

GEPHE SUMMARY

|                                                                                                                                                                                                                   |                |            |              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------|--------------|
| ABCC2 ( <a href="https://www.gephebase.org/search-criteria?/and+GeneGephebase=^ABCC2^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+GeneGephebase=^ABCC2^#gephebase-summary-title</a> ) | Gephebase Gene | GP00001439 | GepheID      |
|                                                                                                                                                                                                                   | Entry Status   | Prigent    | Main curator |
|                                                                                                                                                                                                                   | Published      |            |              |

PHENOTYPIC CHANGE

|                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                                                                                                                                                                                                                                                                                                           |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+TraitCategory=^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TraitCategory=^Physiology^#gephebase-summary-title</a> )                                                                                                                                          |  | Trait Category                                                                                                                                                                                                                                                                                                                                                            |  |
| Xenobiotic resistance (insecticide; Bt toxins) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (insecticide; Bt toxins)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (insecticide; Bt toxins)^#gephebase-summary-title</a> )                                              |  | Trait                                                                                                                                                                                                                                                                                                                                                                     |  |
| Spodoptera exigua (FRA) from France susceptible                                                                                                                                                                                                                                                                                                                           |  | Trait State in Taxon A                                                                                                                                                                                                                                                                                                                                                    |  |
| Spodoptera exigua (Xen-R) highly resistant                                                                                                                                                                                                                                                                                                                                |  | Trait State in Taxon B                                                                                                                                                                                                                                                                                                                                                    |  |
| Taxon A                                                                                                                                                                                                                                                                                                                                                                   |  | Ancestral State                                                                                                                                                                                                                                                                                                                                                           |  |
| Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Intraspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=^Intraspecific^#gephebase-summary-title</a> )                                                                                                                             |  | Taxonomic Status                                                                                                                                                                                                                                                                                                                                                          |  |
| Taxon A                                                                                                                                                                                                                                                                                                                                                                   |  | Taxon B                                                                                                                                                                                                                                                                                                                                                                   |  |
| Spodoptera exigua<br>( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Spodoptera exigua^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Spodoptera exigua^#gephebase-summary-title</a> )                                                                                                        |  | Spodoptera exigua<br>( <a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Spodoptera exigua^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Spodoptera exigua^#gephebase-summary-title</a> )                                                                                                        |  |
| beet armyworm                                                                                                                                                                                                                                                                                                                                                             |  | beet armyworm                                                                                                                                                                                                                                                                                                                                                             |  |
| beet armyworm; pigweed caterpillar; small mottled willow caterpillar; Spodoptera exigua (Hubner, 1808)                                                                                                                                                                                                                                                                    |  | beet armyworm; pigweed caterpillar; small mottled willow caterpillar; Spodoptera exigua (Hubner, 1808)                                                                                                                                                                                                                                                                    |  |
| species                                                                                                                                                                                                                                                                                                                                                                   |  | species                                                                                                                                                                                                                                                                                                                                                                   |  |
| 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; Obtectomera; Noctuoidea; Noctuidae; Amphipyrrinae; Spodoptera |  | 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; Obtectomera; Noctuoidea; Noctuidae; Amphipyrrinae; Spodoptera |  |
| Spodoptera () - (Rank: genus)<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106</a> )                                                                                                                                                                                    |  | Spodoptera () - (Rank: genus)<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7106</a> )                                                                                                                                                                                    |  |
| 7107<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7107">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7107</a> )                                                                                                                                                                                                             |  | 7107<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7107">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 7107</a> )                                                                                                                                                                                                             |  |
| No                                                                                                                                                                                                                                                                                                                                                                        |  | No                                                                                                                                                                                                                                                                                                                                                                        |  |

GENOTYPIC CHANGE

|                         |  |                                                                                                                        |
|-------------------------|--|------------------------------------------------------------------------------------------------------------------------|
| Generic Gene Name       |  | UniProtKB                                                                                                              |
| -                       |  | GenebankID or UniProtKB                                                                                                |
| Synonyms                |  | KF926100 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/KF926100">https://www.ncbi.nlm.nih.gov/nuccore/KF926100</a> ) |
| -                       |  |                                                                                                                        |
| String                  |  |                                                                                                                        |
| -                       |  |                                                                                                                        |
| Sequence Similarities   |  |                                                                                                                        |
| -                       |  |                                                                                                                        |
| GO - Molecular Function |  |                                                                                                                        |
| -                       |  |                                                                                                                        |
| GO - Biological Process |  |                                                                                                                        |
| -                       |  |                                                                                                                        |
| GO - Cellular Component |  |                                                                                                                        |
| -                       |  |                                                                                                                        |
|                         |  | Presumptive Null                                                                                                       |

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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Yes ( <a href="https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes~#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Molecular Type                    |
| Coding ( <a href="https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding~#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Aberration Type                   |
| Deletion ( <a href="https://www.gephebase.org/search-criteria?/and+Aberration Type=~Deletion~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Aberration Type=~Deletion~#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Deletion Size                     |
| 100-999 bp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Molecular Details of the Mutation |
| About 500 nt genomic deletion over 2 exons involving 246 nt coding 82aa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Experimental Evidence             |
| Linkage Mapping ( <a href="https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Main Reference                    |
| ABCC transporters mediate insect resistance to multiple Bt toxins revealed by bulk segregant analysis. (2014) ( <a href="https://pubmed.ncbi.nlm.nih.gov/24912445">https://pubmed.ncbi.nlm.nih.gov/24912445</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Authors                           |
| Park Y; González-Martínez RM; Navarro-Cerrillo G; Chakroun M; Kim Y; Ziarsolo P; Blanca J; Cañizares J; FerrÃ© J; Herrero S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Abstract                          |
| <p>Relatively recent evidence indicates that ABCC2 transporters play a main role in the mode of action of <i>Bacillus thuringiensis</i> (Bt) Cry1A-type proteins. Mapping of major Cry1A resistance genes has linked resistance to the ABCC2 locus in <i>Heliothis virescens</i>, <i>Plutella xylostella</i>, <i>Trichoplusia ni</i> and <i>Bombyx mori</i>, and mutations in this gene have been found in three of these Bt-resistant strains.</p> <p>We have used a colony of <i>Spodoptera exigua</i> (Xen-R) highly resistant to a Bt commercial bioinsecticide to identify regions in the <i>S. exigua</i> genome containing loci for major resistance genes by using bulk segregant analysis (BSA). Results reveal a region containing three genes from the ABCC family (ABBC1, ABBC2 and ABBC3) and a mutation in one of them (ABBC2) as responsible for the resistance of <i>S. exigua</i> to the Bt commercial product and to its key <i>Spodoptera</i>-active ingredients, Cry1Ca. In contrast to all previously described mutations in ABCC2 genes that directly or indirectly affect the extracellular domains of the membrane protein, the ABCC2 mutation found in <i>S. exigua</i> affects an intracellular domain involved in ATP binding. Functional analyses of ABBC2 and ABBC3 support the role of both proteins in the mode of action of Bt toxins in <i>S. exigua</i>. Partial silencing of these genes with dsRNA decreased the susceptibility of wild type larvae to both Cry1Ac and Cry1Ca. In addition, reduction of ABBC2 and ABBC3 expression negatively affected some fitness components and induced up-regulation of arylphorin and repat5, genes that respond to Bt intoxication and that are found constitutively up-regulated in the Xen-R strain.</p> <p>The current results show the involvement of different members of the ABCC family in the mode of action of <i>B. thuringiensis</i> proteins and expand the role of the ABCC2 transporter in <i>B. thuringiensis</i> resistance beyond the Cry1A family of proteins to include Cry1Ca.</p> |                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Additional References             |

RELATED GEPHE

|                                                                                                                                                                                                                                                                                                                                                   |                    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
|                                                                                                                                                                                                                                                                                                                                                   | Related Genes      |
| 4 (CYP321A8, CYP9A186, GSTe, RYR) ( <a href="https://www.gephebase.org/search-criteria?/or+Taxon ID=~7107~/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title">https://www.gephebase.org/search-criteria?/or+Taxon ID=~7107~/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title</a> ) | Related Haplotypes |
| No matches found.                                                                                                                                                                                                                                                                                                                                 |                    |

EXTERNAL LINKS

COMMENTS