Characterisation of a specific class of typical low molecular weight glutenin subunits of durum wheat by a proteomic approach

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1. Introduction

Quality characteristics of durum and bread wheats are strongly influenced by the gluten proteins. They consist of monomeric gliadins (alpha/beta, gamma and omega) characterised by intramolecular disulphide bonds, when present, and polymeric glutenins formed by high (HMW-GS) and low (LMW-GS) molecular weight subunits possessing both intra- and inter-chain bonds. Polymeric glutenins constitute the biggest polymers present in nature, with maximum molecular weights reaching several million Daltons (Wrigley, 1996). Gliadins are encoded at the Gli-1 (alpha- and gamma-gliadins) and Gli-2 (alpha/beta-gliadins) loci, on the short arms of groups 1 and 6 chromosomes, respectively. HMW-GS are encoded at the Glu-1 loci, on the long arm of group 1 chromosomes, while LMW-GS are encoded by complex loci on chromosomes 1 and 6, depending on the LMW-GS subgroup (Masci et al., 2002). LMW-GS are, in fact, classified in different groups, according to structural and functional properties. The main subdivision regards the separation between typical LMW-GS (also known as B-subunits), with a peculiar structure, and gliadin-like LMW-GS (including C- and D subunits), that are structurally gliadins but functionally glutenins, because they are able to form inter-molecular disulphide bonds by means of unpaired cysteine residues (D’Ovidio and Masci, 2004).

In the case of typical LMW-GS, the sequence of the mature protein can be divided into three parts: a short N-terminal domain, a long central repetitive block and a C-terminal domain where most of the cysteine residues occur. Typical LMW-GS sequences are classified as LMW-s, LMW-m and LMW-i types, on the basis of the first amino acid of the mature polypeptide (serine, methionine or isoleucine, respectively).

B-type subunits include most of the typical LMW-GS sequences, that are the LMW-s, LMW-m and LMW-i types, according to the first amino acid of the mature polypeptide. All typical LMW-GS