

GEPHE SUMMARY

	Gephebase Gene	GephelD
acetyl-CoA carboxylase (ACC) (https://www.gephebase.org/search-criteria/?and+Gene) Gephebase=^acetyl-CoA carboxylase (ACC)^#gephebase-summary-title)	GP00002556	Main curator
	Entry Status	Courtier
Published		

PHENOTYPIC CHANGE

	Trait Category	
Physiology (https://www.gephebase.org/search-criteria/?and+Trait) Category=^Physiology^#gephebase-summary-title)	Trait	
Xenobiotic resistance (insecticide; spiromesifen) (https://www.gephebase.org/search-criteria/?and+Trait=^Xenobiotic+resistance+(insecticide;+spiromesifen)^#gephebase-summary-title)	Trait State in Taxon A	
Trialeurodes vaporariorum - sensitive	Trait State in Taxon B	
Trialeurodes vaporariorum - resistant	Ancestral State	
Taxon A	Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria/?and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)		
Taxon A		Taxon B
	Latin Name	Latin Name
Trialeurodes vaporariorum (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Trialeurodes+vaporariorum^#gephebase-summary-title)	Trialeurodes vaporariorum (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Trialeurodes+vaporariorum^#gephebase-summary-title)	
greenhouse whitefly	Common Name	Common Name
greenhouse whitefly; Trialeurodes vaporariorum (Westwood, 1856); Trialeurodes vaporarium	Synonyms	
species	Rank	Rank
	Lineage	Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aleyrodoidea; Aleyrodidae; Aleyrodinae; Trialeurodes		
Trialeurodes () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88555)	Parent	Parent
88556 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88556)	NCBI Taxonomy ID	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

ACC	Generic Gene Name	UniProtKB Drosophila melanogaster
A1Z784_DROME; acc; Acc; ACoT; CG11198; CG8723; dACC; DmACC; Dmel\CG11198; FBgn0043811; Dmel_CG11198	Synonyms	GenebankID or UniProtKB
-	String	
-	Sequence Similarities	
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 - Molecular Function	
GO:0006633 : fatty acid biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0006633)	GO - Biological Process	

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

E645K

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Glu	Lys	645

Main Reference

Resistance to spiromesifen in *Trialeurodes vaporariorum* is associated with a single amino acid replacement in its target enzyme acetyl-coenzyme A carboxylase. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22458881>)

Authors

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Abstract

Spiromesifen is a novel insecticide and is classed as a tetronic acid derivative. It targets the insects' acetyl-coenzyme A carboxylase (ACCase) enzyme, causing a reduction in lipid biosynthesis. At the time of this publication, there are no reports of resistance to this class of insecticides in insects although resistance has been observed in several mite species. The greenhouse whitefly *Trialeurodes vaporariorum* (Westwood) is a serious pest of protected vegetable and ornamental crops in temperate regions of the world and spiromesifen is widely used in its control. Mortality rates of UK and European populations of *T. vaporariorum* to spiromesifen were calculated and up to 26-fold resistance was found. We therefore sought to examine the molecular mechanism underlying spiromesifen resistance in this important pest. Pre-treatment with piperonyl butoxide did not synergize spiromesifen, suggesting a target-site resistance mechanism. The full length ACCase gene was sequenced for a range of *T. vaporariorum* strains and a strong association was found between spiromesifen resistance and a glutamic acid substitution with lysine in position 645 (E645K) of this gene. A TaqMan allelic discrimination assay confirmed these findings. Although this resistance is not considered sufficient to compromise the field performance of spiromesifen, this association of E645K with resistance is the first report of a potential target site mechanism affecting an ACCase inhibitor in an arthropod species.

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Additional References

Genotype to phenotype, the molecular and physiological dimensions of resistance in arthropods. (2015) (<https://pubmed.ncbi.nlm.nih.gov/26047113>)

RELATED GEPHE

Related Genes

1 (para (kdr)) ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon ID=^88556^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

