

GEPHE SUMMARY

	Gephebase Gene	GepheID
EPSPS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^EPSPS^#gephebase-summary-title)	GP00001885	
	Entry Status	Main curator
Published	Courtier	

PHENOTYPIC CHANGE

Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)		
Xenobiotic resistance (herbicides; glyphosate) (https://www.gephebase.org/search-criteria?/and+Trait=Xenobiotic+resistance+(herbicides;+glyphosate)^#gephebase-summary-title)	Trait	
Lolium multiflorum - sensitive	Trait State in Taxon A	
Lolium multiflorum - resistant	Trait State in Taxon B	
Taxon A	Ancestral State	
Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)		
Taxon A		Taxon B
Lolium multiflorum	Latin Name	Latin Name
(https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=Lolium+multiflorum^#gephebase-summary-title)		
Italian ryegrass	Common Name	Common Name
Lolium italicum; Lolium perenne subsp. multiflorum; Lolium perenne var. multiflorum; Italian ryegrass; Lolium italicum A.Braun, 1834, nom. illeg.; Lolium multiflorum Lam., 1779; Lolium perenne subsp. multiflorum (Lam.) Husn., 1899; Lolium perenne var. multiflorum (Lam.) Parn., 1845	Synonyms	Synonyms
species	Rank	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; BOP clade; Pooideae; Pooideae; Poeae; Poeae Chloroplast Group 2 (Poeae type); Loliiinae; Lolium	Lineage	Lineage
Lolium () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4520)	Parent	Parent
4521 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521)	NCBI Taxonomy ID	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

At2g45300	Generic Gene Name	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	
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 - 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>)

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

15-25 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

EPSPS gene amplification in glyphosate-resistant Italian ryegrass (*Lolium perenne* ssp. *multiflorum*) from Arkansas. (2012) (<https://pubmed.ncbi.nlm.nih.gov/22815255>)

Authors

Salas RA; Dayan FE; Pan Z; Watson SB; Dickson JW; Scott RC; Burgos NR

Abstract

Resistance to glyphosate in weed species is a major challenge for the sustainability of glyphosate use in crop and non-crop systems. A glyphosate-resistant Italian ryegrass population has been identified in Arkansas. This research was conducted to elucidate its resistance mechanism.

The investigation was conducted on resistant and susceptible plants from a population in Desha County, Arkansas (Des03). The amounts of glyphosate that caused 50% overall visual injury were 7 to 13 times greater than those for susceptible plants from the same population. The EPSPS gene did not contain any point mutation that has previously been associated with resistance to glyphosate, nor were there any other mutations on the EPSPS gene unique to the Des03 resistant plants. The resistant plants had 6-fold higher basal EPSPS enzyme activities than the susceptible plants, but their I(50) values in response to glyphosate were similar. The resistant plants contained up to 25 more copies of EPSPS gene than the susceptible plants. The level of resistance to glyphosate correlated with increases in EPSPS enzyme activity and EPSPS copy number.

Increased EPSPS gene amplification and EPSPS enzyme activity confer resistance to glyphosate in the Des03 population. This is the first report of EPSPS gene amplification in glyphosate-resistant Italian ryegrass. Other resistance mechanism(s) may also be involved.

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Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

2 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=%EPSPS%/and+Taxon+ID=%4521%/or+Gene+Gephebase=%EPSPS%/and+Taxon+ID=%4521%#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS