

GEPHE SUMMARY

	Gephebase Gene	GephelD
HM1 = HC toxin reductase (HCTR) (https://www.gephebase.org/search-criteria?/and+Gene	GP00000480	
Gephebase=^HM1 = HC toxin reductase (HCTR)^#gephebase-summary-title)		Main curator
	Entry Status	Martin
Published		

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait			
Category=^Physiology^#gephebase-summary-title)			
Pathogen resistance (https://www.gephebase.org/search-criteria?/and+Trait=^Pathogen	Trait		
resistance^#gephebase-summary-title)			
Zea mays - resistant	Trait State in Taxon A		
Zea mays - M021A - sensitive	Trait State in Taxon B		
Data not curated	Ancestral State		
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic	Taxonomic Status		
Status=^Domesticated^#gephebase-summary-title)			
Taxon A		Taxon B	
Zea mays	Latin Name	Zea mays	Latin Name
(https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Zea		(https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Zea	
mays^#gephebase-summary-title)		mays^#gephebase-summary-title)	
-	Common Name	-	Common Name
Zea mays var. japonica; maize; Zea mays L.; Zea mays mays	Synonyms	Zea mays var. japonica; maize; Zea mays L.; Zea mays mays	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea	Lineage
Zea () - (Rank: genus)	Parent	Zea () - (Rank: genus)	Parent
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4575)	NCBI Taxonomy ID	(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4575)	NCBI Taxonomy ID
4577		4577	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4577)			
is Taxon A an Infraspecies?		is Taxon B an Infraspecies?	
No		Yes	
		Zea mays - M021A - sensitive	Taxon B Description

GENOTYPIC CHANGE

hm1	Generic Gene Name	UniProtKB Zea mays
GRMZM5G881887	Synonyms	GenebankID or UniProtKB
-	String	
	Sequence Similarities	
GO:0050662 : coenzyme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0050662)	GO - Molecular Function	
GO:0003824 : catalytic activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003824)		
	GO - Biological Process	
	GO - Cellular Component	
		Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

Not identified

Experimental Evidence

Candidate Gene ([#gephebase-summary-title\)](https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene)

Main Reference

Plant-pathogen microevolution: molecular basis for the origin of a fungal disease in maize. (1998) (<https://pubmed.ncbi.nlm.nih.gov/9465077>)

Authors

Multani DS; Meeley RB; Paterson AH; Gray J; Briggs SP; Johal GS

Abstract

A new and severe disease of maize caused by a previously unknown fungal pathogen, *Cochliobolus carbonum* race 1, was first described in 1938. The molecular events that led to the sudden appearance of this disease are described in this paper. Resistance to *C. carbonum* race 1 was found to be widespread in maize and is conferred by a pair of unlinked duplicate genes, Hm1 and Hm2. Here, we demonstrate that resistance is the wild-type condition in maize. Two events, a transposon insertion in Hm1 and a deletion in Hm2, led to the loss of resistance, resulting in the origin of a new disease. None of the other plant species tested is susceptible to *C. carbonum* race 1, and they all possess candidate genes with high homology to Hm1 and Hm2. In sorghum and rice, these homologs map to two chromosomal regions that are syntenic with the maize Hm1 and Hm2 loci, indicating that they are related to the maize genes by vertical descent. These results suggest that the Hm-encoded resistance is of ancient origin and probably is conserved in all grasses.

Additional References

RELATED GEPHE

Related Genes

5 (HM1 = HC toxin reductase (HCTR) [possible pseudo-replicate from other Maize entry], HM2 = HC toxin reductase (HCTR), Lysine histidine transporter 1, Rp1-D, Rp3 cluster) ([#gephebase-summary-title\)](https://www.gephebase.org/search-criteria?/or+Taxon ID=^4577/and+Trait=Pathogen resistance/and+groupHaplotypes=true)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS