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Chalcone synthase expression and pigments deposition in wheat with purple and blue colored caryopsis

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Highlights:

- Characterization of the chalcone synthase mRNA expression and its role by common wheat with pigmented caryopses.
- Correlation between chalcone synthase mRNA expression and pigment deposition in pericarp and aleurone layer of caryopses.
- Correlation between major anthocyanins and chalcone synthase production.
- Differences in chalcone synthase expression between purple and blue pigmented genotypes of common wheat

Abstract

Red and white caryopses are typical in common wheat. Genotypes with purple and blue caryopses are also described. This coloring is caused by anthocyanins which deposit in the pericarp (purple) or aleurone layer (blue). The anthocyanins biosynthetic pathway is well described. The key enzyme is chalcone synthase (CHS). It catalyzes the first step. We observed the deposition of anthocyanins in the pericarp and aleurone layer, the expression of a chalcone synthase gene and the amount of two anthocyanins - cyanidin-3-glycoside (pericarp of purple caryopses), and delphinidin-3-glycoside (aleurone layer of blue caryopses) during caryopsis development. Purple pigment deposition was not homogeneous and/or uniform. At first, small isolated spots of purple color were formed and thereafter they expanded. In blue caryopses, however, the coloring process was more homogeneous. The expression of chalcone synthase mRNA occurred five days before pigment deposition and finished earlier than expected. Amounts of cyanidin-3-glycoside and delphinidin-3-glycoside increased in a similar manner. Amounts of these fell at the end of caryopses development probably due to formation of more complex substances.



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Keywords

Chalcone synthase; *Triticum aestivum* L.; Purple pericarp; Blue aleurone

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