

Functional Investigation of a Cotton Fiber *HOX* Gene

GUAN Xue-ying, SHANGGUAN Xiao-xia, WANG Shui,

WANG Ling-jian, CHEN Xiao-ya

(National Key Laboratory of Plant Molecular Genetics, Institute of Plant Physiology and Ecology, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences, Shanghai 200032, China)

Most of the plant homeodomain-containing proteins play important roles in regulating cell differentiation and organ development, and *Arabidopsis* *GLABRA2* (*GL2*), a member of the class IV homeodomain-Leucine zipper (HD-ZIP) proteins, is a trichome and non-root hair cell regulator. We have analyzed several cotton homeodomain-containing proteins that belong to the class IV HD-ZIP family. One of them, *GaHOX1*, shows a high sequence identity to *Arabidopsis* *GL2* (95% in the homeodomain and 64% overall). When controlled by the *GL2* promoter, *GaHOX1* rescued trichome development of an *Arabidopsis* glabrous mutant of *gl2-2* (SALK_130213). On the other hand, expression of *GaHOX1* with a CaMV 35S promoter in the wild-type *Arabidopsis* plants suppressed trichome development, as previously reported for the *GL2* ectopic expression. Northern, RT-PCR and in situ hybridization analyses indicated that *GaHOX1* is predominantly expressed in cotton fiber cells at early developmental stages, consistent with its putative role in regulating cotton fiber development. No obvious signal of *HOX1* transcripts was detected in the ovule of F_1 mutant, which is defective in producing cotton fiber. We then generated transgenic cotton plants harboring 35S::*HOX1*. At least in one of the *HOX1* over expression lines the fiber length was significantly increased in comparison with the un-transformed line. Our results suggest that *GaHOX1* is a functional homolog of *GL2* in plant trichome development, and it plays a role in promoting cotton fiber development and growth.