

GEPHE SUMMARY

	Gephebase Gene		GepheID
EARLY FLOWERING 3 (here = Mat-a) (<a (here='Mat-a)+"#gephebase-summary-title"' +early="" 3="" flowering="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene Gephebase="EARLY FLOWERING 3 (here = Mat-a)"#gephebase-summary-title)	GP00000243		
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait Category="Physiology"#gephebase-summary-title)		Trait	
Flowering time (<a +flowering="" href="https://www.gephebase.org/search-criteria?/and+Trait=" time+"#gephebase-summary-title"="">https://www.gephebase.org/search-criteria?/and+Trait="Flowering time"#gephebase-summary-title)			
	Trait State in Taxon A		
Hordeum vulgare		Trait State in Taxon B	
Hordeum vulgare - Mari (commercially available induced mutant)			
	Ancestral State		
Taxon A		Taxonomic Status	
Domesticated (<a +domesticated+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Domesticated"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Hordeum vulgare (<a +hordeum="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=" vulgare+"#gephebase-summary-title"="">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Hordeum vulgare"#gephebase-summary-title)		Hordeum vulgare (<a +hordeum="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=" vulgare+"#gephebase-summary-title"="">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Hordeum vulgare"#gephebase-summary-title)	
	Common Name		Common Name
-		-	
	Synonyms		Synonyms
barley; Hordeum vulgare L.; Horedum vulgare		barley; Hordeum vulgare L.; Horedum vulgare	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Hordeinae; Hordeum		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Hordeinae; Hordeum	
	Parent		Parent
Hordeum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4512)		Hordeum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4512)	
4513 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4513)	NCBI Taxonomy ID	4513 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4513)	NCBI Taxonomy ID
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
			Hordeum vulgare - Mari (commercially available induced mutant)

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Arabidopsis thaliana
ELF3		O82804 (http://www.uniprot.org/uniprot/O82804)	
	Synonyms		GenebankID or UniProtKB
EARLY FLOWERING 3; F17H15.25; PYK20; At2g25930; T19L18.26		AEW48248 (https://www.ncbi.nlm.nih.gov/nuccore/AEW48248)	
	String		
3702.AT2G25930.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 3702.AT2G25930.1)			
	Sequence Similarities		
-			
	GO - Molecular Function		
GO:0003700 : DNA-binding transcription factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003700)			
	GO - Biological Process		
GO:0009733 : response to auxin (https://www.ebi.ac.uk/QuickGO/term/GO:0009733)			

GO:0009826 : unidimensional cell growth
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009826>)
GO:0009737 : response to abscisic acid
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009737>)
GO:0007623 : circadian rhythm (<https://www.ebi.ac.uk/QuickGO/term/GO:0007623>)
GO:0009409 : response to cold (<https://www.ebi.ac.uk/QuickGO/term/GO:0009409>)
GO:0009909 : regulation of flower development
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009909>)
GO:2000028 : regulation of photoperiodism, flowering
(<https://www.ebi.ac.uk/QuickGO/term/GO:2000028>)
GO:0010031 : circumnutation (<https://www.ebi.ac.uk/QuickGO/term/GO:0010031>)
GO:0048573 : photoperiodism, flowering
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048573>)
GO:0009585 : red, far-red light phototransduction
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009585>)
GO:0010119 : regulation of stomatal movement
(<https://www.ebi.ac.uk/QuickGO/term/GO:0010119>)

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

4bp deletion resulting in truncated protein ; this deletion seem to have evolved multiple times (fragile site?)

Experimental Evidence

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

Main Reference

Induced mutations in circadian clock regulator *Mat-a* facilitated short-season adaptation and range extension in cultivated barley. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22371569/>)

Authors

Zakhrabekova S; Gough SP; Braumann I; M^Åller AH; Lundqvist J; Ahmann K; Dockter C; Matyszcak I; Kurowska M; Druka A; Waugh R; Graner A; Stein N; Steuernagel B; Lundqvist U; Hansson M

Abstract

Time to flowering has an important impact on yield and has been a key trait in the domestication of crop plants and the spread of agriculture. In 1961, the cultivar Mari (mat-a.8) was the very first induced early barley (*Hordeum vulgare* L.) mutant to be released into commercial production. Mari extended the range of two-row spring barley cultivation as a result of its photoperiod insensitivity. Since its release, Mari or its derivatives have been used extensively across the world to facilitate short-season adaptation and further geographic range extension. By exploiting an extended historical collection of early-flowering mutants of barley, we identified Praematurum-a (Mat-a), the gene responsible for this key adaptive phenotype, as a homolog of the *Arabidopsis thaliana* circadian clock regulator Early Flowering 3 (Elf3). We characterized 87 induced mat-a mutant lines and identified >20 different mat-a alleles that had clear mutations leading to a defective putative ELF3 protein. Expression analysis of HvElf3 and Gigantea in mutant and wild-type plants demonstrated that mat-a mutations disturb the flowering pathway, leading to the early phenotype. Alleles of Mat-a therefore have important and demonstrated breeding value in barley but probably also in many other day-length-sensitive crop plants, where they may tune adaptation to different geographic regions and climatic conditions, a critical issue in times of global warming.

Additional References

RELATED GEPHE

Related Genes

6 (CENTRORADIALIS (HvCEN), EARLY FLOWERING 3/ EARLY MATURITY 8, EARLY FLOWERING 3/ EARLY MATURITY 8, Flowering locus T (=HvFT=VRN3), PRR37-like Photoperiod-H1 (Ppd-H1), VRN2) (<https://www.gephebase.org/search-criteria?or+TaxonID=~4513~+and+Trait=Flowering+time+and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Parallelism independent evolution of the same mutation (or alternatively: pseudo-replicate?)

