

GEPHE SUMMARY

ABCC2 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=^ABCC2^#gephebase-summary-title)	Gephebase Gene	GP00002461	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+TraitCategory=^Physiology^#gephebase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; Bt toxins) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (insecticide; Bt toxins)^#gephebase-summary-title)	Trait		
Spodoptera frugiperda - susceptible	Trait State in Taxon A		
Spodoptera frugiperda - individuals from from Puerto Rico resistant to transgenic maize expressing the Cry1Fa toxin	Trait State in Taxon B		
	Ancestral State		
	Taxon A		
Intraspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Intraspecific^#gephebase-summary-title)	Taxonomic Status		
	Taxon A		Taxon B
	Latin Name		Latin Name
Spodoptera frugiperda (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Spodoptera frugiperda^#gephebase-summary-title)	Latin Name	Spodoptera frugiperda (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Spodoptera frugiperda^#gephebase-summary-title)	Latin Name
	Common Name		Common Name
fall armyworm	Common Name	fall armyworm	Common Name
	Synonyms		Synonyms
fall armyworm; Spodoptera frugiperda (Smith, 1797)	Synonyms	fall armyworm; Spodoptera frugiperda (Smith, 1797)	Synonyms
	Rank		Rank
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Obtectomera; Noctuoidea; Noctuidae; Amphipyrrinae; Spodoptera	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Obtectomera; Noctuoidea; Noctuidae; Amphipyrrinae; Spodoptera	Lineage
	Parent		Parent
Spodoptera () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106)	Parent	Spodoptera () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106)	Parent
	NCBI Taxonomy ID		NCBI Taxonomy ID
7108 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7108)	NCBI Taxonomy ID	7108 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7108)	NCBI Taxonomy ID
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

MRP1	Generic Gene Name	H8YF43 (http://www.uniprot.org/uniprot/H8YF43)	UniProtKB Drosophila melanogaster
-	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
	GO - Molecular Function		
GO:000524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:000524)	GO - Molecular Function		
GO:0008514 : organic anion transmembrane transporter activity (https://www.ebi.ac.uk/QuickGO/term/GO:0008514)	GO - Molecular Function		
GO:0140359 : ABC-type transporter activity (https://www.ebi.ac.uk/QuickGO/term/GO:0140359)	GO - Molecular Function		
	GO - Biological Process		

GO - Cellular Component

GO:0005887 : integral component of plasma membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)

Presumptive Null

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

Molecular Type

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

Aberration Type

Complex Change ([https://www.gephebase.org/search-criteria?/and+Aberration Type=~Complex Change~ #gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=~Complex+Change~#gephebase-summary-title))

Molecular Details of the Mutation

A nine-base deletion (position 39â€“47) and a two-base insertion (GC at position 2218) lead to a frameshift and the occurrence of a premature stop codon. The truncated protein is 746 amino acids whereas the ABCC2 of the susceptible strain encodes a protein of 1349 amino acids.

Experimental Evidence

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

Main Reference

Mechanism and DNA-based detection of field-evolved resistance to transgenic Bt corn in fall armyworm (*Spodoptera frugiperda*). (2017) (<https://pubmed.ncbi.nlm.nih.gov/28883440>)

Authors

Banerjee R; Hasler J; Meagher R; Nagoshi R; Hietala L; Huang F; Narva K; Jurat-Fuentes JL

Abstract

Evolution of resistance threatens sustainability of transgenic crops producing insecticidal proteins from the bacterium *Bacillus thuringiensis* (Bt). The fall armyworm (*Spodoptera frugiperda*) is a devastating pest of corn in the Western Hemisphere initially controlled by transgenic Bt corn producing the Cry1Fa insecticidal protein (event TC1507). However field-evolved resistance to TC1507 was observed in Puerto Rico in 2007 and has subsequently been reported in a number of locations in North and South America. Early studies on Puerto Rico fall armyworm populations found that the resistance phenotype was associated with reduced expression of alkaline phosphatase. However, in this work we show that field-evolved resistance to Cry1Fa Bt corn in Puerto Rico is closely linked to a mutation in an ATP Binding Cassette subfamily C2 (ABCC2) gene that functions as a Cry1Fa receptor in susceptible insects. Furthermore, we report a DNA-based genotyping test used to demonstrate the presence of the resistant (SfABCC2mut) allele in Puerto Rico populations in 2007, coincident with the first reports of damage to TC1507 corn. These DNA-based field screening data provide strong evidence that resistance to TC1507 in fall armyworm maps to the SfABCC2 gene and provides a useful molecular marker for detecting the SfABCC2mut allele in resistant fall armyworm.

Additional References

Mutational disruption of the ABCC2 gene in fall armyworm, *Spodoptera frugiperda*, confers resistance to the Cry1Fa and Cry1A.105 insecticidal proteins. (2018) (<https://pubmed.ncbi.nlm.nih.gov/29740041>)

RELATED GEPHE

Related Genes

2 (CYP9A, GSTe) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=~7108~/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=~7108~/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~ABCC2~/and+Taxon ID=~7108~/or+Gene Gephebase=~ABCC2~/and+Taxon ID=~7108~ #gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~ABCC2~/and+Taxon+ID=~7108~/or+Gene+Gephebase=~ABCC2~/and+Taxon+ID=~7108~#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS