

GEPHE SUMMARY

Ha_BtR (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase+Ha_BtR+Gephebase-summary-title)	Gephebase Gene	GP00000426	GepheID
Published	Entry Status	Martin	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category+Physiology+Gephebase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; Bt Cry1Ac toxin) (https://www.gephebase.org/search-criteria?/and+Trait+Xenobiotic+resistance+(insecticide;+Bt+Cry1Ac+toxin)+Gephebase-summary-title)	Trait		
Helicoverpa armigera - Bt-Cry1Ac susceptible	Trait State in Taxon A		
Helicoverpa armigera - Bt-Cry1Ac 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
Helicoverpa armigera (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+Helicoverpa+armigera+Gephebase-summary-title)	Latin Name	Helicoverpa armigera (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms+Helicoverpa+armigera+Gephebase-summary-title)	Latin Name
cotton bollworm	Common Name	cotton bollworm	Common Name
Heliothis (Helicoverpa) armigera; Heliothis armigera; cotton bollworm; American bollworm; corn ear worm; scarce bordered straw; tobacco budworm; Helicoverpa armigera (Hubner, 1808)	Synonyms	Heliothis (Helicoverpa) armigera; Heliothis armigera; cotton bollworm; American bollworm; corn ear worm; scarce bordered straw; tobacco budworm; Helicoverpa armigera (Hubner, 1808)	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; Obtectomera; Noctuoidea; Noctuidae; Heliothinae; Helicoverpa	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; Obtectomera; Noctuoidea; Noctuidae; Heliothinae; Helicoverpa	Lineage
Helicoverpa () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7112)	Parent	Helicoverpa () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7112)	Parent
29058 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29058)	NCBI Taxonomy ID	29058 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29058)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

ABCA2	Generic Gene Name	A0A0S0G7V0 (http://www.uniprot.org/uniprot/A0A0S0G7V0)	UniProtKB Helicoverpa armigera
-	Synonyms		GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
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 - Biological Process		

GO:0016021 : integral component of membrane
 (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)

- Yes (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes^#gephebase-summary-title) Presumptive Null
- Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding^#gephebase-summary-title) Molecular Type
- SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP^#gephebase-summary-title) Aberration Type
- Nonsense SNP Coding Change
- Pro53* (161T>A) Molecular Details of the Mutation
- Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping^#gephebase-summary-title) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Diverse cadherin mutations conferring resistance to *Bacillus thuringiensis* toxin Cry1Ac in *Helicoverpa armigera*. (2010) (https://pubmed.ncbi.nlm.nih.gov/20079435)

Authors

Zhao J; Jin L; Yang Y; Wu Y

Abstract

Transgenic cotton expressing *Bacillus thuringiensis* (Bt) toxins has been widely adopted to control some key lepidopteran pests including the bollworm *Helicoverpa armigera*. Evolution of resistance to Bt cotton by target pests is a major threat to the continued success of Bt cotton. Previous results revealed 3 null alleles (r1-r3) of a cadherin gene (Ha_BtR) conferring Cry1Ac resistance in *H. armigera*. An F(1) screen of 123 single-pair families was conducted between a Cry1Ac-resistant strain (the SCD-r1 strain, homozygous for the r1 allele of Ha_BtR) and field-derived insects from Jiangpu population (Jiangsu province, China) in 2008. Five new null alleles of Ha_BtR (r4-r8) were identified in six candidate single-pair families. These null alleles were created through either an insertion or a point mutation. Interestingly, intact alleles of Ha_BtR were found in two field-derived insects from another two candidate single-pair families. It suggests that these two field-derived insects may carry novel resistance alleles of Ha_BtR, with missense mutations resulting in a non-functional cadherin protein, or a major dominant mutation at a locus other than cadherin. The resistance allele frequency of Ha_BtR was detected at an appreciable level (0.024) in the Jiangpu population of *H. armigera* in 2008. Together with previous findings, a total of eight different resistance alleles of Ha_BtR were identified from three Chinese strains of *H. armigera*. Mutational diversity of Ha_BtR could impair DNA screening for Bt resistance allele frequency in the field, and an F(1) screen should be used routinely for monitoring cadherin-based resistance allele frequencies in *H. armigera*.

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Additional References

Identification and molecular detection of a deletion mutation responsible for a truncated cadherin of *Helicoverpa armigera*. (2006) (https://pubmed.ncbi.nlm.nih.gov/16935222)

RELATED GEPHE

Related Genes

6 (ABCA2, Aminopeptidase N (APN), cadherin, CYP337B3, para (kdr), tetraspanin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=~29058^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

7 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~Ha_BtR^/and+Taxon ID=~29058^/or+Gene Gephebase=~Ha_BtR^/and+Taxon ID=~29058^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@TE Parallelism: repeated loss-of-function