

GEPHE SUMMARY

	Gephebase Gene		GepheID
CYP6CM1 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=CYP6CM1#gephebase-summary-title)		GP00002608	
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+TraitCategory=Physiology#gephebase-summary-title)		Trait	
Xenobiotic resistance (insecticide; imidacloprid) (https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(insecticide;+imidacloprid)#gephebase-summary-title)			
	Trait State in Taxon A		
Bemisia tabaci - sensitive		Trait State in Taxon B	
Bemisia tabaci - resistant			
	Ancestral State		
Taxon A		Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=Intraspecific#gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Bemisia tabaci (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Bemisia+tabaci#gephebase-summary-title)		Bemisia tabaci (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Bemisia+tabaci#gephebase-summary-title)	
	Common Name		Common Name
-		-	
	Synonyms		Synonyms
Aleyrodes tabaci; sweet potato whitefly; Bemisia tabaci (Gennadius, 1889)		Aleyrodes tabaci; sweet potato whitefly; Bemisia tabaci (Gennadius, 1889)	
	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; Bemisia		cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Paraneoptera; Hemiptera; Sternorrhyncha; Aleyrodoidea; Aleyrodidae; Aleyrodinae; Bemisia	
	Parent		Parent
Bemisia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7037)		Bemisia () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7037)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
7038 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7038)		7038 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=7038)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Bemisia tabaci
-		A0A6C0PTH9 (http://www.uniprot.org/uniprot/A0A6C0PTH9)	
	Synonyms		GenebankID or UniProtKB Bemisia tabaci
-			
	String		A0A6C0PTH9 (https://www.ncbi.nlm.nih.gov/nuccore/A0A6C0PTH9)
-			
	Sequence Similarities		
Belongs to the cytochrome P450 family.			
	GO - Molecular Function		
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)			
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)			
GO:0070330 : aromatase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0070330)			
	GO - Biological Process		
-			
	GO - Cellular Component		
GO:0016021 : integral component of membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016021)			

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title)	Presumptive Null
Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title)	Molecular Type
SNP (https://www.gephebase.org/search-criteria?/and+Aberration Type=^SNP^#gephebase-summary-title)	Aberration Type
three single-nucleotide polymorphic (SNP) markers in the intron region of CYP6CM1 that discriminate between the resistant and susceptible CYP6CM1 alleles	Molecular Details of the Mutation
Candidate Gene (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title)	Experimental Evidence
Over-expression of cytochrome P450 CYP6CM1 is associated with high resistance to imidacloprid in the B and Q biotypes of Bemisia tabaci (Hemiptera: Aleyrodidae). (2008) (https://pubmed.ncbi.nlm.nih.gov/18510975)	Main Reference
Karunker I; Benting J; Lueke B; Ponge T; Nauen R; Roditakis E; Vontas J; Gorman K; Denholm I; Morin S	Authors
The two most damaging biotypes of Bemisia tabaci, B and Q, have both evolved strong resistance to the neonicotinoid insecticide imidacloprid. The major mechanism in all samples investigated so far appeared to be enhanced detoxification by cytochrome P450s monooxygenases (P450s). In this study, a polymerase chain reaction (PCR) technology using degenerate primers based on conserved P450 helix I and heme-binding regions was employed to identify P450 cDNA sequences in B. tabaci that might be involved in imidacloprid resistance. Eleven distinct P450 cDNA sequences were isolated and classified as members of the CYP4 or CYP6 families. The mRNA expression levels of all 11 genes were compared by real-time quantitative RT-PCR across nine B and Q field-derived strains of B. tabaci showing strong resistance, moderate resistance or susceptibility to imidacloprid. We found that constitutive over-expression (up to approximately 17-fold) of a single P450 gene, CYP6CM1, was tightly related to imidacloprid resistance in both the B and Q biotypes. Next, we identified three single-nucleotide polymorphic (SNP) markers in the intron region of CYP6CM1 that discriminate between the resistant and susceptible Q-biotype CYP6CM1 alleles (r-Q and s-Q, respectively), and used a heterogeneous strain to test for association between r-Q and resistance. While survivors of a low imidacloprid dose carried both the r-Q and s-Q alleles, approximately 95% of the survivors of a high imidacloprid dose carried only the r-Q allele. Together with previous evidence, the results reported here identify enhanced activity of P450s as the major mechanism of imidacloprid resistance in B. tabaci, and the CYP6CM1 gene as a leading target for DNA-based screening for resistance to imidacloprid and possibly other neonicotinoids in field populations.	Abstract
	Additional References

RELATED GEPHE

5 (acetyl-CoA carboxylase (ACC), Acetylcholinesterase (Ace-1), Acetylcholinesterase (Ace-2), para (kdr), resistance to dieldrin) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^7038^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS