

The Genome of the Perennial Biomass Grass *Miscanthus sinensis*

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<https://cabbi.bio/research/feedstocks-theme/>

Project Goals: Despite C4 perennial crops having tremendous potential for maximizing agricultural yields and minimizing environmental impacts, genetic improvement is limited due to the complexity of their genomes. The objectives of this study are to:

- 1. Provide a chromosome-scale reference and annotation of the *Miscanthus* genome**
- 2. Conduct transcriptomic profiling to find tissue-specific genes and nitrogen remobilization pathways**
- 3. Population sampling to track admixtures and hybridizations, and inform future breeding efforts**
- 4. Continue to improve genomic resources, as well as develop methods and datasets to understand the biology of the grass stem and its modifications, for the bioenergy grasses of interest, including miscanthus, sorghum, and Saccharum**

Miscanthus is a perennial wild grass of global importance for papermaking, roofing, decorative plantings, and as an emerging highly productive temperate biomass crop. We published a chromosome-scale assembly of the *Miscanthus sinensis* genome, providing a resource for *Miscanthus* that links its chromosomes to the related diploid *Sorghum* and complex polyploid sugarcanes¹. We establish the paleo-allotetraploid nature of miscanthus by the identification of sub-genome-specific repeats. Analysis of *M. sinensis* and *M. sacchariflorus* populations demonstrates extensive interspecific admixture and hybridization, and documents the origin of the highly productive triploid bioenergy crop *M. × giganteus*. Transcriptional profiling of leaves, stems, and rhizomes over multiple seasons provides insight into rhizome development and nutrient recycling, processes critical for sustainable biomass accumulation in a perennial temperate grass. An improved PacBio HiFi assembly provides a more contiguous assembly with better-resolved repeat content.

References

Mitros, T., Session, A.M., James, B.T. *et al.* Genome biology of the paleotetraploid perennial biomass crop *Miscanthus*. *Nat Commun* **11**, 5442 (2020). <https://doi.org/10.1038/s41467-020-18923-6>

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