

GEPHE SUMMARY

	Gephebase Gene	GephelD
EPSPS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^EPSPS^#gephebase-summary-title)	GP00001900	Main curator
Published	Entry Status	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)			
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	Latin Name	Taxon B	Latin Name
Lolium rigidum (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+rigidum^#gephebase-summary-title)	Lolium rigidum (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+rigidum^#gephebase-summary-title)	Lolium rigidum (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+rigidum^#gephebase-summary-title)	Lolium rigidum (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+rigidum^#gephebase-summary-title)
-	Common Name	-	Common Name
Lolium rigidum Gaudin; Lolium rigidum	Synonyms	Lolium rigidum Gaudin; Lolium rigidum	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viriplantae; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophytina; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Pooideae; Poeae; Poeae Chloroplast Group 2 (Poeae type); Loliinae; Lolium	Lineage	cellular organisms; Eukaryota; Viriplantae; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophytina; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Pooideae; Poeae; Poeae Chloroplast Group 2 (Poeae type); Loliinae; Lolium	Lineage
Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4520)	Parent	Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4520)	Parent
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 Infraspecies?	Yes	is Taxon B an Infraspecies?
			Taxon B Description
		a population from South Africa	

GENOTYPIC CHANGE

	Generic Gene Name		
At2g45300	P05466 (http://www.uniprot.org/uniprot/P05466)		UniProtKB Arabidopsis thaliana
F4L23.19; At2g45300	Synonyms		GenebankID or UniProtKB
3702.AT2G45300.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT2G45300.1)	String	0	
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=%22No%22#gephebase-summary-title>)

Molecular Type

Coding (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=%22Coding%22#gephebase-summary-title>)

Aberration Type

SNP (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=%22SNP%22#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=%22Candidate+Gene%22#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=%22EPSPS%22/and+Taxon+ID=%2289674%22/or+Gene+Gephebase=%22EPSPS%22/and+Taxon+ID=%2289674%22#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS