

GEPHE SUMMARY

CYP9A (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CYP9A^#gephebase-summary-title)	Gephebase Gene	GP00002476	GephelD
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)	Trait
Xenobiotic resistance (insecticide; deltamethrin) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(insecticide;+deltamethrin)^#gephebase-summary-title)	
Spodoptera frugiperda - sensitive	Trait State in Taxon A
Spodoptera frugiperda - resistant	Trait State in Taxon B
Data not curated	Ancestral State
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)	Taxonomic Status

Taxon A		Taxon B	
	Latin Name		Latin Name
Spodoptera frugiperda (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Spodoptera+frugiperda^#gephebase-summary-title)		Spodoptera frugiperda (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Spodoptera+frugiperda^#gephebase-summary-title)	
fall armyworm	Common Name	fall armyworm	Common Name
fall armyworm; Spodoptera frugiperda (Smith, 1797)	Synonyms	fall armyworm; Spodoptera frugiperda (Smith, 1797)	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Noctuoidea; Noctuidae; Amphipyrae; Spodoptera	Lineage	cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Endopterygota; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Obtectomera; Noctuoidea; Noctuidae; Amphipyrae; Spodoptera	Lineage
Spodoptera () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106)	Parent	Spodoptera () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106)	Parent
7108 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7108)	NCBI Taxonomy ID	7108 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7108)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

-	Generic Gene Name		UniProtKB
-	0		
-	Synonyms		GenebankID or UniProtKB
-	0		
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
-	GO - Biological Process		
-	GO - Cellular Component		
-			Presumptive Null
No (https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No^#gephebase-summary-title)			

Gene Amplification (#gephebase-summary-title)	Molecular Type
Insertion (#gephebase-summary-title)	Aberration Type
unknown	Insertion Size
In sensitive alleles the gene cluster is composed of 12 CYP9A genes and two alcohol dehydrogenase genes. All 30 resistant alleles have two copies of this unit while 28 and 6 alleles of the sensitive individuals had one and two copies; respectively.	Molecular Details of the Mutation
Association Mapping (#gephebase-summary-title)	Experimental Evidence
Adaptation by copy number variation increases insecticide resistance in the fall armyworm. (2020) (https://pubmed.ncbi.nlm.nih.gov/33184418)	Main Reference
Gimenez S; Abdelgaffar H; Goff GL; Hilliou F; Blanco CA; HÄnniger S; Bretaudou A; Legeai F; NÄgre N; Jurat-Fuentes JL; d'AlenÅson E; Nam K	Authors
Understanding the genetic basis of insecticide resistance is a key topic in agricultural ecology. The adaptive evolution of multi-copy detoxification genes has been interpreted as a cause of insecticide resistance, yet the same pattern can also be generated by the adaptation to host-plant defense toxins. In this study, we tested in the fall armyworm, <i>Spodoptera frugiperda</i> (Lepidoptera: Noctuidae), if adaptation by copy number variation caused insecticide resistance in two geographically distinct populations with different levels of resistance and the two host-plant strains. We observed a significant allelic differentiation of genomic copy number variations between the two geographic populations, but not between host-plant strains. A locus with positively selected copy number variation included a CYP gene cluster. Toxicological tests supported a central role for CYP enzymes in deltamethrin resistance. Our results indicate that copy number variation of detoxification genes might be responsible for insecticide resistance in fall armyworm and that evolutionary forces causing insecticide resistance could be independent of host-plant adaptation.	Abstract
	Additional References

RELATED GEPHE

2 (ABCC2, GSTe) (#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS