

Molecular Characterization of Grain Storage Proteins in Some Hordeum Species

Authors : Manar Makhoul, Buthainah Alsalamah, Salam Lawand, Hassan Azzam

Abstract : The major storage proteins in endosperm of 33 cultivated and wild barley genotypes (*H.vulgare*, *H. spontaneum*, *H. bulbosum*, *H. murinum*, *H. marinum*) were analyzed to demonstrate the variation in the hordein polypeptides encoded by multigene families in grains. The SDS-PAGE revealed 13 and 17 alleles at the Hor1 and the Hor2 loci respectively, with frequencies from 0.83 to 14 and 0.56 to 13.41% respectively, while seven alleles at the Hor3 locus with frequencies from 3.63 to 30.91% were recognized. The phylogenetic analysis indicated to relevance of the polymorphism in hordein patterns as successful tool in identifying the individual genotypes and discriminating the species according to genome type. We also reported in this research complete nucleotide sequence B-hordein genes of seven wild and cultivated barley genotypes. A 152bp upstream sequence of B-hordein promoter contained a TATA box, CATC box, AAAG motif, N-motif and E-motif. In silico analysis of B-Hordein sequences demonstrated that the coding regions were not interrupted by any intron, and included the complete ORF which varied between 882 and 906 bp, and encoded mature proteins with 293-301 residues characterized by high contents of glutamine (29%), and proline (18%). Comparison of the predicted polypeptide sequences with the published ones suggested that all S-rich prolamins genes are descended from common ancestor. The sequence started at N-terminal with a signal peptide, and then followed directly by two domains; a repetitive one based on the repetition of the repeat unit PQQPFPQQ and C-terminal domain. Also, it was found that positions of the eight cysteine residues were highly conserved in all the B-hordein sequences, but *Hordeum bulbosum* had additional unpaired one. The phylogenetic tree of B-hordein polypeptide separated the genotypes in distinct seven subgroups. In general, the high homology between B-hordeins and LMW glutenin subunits suggests similar bread-making influences for these B-hordeins.

Keywords : hordeum, phylogenetic tree, sequencing, storage protein

Conference Title : ICAST 2017 : International Conference on Agricultural Science and Technology

Conference Location : Berlin, Germany

Conference Dates : May 21-22, 2017