

GEPHE SUMMARY

BADH2 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^BADH2^#gephebase-summary-title)	Gephebase Gene	GP00001778	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)	Trait Category		
Fragrance (https://www.gephebase.org/search-criteria?/and+Trait=^Fragrance^#gephebase-summary-title)	Trait		
Oryza sativa - non-fragrant	Trait State in Taxon A		
Oryza sativa - fragrant - variety from Malaysia	Trait State in Taxon B		
Taxon A	Ancestral State		
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Domesticated^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Oryza+sativa^#gephebase-summary-title)	Latin Name	Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Oryza+sativa^#gephebase-summary-title)	Latin Name
rice	Common Name	rice	Common Name
rice; red rice; Oryza sativa L.	Synonyms	rice; red rice; Oryza sativa L.	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzaceae; Oryzinae; Oryza	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzaceae; Oryzinae; Oryza	Lineage
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)	Parent	Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)	Parent
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)	NCBI Taxonomy ID	4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
		Padi Wangi	Taxon B Description

GENOTYPIC CHANGE

BADH2	Generic Gene Name	UniProtKB Oryza sativa subsp. japonica
fgr; BADH2; OsBADH2; OsJ_27367; LOC_Os08g32870; Os08g0424500; OSJNBa0056L09.30; P0456B03.101	Synonyms	Q84LK3 (http://www.uniprot.org/uniprot/Q84LK3) ALZ42021 (https://www.ncbi.nlm.nih.gov/nucore/ALZ42021)
39947.LOC_Os08g32870.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=39947.LOC_Os08g32870.1)	String	
Belongs to the aldehyde dehydrogenase family.	Sequence Similarities	
GO:0008802 : betaine-aldehyde dehydrogenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008802)	GO - Molecular Function	
GO:0071454 : cellular response to anoxia	GO - Biological Process	

(<https://www.ebi.ac.uk/QuickGO/term/GO:0071454>)
GO:0019285 : glycine betaine biosynthetic process from choline
(<https://www.ebi.ac.uk/QuickGO/term/GO:0019285>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
GO:0005777 : peroxisome (<https://www.ebi.ac.uk/QuickGO/term/GO:0005777>)

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

1-bp deletion in exon 10 - causes a frameshift

Experimental Evidence

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

Main Reference

The origin and evolution of fragrance in rice (*Oryza sativa* L.). (2009) (<https://pubmed.ncbi.nlm.nih.gov/19706531>)

Authors

Kovach MJ; Calingacion MN; Fitzgerald MA; McCouch SR

Abstract

Fragrance in the grain is one of the most highly valued grain quality traits in rice, yet the origin and evolution of the betaine aldehyde dehydrogenase gene (BADH2) underlying this trait remains unclear. In this study, we identify eight putatively nonfunctional alleles of the BADH2 gene and show that these alleles have distinct geographic and genetic origins. Despite multiple origins of the fragrance trait, a single allele, badh2.1, is the predominant allele in virtually all fragrant rice varieties today, including the widely recognized Basmati and Jasmine types. Haplotype analysis allowed us to establish a single origin of the badh2.1 allele within the Japonica varietal group and demonstrate the introgression of this allele from Japonica to Indica. Basmati-like accessions were nearly identical to the ancestral Japonica haplotype across a 5.3-Mb region flanking BADH2 regardless of their fragrance phenotype, demonstrating a close evolutionary relationship between Basmati varieties and the Japonica gene pool. These results clarify the relationships among fragrant rice varieties and challenge the traditional assumption that the fragrance trait arose in the Indica varietal group.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

9 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^BADH2^/and+Taxon ID=^4530^/or+Gene Gephebase=^BADH2^/and+Taxon ID=^4530^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^BADH2^/and+Taxon+ID=^4530^/or+Gene+Gephebase=^BADH2^/and+Taxon+ID=^4530^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

@Parallelism