

GEPHE SUMMARY

MLO (https://www.gephebase.org/search-criteria/?and+GeneGephebase=%MLO^#gephebase-summary-title)	Gephebase Gene	GP00000672	GephelD
	Entry Status	Martin	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		
Hordeum vulgare - susceptible	Trait State in Taxon B		
Hordeum vulgare - Ethiopian origin resistant cultivars	Ancestral State		
Taxon A	Taxonomic Status		
Domesticated (https://www.gephebase.org/search-criteria/?and+TaxonomicStatus=%Domesticated^#gephebase-summary-title)			
Taxon A	Latin Name	Taxon B	Latin Name
Hordeum vulgare (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Hordeum+vulgare^#gephebase-summary-title)		Hordeum vulgare (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=%Hordeum+vulgare^#gephebase-summary-title)	
-	Common Name	-	Common Name
barley; Hordeum vulgare L.; Horedum vulgare	Synonyms	barley; Hordeum vulgare L.; Horedum vulgare	Synonyms
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Hordeinae; Hordeum		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Triticodae; Triticeae; Hordeinae; Hordeum	
Hordeum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4512)	Parent	Hordeum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4512)	Parent
4513 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4513)	NCBI Taxonomy ID	4513 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4513)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	Yes	is Taxon B an Infraspecies?
			Taxon B Description
			Hordeum vulgare - Ethiopian origin resistant cultivars

GENOTYPIC CHANGE

MLO	Generic Gene Name	UniProtKB Hordeum vulgare
-	Synonyms	GenebankID or UniProtKB
-	String	
Belongs to the MLO family.	Sequence Similarities	
GO:0005516 : calmodulin binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005516)	GO - Molecular Function	
	GO - Biological Process	
GO:0006952 : defense response (https://www.ebi.ac.uk/QuickGO/term/GO:0006952)		
GO:0009607 : response to biotic stimulus (https://www.ebi.ac.uk/QuickGO/term/GO:0009607)		
GO:0016021 : integral component of membrane	GO - Cellular Component	

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

Molecular Type

Gene Amplification (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=%Gene+Amplification%#gephebase-summary-title>)

Aberration Type

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

Tandem array duplication including promoter and partial CDS; resulting in loss-of-function by transcriptional interference

Experimental Evidence

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

Main Reference

A barley cultivation-associated polymorphism conveys resistance to powdery mildew. (2004) (<https://pubmed.ncbi.nlm.nih.gov/15318221>)

Authors

Piffanelli P; Ramsay L; Waugh R; Benabdelmouna A; D'Hont A; Hollricher K; Jørgensen JH; Schulze-Lefert P; Panstruga R

Abstract

Barley (*Hordeum vulgare*) has played a pivotal role in Old World agriculture since its domestication about 10,000 yr ago. Barley plants carrying loss-of-function alleles (*mlo*) of the *Mlo* locus are resistant against all known isolates of the widespread powdery mildew fungus. The sole *mlo* resistance allele recovered so far from a natural habitat, *mlo-11*, was originally retrieved from Ethiopian landraces and nowadays controls mildew resistance in the majority of cultivated European spring barley elite varieties. Here we use haplotype analysis to show that the *mlo-11* allele probably arose once after barley domestication. Resistance in *mlo-11* plants is linked to a complex tandem repeat array inserted upstream of the wild-type gene. The repeat units consist of a truncated *Mlo* gene comprising 3.5 kilobases (kb) of 5'-regulatory sequence plus 1.1 kb of coding sequence. These generate aberrant transcripts that impair the accumulation of both *Mlo* wild-type transcript and protein. We exploited the meiotic instability of *mlo-11* resistance and recovered susceptible revertants in which restoration of *Mlo* function was accompanied by excision of the repeat array. We infer cis-dependent perturbation of transcription machinery assembly by transcriptional interference in *mlo-11* plants as a likely mechanism leading to disease resistance.

Additional References

RELATED GEPHE

Related Genes

3 (*Mla1*, *Mla13*, *Mla6*) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=%4513%and+Trait=Pathogen+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS