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# *ANTHOCYANIN PIGMENTATION IN TRITICUM AESTIVUM L.: GENETIC BASIS AND ROLE UNDER ABIOTIC STRESS CONDITIONS*

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Anthocyanins are secondary metabolites of plants. They have a wide range of biological activity such as antioxidant, photoprotection, osmoregulation, heavy metal ions chelation, antimicrobial and antifungal activities, which help plants to survive under different stress conditions. Bread wheat (*T. aestivum* L.) can have purple pigmentation provided by anthocyanin compounds in different organs, such as grain pericarp, coleoptile, culm, leaf blades, leaf sheaths, glumes and anthers. However, the genetic mechanisms underlying formation of these traits as well as contribution of the pigmentation to stress tolerance have not been widely studied in wheat. The aim of the current study was to investigate molecular-genetic mechanisms underlying anthocyanin pigmentation in different wheat organs and to estimate the role of the pigmentation under different abiotic stress conditions in wheat seedlings. In the current study, near-isogenic lines (NILs): cv. 'Saratovskaya 29' ('S29') and lines i:S29Pp1Pp2$^{PF}$ and i:S29Pp1Pp3$^{P}$ developed on the 'S29' background but having grain pericarp coloration (genes *Pp*) and more intense coleoptile (*Rc*), culm (*Pc*), leaf blade (*Plb*), leaf sheath (*Pls*) pigmentation in comparison with 'S29', were used. Comparative transcriptional analysis of the five structural genes *Chs*, *Chi*, *F3h*, *Dfr*, *Ans*, encoding enzymes participating in the anthocyanin biosynthesis, was performed in different organs of NILs. It was shown that the presence of the *Rc*, *Pc*, *Plb*, *Pls* and *Pp* alleles conferring strong anthocyanin pigmentation induced more intense transcription of the structural genes, suggesting the genes *Rc*, *Pc*, *Plb*, *Pls* and *Pp* to play a regulatory role in anthocyanin biosynthesis network. To evaluate the role of anthocyanins in stress response at the seedling stage, growth ability of the NILs and anthocyanin content in their coleoptiles were assessed after treatments with NaCl (100 and 200 mM), $CdCl_2$ (25 and 50 μM) and 15% PEG 6000 (polyethylene glycol 6000), simulating salinity, heavy metal and drought stress, respectively. Under salinity and drought stress, the level of anthocyanins increased significantly in all three NILs in comparison with untreated control, whereas under $CdCl_2$ treatment anthocyanin content increased significantly in 'S29' only. The tendency of the lines having more intensive anthocyanin pigmentation to have better growth ability under stress conditions was observed. Taken together the results obtained it may be suggested that anthocyanin production in wheat seedlings is tightly related with the response to abiotic stress.

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