

GEPHE SUMMARY

S5 (ORF3-ORF4-ORF5 gene complex) (<a +s5+(orf3-orf4-orf5+gene+complex)^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+S5+(ORF3-ORF4-ORF5+gene+complex)^#gephebase-summary-title)	Gephebase Gene	GepheID
	GP00001021	Main curator
	Martin	
Published	Entry Status	

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	
Hybrid incompatibility (sterility) (<a +hybrid+incompatibility+(sterility)^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Hybrid+incompatibility+(sterility)^#gephebase-summary-title)		Trait State in Taxon A	
Oryza sativa indica		Trait State in Taxon B	
Oryza sativa japonica		Ancestral State	
Data not curated		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	
Oryza sativa		Oryza sativa	
(<a +oryza+sativa^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Oryza+sativa^#gephebase-summary-title)		(<a +oryza+sativa^#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">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)		Oryza () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4527)	
NCBI Taxonomy ID		NCBI Taxonomy ID	
4530		4530	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4530)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
Yes		Yes	
Taxon A Description		Taxon B Description	
Oryza sativa indica		Oryza sativa japonica	

GENOTYPIC CHANGE

		UniProtKB Oryza sativa subsp. japonica	
Generic Gene Name		Q5QLR2 (http://www.uniprot.org/uniprot/Q5QLR2)	
GRXS5		GenebankID or UniProtKB	
GRXS5; P0014E08.2; Os01g0667900; LOC_Os01g47760; OSJNBb0063G05.32		ACG76111 (https://www.ncbi.nlm.nih.gov/nuccore/ACG76111)	
String			
39947.LOC_Os01g47760.1			
(http://string-db.org/newstring.cgi/show_network_section.pl?identifier=39947.LOC_Os01g47760.1)			
Sequence Similarities			
Belongs to the glutaredoxin family. CC-type subfamily.			
GO - Molecular Function			
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)			
GO:0009055 : electron transfer activity			
(https://www.ebi.ac.uk/QuickGO/term/GO:0009055)			
GO:0051537 : 2 iron, 2 sulfur cluster binding			

(<https://www.ebi.ac.uk/QuickGO/term/GO:0051537>)
GO:0015035 : protein disulfide oxidoreductase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0015035>)

GO - Biological Process

GO:0045454 : cell redox homeostasis
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045454>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

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

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

Molecular Details of the Mutation

System of alleles at three linked genes resulting in killer-protector system (hybrid incompatibilities)

Experimental Evidence

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

Main Reference

A killer-protector system regulates both hybrid sterility and segregation distortion in rice. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22984070>)

Authors

Yang J; Zhao X; Cheng K; Du H; Ouyang Y; Chen J; Qiu S; Huang J; Jiang Y; Jiang L; Ding J; Wang J; Xu C; Li X; Zhang Q

Abstract

Hybrid sterility is a major form of postzygotic reproductive isolation that restricts gene flow between populations. Cultivated rice (*Oryza sativa* L.) consists of two subspecies, indica and japonica; inter-subspecific hybrids are usually sterile. We show that a killer-protector system at the *S5* locus encoded by three tightly linked genes [Open Reading Frame 3 (ORF3) to ORF5] regulates fertility in indica-japonica hybrids. During female sporogenesis, the action of ORF5+ (killer) and ORF4+ (partner) causes endoplasmic reticulum (ER) stress. ORF3+ (protector) prevents ER stress and produces normal gametes, but ORF3- cannot prevent ER stress, resulting in premature programmed cell death and leads to embryo-sac abortion. Preferential transmission of ORF3+ gametes results in segregation distortion in the progeny. These results add to our understanding of differences between indica and japonica rice and may aid in rice genetic improvement.

Additional References

RELATED GEPHE

Related Genes

2 (S5, SaM + SaF) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^4530^/and+Trait=Hybrid incompatibility/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS