GEPHE SUMMARY

Gephebase Gene

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

GepheID

GP00002637

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

Schizaphis graminum - sensitive

Trait State in Taxon B

Schizaphis graminum - 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

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

Common Name

greenbug

Synonyms

greenbug

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Aphidini; Schizaphis

Parent

Schizaphis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13261)

NCBI Taxonomy ID

13262 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13262)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

greenbug

Synonyms

greenbug

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aphidomorpha; Aphidoidea; Aphididae; Aphidinae; Aphidini; Schizaphis

Parent

Schizaphis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13261)

NCBI Taxonomy ID

13262 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 13262)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

-

Synonyms

-

String

-

Sequence Similarities

Belongs to the type-B carboxylesterase/lipase family.

GO - Molecular Function

GO:0052689 : carboxylic ester hydrolase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0052689)

GO - Biological Process

-

GO - Cellular Component

-

UniProtKB Myzus persicae

P35501 (http://www.uniprot.org/uniprot/P35501)

GenebankID or UniProtKB

()

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Insertion Size

10-100 kb

Molecular Details of the Mutation

The type I esterase is amplified 4- to 8-fold in resistant S. graminum and that the amplified sequences contain 5-methylcytosine at MspI/HpaII sites.

Experimental Evidence

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

Main Reference

Amplification and methylation of an esterase gene associated with insecticide-resistance in greenbugs, Schizaphis graminum (Rondani) (Homoptera: Aphididae). (1999) (https://pubmed.ncbi.nlm.nih.gov/10612041)

Authors

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Abstract

The greenbug aphid, Schizaphis graminum (Rondani) has developed resistance to organophosphorus insecticides by the over-production of esterases that have been classified as Type I and Type II. The first twenty N-terminal amino acids of the Type I esterase were determined and used to design an oligonucleotide, which in conjunction with an active site primer derived from conserved sequences of other insect esterases and two internal primers specific for esterases from another aphid species resulted in a 0.85 kb genomic DNA fragment from resistant greenbugs. This was extended by 5′ RACE which provided approximately 1.2 kb of the 5′ end of the esterase gene. The 5′ DNA sequence corresponded to 19 of the 20 known amino acids of the Type I esterase, with the last needing only a one base change (probably resulting from a PCR artifact). Furthermore, the sequence showed very close similarity to the amplified E4/FE4 esterase genes of Myzus persicae (Sulzer). A comparison of sequences suggested that the S. graminum gene has introns in the same positions as the first two introns of E4/FE4, with the second intron being considerably larger in S. graminum. Probing of Southern blots with the 0.85 kb esterase fragment showed that the gene encoding the Type I esterase is amplified 4- to 8-fold in resistant S. graminum and that the amplified sequences contain 5-methylcytosine at MspI/HpaII sites, again in agreement with previous findings for M. persicae genes.

Additional References

Comparison of esterase gene amplification, gene expression and esterase activity in insecticide susceptible and resistant strains of the brown planthopper, Nilaparvata lugens (StÃ¥l). (2000) (https://pubmed.ncbi.nlm.nih.gov/11122475)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS