GEPHE SUMMARY

Gephebase Gene
PigmR (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^PigmR^#gephebase-summary-title)

GepheID
GP00001592

Entry Status
Published

Main curator
Prigent

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Pathogen resistance (plant fungus pathogen) (https://www.gephebase.org/search-criteria?/and+Trait=^Pathogen resistance (plant fungus pathogen)^#gephebase-summary-title)

Trait State in Taxon A
nipponbare japonica (NIPB) cultivar without this resistance

Trait State in Taxon B
Chinese rice variety Gumei 4 resistant

Ancestral State
Unknown

Taxonomic Status
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)

Common Name
rice

Synonyms
rice; red rice; Oryza sativa L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza

Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)

NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Nipponbare japonica (NIPB) cultivar without this resistance

Taxon B

Latin Name
Oryza sativa (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Oryza sativa^#gephebase-summary-title)

Common Name
rice

Synonyms
rice; red rice; Oryza sativa L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Oryzoideae; Oryzeae; Oryzinae; Oryza

Parent
Oryza () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4527)

NCBI Taxonomy ID
4530 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4530)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Chinese rice variety Gumei 4 resistant

GENOTYPIC CHANGE

Generic Gene Name
Pigm_GM4.7

Synonyms
-

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
-

UniProtKB Oryza sativa subsp. indica
A0A1P8CYR1 (http://www.uniprot.org/uniprot/A0A1P8CYR1)

GenebankID or UniProtKB
()

Presumptive Null

Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

unknown

Experimental Evidence

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

Main Reference

Epigenetic regulation of antagonistic receptors confers rice blast resistance with yield balance. (2017) (https://pubmed.ncbi.nlm.nih.gov/28154240)

Authors

Deng Y; Zhai K; Xie Z; Yang D; Zhu X; Liu J; Wang X; Qin P; Yang Y; Zhang G; Li Q; Zhang J; Wu S; Milazzo J; Mao B; Wang E; Xie H; Tharreau D; He Z

Abstract

Crop breeding aims to balance disease resistance with yield; however, single resistance (R) genes can lead to resistance breakdown, and R gene pyramiding may affect growth fitness. Here we report that the rice Pigm locus contains a cluster of genes encoding nucleotide-binding leucine-rich repeat (NLR) receptors that confer durable resistance to the fungus Magnaporthe oryzae without yield penalty. Among these NLR receptors, PigmR confers broad-spectrum resistance, whereas PigmS competitively attenuates PigmR homodimerization to suppress resistance. PigmS expression, and thus PigmR-mediated resistance, are subjected to tight epigenetic regulation. PigmS increases seed production to counteract the yield cost induced by PigmR Therefore, our study reveals a mechanism balancing high disease resistance and yield through epigenetic regulation of paired antagonistic NLR receptors, providing a tool to develop elite crop varieties.

Additional References

RELATED GEPHE

Related Genes

15 (Pi-ta, Pi2 (Nbs4-Pi2), Pi36, Pi37, Pi5-1 + Pi5-2 cluster, Pi9 (= Nbs2-Pi9), Pib, Pid3, 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 Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

PigmR displayed constitutive low-level expression in all tissues and is repressed by PigmS in pollen and panicles. Susceptible varieties may not have this gene?