

## GEPHE SUMMARY

	Gephebase Gene		GepheID
Heading Date 1 (HD1) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> )		GP00001409	
Gephebase="Heading Date 1 (HD1)"#gephebase-summary-title)			Main curator
	Entry Status	Prigent	
Published			

## PHENOTYPIC CHANGE

	Trait Category		
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> )			
Category="Physiology"#gephebase-summary-title)	Trait		
Flowering time ( <a flowering"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="Flowering</a> )			
time"#gephebase-summary-title)	Trait State in Taxon A		
Sorghum others than from Australia			
	Trait State in Taxon B		
wild sorghum W11 from Australia ( <i>Sorghum verticilliflorum</i> )			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Interspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> )			
Status="Interspecific"#gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Sorghum		Sorghum	
( <a href="https://www.gephebase.org/search-criteria?/and+Taxon">https://www.gephebase.org/search-criteria?/and+Taxon</a> and		( <a href="https://www.gephebase.org/search-criteria?/and+Taxon">https://www.gephebase.org/search-criteria?/and+Taxon</a> and	
Synonyms="Sorghum"#gephebase-summary-title)		Synonyms="Sorghum"#gephebase-summary-title)	
	Common Name		Common Name
-		-	
	Synonyms		Synonyms
Sorghum Moench, 1794		Sorghum Moench, 1794	
	Rank		Rank
genus		genus	
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta;		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta;	
Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae;		Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae;	
Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae;		Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae;	
Andropogonodae; Andropogoneae; Sorghinae		Andropogonodae; Andropogoneae; Sorghinae	
	Parent		Parent
Sorghinae () - (Rank: subtribe)		Sorghinae () - (Rank: subtribe)	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1648028">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1648028</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1648028">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1648028</a> )	
	NCBI Taxonomy ID		NCBI Taxonomy ID
4557		4557	
( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4557">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4557</a> )		( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4557">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4557</a> )	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
		wild sorghum W11 from Australia ( <i>Sorghum verticilliflorum</i> )	

## GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Arabidopsis thaliana
CO		Q39057 ( <a href="http://www.uniprot.org/uniprot/Q39057">http://www.uniprot.org/uniprot/Q39057</a> )	
	Synonyms		GenebankID or UniProtKB
B-box domain protein 1; BBX1; CONSTANS; F14F8.220; F14F8_220; FG; At5g15840		()	
	String		
3702.AT5G15840.1			
( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT5G15840.1">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT5G15840.1</a> )			
	Sequence Similarities		
Belongs to the CONSTANS family.			
	GO - Molecular Function		
GO:0003700 : DNA-binding transcription factor activity			
( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0003700">https://www.ebi.ac.uk/QuickGO/term/GO:0003700</a> )			
GO:0008270 : zinc ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0008270">https://www.ebi.ac.uk/QuickGO/term/GO:0008270</a> )			
GO:0003677 : DNA binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0003677">https://www.ebi.ac.uk/QuickGO/term/GO:0003677</a> )			
	GO - Biological Process		

GO:0030154 : cell differentiation (<https://www.ebi.ac.uk/QuickGO/term/GO:0030154>)  
GO:0009908 : flower development (<https://www.ebi.ac.uk/QuickGO/term/GO:0009908>)  
GO:0009909 : regulation of flower development  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009909>)  
GO:0010218 : response to far red light  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010218>)  
GO:0010018 : far-red light signaling pathway  
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010018>)

GO - Cellular Component

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

Presumptive Null

Yes (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~Yes^#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

Deletion Size

10-99 bp

Molecular Details of the Mutation

80bp deletion in first exon leading to gene frameshift

Experimental Evidence

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

Main Reference

Parallel Domestication of the Heading Date 1 Gene in Cereals. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26116860>)

Authors

Liu H; Liu H; Zhou L; Zhang Z; Zhang X; Wang M; Li H; Lin Z

Abstract

Flowering time is one of the key determinants of crop adaptation to local environments during domestication. However, the genetic basis underlying flowering time is yet to be elucidated in most cereals. Although staple cereals, such as rice, maize, wheat, barley, and sorghum, have spread and adapted to a wide range of ecological environments during domestication, it is yet to be determined whether they have a common genetic basis for flowering time. In this study, we show, through map-based cloning, that flowering time in sorghum is controlled by a major quantitative trait locus (QTL) Heading Date 1 (HD1), located on chromosome 10. The causal gene encodes the CONSTANS gene family which contains a CCT domain. A 5-bp deletion of a minor allele present in the coding sequence leads to a gene frameshift that delays flowering in sorghum. In contrast, in foxtail millet, association mapping of HD1 showed a common causal site with a splicing variant from "GT" to "AT" that was highly correlated with flowering time. In addition, the rice HD1 gene is known to harbor several causal variants controlling flowering time. These data indicate that the major flowering time QTL HD1 was under parallel domestication in sorghum, foxtail millet, and rice. The pattern of common mixed minor, or even rare, causal alleles in HD1 across different species may be representative of the genetic basis of the domestication syndrome. Furthermore, large DNA sequence analysis of HD1 revealed multiple origins for domesticated sorghum and a single origin for domesticated foxtail millet.

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Additional References

## RELATED GEPHE

Related Genes

1 (PRR37 pseudoresponse regulator protein 37) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~4557^/and+Trait=Flowering+time/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~Heading+Date+1+\(HD1\)^/and+Taxon+ID=~4557^/or+Gene+Gephebase=~Heading+Date+1+\(HD1\)^/and+Taxon+ID=~4557^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~Heading+Date+1+(HD1)^/and+Taxon+ID=~4557^/or+Gene+Gephebase=~Heading+Date+1+(HD1)^/and+Taxon+ID=~4557^#gephebase-summary-title))

## EXTERNAL LINKS

## COMMENTS