

GEPHE SUMMARY

EPSPS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase="EPSPS" #gephebase-summary-title)	Gephebase Gene	GP00001900	GepheID
Published	Entry Status	Courtier	Main curator

PHENOTYPIC CHANGE

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category="Physiology" #gephebase-summary-title)	Trait Category		
Xenobiotic resistance (herbicides; glyphosate) (<a #gephebase-summary-title"="" (herbicides;="" glyphosate)"="" href="https://www.gephebase.org/search-criteria?/and+Trait=" resistance="" xenobiotic="">https://www.gephebase.org/search-criteria?/and+Trait="Xenobiotic resistance (herbicides; glyphosate)" #gephebase-summary-title)	Trait		
Lolium rigidum - sensitive	Trait State in Taxon A		
Lolium rigidum - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Intraspecific" #gephebase-summary-title)	Taxonomic Status		
		Taxon A	Taxon B
	Latin Name		Latin Name
Lolium rigidum (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=" lolium="" rigidum"="">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Lolium rigidum" #gephebase-summary-title)		Lolium rigidum (<a #gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=" lolium="" rigidum"="">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms="Lolium rigidum" #gephebase-summary-title)	
-	Common Name	-	Common Name
	Synonyms		Synonyms
Lolium rigidum Gaudin; Lolium rigidum		Lolium rigidum Gaudin; Lolium rigidum	
species	Rank	species	Rank
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Poodae; Poaeae; Poaeae Chloroplast Group 2 (Poaeae type); Loliinae; Lolium		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Poodae; Poaeae; Poaeae Chloroplast Group 2 (Poaeae type); Loliinae; Lolium	
	Parent		Parent
Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4520)		Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4520)	
89674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89674)	NCBI Taxonomy ID	89674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89674)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	Yes	is Taxon B an Intraspecies?
			Taxon B Description
		a population from South Africa	

GENOTYPIC CHANGE

At2g45300	Generic Gene Name	P05466 (http://www.uniprot.org/uniprot/P05466)	UniProtKB Arabidopsis thaliana
F4L23.19; At2g45300	Synonyms	0	GenebankID or UniProtKB
3702.AT2G45300.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 3702.AT2G45300.1)	String		
Belongs to the EPSP synthase family.	Sequence Similarities		
GO:0003866 : 3-phosphoshikimate 1-carboxyvinyltransferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003866)	GO - Molecular Function		
GO:0009073 : aromatic amino acid family biosynthetic process	GO - Biological Process		

(<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](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=))

Molecular Type

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

Aberration Type

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

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](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=))

	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](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=))

EXTERNAL LINKS

COMMENTS