

GEPHE SUMMARY

	Gephebase Gene		GepheID
Pm3 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=~Pm3^#gephebase-summary-title)		GP00000899	
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+TraitCategory=~Physiology^#gephebase-summary-title)			
	Trait		
Pathogen resistance (https://www.gephebase.org/search-criteria?/and+Trait=~Pathogenresistance^#gephebase-summary-title)			
	Trait State in Taxon A		
Triticum aestivum			
	Trait State in Taxon B		
Triticum aestivum			
	Ancestral State		
Data not curated			
	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=~Intraspecific^#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Triticum aestivum (https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=~Triticumaestivum^#gephebase-summary-title)		Triticum aestivum (https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=~Triticumaestivum^#gephebase-summary-title)	
	Common Name		Common Name
bread wheat		bread wheat	
	Synonyms		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		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		Rank
species		species	
	Lineage		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		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		Parent
Triticum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4564)		Triticum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4564)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
4565 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4565)		4565 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4565)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Triticum aestivum
PM3		C1K3M2 (http://www.uniprot.org/uniprot/C1K3M2)	
	Synonyms		GenebankID or UniProtKB
-		FJ794605 (https://www.ncbi.nlm.nih.gov/nuccore/FJ794605)	
	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+PresumptiveNull=~No^#gephebase-summary-title)			

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Various substitution haplotypes - exact causing amino acid change(s) unknown - in hexaploid bread wheat one amino acid change in a solventâ€œexposed residue of LRR27 (E1334 to V1334) was sufficient to convert the susceptible Pm3CS into a functional resistance allele (Yahiaoui et al., 2006).

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Glu	Val	1334

Main Reference

Independent evolution of functional Pm3 resistance genes in wild tetraploid wheat and domesticated bread wheat. (2009) (<https://pubmed.ncbi.nlm.nih.gov/18980638>)

Authors

Yahiaoui N; Kaur N; Keller B

Abstract

The Pm3 alleles of cultivated bread wheat confer gene for gene resistance to the powdery mildew fungus. They represent a particular case of plant disease resistance gene evolution, because of their recent origin and possible evolution after the formation of hexaploid wheat. The Pm3 locus is conserved in tetraploid wheat, thereby allowing the comparative evolutionary study of the same resistance locus in a domesticated species and in one of its wild ancestors. We have identified 61 Pm3 allelic sequences from wild and domesticated tetraploid wheat subspecies. The Pm3 sequences corresponded to 24 different haplotypes. They showed low sequence diversity, differing by only a few polymorphic sequence blocks that were further reshuffled between alleles by gene conversion and recombination. Polymorphic sequence blocks are different from the blocks found in functional Pm3 alleles of hexaploid wheat, indicating an independent evolution of the Pm3 loci in the two species. A new functional gene was identified in a wild wheat accession from Syria. This gene, Pm3k, conferred intermediate race-specific resistance to powdery mildew, and consists of a mosaic of gene segments derived from non-functional alleles. This demonstrates that Pm3-based resistance is not very frequent in wild tetraploid wheat, and that the evolution of functional resistance genes occurred independently in wild tetraploid and bread wheat. The Pm3 sequence variability and geographic distribution indicated that diversity was higher in wild emmer wheat from the Levant area, compared with the accessions from Turkey. Further screens for Pm3 functional genes in wild wheat should therefore focus on accessions from the Levant region.

Additional References

Rapid generation of new powdery mildew resistance genes after wheat domestication. (2006) (<https://pubmed.ncbi.nlm.nih.gov/16740148>)

RELATED GEPHE

Related Genes

4 (Lr21, Lr67, Pore-forming toxin-like (PFT), 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