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Genome-wide identification and expression profile analysis of trihelix transcription factor family genes in response to abiotic stress in Sorghum [*Sorghum bicolor* (L.) Moench]

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Transcription factors, including trihelix transcription factors, play vital roles in various growth and developmental processes and in abiotic stress responses in plants. The trihelix gene has been systematically studied in some dicots and monocots, including *Arabidopsis*, tomato, chrysanthemum, soybean, wheat, corn, rice, and buckwheat. However, there are no related studies on sorghum. In this study, a total of 40 *Sorghum trihelix* (SbTH) genes were identified based on the sorghum genome, among which 34 were located in the nucleus, 5 in the chloroplast, 1 (SbTH38) in the cytoplasm, and 1 (SbTH23) in the extracellular membrane. Phylogenetic analysis of the SbTH genes and *Arabidopsis* and rice trihelix genes indicated that the genes were clustered into seven subfamilies: SIP1, GT γ , GT1, GT2, SH4, GTSb8, and orphan genes. The SbTH genes were located in nine chromosomes and none on chromosome 10. One pair of tandem duplication gene and seven pairs of segmental duplication genes were identified in the SbTH gene family. By qPCR, the expression of 14 SbTH members in different plant tissues and in plants exposed to six abiotic stresses at the seedling stage were quantified. Except for the leaves in which the genes were upregulated after only

2 h exposure to high temperature, the 12 SbTH genes were significantly upregulated in the stems of sorghum seedlings after 24 h under the other abiotic stress conditions. Among the selected genes, SbTH10/37/39 were significantly upregulated, whereas SbTH32 was significantly downregulated under different stress conditions. In this study, we identified 40 trihelix genes in sorghum and found that gene duplication was the main force driving trihelix gene evolution in Sorghum. The findings of our study serve as a basis for further investigation of the functions of SbTH genes and providing candidate genes for stress-resistant sorghum breeding programmes and increasing sorghum yield.

Speaker Biography

Li Kui Yin has been teaching and conducting research in crop cultivation at Anshun University since graduating from Guizhou University in 2008 with a master's degree. He has successfully passed various examinations to enter the PhD program in crop science at Guizhou University in 2019 to pursue his PhD in crop genetic breeding, and his research interests are in the molecular study of genes related to starch synthesis in brewing Sorghum seeds.

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