

# Difference of *PmTDC1* expression levels results the formation of brown and yellow seed color in broomcorn millet (*Panicum miliaceum*)

Tianpeng Liu<sup>1</sup>, Kongjun Dong<sup>1</sup>, Jihong He<sup>1</sup>, Mei Wang<sup>2</sup>, Ruiyu Ren<sup>1</sup>, Lei Zhang<sup>1</sup>, Yawei Li<sup>1</sup>, Tianyu Yang<sup>1\*</sup>

<sup>1</sup>*Crop Research Institute, Gansu Academy of Agricultural Sciences, Lanzhou 730070, China;*

<sup>2</sup>*College of Life Science and Technology, Gansu Agricultural University, Lanzhou, 730070, China)*

**Abstract:** **【Objective】** Broomcorn millet is a cereal crop with abundant genetic variation in morphology, agronomy and yield-related traits. Diversity of seed color is one of the most distinctive morphological characteristic. To identify genes regulating seed color will provide a basis for precise identification of germplasms at molecular level, molecular assisted selection breeding and application of gene editing technology in broomcorn millet. **【Method】** Phenotype identification and statistical analysis were used to dissect inheritance law. And bulked segregant analysis sequencing (BSA-seq), substitution mapping and transcriptome sequencing were performed to identify the casual gene of brown yellow grain color in broomcorn millet. **【Result】** Here, F<sub>2</sub> and F<sub>3</sub> populations from a cross between Longmi12 and Zhang778 were constructed. The statistical analysis of the seed color in F<sub>1</sub>, F<sub>2</sub> and F<sub>3</sub> progenies confirmed that the brown seed color was controlled by a dominant single gene in broomcorn millet. The genetic control locus, *SC9.1*, was preliminarily located in the interval between 32175878 to 44281406 bp on chromosome 9 through the bulked segregant analysis sequencing (BSA-seq). Further, *SC9.1* was narrowed down to a 101kb interval harboring 11 genes by substitution mapping based on 258 recessive individual genotypes. Of 11 genes, *PmTDC1* had a single A to G transition in CDS region and a significantly different expression in seed color formation stage, indicating that *PmTDC1* was the causal gene resulting brown and yellow seed color formation in broomcorn millet. **【Conclusion】** Difference of *PmTDC1* expression levels results the formation of brown and yellow seed color in broomcorn millet.

---

<sup>8</sup>Acknowledgements : the China Agriculture Research System (No.CARS-06-14.5-A8) ; Special Project of Agricultural Science and Technology Innovation of GAAS (2021GAAS02)

Tianpeng Liu, E-mail: 13993184051@163.com