

GEPHE SUMMARY

Gephebase Gene
ABCA2

Entry Status
Draft

GepheID
GP00002057

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Xenobiotic resistance (insecticide; Bt Cry2Ab toxin)

Trait State in Taxon A
Pectinophora gossypiella - Bt-Cry2Ab susceptible

Trait State in Taxon B
Pectinophora gossypiella - Bt-Cry2Ab resistant

Ancestral State
Taxon A

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Pectinophora gossypiella

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; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicopiinae; Pectinophora

Parent
Pectinophora () - (Rank: genus)

NCBI Taxonomy ID
13191

is Taxon A an Intraspecies?
No

Taxon B

Latin Name
Pectinophora gossypiella

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; Amphimesnoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Gelechioidea; Gelechiidae; Pexicopiinae; Pectinophora

Parent
Pectinophora () - (Rank: genus)

NCBI Taxonomy ID
13191

is Taxon B an Intraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
ABCA2

Synonyms
-

String
-

Sequence Similarities
-

GO - Molecular Function
GO:0005524 : ATP binding
GO:0042626 : ATPase activity, coupled to transmembrane movement of substances

GO - Biological Process
-

GO - Cellular Component
GO:0016021 : integral component of membrane

Presumptive Null
Yes

UniProtKB Helicoverpa armigera
A0A0S0G7V0

GenebankID or UniProtKB

Molecular Type

Coding

Aberration Type

Insertion

Insertion Size

1-10 kb

Molecular Details of the Mutation

loss of exon 6 caused by alternative splicing

Experimental Evidence

Candidate Gene

Main Reference

ABC transporter mis-splicing associated with resistance to Bt toxin Cry2Ab in laboratory- and field-selected pink bollworm. (2018)

Authors

Mathew LG; Ponnuraj J; Mallappa B; Chowdary LR; Zhang J; Tay WT; Walsh TK; Gordon KHJ; Heckel DG; Downes S; CarriÃ¨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 (BTR1- Cadherin-like protein)

Related Haplotypes

No matches found.

COMMENTS

@TE @Splicing