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Phytochemical distribution in pearled fractions of *x Tritordeum* and related cereals

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Hexaploid tritordeum (*x Tritordeum* Acherson et Graebner) is the amphidiploid cereal derived from the cross between a South American wild barley (*Hordeum chilense* Roem. et Schultz) and durum wheat (*Triticum turgidum durum* Desf.). In recent years, tritordeum has been proposed for the production of several foods such as bakery products and beer. The aim of the present study was to compare the content of bioactive compounds and other quality parameters of two varieties of tritordeum (cvs. Aucan and Bulel) with those of barley, durum wheat and common wheat. All cereals were cultivated side by side on the same field in northwestern of Italy during the 2015-16 growing season and the grain yield and yield traits have been recorded. Moreover, kernels were analyzed for their chemical composition and then pearled to analyze the distribution pattern of bioactive compounds in nine progressive pearled fractions (0-5%, 5-10%, 10-15%, 15-20%, 20-25%, 25-30%, 30-35%, 35-40% and 40-100% w/w). Total dietary fibre (TDF), β -glucans, proteins, ashes, soluble (SPAs) and cell wall-bound (CWBPAs) phenolic acids, xanthophylls and antioxidant capacity (AC) were analyzed for each fraction and whole-meal flour.

Overall, the grain yield of tritordeum resulted the lowest one (4.8 t/ha). However, the whole-meal flour of the cv. Bulel showed a higher concentration of lutein than the durum wheat variety tested (5.38 vs 3.99 mg/kg dw), while the content of zeaxanthin resulted similar to the one observed in durum wheat. β -glucans, detected at the highest concentration in barley (3.46% dw), were significantly higher in tritordeum and common wheat (0.65% and 0.85% dw) than in durum wheat (0.39% dw). The highest content of SPAs was observed in durum wheat (99.6 mg/kg dw), while CWBPAs resulted the highest in barley (1283 mg/kg dw). As far as the distribution of bioactive compounds in the pearled fraction was concerned, both TDF, ashes, SPAs and CWBPAs resulted mainly concentrated in the outer layers of the kernels, but tritordeum showed a higher retention of CWBPAs in the residual pearled kernel when compared to both the durum and common wheat variety. The distribution of lutein in tritordeum clearly differed from durum and common wheat, whereas resembled more the one observed for barley: after an initial increase in the concentration of this xanthophyll moving from the outermost layers of the kernel to the intermediated ones, a significant decrease was observed in the residual pearled kernel (-25% cv. Aucan; -10% cv. Bulel).

The present study highlights that tritordeum has several potential end-uses in the production of high-quality baked foods. The use as a whole-grain flour is the best way to exploit its nutritional value. Nevertheless, the higher content of lutein and the higher concentration of phenolic acids in the internal layers of tritordeum compared to wheat, make this cereal interesting also for the production of refined flours rich in antioxidant compounds.