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HORDOINDOLINE COMPOSITION AND KERNEL HARDNESS IN BARLEY (*HORDEUM VULGARE*)

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Grain hardness has a strong impact on the end-use quality of barley because good-malting cultivars are softer in texture than poor-malting genotypes, whereas harder textured varieties are desirable for use as feed. Barley kernel texture and related traits such as milling energy, particle size, starch damage, malt extract yield and digestibility in ruminants, are modulated by Hordoindoline A (Hin-A), Hordoindoline B1 (Hin-B1) and Hordoindoline B2 (Hin-B2) encoded by *Hina*, *Hinb-1* and *Hinb-2* genes on the short arm of chromosome 5H, respectively. A-PAGE and A-PAGE x SDS-PAGE fractionations of starch granule proteins from 27 barley cultivars with contrasting grain texture characteristics revealed three pairs of prominent polypeptides, approximately 15 KDa in size, which were assumed to correspond to Hin-A, Hin-B1 and Hin-B2 on the basis of the electrophoretic patterns of some peculiar genotypes possessing modified or null hordoindoline alleles. Cvs Sundance and Hart, which were claimed to be unique in lacking Hin-A, were found to possess different *Hina* alleles and accumulate Hin-A on their starch granules. Two novel alleles for *Hinb-1* and *Hinb-2* were detected from barley cvs Steptoe and Sundance, respectively. Ten two-rowed and ten six-rowed cultivars grown in replicated plots were compared for kernel weight and hardness, as determined by the Single Kernel Characterization System (SKCS) applied to their whole or pearled grains. No significant difference in SKCS index was found between whole and pearled kernels. On the contrary, pearled kernels from two-rowed cultivars were significantly softer (mean SKCS = 66.2± 5.6) than those from six-rowed genotipes (77.0±8.0). A significant negative correlation of -0.75 was observed between SKCS index and kernel weight, the difference in this latter trait explaining approximately 25% and 50% of the phenotypic variation for kernel hardness in two-rowed and six-rowed cultivars, respectively.

The relationship between the presence of certain hordoindoline alleles and grain texture is discussed.