MASS SPECTROMETRIC APPROACHES TO THE CHARACTERIZATION OF LOW-MOLECULAR WEIGHT GLUTENIN SUBUNITS

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The gluten macropolymer, which plays a major role in determining the viscoelastic properties of wheat flour, is constituted by high molecular weight (HMW-GS) and low molecular weight (LMW-GS) glutenin subunits linked together by intermolecular disulphide bridges. Based on their mobilities on SDS-PAGE, HMW-GS are divided into x- and y-type subunits, whereas three groups of LMW-GS can be identified: B, C and D.

Glutenin subunits form both intra- and inter-chain disulfide bonds and, according to this property, they can be classified into three groups: i) “chain branchers” subunits in which at least three cysteins are available for intermolecular bonds and therefore have a branching effect on the gluten macropolymer (likely the HMW-GS); ii) “chain extenders”, in which an even number of cysteine residues are present (i.e. B-LMW-GS); iii) “chain terminators”, which contain an extra cysteine residue (i.e. C and D-LMW-GS).

The LMW-GS present an extraordinary heterogeneity, because they are coded by a great number of genes, coding for different polypeptides. In this investigation, enriched B and C LMW-GS fractions, obtained by fractionated precipitation from hydro-alcoholic extracts of the bread wheat cultivar Chinese Spring, have been characterized by RP-HPLC coupled with ESI and MALDI mass spectrometry. Both procedures are very sensitive, allowing determination of more than 70 components starting from 50 µg of extract. Moreover these techniques provide valuable insight into the structure of the components of the C and B LMW-GS fractions examined, including the determination of the number of cysteine residues present in some subunits, which is a major point in the analysis of these proteins.