

GEPHE SUMMARY

CYP6BG1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=CYP6BG1#gephebase-summary-title)	Gephebase Gene	GP00002064	GepheID
	Entry Status	Cao	Main curator
Published			

PHENOTYPIC CHANGE

Physiology (<https://www.gephebase.org/search-criteria?/and+Trait>
Category=Physiology#gephebase-summary-title)

Xenobiotic resistance (insecticide) (<https://www.gephebase.org/search-criteria?/and+Trait>
Xenobiotic resistance (insecticide)#gephebase-summary-title)

Trait State in Taxon A

Plutella xylostella - diamide (chlorantraniliprole) less resistant

Trait State in Taxon B

Plutella xylostella - diamide (chlorantraniliprole) more 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

Plutella xylostella
(<https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Plutella+xylostella>#gephebase-summary-title)

Common Name

diamondback moth

Synonyms

diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Yponomeutoidea; Plutellidae; Plutella

Parent

Plutella () - (Rank: genus)
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654>)

NCBI Taxonomy ID

51655
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655>)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Plutella xylostella
(<https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Plutella+xylostella>#gephebase-summary-title)

Common Name

diamondback moth

Synonyms

diamondback moth; cabbage moth; Plutella xylostella (Linnaeus, 1758); Putella xylostella

Rank

species

Lineage

cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Protostomia; Ecdysozoa; Panarthropoda; Arthropoda; Mandibulata; Pancrustacea; Hexapoda; Insecta; Dicondylia; Pterygota; Neoptera; Holometabola; Amphiesmenoptera; Lepidoptera; Glossata; Neolepidoptera; Heteroneura; Ditrysia; Yponomeutoidea; Plutellidae; Plutella

Parent

Plutella () - (Rank: genus)
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51654>)

NCBI Taxonomy ID

51655
(<https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=51655>)

is Taxon B an Infraspecies?

Yes

Taxon B Description

resistant population in Chinesecabbage fields in Tonghai; Yunnan province (TH strain)

GENOTYPIC CHANGE

CYP6BG1

Generic Gene Name

UniProtKB Plutella xylostella
A0A222NX20 (<http://www.uniprot.org/uniprot/A0A222NX20>)

-

Synonyms

GenebankID or UniProtKB

-

String

Plutella xylostella

Sequence Similarities

A0A222NX20 (<https://www.ncbi.nlm.nih.gov/nuccore/A0A222NX20>)

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:0004497 : monooxygenase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0004497>)

GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen (<https://www.ebi.ac.uk/QuickGO/term/GO:0016705>)

GO - Biological Process

GO - Cellular Component

Unknown (#gephebase-summary-title)	Presumptive Null
Cis-regulatory (#gephebase-summary-title)	Molecular Type
Unknown (#gephebase-summary-title)	Aberration Type
promoters tested in luciferase assays	Molecular Details of the Mutation

Candidate Gene (#gephebase-summary-title)	Experimental Evidence
Transcription factor FTZ-F1 and cis-acting elements mediate expression of CYP6BG1 conferring resistance to chlorantraniliprole in <i>Plutella xylostella</i> . (2019) (https://pubmed.ncbi.nlm.nih.gov/30471186)	Main Reference

Li X; Shan C; Li F; Liang P; Smagghe G; Gao X	Authors
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Cytochrome P450-mediated detoxification plays an important role in the development of insecticide resistance. Previous studies have demonstrated that overexpression of CYP6BG1 was responsible for permethrin resistance in *Plutella xylostella*, and our experiments also showed that upregulation of this gene is associated with chlorantraniliprole resistance in *P. xylostella*. However, the transcriptional regulation involved in the expression of CYP6BG1 remains unknown. To further investigate the regulation of CYP6BG1 expression, the promoters of this gene were cloned and analyzed from one susceptible and four different resistant populations of *P. xylostella*.

First, the promoter region of *P. xylostella* CYP6BG1 was compared in five populations, and three types of 5'-flanking region were found. Second, the region between -562 and +49 of CYP6BG1 in a field population (TH) of *P. xylostella* showed the highest promoter activity and could be induced by chlorantraniliprole. Third, the transcriptional factor FTZ-F1, which is an orphan nuclear receptor and binds to the fushi tarazu (ftz) gene, was predicted by the online software Algen and Jaspar. It was proved to regulate the expression of CYP6BG1 by RNAi. The expression levels of FTZ-F1 and CYP6BG1 could be induced by chlorantraniliprole and were significantly higher in the resistant populations.

These data give a better understanding of the transcriptional regulation of an important insecticide detoxification enzyme gene, and therefore will help in understanding the molecular mechanisms of insecticide resistance in *P. xylostella*. © 2018 Society of Chemical Industry.

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Additional References

A flavin-dependent monooxygenase confers resistance to chlorantraniliprole in the diamondback moth, *Plutella xylostella*. (2019) (<https://pubmed.ncbi.nlm.nih.gov/31626952>)

RELATED GEPHE

10 (ABCC2, Acetylcholinesterase (Ace-1), Chitin synthase 1 (CHS1), FMO2, glutamate-gated chloride channel (GluCl), MAP4K4, nAChR, para (kdr), resistance to dieldrin, RYR) (#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS