

GEPHE SUMMARY

	Gephebase Gene		GepheID
acetyl-CoA carboxylase (ACC) (https://www.gephebase.org/search-criteria?/and+Gene)		GP00002556	
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; spiromesifen) (<a (insecticide;="" href="https://www.gephebase.org/search-criteria?/and+Trait=" resistance="" spiromesifen)"#gephebase-summary-title"="" xenobiotic="">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		Trialeurodes vaporariorum	
(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Trialeurodes vaporariorum"#gephebase-summary-title)		(https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Trialeurodes vaporariorum"#gephebase-summary-title)	
	Common Name		Common Name
greenhouse whitefly		greenhouse whitefly	
	Synonyms		Synonyms
greenhouse whitefly; Trialeurodes vaporariorum (Westwood, 1856); Trialeurodes vaporarium		greenhouse whitefly; Trialeurodes vaporariorum (Westwood, 1856); Trialeurodes vaporarium	
	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; Aleyrodoidea; Aleyrodidae; Aleyrodinae; Trialeurodes		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	
	Parent		Parent
Trialeurodes () - (Rank: genus)		Trialeurodes () - (Rank: genus)	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88555)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88555)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
88556		88556	
(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88556)		(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88556)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Drosophila melanogaster
ACC		Q7JV23 (http://www.uniprot.org/uniprot/Q7JV23)	
	Synonyms		GenebankID or UniProtKB
A1Z784_DROME; 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

E645K

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	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

Karatolos N; Williamson MS; Denholm I; Gorman K; French-Constant R; Nauen R

Abstract

Spiromesifen is a novel insecticide and is classed as a tetrone 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)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^88556^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

