GEPHE SUMMARY

Gephebase Gene
cadherin (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^cadherin^#gephebase-summary-title)

GepheID
GP00002450

Entry Status
Published

Main curator
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

Latin Name
Pectinophora gossypiella (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Pectinophora gossypiella^#gephebase-summary-title)

Common Name
pink bollworm

Synonyms
pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gassypiella

Rank
species

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

Parent
Pectinophora () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13190)

NCBI Taxonomy ID
13191 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13191)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Pectinophora gossypiella (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Pectinophora gossypiella^#gephebase-summary-title)

Common Name
pink bollworm

Synonyms
pink bollworm; Pectinophora gossypiella (Saunders, 1844); Pectinophora gassypiella

Rank
species

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

Parent
Pectinophora () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13190)

NCBI Taxonomy ID
13191 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13191)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
-

Synonyms
-

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)

UniProtKB Helicoverpa zea
A0A1B0RHM4 (http://www.uniprot.org/uniprot/A0A1B0RHM4)

GenebankID or UniProtKB
()

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

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=^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; Ellers-Kirk C; Higginson D; Holley D; Gahan LJ; Heckel DG; CarriÃ¨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