

GEPHE SUMMARY

RPP1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^RPP1^#gephebase-summary-title)	Gephebase Gene	GP00001282	GephelD
	Entry Status	Arnoult	Main curator
Published			

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)
Hybrid incompatibility (https://www.gephebase.org/search-criteria?/and+Trait=^Hybrid incompatibility^#gephebase-summary-title)
Arabidopsis thaliana - Ler and Col (Northern Europe) "compatible"
Arabidopsis thaliana - Kond (Central Asia) "incompatible" [Hybrids with Ler show a strong growth defect at 14C]
Unknown

Taxonomic Status

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

Taxon A	Taxon B
Latin Name	Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title)	Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title)
Common Name	Common Name
thale cress	thale cress
Synonyms	Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress
Rank	Rank
species	species
Lineage	Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis
Parent	Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)	Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)
NCBI Taxonomy ID	NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)	3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)
is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
Yes	Yes
Taxon A Description	Taxon B Description
Arabidopsis thaliana - Ler and Col (Northern Europe) "compatible"	Arabidopsis thaliana - Kond (Central Asia) "incompatible" [Hybrids with Ler show a strong growth defect at 14C]

GENOTYPIC CHANGE

RPP1	Generic Gene Name	UniProtKB Arabidopsis thaliana
cogl; recognition of peronospora parasitica 1; At3g44480; F14L2_30	Synonyms	GenebankID or UniProtKB
3702.AT3G44480.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT3G44480.1)	String	823573 (https://www.ncbi.nlm.nih.gov/nucore/823573)
-	Sequence Similarities	
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)	GO - Molecular Function	
GO:0043531 : ADP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043531)		

GO:0030275 : LRR domain binding (<https://www.ebi.ac.uk/QuickGO/term/GO:0030275>)

GO - Biological Process

GO:0006952 : defense response (<https://www.ebi.ac.uk/QuickGO/term/GO:0006952>)

GO:0007165 : signal transduction (<https://www.ebi.ac.uk/QuickGO/term/GO:0007165>)

GO:0009817 : defense response to fungus, incompatible interaction

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009817>)

GO:0002239 : response to oomycetes

(<https://www.ebi.ac.uk/QuickGO/term/GO:0002239>)

GO - Cellular Component

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

GO:0000139 : Golgi membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0000139>)

GO:0005789 : endoplasmic reticulum membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005789>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>)

Molecular Type

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

complex

Experimental Evidence

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

Main Reference

Analysis of a plant complex resistance gene locus underlying immune-related hybrid incompatibility and its occurrence in nature. (2014) (<https://pubmed.ncbi.nlm.nih.gov/25503786>)

Authors

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Abstract

Mechanisms underlying speciation in plants include detrimental (incompatible) genetic interactions between parental alleles that incur a fitness cost in hybrids. We reported on recessive hybrid incompatibility between an *Arabidopsis thaliana* strain from Poland, Landsberg erecta (Ler), and many Central Asian *A. thaliana* strains. The incompatible interaction is determined by a polymorphic cluster of Toll/interleukin-1 receptor-nucleotide binding-leucine rich repeat (TNL) RPP1 (Recognition of *Peronospora parasitica*)-like genes in Ler and alleles of the receptor-like kinase Strubbelpig Receptor Family 3 (SRF3) in Central Asian strains Kas-2 or Kond, causing temperature-dependent autoimmunity and loss of growth and reproductive fitness. Here, we genetically dissected the RPP1-like Ler locus to determine contributions of individual RPP1-like Ler (R1-R8) genes to the incompatibility. In a neutral background, expression of most RPP1-like Ler genes, except R3, has no effect on growth or pathogen resistance. Incompatibility involves increased R3 expression and engineered R3 overexpression in a neutral background induces dwarfism and sterility. However, no individual RPP1-like Ler gene is sufficient for incompatibility between Ler and Kas-2 or Kond, suggesting that co-action of at least two RPP1-like members underlies this epistatic interaction. We find that the RPP1-like Ler haplotype is frequent and occurs with other Ler RPP1-like alleles in a local population in Gorz Áw Wielkopolski (Poland). Only Gorz Áw individuals carrying the RPP1-like Ler haplotype are incompatible with Kas-2 and Kond, whereas other RPP1-like alleles in the population are compatible. Therefore, the RPP1-like Ler haplotype has been maintained in genetically different individuals at a single site, allowing exploration of forces shaping the evolution of RPP1-like genes at local and regional population scales.

Additional References

Natural variation at Strubbelpig Receptor Kinase 3 drives immune-triggered incompatibilities between *Arabidopsis thaliana* accessions. (2010) (<https://pubmed.ncbi.nlm.nih.gov/21037570>)

RELATED GEPHE

Related Genes

2 (AT5G41740/AT5G41750, SRF3) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Hybrid incompatibility/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^RPP1^/and+Taxon ID=^3702^/or+Gene Gephebase=^RPP1^/and+Taxon ID=^3702^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS

Recessive incompatibility trait ; @Epistasis interaction with SRF3. Other RPP-1 like genes are responsible fot the HI.