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Czech J. Genet. Plant Breed.

**P., Hrstková P., Prá šl
I.T., Bradáčová M.,
Prá šlová P., Chloupek
O.:**

**Allelic variations at
Dhn4 and *Dhn7* are
associated with frost
tolerance in barley**

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149-158

The sequences of the closely linked barley dehydrin genes *Dhn4* and *Dhn7* are both known to vary allelically. Here we associated allelic constitution at *Dhn4/7* with frost sensitivity across a panel of 30 diverse barley varieties. The combined presence of a 6 bp insertion in exon1 of *Dhn4* and a 30 bp deletion in exon1 of *Dhn7* was restricted to six-rowed winter and intermediate varieties characterised by relatively higher frost tolerance (12 genotypes; LT_{50} from -14.2° C to $-$

15.6° C). The alternative combination was present with one exception (six-rowed winter variety Alissa) only in spring and two-rowed winter varieties (17 genotypes; LT_{50} from – 10.0° C to – 14.3° C). The genetic linkage between *Dhn4* and *Dhn7* identified e.g. in Dictoo and Morex varieties was verified by segregation analysis of F_2 plants from a cross between two genotypes carrying different allelic combination of *Dhn4* and *Dhn7* genes (two-rowed spring variety Akcent × six-rowed winter variety Okal). The potential of the former allelic combination as a marker for enhanced frost tolerance was tested in a sample of F_5 derivatives of a cross between the two-rowed winter type variety Monaco (Akcent allele combination) and the six-rowed winter type variety Okal. Plants with the Okal allele combination showed significantly higher frost tolerance than those with the alternative growth habit. The effect of ear type on frost tolerance was insignificant.

Keywords:

abiotic stress; dehydrins; gene polymorphism; *Hordeum vulgare*

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