## GEPHE SUMMARY

Gephebase Gene

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

GepheID

GP00001900

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

Lolium rigidum - sensitive

Trait State in Taxon B

Lolium rigidum - 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

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

Common Name

-

Synonyms

Lolium rigidum Gaudin; Lolium rigidium

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Poodae; Poeae; Poeae Chloroplast Group 2 (Poeae type); Loliinae; Lolium

Parent

Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4520 )

NCBI Taxonomy ID

89674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89674 )

is Taxon A an Infraspecies?

No

### Taxon B

Latin Name

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

Common Name

-

Synonyms

Lolium rigidum Gaudin; Lolium rigidium

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Poodae; Poeae; Poeae Chloroplast Group 2 (Poeae type); Loliinae; Lolium

Parent

Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4520 )

NCBI Taxonomy ID

89674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89674 )

is Taxon B an Infraspecies?

Yes

Taxon B Description

a population from South Africa

## 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

UniProtKB Arabidopsis thaliana

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

GenebankID or UniProtKB

()

(https://www.ebi.ac.uk/QuickGO/term/GO:0009073)
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 conferring a 1.7-fold resistance increase to glyphosate at the whole plant level

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 | - | - | - |

Main Reference

A novel P106L mutation in EPSPS and an unknown mechanism(s) act additively to confer resistance to glyphosate in a South African Lolium rigidum population. (2011) (https://pubmed.ncbi.nlm.nih.gov/21405127)

Authors

Kaundun SS; Dale RP; Zelaya IA; Dinelli G; Marotti I; McIndoe E; Cairns A

Abstract

Glyphosate resistance evolution in weeds is a growing problem in world agriculture. Here, we have investigated the mechanism(s) of glyphosate resistance in a Lolium rigidum population (DAG1) from South Africa. Nucleotide sequencing revealed the existence of at least three EPSPS homologues in the L. rigidum genome and identified a novel proline 106 to leucine substitution (P106L) in 52% DAG1 individuals. This mutation conferred a 1.7-fold resistance increase to glyphosate at the whole plant level. Additionally, a 3.1-fold resistance increase, not linked to metabolism or translocation, was estimated between wild-type P106-DAG1 and P106-STDS sensitive plants. Point accepted mutation analysis suggested that other amino acid substitutions at EPSPS position 106 are likely to be found in nature besides the P106/S/A/T/L point mutations reported to date. This study highlights the importance of minor mechanisms acting additively to confer significant levels of resistance to commercial field rates of glyphosate in weed populations subjected to high selection pressure.

Additional References

## RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

3 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^89674^/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^89674^#gephebase-summary-title)

## EXTERNAL LINKS

## COMMENTS