

GEPHE SUMMARY

	Gephebase Gene	GephelD
CBF2-CBF4; CBF13 (https://www.gephebase.org/search-criteria/?and+Gene+Gephebase=%CBF2-CBF4;+CBF13%#gephebase-summary-title)	GP00000176	
	Entry Status	Main curator
Published	Martin	

PHENOTYPIC CHANGE

	Trait Category	
Physiology (https://www.gephebase.org/search-criteria/?and+Trait+Category=%Physiology%#gephebase-summary-title)	Trait	
Temperature tolerance (cold) (https://www.gephebase.org/search-criteria/?and+Trait=%Temperature+tolerance+(cold)%#gephebase-summary-title)	Trait State in Taxon A	
Hordeum vulgare; Spring "Tremois"	Trait State in Taxon B	
Hordeum vulgare; winter-hardy "Dicktoo" and "Nure"	Ancestral State	
Data not curated	Taxonomic Status	
Domesticated (https://www.gephebase.org/search-criteria/?and+Taxonomic+Status=%Domesticated%#gephebase-summary-title)		
Taxon A		Taxon B
Hordeum vulgare (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Hordeum+vulgare%#gephebase-summary-title)	Latin Name	Latin Name
-	Common Name	Common Name
barley; Hordeum vulgare L.; Horedum vulgare	Synonyms	Synonyms
species	Rank	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophytina; Embryophytina; Tracheophytina; Euphyllophyta; Spermatophytina; Magnoliophytina; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Hordeinae; Hordeum	Lineage	Lineage
Hordeum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4512)	Parent	Parent
4513 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4513)	NCBI Taxonomy ID	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
Hordeum vulgare; Tremois	Taxon A Description	Taxon B Description
Hordeum vulgare; Barley genotypes "Dicktoo" and "Nure"		

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Triticum monococcum
-	B1NSN2 (http://www.uniprot.org/uniprot/B1NSN2)	
-	ACI62506 (https://www.ncbi.nlm.nih.gov/nuccore/ACI62506)	GenebankID or UniProtKB
	String	
	Sequence Similarities	
	GO - Molecular Function	
GO:0003700 : DNA-binding transcription factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003700)		
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)	GO - Biological Process	
GO:0006351 : transcription, DNA-templated (https://www.ebi.ac.uk/QuickGO/term/GO:0006351)		
	GO - Cellular Component	

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=%22No%22#gephebase-summary-title>)

Molecular Type

Gene Amplification (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=%22Gene+Amplification%22#gephebase-summary-title>)

Aberration Type

Complex Change (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=%22Complex+Change%22#gephebase-summary-title>)

Molecular Details of the Mutation

tandem duplication of CBF2-CBF4 region and/or pseudogenisation of CBF13

Experimental Evidence

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=%22Candidate+Gene%22#gephebase-summary-title>)

Main Reference

CBF gene copy number variation at Frost Resistance-2 is associated with levels of freezing tolerance in temperate-climate cereals. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20213518>)

Authors

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Abstract

Frost Resistance-1 (FR-1) and FR-2 are two loci affecting freezing tolerance and winter hardiness of the temperate-climate cereals. FR-1 is hypothesized to be due to the pleiotropic effects of VRN-1. FR-2 spans a cluster of C-Repeat Binding Factor (CBF) genes. These loci are genetically and functionally linked. Recent studies indicate CBF transcripts are downregulated by the VRN-1 encoded MADS-box protein or a factor in the VRN-1 pathway. Here, we report that barley genotypes 'Dicktoo' and 'Nure' carrying a vrn-H1 winter allele at VRN-H1 harbor increased copy numbers of CBF coding sequences relative to Vrn-H1 spring allele genotypes 'Morex' and 'Tremois'. Sequencing bacteriophage lambda genomic clones from these four genotypes alongside DNA blot hybridizations indicate approximately half of the eleven CBF orthologs at FR-H2 are duplicated in individual genomes. One of these duplications discriminates vrn-H1 genotypes from Vrn-H1 genotypes. The vrn-H1 winter allele genotypes harbor tandem segmental duplications through the CBF2A-CBF4B genomic region and maintain two distinct CBF2 paralogs, while the Vrn-H1 spring allele genotypes harbor single copies of CBF2 and CBF4. An additional CBF gene, CBF13, is a pseudogene interrupted by multiple non-sense codons in 'Tremois' whereas CBF13 is a complete uninterrupted coding sequence in 'Dicktoo' and 'Nure'. DNA blot hybridization with wheat DNAs reveals greater copy numbers of CBF14 also occurs in winter wheats than in spring wheats. These data indicate that variation in CBF gene copy numbers is widespread in the Triticeae and suggest selection for winter hardiness co-selects winter alleles at both VRN-1 and FR-2.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS