GEPHE SUMMARY

Gephebase Gene

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

GepheID

GP00001884

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

Amaranthus tuberculatus - sensitive

Trait State in Taxon B

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

Common Name

-

Synonyms

Amaranthus rudis; Amaranthus rudis J.D.Sauer; Amaranthus tuberculatus (Moq.) J.D.Sauer

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; 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

277990 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 277990)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

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

Common Name

-

Synonyms

Amaranthus rudis; Amaranthus rudis J.D.Sauer; Amaranthus tuberculatus (Moq.) J.D.Sauer

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; 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

277990 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 277990)

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

4 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

Herbicide resistances in Amaranthus tuberculatus: a call for new options. (2011) (https://pubmed.ncbi.nlm.nih.gov/21073196)

Authors

Tranel PJ; Riggins CW; Bell MS; Hager AG

Abstract

Amaranthus tuberculatus is a major weed of crop fields in the midwestern United States. Making this weed particularly problematic to manage is its demonstrated ability to evolve resistance to herbicides. Herbicides to which A. tuberculatus has evolved resistance are photosystem II inhibitors, acetolactate synthase inhibitors, protoporphyrinogen oxidase inhibitors, and glyphosate. Many populations of A. tuberculatus contain more than one of these resistances, severely limiting the options for effective herbicide control. A survey of multiple-herbicide resistance in A. tuberculatus revealed that all populations resistant to glyphosate contained resistance to acetolactate synthase inhibitors, and 40% contained resistance to protoporphyrinogen oxidase inhibitors. The occurrences of multiple-herbicide resistances in A. tuberculatus illustrate the need for continued herbicide discovery efforts and/or the development of new strategies for weed management.

Additional References

RELATED GEPHE

Related Genes

2 (ALS, protoporphyrinogen oxidase (PPO2 = PPX2L)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^277990^/and+Trait=Xenobiotic resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^277990^/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^277990^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS