

GEPHE SUMMARY

cadherin (https://www.gephebase.org/search-criteria?/and+Gene Gephebase= [^] cadherin [^] #gephebase-summary-title)	Gephebase Gene	GP00002451	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) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Xenobiotic%20resistance%20(insecticide;%20Bt%20Cry2Ab%20toxin)<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=[^]Xenobiotic resistance (insecticide; Bt Cry2Ab toxin)[^]#gephebase-summary-title)	Trait		
Pectinophora gossypiella - Bt-Cry1Ac susceptible	Trait State in Taxon A		
Pectinophora gossypiella - Bt-Cry1Ac resistant lab selected strain	Trait State in Taxon B		
Taxon A	Ancestral State		
Experimental Evolution (https://www.gephebase.org/search-criteria?/and+Taxonomic Status= [^] Experimental Evolution [^] #gephebase-summary-title)	Taxonomic Status		

Taxon A	Latin Name	Taxon B	Latin Name
Pectinophora gossypiella (<a href="https://www.gephebase.org/search-criteria?/and+Taxon%20and%20Synonyms=<sup>^</sup>Pectinophora%20gossypiella<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Pectinophora gossypiella[^]#gephebase-summary-title)	Pectinophora gossypiella	Pectinophora gossypiella (<a href="https://www.gephebase.org/search-criteria?/and+Taxon%20and%20Synonyms=<sup>^</sup>Pectinophora%20gossypiella<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Pectinophora gossypiella[^]#gephebase-summary-title)	Pectinophora gossypiella
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; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; Gelechioidea; Gelechiidae; Pexicoiinae; Pectinophora	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityrsia; 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

-	Generic Gene Name	A0A1B0RHM4 (http://www.uniprot.org/uniprot/A0A1B0RHM4)	UniProtKB Helicoverpa zea
-	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)	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=^Yes^#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

Deletion Size

100-999 bp

Molecular Details of the Mutation

126-bp deletion spanning a putative intron 15/exon 16 splice site that introduces a premature stop codon and causes loss of the final 929 amino acid residues.

Experimental Evidence

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Candidate+Gene^#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; Eilers-Kirk C; Higginson D; Holley D; Gahan LJ; Heckel DG; Carri re 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=^13191^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

6 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=^cadherin^/and+Taxon+ID=^13191^/or+Gene+Gephebase=^cadherin^/and+Taxon+ID=^13191^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS