

GEPHE SUMMARY

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| <p>cadherin (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=[^]cadherin[^]#gephebase-summary-title)</p> <p>Published</p> | <p>Gephebase Gene</p> <p>Entry Status</p> | <p>GP00002465</p> <p>Courtier</p> | <p>GepheID</p> <p>Main curator</p> |
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PHENOTYPIC CHANGE

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| <p>Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=[^]Physiology[^]#gephebase-summary-title)</p> <p>Xenobiotic resistance (insecticide; Bt Cry1Ac toxin) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Xenobiotic resistance (insecticide; Bt Cry1Ac toxin)<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=[^]Xenobiotic resistance (insecticide; Bt Cry1Ac toxin)[^]#gephebase-summary-title)</p> <p>Ostrinia furnacalis - Bt-Cry1Ac susceptible</p> <p>Ostrinia furnacalis - Bt-Cry1Ac resistant strain</p> <p>Taxon A</p> <p>Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=[^]Intraspecific[^]#gephebase-summary-title)</p> | <p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p> | <p>Taxon A</p> <p>Latin Name</p> <p>Ostrinia furnacalis (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Ostrinia furnacalis<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Ostrinia furnacalis[^]#gephebase-summary-title)</p> <p>Common Name</p> <p>Asian corn borer</p> <p>Synonyms</p> <p>Asian corn borer; Ostrinia furnacalis (Guenee, 1854); Ostrinia furnacalis species</p> <p>Lineage</p> <p>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; Obtectomera; Pyraloidea; Crambidae; Pyraustinae; Ostrinia</p> <p>Parent</p> <p>Ostrinia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29056)</p> <p>NCBI Taxonomy ID</p> <p>93504 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=93504)</p> <p>is Taxon A an Intraspecies?</p> <p>No</p> | <p>Taxon B</p> <p>Latin Name</p> <p>Ostrinia furnacalis (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Ostrinia furnacalis<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Ostrinia furnacalis[^]#gephebase-summary-title)</p> <p>Common Name</p> <p>Asian corn borer</p> <p>Synonyms</p> <p>Asian corn borer; Ostrinia furnacalis (Guenee, 1854); Ostrinia furnacalis species</p> <p>Lineage</p> <p>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; Obtectomera; Pyraloidea; Crambidae; Pyraustinae; Ostrinia</p> <p>Parent</p> <p>Ostrinia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29056)</p> <p>NCBI Taxonomy ID</p> <p>93504 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=93504)</p> <p>is Taxon B an Intraspecies?</p> <p>No</p> |
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GENOTYPIC CHANGE

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| <p>-</p> <p>-</p> <p>-</p> <p>-</p> <p>GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)</p> <p>GO:0007156 : homophilic cell adhesion via plasma membrane adhesion molecules (https://www.ebi.ac.uk/QuickGO/term/GO:0007156)</p> <p>GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)</p> | <p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p> <p>GO - Cellular Component</p> | <p>UniProtKB Helicoverpa zea A0A1B0RHM4 (http://www.uniprot.org/uniprot/A0A1B0RHM4)</p> <p>GenebankID or UniProtKB</p> <p>0</p> |
|--|--|---|

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

Presumptive Null

Unknown (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Thr1457Ser

Experimental Evidence

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title>)

| | Taxon A | Taxon B | Position |
|------------|---------|---------|----------|
| Codon | - | - | - |
| Amino-acid | Thr | Ser | 1457 |

Main Reference

Downregulation and mutation of a Cadherin gene associated with Cry1Ac resistance in the Asian Corn Borer, *Ostrinia furnacalis* (GuenÃ©). (2014) (<https://pubmed.ncbi.nlm.nih.gov/25216082>)

Authors

Jin T; Chang X; Gatehouse AM; Wang Z; Edwards MG; He K

Abstract

Development of resistance in target pests is a major threat to long-term use of transgenic crops expressing *Bacillus thuringiensis* (Bt) Cry toxins. To manage and/or delay the evolution of resistance in target insects through the implementation of effective strategies, it is essential to understand the basis of resistance. One of the most important mechanisms of insect resistance to Bt crops is the alteration of the interactions between Cry toxins and their receptors in the midgut. A Cry1Ac-selected strain of Asian corn borer (ACB), *Ostrinia furnacalis*, a key pest of maize in China, evolved three mutant alleles of a cadherin-like protein (OfCAD) (MPR-r1, MPR-r2 and MPR-r3), which mapped within the toxin-binding region (TBR). Each of the three mutant alleles possessed two or three amino acid substitutions in this region, especially Thr1457 \rightarrow Ser. In highly resistant larvae (ACB-Ac200), MPR-r2 had a 26-amino acid residue deletion in the TBR, which resulted in reduced binding of Cry1Ac compared to the MPR from the susceptible strain, suggesting that the number of amino acid deletions influences the level of resistance. Furthermore, downregulation of OfCAD gene (*ofcad*) transcription was observed in the Cry1Ac resistant strain, ACB-Ac24, suggesting that Cry1Ac resistance in ACB is associated with the downregulation of the transcript levels of the cadherin-like protein gene. The OfCAD identified from ACB exhibited a high degree of similarity to other members of the cadherin super-family in lepidopteran species.

Additional References

Mechanisms of Resistance to Insecticidal Proteins from *Bacillus thuringiensis*. (2021) (<https://pubmed.ncbi.nlm.nih.gov/33417820>)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^cadherin^/and+Taxon ID=^93504^/or+Gene Gephebase=^cadherin^/and+Taxon ID=^93504^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS