GEPHE SUMMARY

Gephebase Gene

Acetylcholinesterase (Ace-1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^Acetylcholinesterase (Ace-1)^#gephebase-summary-title)

GepheID

GP00002453

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) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (insecticide)^#gephebase-summary-title)

Trait State in Taxon A

Chilo suppressalis - sensitive

Trait State in Taxon B

Chilo suppressalis - resistant

Ancestral State

Taxon A

Taxonomic Status

Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin Name

Chilo suppressalis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Chilo suppressalis^#gephebase-summary-title)

Common Name

striped riceborer

Synonyms

Crambus suppressalis; striped riceborer; Asiatic rice borer; striped rice borer; Chilo suppressalis (Walker, 1863); Chilo supperssalis; Chilo supressalis

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Pyraloidea; Crambidae; Crambinae; Chilo

Parent

Chilo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 168630)

NCBI Taxonomy ID

168631 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 168631)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Chilo suppressalis (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Chilo suppressalis^#gephebase-summary-title)

Common Name

striped riceborer

Synonyms

Crambus suppressalis; striped riceborer; Asiatic rice borer; striped rice borer; Chilo suppressalis (Walker, 1863); Chilo supperssalis; Chilo supressalis

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Pyraloidea; Crambidae; Crambinae; Chilo

Parent

Chilo () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 168630)

NCBI Taxonomy ID

168631 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 168631)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

Ace

Synonyms

AcChE; ace; ACE; ace-2; ache; AchE; AChE; CG17907; CHE; dAChE; dmAChE; DmAChE; Dmel\CG17907; Dm_ace; FBgn0000024; l(3)26; l(3)87Ed

String

7227.FBpp0289713 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0289713)

Sequence Similarities

Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function

GO:0042803 : protein homodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0042803)
GO:0003990 : acetylcholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003990)

UniProtKB Drosophila melanogaster

P07140 (http://www.uniprot.org/uniprot/P07140)

GenebankID or UniProtKB

()

GO:0004104 : cholinesterase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004104)
GO:0043199 : sulfate binding (https://www.ebi.ac.uk/QuickGO/term/GO:0043199)

GO - Biological Process

GO:0006581 : acetylcholine catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0006581)
GO:0001507 : acetylcholine catabolic process in synaptic cleft
(https://www.ebi.ac.uk/QuickGO/term/GO:0001507)
GO:0007268 : chemical synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0042426 : choline catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0042426)
GO:0042331 : phototaxis (https://www.ebi.ac.uk/QuickGO/term/GO:0042331)

GO - Cellular Component

GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
GO:0031225 : anchored component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0031225)
GO:0030054 : cell junction (https://www.ebi.ac.uk/QuickGO/term/GO:0030054)
GO:0043083 : synaptic cleft (https://www.ebi.ac.uk/QuickGO/term/GO:0043083)

Presumptive Null

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#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

an amino acid mutation A314S in Ch-ace1 (corresponding to A201S in Torpedo californica AChE) was consistently associated with the occurrence of resistance

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	Ala	Ser	201

Main Reference

Mutation in acetylcholinesterase1 associated with triazophos resistance in rice stem borer, Chilo suppressalis (Lepidoptera: Pyralidae). (2009) (https://pubmed.ncbi.nlm.nih.gov/19028456)

Authors

Jiang X; Qu M; Denholm I; Fang J; Jiang W; Han Z

Abstract

Two full-length genes encoding different acetylcholinesterases (AChEs), designated as Ch-ace1 and Ch-ace2, were cloned from strains of the rice stem borer (Chilo suppressalis) susceptible and resistant to the organophosphate insecticide triazophos. Sequence analysis found an amino acid mutation A314S in Ch-ace1 (corresponding to A201 in Torpedo californica AChE) that was consistently associated with the occurrence of resistance. This mutation removed an MspA1 I restriction site from the wild type allele. An assay based on restriction fragment length polymorphism (RFLP) analysis was developed to diagnose A314S genotypes in field populations. Results showed a strong correlation between frequencies of the mutation and phenotypic levels of resistance to triazophos. The assay offers a prospect for rapid monitoring of resistance and assisting with the appropriate choice of insecticide for combating damage caused by C. suppressalis.

Additional References

RELATED GEPHE

Related Genes

1 (RYR) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^168631^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS