

GEPHE SUMMARY

	Gephebase Gene		GepheID
Pi5-1 + Pi5-2 cluster (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Pi5-1 + Pi5-2 cluster^#gephebase-summary-title)		GP00000880	
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category	
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)		
	Trait	
Pathogen resistance (https://www.gephebase.org/search-criteria?/and+Trait=^Pathogen resistance^#gephebase-summary-title)		
	Trait State in Taxon A	
Oryza sativa - blast susceptible IR50		
	Trait State in Taxon B	
Oryza sativa - blast resistant RIL260		
	Ancestral State	
Data not curated		
	Taxonomic Status	
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)		

Taxon A	Latin Name	Taxon B	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?
Yes		Yes	
	Taxon A Description		Taxon B Description
Oryza sativa - blast susceptible IR50		Oryza sativa - blast resistant RIL260	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Oryza sativa subsp. japonica
Pi5-1		C3SBK3 (http://www.uniprot.org/uniprot/C3SBK3)	
	Synonyms		GenebankID or UniProtKB
-		ACJ54697 (https://www.ncbi.nlm.nih.gov/nuccore/ACJ54697)	
	String		
-			
	Sequence Similarities		
Belongs to the disease resistance NB-LRR family.			
	GO - Molecular Function		
GO:0043531 : ADP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043531)			
	GO - Biological Process		
-			
	GO - Cellular Component		
-			
			Presumptive Null
No (https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title)			

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

Molecular Type

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

Aberration Type

In genetic transformation experiments of a susceptible rice cultivar neither the Pi5-1 nor the Pi5-2 gene was found to confer resistance to *M. oryzae*. In contrast transgenic rice plants expressing both of these genes (generated by crossing transgenic lines carrying each gene individually) conferred Pi5-mediated resistance to *M. oryzae*

Molecular Details of the Mutation

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

Experimental Evidence

Rice Pi5-mediated resistance to Magnaporthe oryzae requires the presence of two coiled-coil-nucleotide-binding-leucine-rich repeat genes. (2009) (<https://pubmed.ncbi.nlm.nih.gov/19153255>)

Main Reference

Lee SK; Song MY; Seo YS; Kim HK; Ko S; Cao PJ; Suh JP; Yi G; Roh JH; Lee S; An G; Hahn TR; Wang GL; Ronald P; Jeon JS

Authors

Rice blast, caused by the fungus Magnaporthe oryzae, is one of the most devastating diseases of rice. To understand the molecular basis of Pi5-mediated resistance to *M. oryzae*, we cloned the resistance (R) gene at this locus using a map-based cloning strategy. Genetic and phenotypic analyses of 2014 F2 progeny from a mapping population derived from a cross between IR50, a susceptible rice cultivar, and the RIL260 line carrying Pi5 enabled us to narrow down the Pi5 locus to a 130-kb interval. Sequence analysis of this genomic region identified two candidate genes, Pi5-1 and Pi5-2, which encode proteins carrying three motifs characteristic of R genes: an N-terminal coiled-coil (CC) motif, a nucleotide-binding (NB) domain, and a leucine-rich repeat (LRR) motif. In genetic transformation experiments of a susceptible rice cultivar, neither the Pi5-1 nor the Pi5-2 gene was found to confer resistance to *M. oryzae*. In contrast, transgenic rice plants expressing both of these genes, generated by crossing transgenic lines carrying each gene individually, conferred Pi5-mediated resistance to *M. oryzae*. Gene expression analysis revealed that Pi5-1 transcripts accumulate after pathogen challenge, whereas the Pi5-2 gene is constitutively expressed. These results indicate that the presence of these two genes is required for rice Pi5-mediated resistance to *M. oryzae*.

Abstract

Additional References

RELATED GEPHE

15 (Pi-ta, Pi2 (Nbs4-Pi2), Pi36, Pi37, Pi9 (= Nbs2-Pi9), Pib, Pid3, PigmR, Pikm1-TS + Pikm2-TS cluster, Pit, Piz-t, SLB1/2, Xa1, Xa21, Xa26) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^4530^/and+Trait=Pathogen resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

No matches found.

Related Haplotypes

EXTERNAL LINKS

COMMENTS

Cluster of paralogous genes