

GEPHE SUMMARY

	Gephebase Gene	GepheID
para (kdr) (<a +para+(kdr)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+para+(kdr)+"#gephebase-summary-title)	GP00002527	Main curator
Published	Entry Status	Courtier

PHENOTYPIC CHANGE

	Trait Category	
Physiology (<a +physiology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Physiology+"#gephebase-summary-title)		
	Trait	
Xenobiotic resistance (insecticide) (<a +xenobiotic+resistance+(insecticide)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Xenobiotic+resistance+(insecticide)+"#gephebase-summary-title)		
Sitobion avenae	Trait State in Taxon A	
Sitobion avenae - resistant	Trait State in Taxon B	
Taxon A	Ancestral State	
Intraspecific (<a +intraspecific+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Intraspecific+"#gephebase-summary-title)	Taxonomic Status	
	Taxon A	Taxon B
	Latin Name	Latin Name
Sitobion avenae (<a +sitobion+avenae+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Sitobion+avenae+"#gephebase-summary-title)	Common Name	Common Name
English grain aphid	Synonyms	Synonyms
Sitobion (Sitobion) avenae; Sitobion (Sitobium) avenae; Sitobium avenae; English grain aphid; grain aphid; Sitobion avenae (Fabricius, 1775); Sitibion avenae	Rank	Rank
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; Sitobion	Parent	Parent
Sitobion () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44662)	NCBI Taxonomy ID	NCBI Taxonomy ID
44664 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=44664)	is Taxon A an Intraspecies?	is Taxon B an Intraspecies?
No		No

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Drosophila melanogaster
para	P35500 (http://www.uniprot.org/uniprot/P35500)	GenebankID or UniProtKB
	Synonyms	
bas; bss; CG9907; Dmel\CG9907; DmNav; DmNav1; DmNa[[v]]; DmNa[[V]]; DmNa[[v]]1; I(1)14Da; I(1)ESHS48; lincRNA.S9469; Nav1; Ocd; olfD; par; sbl; sbl-1; Shu; Shudderer	String	
7227.FBpp0303597 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=7227.FBpp0303597)	Sequence Similarities	
Belongs to the sodium channel (TC.1.A.1.10) family. Para subfamily.	GO - Molecular Function	
GO:0005509 : calcium ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005509)		
GO:0005244 : voltage-gated ion channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005244)		
GO:0005248 : voltage-gated sodium channel activity (https://www.ebi.ac.uk/QuickGO/term/GO:0005248)		

GO:0005272 : sodium channel activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005272>)

GO - Biological Process

GO:0045433 : male courtship behavior, veined wing generated song production
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045433>)
GO:0001666 : response to hypoxia (<https://www.ebi.ac.uk/QuickGO/term/GO:0001666>)
GO:0009612 : response to mechanical stimulus
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009612>)
GO:0034765 : regulation of ion transmembrane transport
(<https://www.ebi.ac.uk/QuickGO/term/GO:0034765>)
GO:0035725 : sodium ion transmembrane transport
(<https://www.ebi.ac.uk/QuickGO/term/GO:0035725>)
GO:0007638 : mechanosensory behavior
(<https://www.ebi.ac.uk/QuickGO/term/GO:0007638>)
GO:0060078 : regulation of postsynaptic membrane potential
(<https://www.ebi.ac.uk/QuickGO/term/GO:0060078>)

GO - Cellular Component

GO:0005887 : integral component of plasma membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0005887>)
GO:0001518 : voltage-gated sodium channel complex
(<https://www.ebi.ac.uk/QuickGO/term/GO:0001518>)

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No^#gephebase-summary-title>) Presumptive Null
Coding (<https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding^#gephebase-summary-title>) Molecular Type
SNP (<https://www.gephebase.org/search-criteria?/and+Aberration Type=~SNP^#gephebase-summary-title>) Aberration Type
Nonsynonymous SNP Coding Change
L1014F Molecular Details of the Mutation
Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Candidate Gene^#gephebase-summary-title>) Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

A mutation (L1014F) in the voltage-gated sodium channel of the grain aphid, *Sitobion avenae*, is associated with resistance to Δ pyrethroid insecticides. (2014)
(<https://pubmed.ncbi.nlm.nih.gov/24227679>) Main Reference

Foster SP; Paul VL; Slater R; Warren A; Denholm I; Field LM; Williamson MS Authors

The grain aphid, *Sitobion avenae* Fabricius (Hemiptera: Aphididae), is an important pest of cereal crops. Pesticides are the main method for control but carry the risk of selecting for resistance. In response to reports of reduced efficacy of pyrethroid sprays applied to *S. avenae*, field samples were collected and screened for mutations in the voltage-gated sodium channel, the primary target site for pyrethroids. Aphid mobility and mortality to lambda-cyhalothrin were measured in coated glass vial bioassays. Abstract

A single amino acid substitution (L1014F) was identified in the domain IIS6 segment of the sodium channel from the *S. avenae* samples exhibiting reduced pyrethroid efficacy. Bioassays on aphids heterozygous for the *kdr* mutation (SR) or homozygous for the wild-type allele (SS) showed that those carrying the mutation had significantly lower susceptibility to lambda-cyhalothrin.

The L1014F (*kdr*) mutation, known to confer pyrethroid resistance in many insect pests, has been identified for the first time in *S. avenae*. Clonal lines heterozygous for the mutation showed 35-40-fold resistance to lambda-cyhalothrin in laboratory bioassays, consistent with the reported effect of this mutation on pyrethroid sensitivity in other aphid species.

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Molecular biology of insect sodium channels and pyrethroid resistance. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24704279>) Additional References

RELATED GEPHE

2 (Acetylcholinesterase (Ace-1), Acetylcholinesterase (Ace-2)) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=~44664^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>) Related Genes

No matches found. Related Haplotypes

EXTERNAL LINKS

