GEPHE SUMMARY

Gephebase Gene

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

Entry Status

Published

GepheID

GP00001887

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

Amaranthus spinosus - sensitive

Trait State in Taxon B

Amaranthus spinosus - 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

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

Common Name

-

Synonyms

Amaranthus spinosus L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; Caryophyllales; Amaranthaceae; Amaranthus

Parent

Amaranthus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3564)

NCBI Taxonomy ID

124765 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 124765)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

-

Synonyms

Amaranthus spinosus L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; Caryophyllales; Amaranthaceae; Amaranthus

Parent

Amaranthus () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3564)

NCBI Taxonomy ID

124765 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 124765)

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

UniProtKB Arabidopsis thaliana

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

GenebankID or UniProtKB

()

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

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

Aberration Type

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

Insertion Size

10-100 kb

Molecular Details of the Mutation

26-37 copies of the EPSPS gene

Experimental Evidence

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

Main Reference

Glyphosate resistance: state of knowledge. (2014) (https://pubmed.ncbi.nlm.nih.gov/25180399)

Authors

Sammons RD; Gaines TA

Abstract

Studies of mechanisms of resistance to glyphosate have increased current understanding of herbicide resistance mechanisms. Thus far, single-codon non-synonymous mutations of EPSPS (5-enolypyruvylshikimate-3-phosphate synthase) have been rare and, relative to other herbicide mode of action target-site mutations, unconventionally weak in magnitude for resistance to glyphosate. However, it is possible that weeds will emerge with non-synonymous mutations of two codons of EPSPS to produce an enzyme endowing greater resistance to glyphosate. Today, target-gene duplication is a common glyphosate resistance mechanism and could become a fundamental process for developing any resistance trait. Based on competition and substrate selectivity studies in several species, rapid vacuole sequestration of glyphosate occurs via a transporter mechanism. Conversely, as the chloroplast requires transporters for uptake of important metabolites, transporters associated with the two plastid membranes may separately, or together, successfully block glyphosate delivery. A model based on finite glyphosate dose and limiting time required for chloroplast loading sets the stage for understanding how uniquely different mechanisms can contribute to overall glyphosate resistance.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS