

GEPHE SUMMARY

<p>glutamate-gated chloride channel (GluCl) (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=^glutamate-gated+chloride+channel+(GluCl)^#gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>GP00002634</p> <p>Courtier</p> <p>Entry Status</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title)</p> <p>Xenobiotic resistance (insecticide; abamectin) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(insecticide;+abamectin)^#gephebase-summary-title)</p> <p>Plutella xylostella - sensitive</p> <p>Plutella xylostella - resistant</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>Plutella xylostella</p> <p>diamondback moth</p> <p>diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityisia; Yponomeutoidea; Plutellidae; Plutella</p> <p>Plutella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654)</p> <p>51655 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655)</p> <p>No is Taxon A an Infrappecies?</p>	<p>Plutella xylostella</p> <p>diamondback moth</p> <p>diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella species</p> <p>cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Dityisia; Yponomeutoidea; Plutellidae; Plutella</p> <p>Plutella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654)</p> <p>51655 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655)</p> <p>No is Taxon B an Infrappecies?</p>
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GENOTYPIC CHANGE

<p>GluClalpha</p> <p>BcDNA:HL07853; CG7535; CT23049; dGluCl-alpha; Dm-GluCl; Dmel\CG7535; DmGlu; DmGluClalpha; DrosGlu-Cl-alpha; DrosGluCl; DrosGluCl-alpha; DrosGluCl-alpha1; glc; glu; GluCl; GLUCL; GluCl; gluCl; gluClalpha; GluClalpha1</p> <p>7227.FBpp0099473 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0099473)</p> <p>Belongs to the ligand-gated ion channel (TC 1.A.9) family. Glutamate-gated chloride channel (TC 1.A.9.4) subfamily.</p> <p>GO:0004888 : transmembrane signaling receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004888)</p>	<p>Generic Gene Name</p> <p>Synonyms</p> <p>String</p> <p>Sequence Similarities</p> <p>GO - Molecular Function</p>	<p>UniProtKB Drosophila melanogaster</p> <p>Q94900 (http://www.uniprot.org/uniprot/Q94900)</p> <p>0</p> <p>GenebankID or UniProtKB</p>
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GO:1904315 : transmitter-gated ion channel activity involved in regulation of postsynaptic membrane potential (<https://www.ebi.ac.uk/QuickGO/term/GO:1904315>)
 GO:0005231 : excitatory extracellular ligand-gated ion channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0005231>)
 GO:0008068 : extracellularly glutamate-gated chloride channel activity (<https://www.ebi.ac.uk/QuickGO/term/GO:0008068>)
 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: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:1902476 : chloride transmembrane transport (<https://www.ebi.ac.uk/QuickGO/term/GO:1902476>)
 GO:0006821 : chloride transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0006821>)

GO - Cellular Component

GO:0016021 : integral component of membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
 GO:0005887 : integral component of plasma membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)
 GO:0043005 : neuron projection (<https://www.ebi.ac.uk/QuickGO/term/GO:0043005>)
 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:0070161 : anchoring junction (<https://www.ebi.ac.uk/QuickGO/term/GO:0070161>)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

A309V

Experimental Evidence

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

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

Main Reference

A point mutation in the glutamate-gated chloride channel of *Plutella xylostella* is associated with resistance to abamectin. (2016) (<https://pubmed.ncbi.nlm.nih.gov/26592158>)

Authors

Wang X; Wang R; Yang Y; Wu S; O'Reilly AO; Wu Y

Abstract

The diamondback moth, *Plutella xylostella*, is a global pest of cruciferous vegetables. Abamectin resistance in a field population of *P. xylostella* was introgressed into the susceptible Roth strain. The resulting introgression strain Roth-Abm showed 11-fold resistance to abamectin compared with Roth. An A309V substitution at the N-terminus of the third transmembrane helix (M3) of the glutamate-gated chloride channel of *P. xylostella* (PxGluCl) was identified in Roth-Abm. The frequency of the V309 allele of PxGluCl was 94.7% in Roth-Abm, whereas no such allele was detected in Roth. A subpopulation of Roth-Abm was kept without abamectin selection for 20 generations to produce a revertant strain, Roth-Abm-D. Abamectin resistance in Roth-Abm-D declined to 1150-fold compared with Roth, with the V309 allele frequency decreased to 9.6%. After treatment of the Roth-Abm-D strain with 80 mg/l abamectin the V309 allele frequency in the survivors increased to 55%. This demonstrates that the A309V mutation in PxGluCl is strongly associated with a 10-fold increase in abamectin resistance in Roth-Abm relative to Roth-Abm-D. Homology modelling and automated ligand docking results suggest that the A309V substitution allosterically modifies the abamectin-binding site, as opposed to directly eliminating a key binding contact. Other resistance mechanisms to abamectin in Roth-Abm are discussed besides the A309V mutation of PxGluCl.

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Additional References

RELATED GEPHE

Related Genes

10 (ABCC2, Acetylcholinesterase (Ace-1), Chitin synthase 1 (CHS1), CYP6BG1, FMO2, MAP4K4, nAChR, para (kdr), resistance to dieldrin, RYR) ([https://www.gephebase.org/search-criteria?/or+Taxon+ID="+51655^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=))

No matches found.

EXTERNAL LINKS

COMMENTS

Homology modeling and automated ligand docking results suggest that this substitution allosterically modifies the abamectin-binding site.