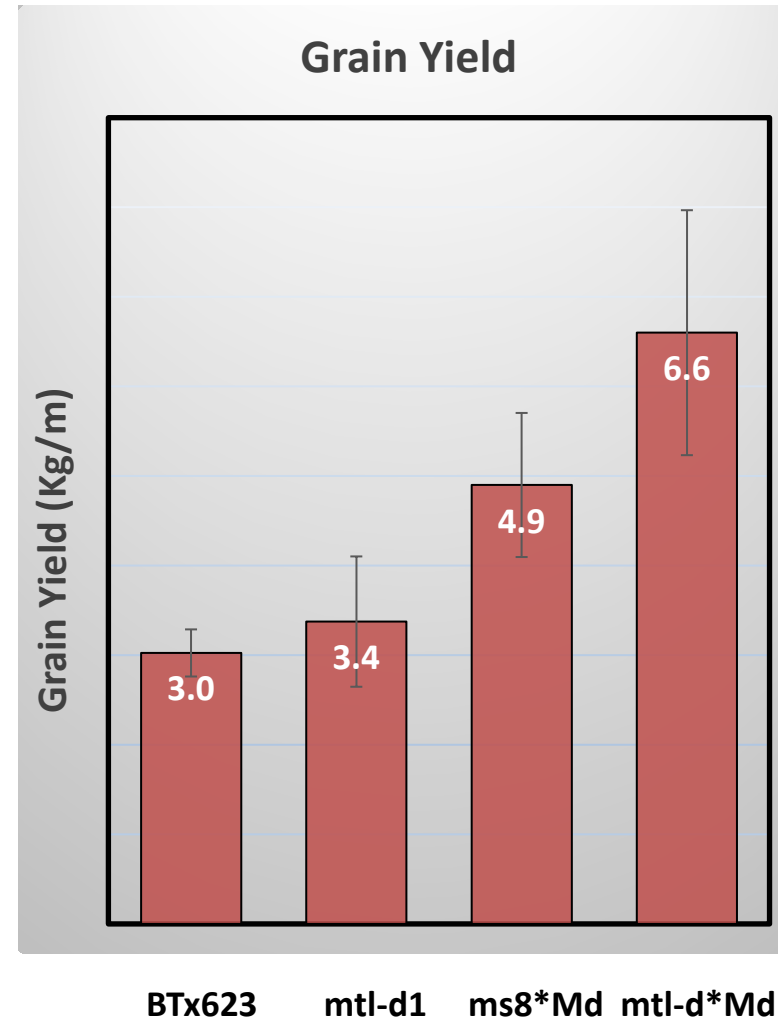
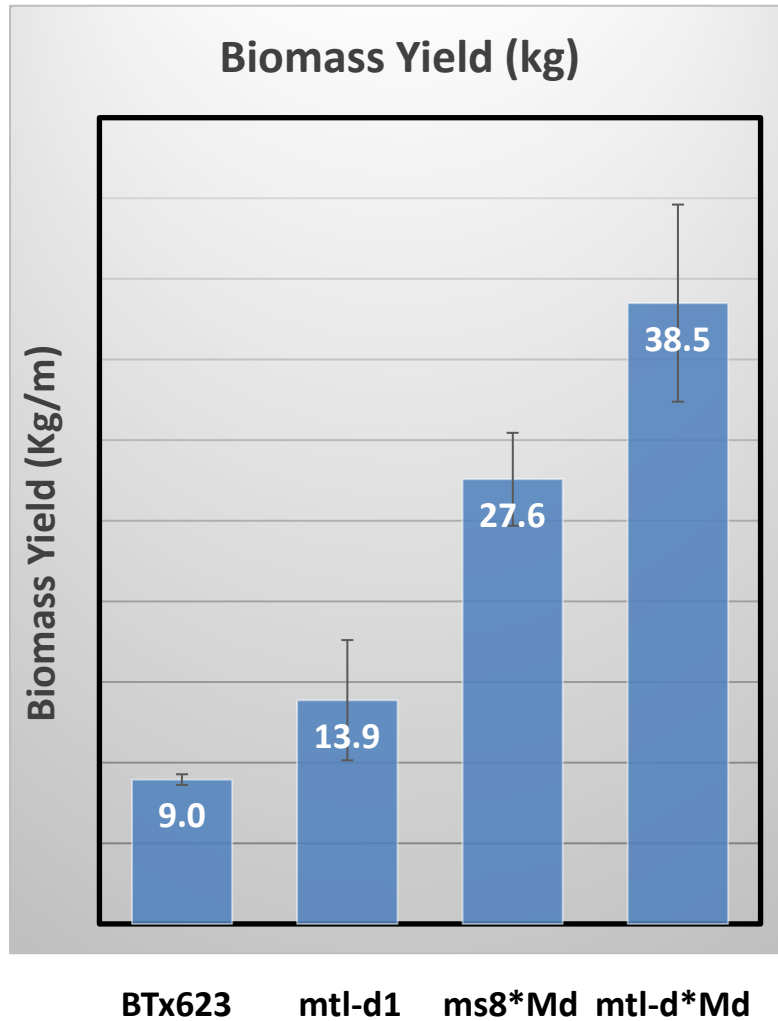
# The *mtl-D1* Trait after Cutting



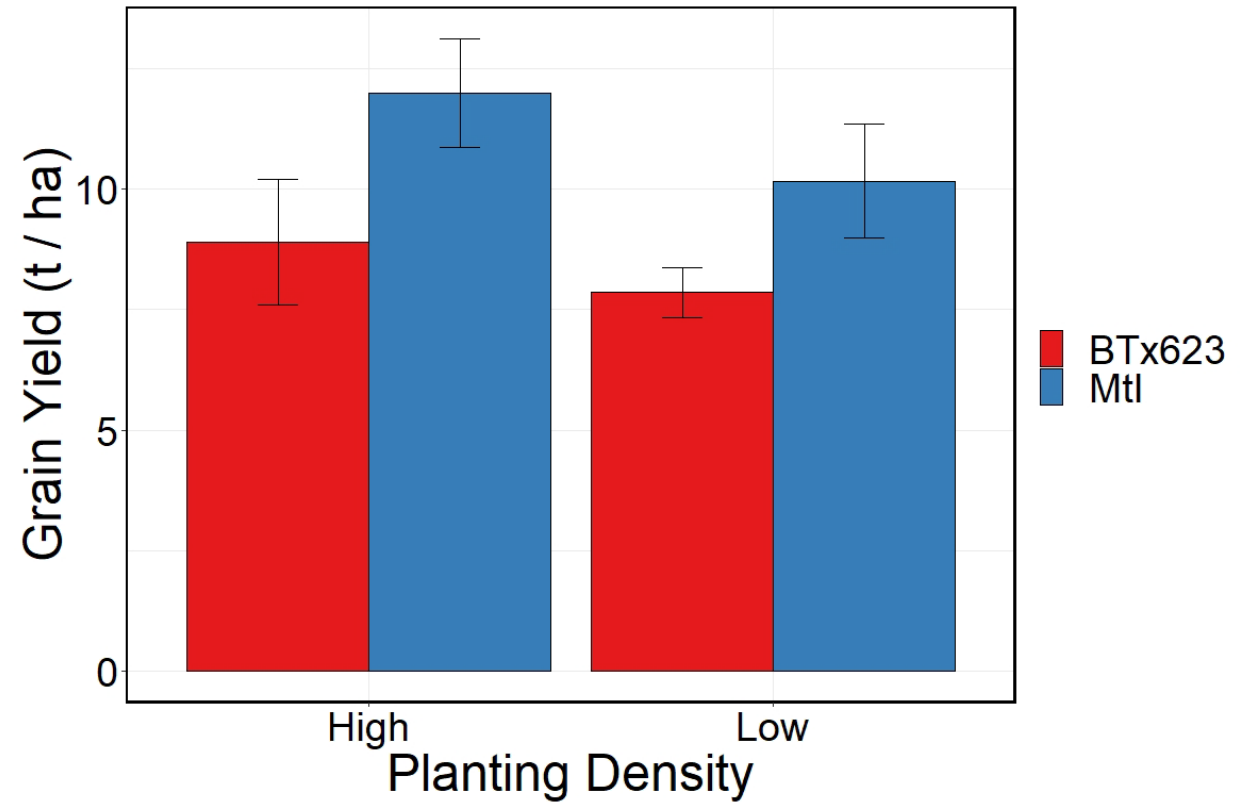
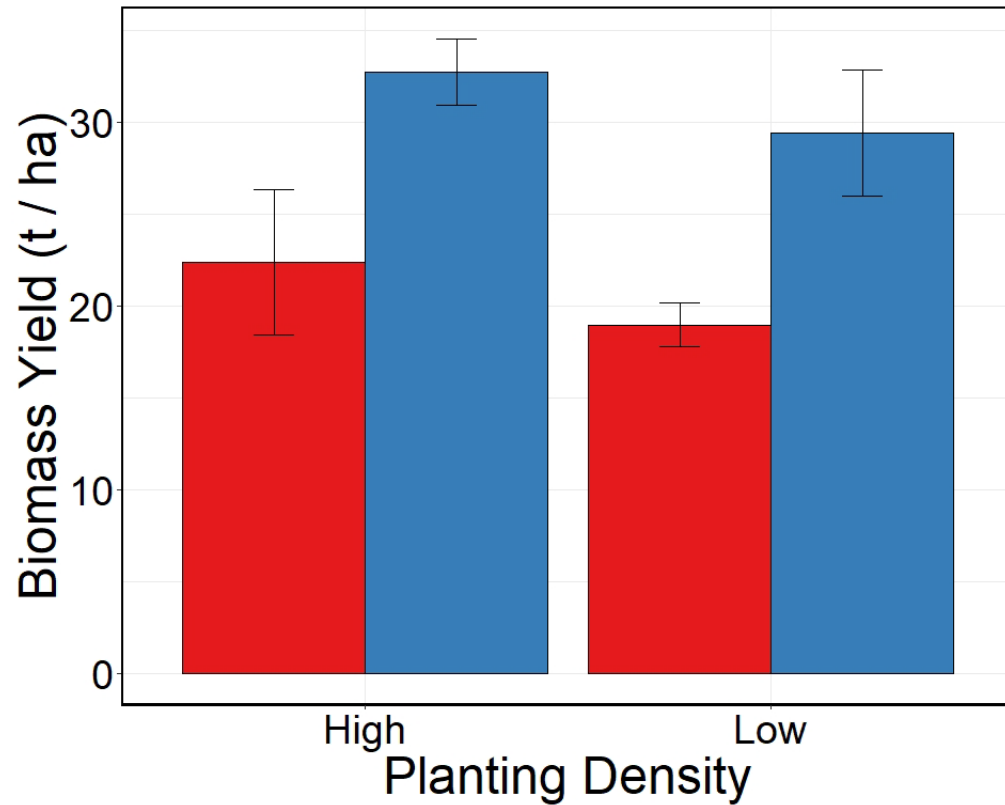
Mtl-D1

BTx623

# Dominant *mtl-D1* Yield Test-Lincoln, NE

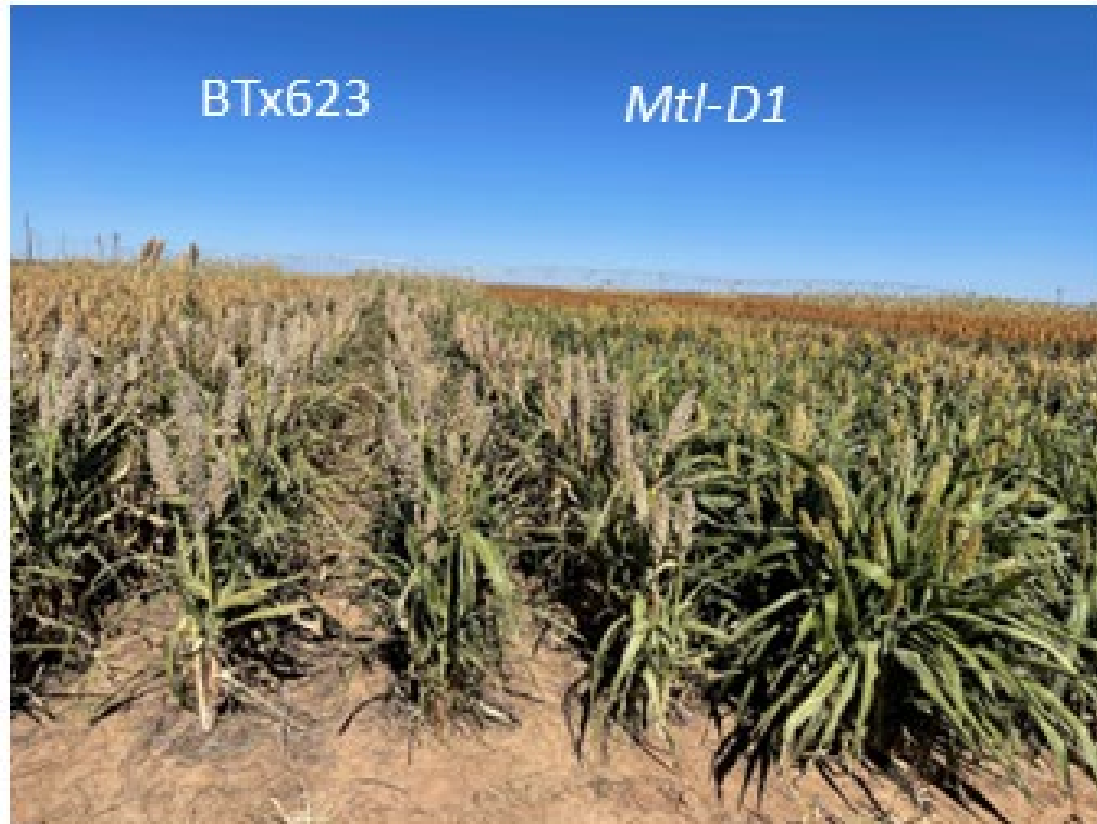


# Dominant *mtl-D1* Yield Test-Lubbock, TX

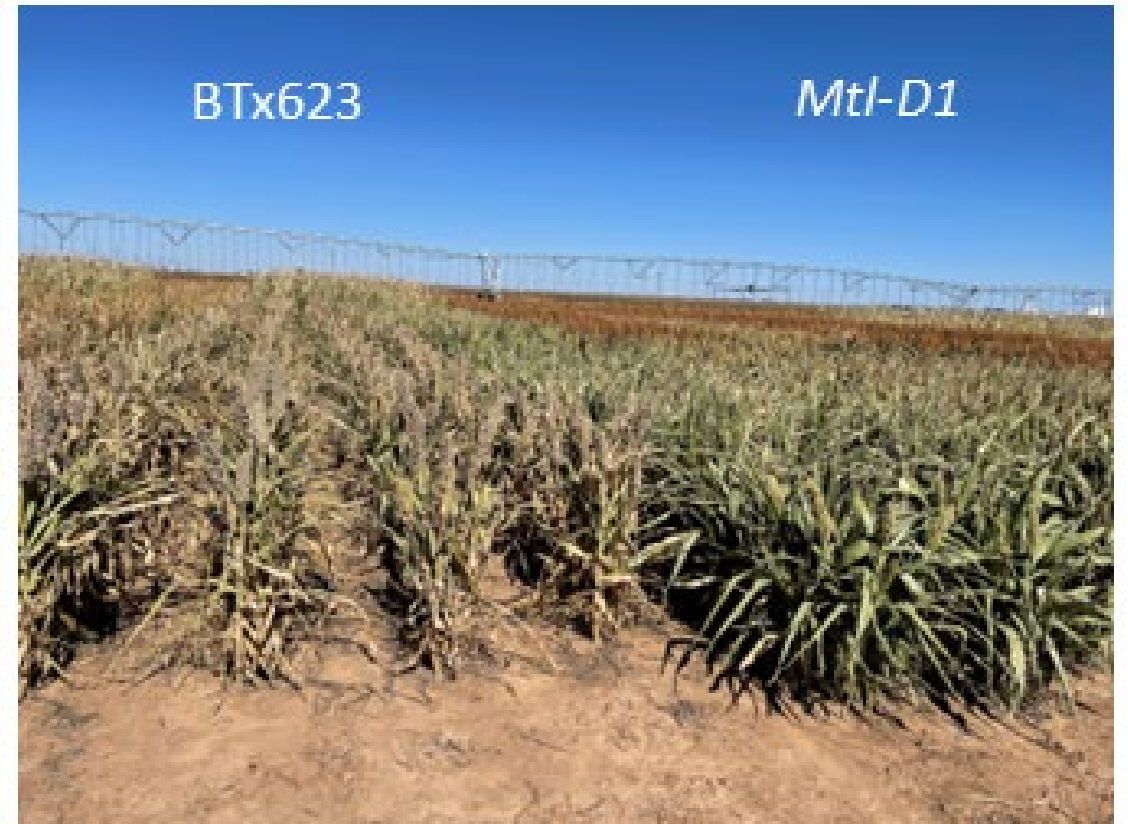


# ***Mtl-D1* May Be Drought Tolerant**

Full Irrigation at 14 inches



Deficit Irrigation at 7 inches



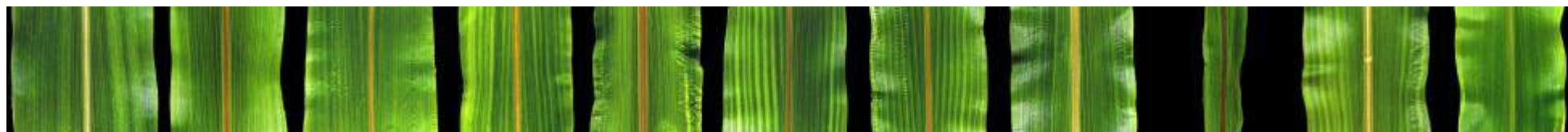
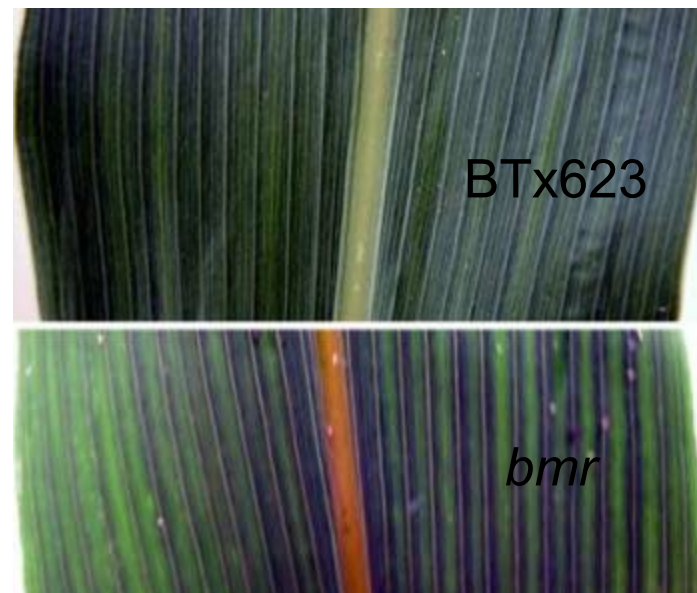
# A Provisional Forage Hybrid with the mtl-D1 Trait



**Ck hybrid:**  
ATx623\*Greenleaf

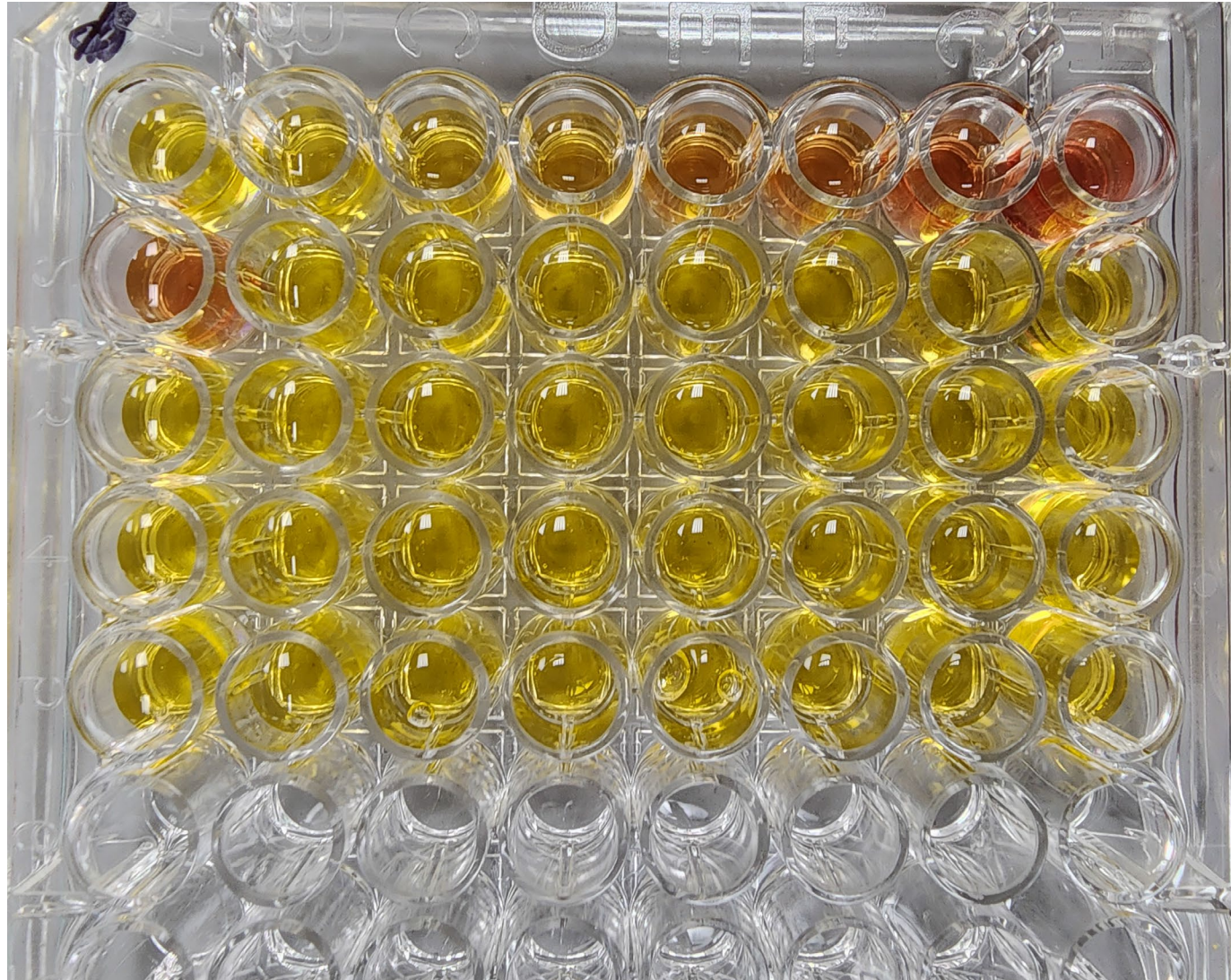
**Mtl hybrid:**  
ATxmtID1\*Greenleaf

# Brown Midrib Mutants



- ◆ 30 bmr mutants confirmed
- ◆ Many new alleles of bmr2, bmr6, and bmr12
- ◆ Four new loci not reported before

# Colorimetric Assay of HCN



## Summary

- The dominant *mtl-D1* mutant may be a promising lead for biomass sorghum production
- It can increase grain yield if planting early in regions with sufficient long growing season
- It takes a team to develop forage sorghum hybrids with the *mtl-D1* trait



# Acknowledgements



**Dr. Doreen Ware**  
**Cold Spring Harbor Laboratory**



**Dr. Yinping Jiao**  
**Genomic Institutes, Texas Tech Univ.**

**USDA-ARS Colleagues: Ace Pugh, Gloria Burow, Chad Hayes,  
Yves Emendack, Junping Chen, Scott Sattler**