

GEPHE SUMMARY

ABCA2 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^ABCA2^#gephebase-summary-title)	Gephebase Gene	GP00002057	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; Bt Cry2Ab toxin) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(insecticide;+Bt+Cry2Ab+toxin)^#gephebase-summary-title)	Trait		
Pectinophora gossypiella - Bt-Cry2Ab susceptible	Trait State in Taxon A		
Pectinophora gossypiella - Bt-Cry2Ab resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title)	Taxonomic Status		
	Taxon A	Taxon B	
Pectinophora gossypiella (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Pectinophora+gossypiella^#gephebase-summary-title)	Latin Name	Pectinophora gossypiella (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Pectinophora+gossypiella^#gephebase-summary-title)	Latin Name
pink bollworm	Common Name	pink bollworm	Common Name
pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gossypiella	Synonyms	pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gossypiella	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicoiinae; Pectinophora	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicoiinae; Pectinophora	Lineage
Pectinophora () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13190)	Parent	Pectinophora () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13190)	Parent
13191 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13191)	NCBI Taxonomy ID	13191 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13191)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

ABCA2	Generic Gene Name	UniProtKB Helicoverpa armigera A0A0S0G7V0 (http://www.uniprot.org/uniprot/A0A0S0G7V0)
-	Synonyms	GenebankID or UniProtKB 0
-	String	
-	Sequence Similarities	
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524) GO:0042626 : ATPase activity, coupled to transmembrane movement of substances (https://www.ebi.ac.uk/QuickGO/term/GO:0042626)	GO - Molecular Function	
-	GO - Biological Process	
GO:0016021 : integral component of membrane	GO - Cellular Component	

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)

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

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

loss of exon 6 caused by alternative splicing

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

ABC transporter mis-splicing associated with resistance to Bt toxin Cry2Ab in laboratory- and field-selected pink bollworm. (2018) (<https://pubmed.ncbi.nlm.nih.gov/30202031>)

Authors

Mathew LG; Ponnuraj J; Mallappa B; Chowdary LR; Zhang J; Tay WT; Walsh TK; Gordon KHJ; Heckel DG; Downes S; Carri re Y; Li X; Tabashnik BE; Fabrick JA

Abstract

Evolution of pest resistance threatens the benefits of genetically engineered crops that produce *Bacillus thuringiensis* (Bt) insecticidal proteins. Strategies intended to delay pest resistance are most effective when implemented proactively. Accordingly, researchers have selected for and analyzed resistance to Bt toxins in many laboratory strains of pests before resistance evolves in the field, but the utility of this approach depends on the largely untested assumption that laboratory- and field-selected resistance to Bt toxins are similar. Here we compared the genetic basis of resistance to Bt toxin Cry2Ab, which is widely deployed in transgenic crops, between laboratory- and field-selected populations of the pink bollworm (*Pectinophora gossypiella*), a global pest of cotton. We discovered that resistance to Cry2Ab is associated with mutations disrupting the same ATP-binding cassette transporter gene (PgABCA2) in a laboratory-selected strain from Arizona, USA, and in field-selected populations from India. The most common mutation, loss of exon 6 caused by alternative splicing, occurred in resistant larvae from both locations. Together with previous data, the results imply that mutations in the same gene confer Bt resistance in laboratory- and field-selected strains and suggest that focusing on ABCA2 genes may help to accelerate progress in monitoring and managing resistance to Cry2Ab.

Additional References

RELATED GEPHE

Related Genes

1 (cadherin) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=^13191^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=^13191^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE @Splicing