GEPHE SUMMARY

Gephebase Gene
Pore-forming toxin-like (PFT) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Pore-forming toxin-like (PFT)^#gephebase-summary-title)

GepheID
GP00001563

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

Trait State in Taxon A
Chinese Spring (CS) wheat susceptible

Trait State in Taxon B
Chinese wheat cultivar Sumai3 resistant

Ancestral State
Unknown

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

Taxon A

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

Common Name
bread wheat

Synonyms
Triticum aestivum subsp. aestivum; Triticum vulgare; bread wheat; Canadian hard winter wheat; common wheat; wheat; Triticum aestivum L.; Triticum vulgare L.; Triticum vulgare Vill., nom. illeg.; Tricum aestivum; Triticum aestivam; Triticum aestivum8

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Triticinae; Triticum

Parent
Triticum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4564)

NCBI Taxonomy ID
4565 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4565)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Chinese Spring (CS) wheat susceptible

Taxon B

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

Common Name
bread wheat

Synonyms
Triticum aestivum subsp. aestivum; Triticum vulgare; bread wheat; Canadian hard winter wheat; common wheat; wheat; Triticum aestivum L.; Triticum vulgare L.; Triticum vulgare Vill., nom. illeg.; Tricum aestivum; Triticum aestivam; Triticum aestivum8

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Triticinae; Triticum

Parent
Triticum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4564)

NCBI Taxonomy ID
4565 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4565)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Chinese wheat cultivar Sumai3 resistant

GENOTYPIC CHANGE

Generic Gene Name
-

Synonyms
-

String
-

Sequence Similarities
-

GO - Molecular Function
-

GO - Biological Process
GO:0009405 : pathogenesis (https://www.ebi.ac.uk/QuickGO/term/GO:0009405)

GO - Cellular Component
GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)

UniProtKB Triticum aestivum
Q4JEV5 (http://www.uniprot.org/uniprot/Q4JEV5)

GenebankID or UniProtKB
()

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Indel Size

10-100 kb

Molecular Details of the Mutation

PFT gene is present and constitutively expressed in resistant line and absent in susceptible line

Experimental Evidence

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

Main Reference

Wheat Fhb1 encodes a chimeric lectin with agglutinin domains and a pore-forming toxin-like domain conferring resistance to Fusarium head blight. (2016) (https://pubmed.ncbi.nlm.nih.gov/27776114)

Authors

Rawat N; Pumphrey MO; Liu S; Zhang X; Tiwari VK; Ando K; Trick HN; Bockus WW; Akhunov E; Anderson JA; Gill BS

Abstract

Fusarium head blight (FHB), caused by Fusarium graminearum, is a devastating disease of wheat and barley that leads to reduced yield and mycotoxin contamination of grain, making it unfit for human consumption. FHB is a global problem, with outbreaks in the United States, Canada, Europe, Asia and South America. In the United States alone, total direct and secondary economic losses from 1993 to 2001 owing to FHB were estimated at $7.67 billion. Fhb1 is the most consistently reported quantitative trait locus (QTL) for FHB resistance breeding. Here we report the map-based cloning of Fhb1 from a Chinese wheat cultivar Sumai 3. By mutation analysis, gene silencing and transgenic overexpression, we show that a pore-forming toxin-like (PFT) gene at Fhb1 confers FHB resistance. PFT is predicted to encode a chimeric lectin with two agglutinin domains and an ETX/MTX2 toxin domain. Our discovery identifies a new type of durable plant resistance gene conferring quantitative disease resistance to plants against Fusarium species.

Additional References

RELATED GEPHE

Related Genes

4 (Lr21, Lr67, Pm3, Mla (=Sr33/AetRGA1e)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^4565^/and+Trait=Pathogen resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Considered null mutation when absent. PFT is predicted to encode a chimeric lectin with two agglutinin domains and an ETX/MTX2 toxin domain. Demonstrated by mutation analysis; gene silencing and transgenic overexpression