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PHENOTYPING OF OLD AND MODERN DURUM WHEAT GENOTYPES FOR GLIADIN COMPOSITION IN RELATION TO HEALTH QUALITY

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The selection of durum wheat genotypes during the last decade led to the release of varieties with higher grain yield and better technological properties. Grain storage proteins account for 60–80% of total grain proteins. Glutenin proteins (HMW-GS, LMW-GS) are mainly responsible for dough strength, while gliadins contribute to the viscous properties. Furthermore in prolamins some epitopes were found to be relevant for gluten related disorders, such as celiac disease and wheat allergy. Gluten improvement for pasta quality was due to both a favourable allelic composition [1] and different sub-fraction expression [2]. The impact of breeding on gliadin composition has been little investigated. Changes in protein composition due to breeding appear in a reduction of the glia/glut ratio and in the proportion of ω-gliadins, both in terms of expression and number of isoforms [2]. In this study some durum wheat genotypes with different release date were investigated for prolamin composition, in particular gliadins, in relation to health aspects. 2DE SDS-PAGE showed differences in gliadin protein spots in either ω- or α-/β and γ-type gliadin gel regions. The characterization of these spots by a dedicated enzymatic digestion, high resolution mass spectrometry analysis and database search using a manually curated database (GluPro V1.0) [3] is in progress. Though preliminary, the first results of the proteomic approach allowed the reliable identification of the ω-gliadins, including isoforms up to date not represented in the databases, responsible for the differences observed in 2D-PAGE profiles. Investigation by enzyme-linked immunosorbent assay (ELISA), by a monoclonal antibody raised against the 33-mer α-gliadin peptide (QPQLPY) was performed (G12 AgraQuant, RomerLabs). Genetic differences were found in gliadin composition, especially in relation to gluten-related disorders. This will led useful information to deep insight into the effect of breeding on gluten composition also in relation to gluten related disorders.

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[2] De Santis M.A. et al. 2017. Europ. J. Agron. 87, 19-29.
[3] Bromilow S. et al., 2017. J Proteomics 163: 67–75.