Journal of Stress Physiology & Biochemistry, Vol. 8 No. 3 2012, p. S5 ISSN 1997-0838

FUNCTIONAL SPECIALIZATION OF DUPLICATED FLAVONOID BIOSYNTHESIS GENES IN WHEAT

Khlestkina E.*, O. Tereshchenko

Institute of Cytology and Genetics SB RAS, Novosibirsk, Russia

*e-mail: khlest@bionet.nsc.ru

Gene duplication followed by subfunctionalization and neofunctionalization is of a great evolutionary importance. In plant genomes, duplicated genes may result from either polyploidization (homoeologous genes) or segmental chromosome duplications (paralogous genes). In allohexaploid wheat *Triticum aestivum* L. (*2n=6x*=42, genome BBAADD), both homoeologous and paralogous copies were found for the regulatory gene *Myc* encoding MYC-like transcriptional factor in the biosynthesis of flavonoid pigments, anthocyanins, and for the structural gene *F3h* encoding one of the key enzymes of flavonoid biosynthesis, flavanone 3-hydroxylase. From the 5 copies (3 homoeologous and 2 paralogous) of the *Myc* gene found in *T. aestivum*, only one plays a regulatory role in anthocyanin biosynthesis, interacting complementary with another transcriptional factor (MYB-like) to confer purple pigmentation of grain pericarp in wheat. The role and functionality of the other 4 copies of the *Myc* gene remain unknown. From the 4 functional copies of the *F3h* gene in *T. aestivum*, three homoeologues have similar function. They are expressed in wheat organs colored with anthocyanins or in the endosperm, participating there in biosynthesis of uncolored flavonoid substances. The fourth copy (the B-genomic paralogue) is transcribed neither in wheat organs colored with anthocyanins nor in seeds, however, it's expression has been noticed in roots of aluminium-stressed plants, where the three homoeologous copies are not active. Functional diversification of the duplicated flavonoid biosynthesis genes in wheat may be a reason for maintenance of the duplicated copies and preventing them from pseudogenization.

The study was supported by RFBR (11-04-92707). We also thank Ms. Galina Generalova for technical assistance.