GEPHE SUMMARY

Gephebase Gene

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

GepheID

GP00002626

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

Trait State in Taxon A

Chilo suppressalis - susceptible

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

RyR

Synonyms

Ryr; CG10844; D-RyR; Dmel\CG10844; DmRyR; DRR; dry; DRY; dRyr; dRyR; dya; l(2)k00424; l(2)k04913; Rya-44F; Rya-r4; rya-r44F; Rya-r44F; Rya-R44F; Rya-r76CD; ryr; RYR; RyRs

String

7227.FBpp0293114 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0293114)

Sequence Similarities

Belongs to the ryanodine receptor (TC 1.A.3.1) family.

GO - Molecular Function

GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)
GO:0048763 : calcium-induced calcium release activity

UniProtKB Drosophila melanogaster

Q24498 (http://www.uniprot.org/uniprot/Q24498)

GenebankID or UniProtKB

()

(https://www.ebi.ac.uk/QuickGO/term/GO:0048763)
GO:0005219 : ryanodine-sensitive calcium-release channel activity
(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

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

G4946E

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	Gly	Glu	4946

Main Reference

Monitoring and mechanisms of insecticide resistance in Chilo suppressalis (Lepidoptera: Crambidae), with special reference to diamides. (2017) (https://pubmed.ncbi.nlm.nih.gov/27624654)

Authors

Yao R; Zhao DD; Zhang S; Zhou LQ; Wang X; Gao CF; Wu SF

Abstract

The rice stem borer, Chilo suppressalis Walker (Lepidoptera: Crambidae), is one of the most economically important pests of rice in Asia. Chemical control remains the most efficient primary means for controlling this pest.

Significant variations among field populations in their resistance to seven insecticides were observed. The populations exhibited LC values that ranged between 0.605 and 108.088â€‰mg AI L for chlorantraniliprole and between 0.046 and 3.919â€‰mg AI L for flubendiamide. The YY14 population collected from Yuyao in Zhejiang Province in 2014 showed a moderate resistance level to the two diamides, i.e. up to 77.6-fold and 42.6-fold for chlorantraniliprole and flubendiamide respectively. Synergism tests and biochemical assays showed no obvious correlations between diamide resistance and three detoxifying enzymes. Sequence comparison of the ryanodine receptor gene between the YY14 resistant population and susceptible population revealed that a glycine to glutamic acid substitution (G4910E) was presented in the YY14 population.

G4910E mutation might be involved in the resistance evolution of C. suppressalis to the diamides. An appropriate insecticide resistance management programme should be established to maintain the effectiveness of the insecticides and to ensure sustainable management. Â© 2016 Society of Chemical Industry.

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Additional References

Investigation of the contribution of RyR target-site mutations in diamide resistance by CRISPR/Cas9 genome modification in Drosophila. (2017) (https://pubmed.ncbi.nlm.nih.gov/28669775)

RELATED GEPHE

Related Genes

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

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^RYR^/and+Taxon ID=^168631^/or+Gene Gephebase=^RYR^/and+Taxon ID=^168631^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@Parallelism