

GEPHE SUMMARY

<p>RYR (#Gephebase-summary-title)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00002609</p> <p>Courtier</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Physiology (#Gephebase-summary-title)</p> <p>Xenobiotic resistance (insecticide ; diamide ; chlorantraniliprole ; flubendiamide) (https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide+;+diamide+;+chlorantraniliprole+;+flubendiamide)#Gephebase-summary-title)</p> <p>Plutella xylostella - susceptible</p> <p>Plutella xylostella - resistant</p> <p>Taxon A</p> <p>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>Plutella xylostella (#Gephebase-summary-title)</p> <p>Common Name</p> <p>diamondback moth</p> <p>Synonyms</p> <p>diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella</p> <p>Rank</p> <p>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; Dityrsia; Yponomeutoidea; Plutellidae; Plutella</p> <p>Parent</p> <p>Plutella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654)</p> <p>NCBI Taxonomy ID</p> <p>51655 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655)</p> <p>is Taxon A an Intraspecies?</p> <p>No</p>	<p>Taxon B</p> <p>Latin Name</p> <p>Plutella xylostella (#Gephebase-summary-title)</p> <p>Common Name</p> <p>diamondback moth</p> <p>Synonyms</p> <p>diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella</p> <p>Rank</p> <p>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; Dityrsia; Yponomeutoidea; Plutellidae; Plutella</p> <p>Parent</p> <p>Plutella () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654)</p> <p>NCBI Taxonomy ID</p> <p>51655 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655)</p> <p>is Taxon B an Intraspecies?</p> <p>No</p>
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GENOTYPIC CHANGE

<p>RyR</p> <p>RyR; CG10844; D-RyR; Dmel\CG10844; DmRyR; DRR; dry; DRY; dRyR; dRyR; dya; I(2)k00424; I(2)k04913; Rya-44F; Rya-r4; rya-r44F; Rya-r44F; Rya-R44F; Rya-r76CD; ryR; RYR; RyRs</p> <p>7227.FBpp0293114 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0293114)</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>Q24498 (http://www.uniprot.org/uniprot/Q24498)</p> <p>GenebankID or UniProtKB</p> <p>()</p>
<p>Belongs to the ryanodine receptor (TC 1.A.3.1) family.</p> <p>GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)</p> <p>GO:0048763 : calcium-induced calcium release activity (https://www.ebi.ac.uk/QuickGO/term/GO:0048763)</p> <p>GO:0005219 : ryanodine-sensitive calcium-release channel activity</p>		

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005219>)

GO - Biological Process

GO:0006874 : cellular calcium ion homeostasis

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006874>)

GO:0035206 : regulation of hemocyte proliferation

(<https://www.ebi.ac.uk/QuickGO/term/GO:0035206>)

GO:0006936 : muscle contraction (<https://www.ebi.ac.uk/QuickGO/term/GO:0006936>)

GO:0006816 : calcium ion transport (<https://www.ebi.ac.uk/QuickGO/term/GO:0006816>)

GO:0060047 : heart contraction (<https://www.ebi.ac.uk/QuickGO/term/GO:0060047>)

GO:0072347 : response to anesthetic (<https://www.ebi.ac.uk/QuickGO/term/GO:0072347>)

GO - Cellular Component

GO:0016021 : integral component of membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)

GO:0030659 : cytoplasmic vesicle membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0030659>)

GO:0030018 : Z disc (<https://www.ebi.ac.uk/QuickGO/term/GO:0030018>)

GO:0042383 : sarcolemma (<https://www.ebi.ac.uk/QuickGO/term/GO:0042383>)

GO:0033017 : sarcoplasmic reticulum membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0033017>)

GO:0005790 : smooth endoplasmic reticulum

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005790>)

Presumptive Null

Yes ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~Yes^#gephebase-summary-title))

Molecular Type

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

Aberration Type

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

Deletion Size

10-99 bp

Molecular Details of the Mutation

14 amino acid (Q4546-S4559) deletion. RyR transcript levels are lower in resistant strains than in susceptible strains.

Experimental Evidence

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

Main Reference

Chlorantraniliprole resistance in the diamondback moth (Lepidoptera: Plutellidae). (2014) (<https://pubmed.ncbi.nlm.nih.gov/24772564>)

Authors

Gong W; Yan HH; Gao L; Guo YY; Xue CB

Abstract

The wide application of chlorantraniliprole, which selectively targets insect ryanodine receptors (RyR), for control of the diamondback moth, *Plutella xylostella* (L.), has led to increasingly prominent development of resistance to this insecticide. Although much work has been carried out on the structure and function of RyR, the molecular mechanisms of resistance to chlorantraniliprole in diamondback moth still needs further investigation. *P. xylostella* strains with medium and high resistance to chlorantraniliprole were obtained by laboratory selection and field collection. The biological activity of chlorantraniliprole against the third-instar larvae of susceptible and resistant strains was tested, and resistance development and biological fitness were investigated. The realized heritability (h^2) of resistance showed the diamondback moth has a high risk of resistance to chlorantraniliprole. RyR transcript levels were lower in resistant strains than in susceptible strains, indicating that decreased expression of PxRyR may be associated with chlorantraniliprole resistance in *P. xylostella*. A 4,400 bp fragment of the RyR cDNA, which encodes most of the functional domains of RyR, was cloned and characterized from four strains (S, F18, BY, and ZC). A 14 amino acid (Q4546-S4559) deletion was found in three resistant strains (F18, BY, and ZC). A point mutation resulting in a glycine to glutamate substitution, as reported in a previously published article, was also found in the carboxyl-terminal region of two resistant strains (BY and ZC). These results indicated that decreased transcriptional level of RyR mRNA and combined with the site mutation might be related to chlorantraniliprole resistance in *P. xylostella*.

Additional References

RELATED GEPHE

Related Genes

10 (ABCC2, Acetylcholinesterase (Ace-1), Chitin synthase 1 (CHS1), CYP6BG1, FMO2, glutamate-gated chloride channel (GluCl), MAP4K4, nAChR, para (kdr), resistance to dieldrin) ([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=~51655^/and+Trait=Xenobiotic+resistance/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

3 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~RYR^/and+Taxon ID=~51655^/or+Gene Gephebase=~RYR^/and+Taxon ID=~51655^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~RYR^/and+Taxon+ID=~51655^/or+Gene+Gephebase=~RYR^/and+Taxon+ID=~51655^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

