

GEPHE SUMMARY

	Gephebase Gene		GepheID
Rc (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~Rc^#gephebase-summary-title)		GP00000960	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title)		Trait	
Coloration (seed) (https://www.gephebase.org/search-criteria?/and+Trait=~Coloration(seed)^#gephebase-summary-title)			
	Trait State in Taxon A		
Oryza sativa		Trait State in Taxon B	
Oryza sativa var. aus			
	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
	Latin Name		Latin Name
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Oryza+sativa^#gephebase-summary-title)		Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Oryza+sativa^#gephebase-summary-title)	
	Common Name		Common Name
rice		rice	
	Synonyms		Synonyms
rice; red rice; Oryza sativa L.		rice; red rice; Oryza sativa L.	
	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; Oryzoideae; Oryzeae; Oryzinae; Oryza		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza	
	Parent		Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)		Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)		4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
		Oryza sativa var. aus	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Oryza sativa subsp. japonica
Rc		A7J5U6 (http://www.uniprot.org/uniprot/A7J5U6)	
	Synonyms		GenebankID or UniProtKB
-		AFI99125 (https://www.ncbi.nlm.nih.gov/nuccore/AFI99125)	
	String		
-			
	Sequence Similarities		
-			
	GO - Molecular Function		
GO:0046983 ; protein dimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0046983)			
	GO - Biological Process		
-			
	GO - Cellular Component		
-			
			Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsense

Molecular Details of the Mutation

substitution; C->A in exon 6; introduces a premature stop codon (Cys>*) that truncates the protein before the bHLH domain

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Global dissemination of a single mutation conferring white pericarp in rice. (2007) (<https://pubmed.ncbi.nlm.nih.gov/17696613>)

Authors

Sweeney MT; Thomson MJ; Cho YG; Park YJ; Williamson SH; Bustamante CD; McCouch SR

Abstract

Here we report that the change from the red seeds of wild rice to the white seeds of cultivated rice (*Oryza sativa*) resulted from the strong selective sweep of a single mutation, a frame-shift deletion within the Rc gene that is found in 97.9% of white rice varieties today. A second mutation, also within Rc, is present in less than 3% of white accessions surveyed. Haplotype analysis revealed that the predominant mutation originated in the japonica subspecies and crossed both geographic and sterility barriers to move into the indica subspecies. A little less than one Mb of japonica DNA hitchhiked with the rc allele into most indica varieties, suggesting that other linked domestication alleles may have been transferred from japonica to indica along with white pericarp color. Our finding provides evidence of active cultural exchange among ancient farmers over the course of rice domestication coupled with very strong, positive selection for a single white allele in both subspecies of *O. sativa*.

Additional References

Genome-wide association studies of 14 agronomic traits in rice landraces. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20972439>)

Caught red-handed: Rc encodes a basic helix-loop-helix protein conditioning red pericarp in rice. (2006) (<https://pubmed.ncbi.nlm.nih.gov/16399804>)

RELATED GEPHE

Related Genes

2 (Bh4, OsC1) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~4530#/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~Rc#/and+Taxon+ID=~4530#/or+Gene+Gephebase=~Rc#/and+Taxon+ID=~4530#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS