

## GEPHE SUMMARY

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

## PHENOTYPIC CHANGE

Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=^Physiology^#gephebase-summary-title</a> )	Trait Category		
Xenobiotic resistance (herbicides; glyphosate) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(herbicides;+glyphosate)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=^Xenobiotic+resistance+(herbicides;+glyphosate)^#gephebase-summary-title</a> )	Trait		
Lolium multiflorum - sensitive	Trait State in Taxon A		
Lolium multiflorum - resistant	Trait State in Taxon B		
Taxon A	Ancestral State		
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=^Intraspecific^#gephebase-summary-title</a> )	Taxonomic Status		
	Taxon A	Taxon B	
Lolium multiflorum ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+multiflorum^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+multiflorum^#gephebase-summary-title</a> )	Latin Name	Lolium multiflorum ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+multiflorum^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Lolium+multiflorum^#gephebase-summary-title</a> )	Latin Name
Italian ryegrass	Common Name	Italian ryegrass	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	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
species	Rank	species	Rank
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	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	Lineage
Lolium () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521</a> )	Parent	Lolium () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521</a> )	Parent
4521 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521</a> )	NCBI Taxonomy ID	4521 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4521</a> )	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

## GENOTYPIC CHANGE

At2g45300	Generic Gene Name	P05466 ( <a href="http://www.uniprot.org/uniprot/P05466">http://www.uniprot.org/uniprot/P05466</a> )	UniProtKB Arabidopsis thaliana
F4L23.19; At2g45300	Synonyms	()	GenebankID or UniProtKB
3702.AT2G45300.1 ( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT2G45300.1">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT2G45300.1</a> )	String		
Belongs to the EPSP synthase family.	Sequence Similarities		
GO:0003866 : 3-phosphoshikimate 1-carboxyvinyltransferase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0003866">https://www.ebi.ac.uk/QuickGO/term/GO:0003866</a> )	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](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=))

Molecular Type

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

Aberration Type

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

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

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

## EXTERNAL LINKS

## COMMENTS