EVALUATION OF THE RED ANTHER TRAIT OF GOSSYPIUM ARMOURIANUM INTROGRESSED INTO G. HIRSUTUM

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Abstract

Gossypium armourianum Kearney, a D-genome species related to cotton, has red pigmentation in a group of cells of the anther wall. This color is the result of anthocyanins, one of the final metabolites of the flavonoid pathway. The trait is controlled by one incompletely dominant gene that seems to be an allele of the R1 gene (red plant). If identified, the promoter of the gene could be used to target the expression of a transgene only to anther-wall cells. Previously the trait was introgressed into *G. hirsutum* L. by crossing this species with a synthetic allotetraploid of *G. herbaceum* L. and *G. armourianum*. A segregating population of the trait in *G. hirsutum* was analyzed in this research. The plants where scored according to the level of intensity of the red color: 0 (white anther); 1(slightly red anther); and 3 (strongly red anther). Primers where designed to amplify fragments from the genes leading to anthocyanin production. The level of expression of each of the genes was obtained with real time RT-PCR from cDNA from anthers of 4 mm and 10 mm flower buds from 0, 1 and 3 plants. The differences in expression where not statistically significant either between intensity of the color or size of the bud. However, the mean level of expression of chalcone synthase (CHS) and flavanone 3 hydroxylase (F3H) was higher in the 3 intensity anthers than in 1 intensity anthers, and also in 1 anthers in comparison to 0 anthers. Chalcone isomerase (CHI), dihydroflavanone reductase (DFR) and anthocyanidin synthase (ANS) showed similar patterns of expression. This may indicate that CHS and F3H expression is regulated by the same transcription factor (TF) and that CHI, DFR and ANS are also co- regulated by another TF. The gene controlling the trait could be either a TF, as in maze and apple, or a gene which codes for an enzyme of the anthocyanin pathway. Another approach to identify the red anther gene would be to sequence the R1 gene (Red plant), an allele of the red anther gene. Perhaps it would be helpful to know the type of protein encoded by the red anther gene. For a more accurate analysis of the anther wall cells, a technique should be developed to separate anther wall cells from other cells of the anthers. Laser micro-dissection or micropipeting are possible ways to accomplish the separation.