PHYTATE AND MICROELEMENTS CONCENTRATION IN A COLLECTION OF DURUM WHEAT CULTIVARS

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Most of the inorganic phosphorus (Pᵢ) present in mature cereal seeds (between 40 to 80%) is stored as phytate, an anti-nutritional factor, that forms complexes with minerals such as Ca, Mg, Zn and Fe, and reduces the total P bioavailability. The present study was undertaken to determine the variation in Pᵢ and mineral concentration in the whole grains in 93 durum wheat (Triticum durum Desf.) cultivars representative of old and modern germplasm adapted to the Mediterranean conditions and to identify nutritionally superior durum wheat cultivars that possess low phytate content and high concentration of mineral elements in their whole-wheat flour. These cultivars were grown under the same field conditions during 2004-2005 at Foggia, Italy and during 2005-2006 at Foggia and Fiorenzuola d’Arda - PC, Italy. The phytate of each durum wheat cultivar was estimated indirectly by using the microtitre plate assay evaluating the Pᵢ absorbance at 820 nm, while the Cu, Fe, Mn, Ca, K, Mg, Na and Zn mineral contents were determined by ICP/OES. The results obtained showed a large genotypic variation of all micronutrients evaluated. In particular, the contents of Zn and Fe among the 93 durum wheat cultivars ranged from 23.2 to 58.5 ppm for Zn with an average of 34.0 ppm and from 26.2 to 97.3 ppm for Fe with an average of 43.4 ppm. Regarding the Pᵢ grain content the mean values recorded across the years and the locations ranged from 0.32 mg g⁻¹ to 1.09 mg g⁻¹ showing a positive correlation to all minerals with the exception of Cu and Zn suggesting the possibility to design a specific breeding program for improving the nutritional value of durum wheat cultivars through the identification of parental with low-Pᵢ and high minerals concentration in whole grains.