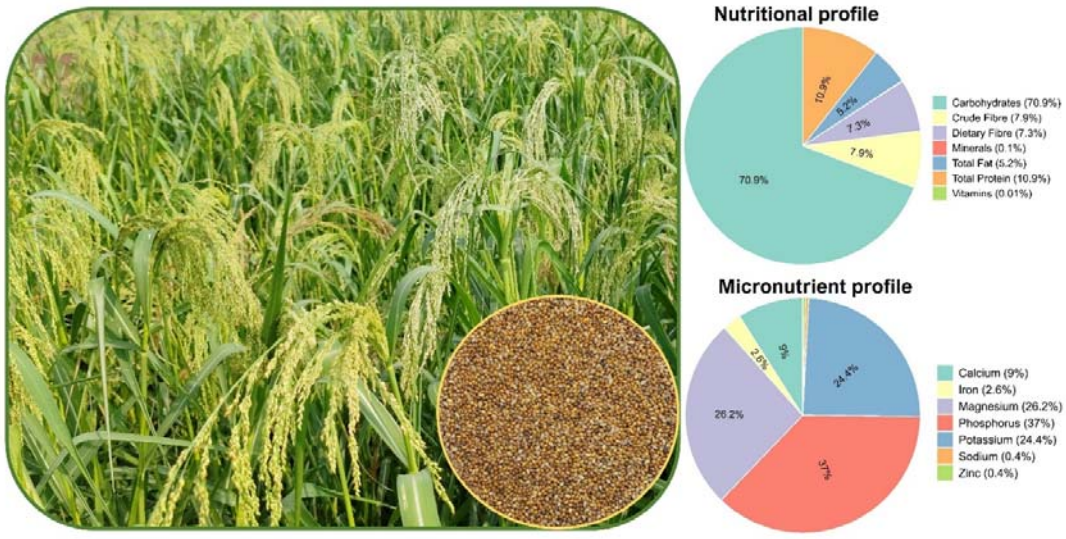
Little Millet Genome Revealed: A Landmark Achievement in Climate-Resilient Crop Genomics

Little millet (*Panicum sumatrense*), a highly climate-resilient yet underutilised small millet, holds significant potential for nutritional security and sustainable agriculture, particularly in marginal and resource-poor environments. To advance its genetic improvement, the Global Centre of Excellence on Millets (Shree Anna) at the ICAR–Indian Institute of Millets Research (IIMR), Hyderabad, in collaboration with in collaboration with the University of Saskatchewan and the National Research Council of Canada, as well as the University of Agricultural Sciences in Bengaluru, has generated the first chromosome-scale reference genome of little millet. The research has been published in the research journal *Nature Communications* (https://doi.org/10.1038/s41467-025-66716-6).

Using a hybrid sequencing approach integrating long-read and short-read technologies, a high-quality genome assembly was produced for the genotype JK-8, comprising 18 chromosomes and 59,045 annotated protein-coding genes. Seven chromosomes were assembled from telomere to telomere, demonstrating exceptional continuity and structural resolution. To capture the species' genetic diversity, a panel of 300 little millet genotypes from diverse agro-ecological regions across India was resequenced, identifying approximately 250,000 SNP markers. Paired with extensive phenotyping for grain yield and micronutrient traits, these genomic datasets enabled genome-wide association studies (GWAS), which revealed genetic loci associated with iron, zinc, phosphorus content and key agronomic traits. These findings establish a robust foundation for integrating molecular breeding, marker-assisted selection, genomic selection and gene-editing into little millet improvement programmes.

This landmark genomic resource elevates little millet from an orphan crop to a genomically empowered species and positions it for targeted enhancement of yield stability, nutritional quality and climate resilience. The achievement emphasises India's leadership in millet science and directly supports the mission of the Global Centre of Excellence on Millets to accelerate millet research, innovation and global food and nutritional security efforts.

The Global Centre of Excellence on Millets was dedicated to the nation by the Honourable Prime Minister in March 2023, reflecting the Government of India's strong commitment to advancing millet science and establishing India as a global hub for climate-smart agriculture. The successful decoding of the little millet genome exemplifies this vision, demonstrating the Centre's growing leadership in high-impact research and its pivotal role in driving the next phase of scientific and technological innovation in millets.



Little millet: A crop known for its climate resilience and nutritional value

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