GEPHE SUMMARY

Gephebase Gene
resistance to dieldrin (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^resistance to dieldrin^#gephebase-summary-title)

GepheID
GP00002561

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
Laodelphax striatellus

Trait State in Taxon B
Laodelphax striatellus - 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
Laodelphax striatellus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Laodelphax striatellus^#gephebase-summary-title)

Common Name
small brown planthopper

Synonyms
Laodelphax striatella; small brown planthopper; Laodelphax striatella (Fallen, 1826); Laodelphax striatellus (Fallen, 1826)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Auchenorrhyncha; Fulgoromorpha; Fulgoroidea; Delphacidae; Criomorphinae; Laodelphax

Parent
Laodelphax () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 195882)

NCBI Taxonomy ID
195883 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 195883)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Laodelphax striatellus (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Laodelphax striatellus^#gephebase-summary-title)

Common Name
small brown planthopper

Synonyms
Laodelphax striatella; small brown planthopper; Laodelphax striatella (Fallen, 1826); Laodelphax striatellus (Fallen, 1826)

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Auchenorrhyncha; Fulgoromorpha; Fulgoroidea; Delphacidae; Criomorphinae; Laodelphax

Parent
Laodelphax () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 195882)

NCBI Taxonomy ID
195883 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 195883)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
Rdl

Synonyms
CG10537; CT29555; Dmel\CG10537; DmRdl; DmRDL; gaba; GABA; GABA-R; GABAr; GABA[[A]]; GABA[[A]] receptor; GABA[[A]]-R; GABA[[A]]R; LCCH1; Rd1; rdl; RDL

String
7227.FBpp0305970 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0305970)

Sequence Similarities
Belongs to the ligand-gated ion channel (TC 1.A.9) family. Gamma-aminobutyric acid receptor (TC 1.A.9.5) subfamily.

GO - Molecular Function
GO:0004890 : GABA-A receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004890)
GO:0022851 : GABA-gated chloride ion channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0022851)

UniProtKB Drosophila melanogaster
P25123 (http://www.uniprot.org/uniprot/P25123)

GenebankID or UniProtKB
()

GO:0030594 : neurotransmitter receptor activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0030594)

GO - Biological Process

GO:0007165 : signal transduction (https://www.ebi.ac.uk/QuickGO/term/GO:0007165)
GO:0007268 : chemical synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0007268)
GO:0034220 : ion transmembrane transport
(https://www.ebi.ac.uk/QuickGO/term/GO:0034220)
GO:0042493 : response to drug (https://www.ebi.ac.uk/QuickGO/term/GO:0042493)
GO:0050877 : nervous system process
(https://www.ebi.ac.uk/QuickGO/term/GO:0050877)
GO:0042391 : regulation of membrane potential
(https://www.ebi.ac.uk/QuickGO/term/GO:0042391)
GO:0006811 : ion transport (https://www.ebi.ac.uk/QuickGO/term/GO:0006811)
GO:0042048 : olfactory behavior (https://www.ebi.ac.uk/QuickGO/term/GO:0042048)
GO:0030431 : sleep (https://www.ebi.ac.uk/QuickGO/term/GO:0030431)
GO:0009612 : response to mechanical stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0009612)
GO:0002121 : inter-male aggressive behavior
(https://www.ebi.ac.uk/QuickGO/term/GO:0002121)
GO:0050805 : negative regulation of synaptic transmission
(https://www.ebi.ac.uk/QuickGO/term/GO:0050805)
GO:0042749 : regulation of circadian sleep/wake cycle
(https://www.ebi.ac.uk/QuickGO/term/GO:0042749)
GO:0090328 : regulation of olfactory learning
(https://www.ebi.ac.uk/QuickGO/term/GO:0090328)

GO - Cellular Component

GO:0016021 : integral component of membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0016021)
GO:0005886 : plasma membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0005886)
GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0030054 : cell junction (https://www.ebi.ac.uk/QuickGO/term/GO:0030054)
GO:0030425 : dendrite (https://www.ebi.ac.uk/QuickGO/term/GO:0030425)
GO:0043005 : neuron projection (https://www.ebi.ac.uk/QuickGO/term/GO:0043005)
GO:0030424 : axon (https://www.ebi.ac.uk/QuickGO/term/GO:0030424)
GO:0045211 : postsynaptic membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0045211)
GO:0045202 : synapse (https://www.ebi.ac.uk/QuickGO/term/GO:0045202)
GO:0034707 : chloride channel complex
(https://www.ebi.ac.uk/QuickGO/term/GO:0034707)
GO:0032589 : neuron projection membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0032589)
GO:0032809 : neuronal cell body membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0032809)

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

A301N

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	-	-	-

Main Reference

The A2′N mutation of the RDL gamma-aminobutyric acid receptor conferring fipronil resistance in Laodelphax striatellus (Hemiptera: Delphacidae). (2011)
(https://pubmed.ncbi.nlm.nih.gov/21510217)

Authors

Nakao T; Kawase A; Kinoshita A; Abe R; Hama M; Kawahara N; Hirase K

Abstract

The planthopper Laodelphax striatellus (FallÃ©n) (Hemiptera: Delphacidae) is a serious insect pest of rice, Oryza sativa L., and has developed resistance to fipronil in Japan. Sequence analysis of L. striatellus RDL gamma-aminobutyric acid (GABA) receptor subunit (LS-RDL) genes from a fipronil-resistant population and a fipronil-susceptible strain identified the A2′N mutation (index number for M2 membrane-spanning region), that was previously implicated in fipronil resistance in the planthopper Sogatella furcifera (HorvÃith) (Hemiptera: Delphacidae). Nineteen of 21 fipronil-resistant L. striatellus individuals were genotyped as heterozygous for the A2′N mutation, suggesting that this mutation is associated with fipronil resistance and that most fipronil-resistant L. striatellus express wild-type and A2′N mutant LS-RDL simultaneously. To confirm the role of the A2′N mutation of LS-RDL, Drosophila Mel-2 cells were transfected with wild-type and A2′N mutant LS-RDL genes, either individually or together. A membrane potential assay showed that fipronil had no inhibitory effect at 10 microM on cells transfected with the A2′N mutant LS-RDL gene with or without the wild-type LS-RDL gene. By contrast, the IC50 value of fipronil for wild-type LS-RDL homomers was 14 nM. These results suggest that the

A2'N mutation of the RDL GABA receptor subunit confers fipronil resistance in L. striatellus as well as S. furcifera.

Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (https://pubmed.ncbi.nlm.nih.gov/26047113)

RELATED GEPHE

Related Genes

2 (Acetylcholinesterase (Ace-1), CYP6FU1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^195883^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS