

GEPHE SUMMARY

	Gephebase Gene		GepheID
acetyl-CoA carboxylase (ACC) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00002616	
Gephebase="acetyl-CoA carboxylase (ACC)"#gephebase-summary-title)			Main curator
Published	Entry Status	Courtier	

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait)			
Category="Physiology"#gephebase-summary-title)	Trait		
Xenobiotic resistance (insecticide; spirotetramat) (<a (insecticide;="" href="https://www.gephebase.org/search-criteria?/and+Trait=" resistance="" spirotetramat)"#gephebase-summary-title"="" xenobiotic="">https://www.gephebase.org/search-criteria?/and+Trait="Xenobiotic resistance (insecticide; spirotetramat)"#gephebase-summary-title)			
Myzus persicae	Trait State in Taxon A		
Myzus persicae - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic)	Taxonomic Status		
Status="Intraspecific"#gephebase-summary-title)			
	Taxon A	Taxon B	
	Latin Name	Latin Name	
Myzus persicae		Myzus persicae	
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Myzus persicae"#gephebase-summary-title)		(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Myzus persicae"#gephebase-summary-title)	
	Common Name	Common Name	
green peach aphid		green peach aphid	
	Synonyms	Synonyms	
Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae		Myzus (Nectarosiphon) persicae; green peach aphid; peach-potato aphid; Myzus persicae (Sulzer, 1776); Myzus persiceae	
	Rank	Rank	
species		species	
	Lineage	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; Macrosiphini; Myzus		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; Macrosiphini; Myzus	
	Parent	Parent	
Myzus () - (Rank: genus)		Myzus () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13163)	
	NCBI Taxonomy ID	NCBI Taxonomy ID	
13164		13164	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=13164)	
	is Taxon A an Infrasppecies?	is Taxon B an Infrasppecies?	
No		No	

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
ACC		Q7JV23 (http://www.uniprot.org/uniprot/Q7JV23)
	Synonyms	GenebankID or UniProtKB
AiZ784_DR0ME; acc; Acc; ACoT; CG11198; CG8723; dACC; DmACC; Dmel\CG11198; FBgn0043811; Dmel_CG11198		()
	String	
-		
	Sequence Similarities	
-		
	GO - Molecular Function	
GO:0005524 : ATP binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005524)		
GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)		
GO:0003989 : acetyl-CoA carboxylase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003989)		
	GO - Biological Process	
GO:0006633 : fatty acid biosynthetic process		

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006633>)
 GO:0019432 : triglyceride biosynthetic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0019432>)
 GO:0009744 : response to sucrose (<https://www.ebi.ac.uk/QuickGO/term/GO:0009744>)
 GO:0000902 : cell morphogenesis (<https://www.ebi.ac.uk/QuickGO/term/GO:0000902>)
 GO:0005977 : glycogen metabolic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005977>)
 GO:0071329 : cellular response to sucrose stimulus
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0071329>)
 GO:2001295 : malonyl-CoA biosynthetic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:2001295>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)
 GO:0005739 : mitochondrion (<https://www.ebi.ac.uk/QuickGO/term/GO:0005739>)

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

a single non-synonymous mutation (gCtâ€‰%>â€‰%gTt) resulting in an alanine to valine substitution in a highly conserved region of the ACC carboxyltransferase (CT) domain

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	GCT	GTT	-
Amino-acid	Ala	Val	2226

Main Reference

Global patterns in genomic diversity underpinning the evolution of insecticide resistance in the aphid crop pest *Myzus persicae*. (2021) (<https://pubmed.ncbi.nlm.nih.gov/34234279>)

Authors

Singh KS; Cordeiro EMG; Troczka BJ; Pym A; Mackisack J; Mathers TC; Duarte A; Legeai F; Robin S; Bielza P; Burrack HJ; Charaabi K; Denholm I; Figueroa CC; Ffrench-Constant RH; Jander G; Margaritopoulos JT; Mazzoni E; Nauen R; Ram rez CC; Ren G; Stepanyan I; Umina PA; Voronova NV; Vontas J; Williamson MS; Wilson ACC; Xi-Wu G; Youn YN; Zimmer CT; Simon JC; Hayward A; Bass C

Abstract

The aphid *Myzus persicae* is a destructive agricultural pest that displays an exceptional ability to develop resistance to both natural and synthetic insecticides. To investigate the evolution of resistance in this species we generated a chromosome-scale genome assembly and living panel of >110 fully sequenced globally sampled clonal lines. Our analyses reveal a remarkable diversity of resistance mutations segregating in global populations of *M. persicae*. We show that the emergence and spread of these mechanisms is influenced by host-plant associations, uncovering the widespread co-option of a host-plant adaptation that also offers resistance against synthetic insecticides. We identify both the repeated evolution of independent resistance mutations at the same locus, and multiple instances of the evolution of novel resistance mechanisms against key insecticides. Our findings provide fundamental insights into the genomic responses of global insect populations to strong selective forces, and hold practical relevance for the control of pests and parasites.

Additional References

RELATED GEPHE

Related Genes

8 (Acetylcholinesterase (Ace-1), CYP6CY3, CYP6CY3-CYP6CY4, esterase E4, esterase FE4, nAChR, para (kdr), resistance to dieldrin) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~13164^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

