

GEPHE SUMMARY

	Gephebase Gene	GephelD
cadherin (https://www.gephebase.org/search-criteria/?and+Gene Gephebase=cadherin^#gephebase-summary-title)	GP00002450	Main curator
Published	Entry Status	Courtier

PHENOTYPIC CHANGE

	Trait Category
Physiology (https://www.gephebase.org/search-criteria/?and+Trait Category=Physiology^#gephebase-summary-title)	Trait
Xenobiotic resistance (insecticide; Bt Cry2Ab toxin) (https://www.gephebase.org/search-criteria/?and+Trait=Xenobiotic+resistance+(insecticide;+Bt+Cry2Ab+toxin)^#gephebase-summary-title)	Trait State in Taxon A
Pectinophora gossypiella - Bt-Cry1Ac susceptible	Trait State in Taxon B
Pectinophora gossypiella - Bt-Cry1Ac resistant lab selected strain	Ancestral State
Taxon A	Taxonomic Status
Experimental Evolution (https://www.gephebase.org/search-criteria/?and+Taxonomic Status=Experimental Evolution^#gephebase-summary-title)	

Taxon A		Taxon B	
	Latin Name		Latin Name
Pectinophora gossypiella (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=Pectinophora+gossypiella^#gephebase-summary-title)		Pectinophora gossypiella (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=Pectinophora+gossypiella^#gephebase-summary-title)	
pink bollworm	Common Name	pink bollworm	Common Name
pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gassypella	Synonyms	pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gassypella	Synonyms
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicopiinae; Pectinophora		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicopiinae; Pectinophora	
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
	is Taxon A an Infraspecies?		is Taxon B an Infraspecies?
No		No	

GENOTYPIC CHANGE

-	Generic Gene Name	UniProtKB Helicoverpa zea
-	Synonyms	GenebankID or UniProtKB
-	String	
-	Sequence Similarities	
-	GO - Molecular Function	
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)		A0A1B0RHM4 (http://www.uniprot.org/uniprot/A0A1B0RHM4)
GO - Biological Process		
GO:0007156 : homophilic cell adhesion via plasma membrane adhesion molecules (https://www.ebi.ac.uk/QuickGO/term/GO:0007156)		
GO - Cellular Component		
GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)		

GO:0005886 : plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005886>)

Presumptive Null

Yes ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=%20Yes%20#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive%20Null=%20Yes%20#gephebase-summary-title))

Molecular Type

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type=%20Coding%20#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular%20Type=%20Coding%20#gephebase-summary-title))

Aberration Type

Deletion ([https://www.gephebase.org/search-criteria?/and+Aberration Type=%20Deletion%20#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration%20Type=%20Deletion%20#gephebase-summary-title))

Deletion Size

10-99 bp

Molecular Details of the Mutation

24-bp deletion in putative exon 21 causing the loss of eight amino acid residues

Experimental Evidence

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=%20Candidate Gene%20#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental%20Evidence=%20Candidate%20Gene%20#gephebase-summary-title))

Main Reference

Three cadherin alleles associated with resistance to *Bacillus thuringiensis* in pink bollworm. (2003) (<https://pubmed.ncbi.nlm.nih.gov/12695565>)

Authors

Morin S; Biggs RW; Sisterson MS; Shriver L; Ellers-Kirk C; Higginson D; Holley D; Gahan LJ; Heckel DG; Carrasco Y; Dennehy TJ; Brown JK; Tabashnik BE

Abstract

Evolution of resistance by pests is the main threat to long-term insect control by transgenic crops that produce *Bacillus thuringiensis* (Bt) toxins. Because inheritance of resistance to the Bt toxins in transgenic crops is typically recessive, DNA-based screening for resistance alleles in heterozygotes is potentially much more efficient than detection of resistant homozygotes with bioassays. Such screening, however, requires knowledge of the resistance alleles in field populations of pests that are associated with survival on Bt crops. Here we report that field populations of pink bollworm (*Pectinophora gossypiella*), a major cotton pest, harbored three mutant alleles of a cadherin-encoding gene linked with resistance to Bt toxin Cry1Ac and survival on transgenic Bt cotton. Each of the three resistance alleles has a deletion expected to eliminate at least eight amino acids upstream of the putative toxin-binding region of the cadherin protein. Larvae with two resistance alleles in any combination were resistant, whereas those with one or none were susceptible to Cry1Ac. Together with previous evidence, the results reported here identify the cadherin gene as a leading target for DNA-based screening of resistance to Bt crops in lepidopteran pests.

Additional References

RELATED GEPHE

Related Genes

1 (ABCA2) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=%2013191%20/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon%20ID=%2013191%20/and+Trait=Xenobiotic%20resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

6 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=%20cadherin%20/and+Taxon ID=%2013191%20/or+Gene Gephebase=%20cadherin%20/and+Taxon ID=%2013191%20#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene%20Gephebase=%20cadherin%20/and+Taxon%20ID=%2013191%20/or+Gene%20Gephebase=%20cadherin%20/and+Taxon%20ID=%2013191%20#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS