

GEPHE SUMMARY

CYP6FU1 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=CYP6FU1#gepbase-summary-title)	Gephebase Gene	GP00002117	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=Physiology#gepbase-summary-title)	Trait Category		
Xenobiotic resistance (insecticide; deltamethrin) (https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide;+deltamethrin)#gepbase-summary-title)	Trait		
rice pest <i>Laodelphax striatellus</i> - susceptible	Trait State in Taxon A		
rice pest <i>Laodelphax striatellus</i> - resistant	Trait State in Taxon B		
	Ancestral State		
Taxon A	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=Intraspecific#gepbase-summary-title)			
	Taxon A	Taxon B	
	Latin Name	Latin Name	
<i>Laodelphax striatellus</i> (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Laodelphax+striatellus#gepbase-summary-title)		<i>Laodelphax striatellus</i> (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Laodelphax+striatellus#gepbase-summary-title)	
	Common Name	Common Name	
small brown planthopper		small brown planthopper	
	Synonyms	Synonyms	
<i>Laodelphax striatella</i> ; small brown planthopper; <i>Laodelphax striatella</i> (Fallen, 1826); <i>Laodelphax striatellus</i> (Fallen, 1826)		<i>Laodelphax striatella</i> ; small brown planthopper; <i>Laodelphax striatella</i> (Fallen, 1826); <i>Laodelphax striatellus</i> (Fallen, 1826)	
	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; Auchenorrhyncha; Fulgoromorpha; Fulgoroidea; Delphacidae; Criomorphae; <i>Laodelphax</i>		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Auchenorrhyncha; Fulgoromorpha; Fulgoroidea; Delphacidae; Criomorphae; <i>Laodelphax</i>	
	Parent	Parent	
<i>Laodelphax</i> () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=195882)		<i>Laodelphax</i> () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=195882)	
	NCBI Taxonomy ID	NCBI Taxonomy ID	
195883 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=195883)		195883 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=195883)	
	is Taxon A an Infrapopulation?	is Taxon B an Infrapopulation?	
No		No	

GENOTYPIC CHANGE

CYP6FU1	Generic Gene Name	UniProtKB <i>Laodelphax striatellus</i>
-	Synonyms	A0A1S5R631 (http://www.uniprot.org/uniprot/A0A1S5R631)
-	String	0
-	Sequence Similarities	GenebankID or UniProtKB
-	GO - Molecular Function	
-	GO - Biological Process	
-	GO - Cellular Component	
GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)		

Presumptive Null

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

Molecular Type

Cis-regulatory (<https://www.gephebase.org/search-criteria?/and+Molecular Type=Cis-regulatory^#gephebase-summary-title>)

Aberration Type

Unknown (<https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title>)

Molecular Details of the Mutation

Four cis-acting elements were identified whose influence on up-regulation was much more pronounced in combination than when present singly.

Experimental Evidence

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

Main Reference

Multiple cis-acting elements involved in up-regulation of a cytochrome P450 gene conferring resistance to deltamethrin in *Laodelphax striatellus* (Fall 2016) (<https://pubmed.ncbi.nlm.nih.gov/27590347>)

Authors

Pu J; Sun H; Wang J; Wu M; Wang K; Denholm I; Han Z

Abstract

As well as arising from single point mutations in binding sites or detoxifying enzymes, it is likely that insecticide resistance mechanisms are frequently controlled by multiple genetic factors, resulting in resistance being inherited as a quantitative trait. However, empirical evidence for this is still rare. Here we analyse the causes of up-regulation of CYP6FU1, a monooxygenase implicated in resistance to deltamethrin in the rice pest *Laodelphax striatellus*. The 5'-flanking region of this gene was cloned and sequenced from individuals of a susceptible and a resistant strain. A luminescent reporter assay was used to evaluate different 5'-flanking regions and their fragments for promoter activity. Mutations enhancing promoter activity in various fragments were characterized, singly and in combination, by site mutation recovery. Nucleotide diversity in flanking sequences was greatly reduced in deltamethrin-resistant insects compared to susceptible ones. Phylogenetic sequence analysis found that CYP6FU1 had five different types of 5'-flanking region. All five types were present in a susceptible strain but only a single type showing the highest promoter activity was present in a resistant strain. Four cis-acting elements were identified whose influence on up-regulation was much more pronounced in combination than when present singly. Of these, two were new transcription factor (TF) binding sites produced by mutations, another one was also a new TF binding site alternated from an existing one, and the fourth was a unique transcription start site. These results demonstrate that multiple cis-acting elements are involved in up-regulating CYP6FU1 to generate a resistance phenotype.

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Additional References

RELATED GEPHE

Related Genes

2 (Acetylcholinesterase (Ace-1), resistance to dieldrin) (<https://www.gephebase.org/search-criteria?/or+Taxon ID=^195883^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS