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PHENOLIC ACIDS IN DURUM WHEAT: GENETIC CONTROL, GENOMIC STUDIES AND BREEDING PERSPECTIVES

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Phenolic acids are the major phenolic components reported in wheat. Based on their chemistry, they are classified as hydroxy derivatives of either cinnamic or benzoic acid. The biogenesis of phenolic acids occurs along the general phenylpropanoid pathway, which is ubiquitously present in plant cell walls, leading to the synthesis of secondary metabolites that are involved in plant defence and structural support. As a result, different environmental factors, such as light, biotic or abiotic stresses, can affect the content of phenolic acids in mature wheat grains. Besides being important for plant survival, phenolic acids also exhibit various biological activities that are beneficial for human health. Among these, the most acknowledged is the antioxidant activity, which can be associated to reduced risks of heart disease and colon cancer.

Due to their significance, phenolic acids have been investigated as a potential target of breeding programs. The present contribution reviews the progress in the comprehension of the genetic and molecular basis of phenolic acids biosynthesis in wheat. Also, the state of the art concerning the genetic variation of individual phenolic acids and total phenolic acids content in several wheat collections is presented. The upcoming literature on the inheritance of phenolic acids in bread and durum wheat, grown in different environments, or under the effect of diverse biotic stress (i.e. drought, heat stress) is presented and discussed. Finally, updates are given on the on-going genomic studies to identifying QTL and genes that are involved in phenolic acids biosynthesis and accumulation in mature wheat grains.

ABSTRACT