## GEPHE SUMMARY

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

GepheID
GP00002556

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; 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

Latin Name
Trialeurodes vaporariorum (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Trialeurodes vaporariorum^#gephebase-summary-title)

Common Name
greenhouse whitefly

Synonyms
greenhouse whitefly; Trialeurodes vaporariorum (Westwood, 1856); Trialeurodes vaporarium

Rank
species

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

Parent
Trialeurodes () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88555 )

NCBI Taxonomy ID
88556 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88556 )

is Taxon A an Infraspecies?
No

### Taxon B

Latin Name
Trialeurodes vaporariorum (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Trialeurodes vaporariorum^#gephebase-summary-title)

Common Name
greenhouse whitefly

Synonyms
greenhouse whitefly; Trialeurodes vaporariorum (Westwood, 1856); Trialeurodes vaporarium

Rank
species

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

Parent
Trialeurodes () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88555 )

NCBI Taxonomy ID
88556 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 88556 )

is Taxon B an Infraspecies?
No

## GENOTYPIC CHANGE

Generic Gene Name
ACC

Synonyms
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)

UniProtKB Drosophila melanogaster
Q7JV23 (http://www.uniprot.org/uniprot/Q7JV23)

GenebankID or UniProtKB
()

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; ffrench-Constant R; Nauen R

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.â€ƒvaporariorum 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