GEPHE SUMMARY

Gephebase Gene

CBF12 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CBF12^#gephebase-summary-title)

GepheID

GP00000175

Entry Status

Published

Main curator

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

Triticum monococcum

Trait State in Taxon B

Triticum monococcum; winter-hardy

Ancestral State

Data not curated

Taxonomic Status

Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name

Triticum monococcum (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Triticum monococcum^#gephebase-summary-title)

Common Name

-

Synonyms

Crithodium monococcum; einkorn wheat; one-grained wheat; small spelt; Crithodium monococcum (L.) A.Love; Triticum monococcum L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Triticinae; Triticum

Parent

Triticum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4564)

NCBI Taxonomy ID

4568 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4568)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Triticum monococcum (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Triticum monococcum^#gephebase-summary-title)

Common Name

-

Synonyms

Crithodium monococcum; einkorn wheat; one-grained wheat; small spelt; Crithodium monococcum (L.) A.Love; Triticum monococcum L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Triticinae; Triticum

Parent

Triticum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4564)

NCBI Taxonomy ID

4568 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4568)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

-

Synonyms

-

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

GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

UniProtKB Triticum monococcum

B1NSN2 (http://www.uniprot.org/uniprot/B1NSN2)

GenebankID or UniProtKB

EU076381 (https://www.ncbi.nlm.nih.gov/nuccore/EU076381)

Presumptive Null

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

Molecular Type

Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Coding^#gephebase-summary-title)

Aberration Type

Unknown (https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title)

Molecular Details of the Mutation

possibly 5a.a. deletion in DNA binding domain

Experimental Evidence

Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Linkage Mapping^#gephebase-summary-title)

Main Reference

Identification of candidate CBF genes for the frost tolerance locus Fr-Am2 in Triticum monococcum. (2008) (https://pubmed.ncbi.nlm.nih.gov/18317935)

Authors

Knox AK; Li C; VÃigÃºjfalvi A; Galiba G; Stockinger EJ; Dubcovsky J

Abstract

A cluster of eleven CBF genes was recently mapped to the Frost resistance-2 (Fr-Am2) locus on chromosome 5 of diploid wheat (Triticum monococcum) using a cross between frost tolerant accession G3116 and frost sensitive DV92. The Fr-Am2 locus was mapped at the peak of two overlapping quantitative trait loci (QTL), one for frost survival and the other for differential expression of the cold regulated gene COR14b. Seven lines with recombination events within the CBF cluster were used to identify CBF candidate genes for these QTL. The lines carrying the critical recombination events were tested for whole plant frost survival and for differential transcript levels of cold induced COR14b and DHN5 genes. The strongest effect for these traits was associated to the linked TmCBF12, TmCBF14 and TmCBF15 genes, with the G3116 allele conferring improved frost tolerance and higher levels of COR14b and DHN5 transcript at mild cold temperatures (12-15 degrees C) than the DV92 allele. Comparison of CBF protein sequences revealed that the DV92 TmCBF12 protein contains a deletion of five amino acids in the AP2 DNA binding domain. Electrophoretic Mobility Shift Assays (EMSA) confirmed that the protein encoded by this allele cannot bind to the CRT/DRE (C-repeat/ dehydration-responsive element) motif present in the promoters of several cold induced genes. A smaller effect on frost tolerance was mapped to the distal group of CBF genes including TmCBF16. Transcript levels of TmCBF16, as well as those of TmCBF12 and TmCBF15 were up-regulated at mild cold temperatures in G3116 but not in DV92. Higher threshold induction temperatures can result in earlier initiation of the cold acclimation process and better resistance to subsequent freezing temperatures. The non-functional TmCBF12 allele in DV92 can also contribute to its lower frost tolerance.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS