GEPHE SUMMARY

Gephebase Gene

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

GepheID

GP00002492

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

Aphis gossypii

Trait State in Taxon B

Aphis gossypii - 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

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

Common Name

cotton aphid

Synonyms

cotton aphid; melon aphid; Aphis gossypii Glover, 1877; Aphis gossyppi

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; Aphis; Aphis

Parent

Aphis () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 464929)

NCBI Taxonomy ID

80765 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 80765)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

cotton aphid

Synonyms

cotton aphid; melon aphid; Aphis gossypii Glover, 1877; Aphis gossyppi

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; Aphis; Aphis

Parent

Aphis () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 464929)

NCBI Taxonomy ID

80765 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 80765)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

nAChRbeta1

Synonyms

AChR; AchR64B; AChR64B; Acr64B; AcrD; ard; Ard; ARD; beta 64B; beta1 nAChR; CG11348; CG11348-PA; CG12606; Dbeta1; Dmel\CG11348; nAChR; nAChR-beta64B; nAcR64B; nAcRbeta-64B

String

7227.FBpp0073155 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 7227.FBpp0073155)

Sequence Similarities

Belongs to the ligand-gated ion channel (TC 1.A.9) family. Acetylcholine receptor (TC 1.A.9.1) subfamily.

GO - Molecular Function

GO:0004888 : transmembrane signaling receptor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004888)
GO:0022848 : acetylcholine-gated cation-selective channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0022848)

UniProtKB Drosophila melanogaster

P04755 (http://www.uniprot.org/uniprot/P04755)

GenebankID or UniProtKB

()

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: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:0007271 : synaptic transmission, cholinergic (https://www.ebi.ac.uk/QuickGO/term/GO:0007271)
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 - Cellular Component

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:0070161 : anchoring junction (https://www.ebi.ac.uk/QuickGO/term/GO:0070161)

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

K264E

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	Lys	Glu	264

Main Reference

Insecticide resistance and resistance mechanisms in the melon aphid, Aphis gossypii, in Shandong, China. (2021) (https://pubmed.ncbi.nlm.nih.gov/33518055)

Authors

Wang ZJ; Liang CR; Shang ZY; Yu QT; Xue CB

Abstract

The melon aphid, Aphis gossypii, is an important pest of vegetables. Insecticide resistance in A. gossypii has increased due to the frequent use of insecticides. We studied the levels and mechanisms of A. gossypii resistance to imidacloprid, acetamiprid and lambda-cyhalothrin here. The resistance levels of the three insecticides in 20 populations of A. gossypii varied. When compared to the susceptible strain (Lab-SS), there were two moderate resistance (MR) populations and nine low resistance (LR) populations to imidacloprid, respectively, two MR populations and two LR populations to acetamiprid, respectively, and, five MR populations and two LR populations to Î»-cyhalothrin, respectively. Gene mutation detection in the MR level populations showed arginine to threonine substitution (R81T) in three populations and lysine to glutamine substitution (K264E) in the nicotinic acetylcholine receptor (nAChR) Î²1 subunit in one population, respectively. No valine to isoleucine substitution (V62I) was found in the nAChR Î²1 subunit in any of the tested populations. The leucine to phenylalanine substitution (L1014F) in sodium channel Î± subunit was found in five MR populations. The relative expression of the CYP6CY13 gene was significantly upregulated in the Daiyue and Shenxian populations. The CYP6CY14 gene was significantly upregulated in Daiyue, Dongchangfu, Shenxian, Mengyin and Anqiu populations. The CYP6CY19 gene was significantly upregulated in the Dongchangfu and Mengyin populations. The relative expressions of the esterase E4 or FE4 genes were significantly upregulated in most of the MR populations. These results provide insight into the current insecticide resistance of A. gossypii and may contribute to more effective resistance management strategies.

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Additional References

RELATED GEPHE

Related Genes

3 (Acetylcholinesterase (Ace-1), Acetylcholinesterase (Ace-2), para (kdr)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^80765^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^nAChR^/and+Taxon ID=^80765^/or+Gene Gephebase=^nAChR^/and+Taxon ID=^80765^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS