GEPHE SUMMARY

Gephebase Gene

EPSPS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^EPSPS^#gephebase-summary-title)

GepheID

GP00001890

Entry Status

Published

Main curator

Courtier

PHENOTYPIC CHANGE

Trait Category

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

Trait

Xenobiotic resistance (herbicides; glyphosate) (https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic resistance (herbicides; glyphosate)^#gephebase-summary-title)

Trait State in Taxon A

Echinochloa colona - sensitive

Trait State in Taxon B

Echinochloa colona - 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

Echinochloa colona (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Echinochloa colona^#gephebase-summary-title)

Common Name

-

Synonyms

Echinochloa colonum; Deccan grass; corn panic grass; jungle-rice; millet-rice; shama millet; Echinochloa colona (L.) Link

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Panicodae; Paniceae; Boivinellinae; Echinochloa

Parent

Echinochloa () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 45618)

NCBI Taxonomy ID

90396 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 90396)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Echinochloa colona (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Echinochloa colona^#gephebase-summary-title)

Common Name

-

Synonyms

Echinochloa colonum; Deccan grass; corn panic grass; jungle-rice; millet-rice; shama millet; Echinochloa colona (L.) Link

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Panicodae; Paniceae; Boivinellinae; Echinochloa

Parent

Echinochloa () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 45618)

NCBI Taxonomy ID

90396 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 90396)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

At2g45300

Synonyms

F4L23.19; At2g45300

String

3702.AT2G45300.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT2G45300.1)

Sequence Similarities

Belongs to the EPSP synthase family.

GO - Molecular Function

GO:0003866 : 3-phosphoshikimate 1-carboxyvinyltransferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003866)

GO - Biological Process

GO:0009073 : aromatic amino acid family biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0009073)

UniProtKB Arabidopsis thaliana

P05466 (http://www.uniprot.org/uniprot/P05466)

GenebankID or UniProtKB

()

GO:0009423 : chorismate biosynthetic process (https://www.ebi.ac.uk/QuickGO/term/GO:0009423)

GO - Cellular Component

GO:0009507 : chloroplast (https://www.ebi.ac.uk/QuickGO/term/GO:0009507)

GO:0009570 : chloroplast stroma (https://www.ebi.ac.uk/QuickGO/term/GO:0009570)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

Pro106Leu leading to resistance

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Pro	Leu	106

Main Reference

Multiple target site resistance to glyphosate in junglerice (Echinochloa colona) lines from California orchards. (2018) (https://pubmed.ncbi.nlm.nih.gov/29722118)

Authors

Morran S; Moretti ML; Brunharo CA; Fischer AJ; Hanson BD

Abstract

In California specialty cropping systems such as vineyards and orchards, Echinochloa colona is present as a summer annual weed. It is able to germinate throughout the growing season whenever favorable conditions are present, and management relies heavily on glyphosate applications. Glyphosate-resistant (GR) E. colona biotypes are present in the state, but the levels of resistance observed suggest that there may be differences in mechanisms of resistance among populations.

Echinochloa colona lines collected from different regions of California's Central Valley presented resistance levels ranging from 1.4 to 4.3-fold compared to susceptible lines. No differences in the absorption and translocation of [C]-glyphosate were observed among lines. Resistant lines accumulated eight-fold less shikimic acid after treatment with 435 and 870 g a.e. ha glyphosate compared to the most susceptible line. Sequencing of a region of the EPSPS gene revealed three single nucleotide changes leading to amino acid substitutions at Proline 106, including Pro106Leu, Pro106Thr and Pro106Ser.

These results indicate that an altered target site in EPSPS is contributing to resistance in these lines and resistance has evolved independently, multiple times in the Central Valley of California. Additional research is needed to further understand the genomic contributions of resistance loci in this polyploid weed species. Â© 2018 Society of Chemical Industry.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

2 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^90396^/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^90396^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@ConvergentEvolution in this species there are three single nucleotide changes leading to amino acid substitutions at Proline 106; including Pro106Leu; Pro106Thr and Pro106Ser