

GEPHE SUMMARY

EPSPS (https://www.gephebase.org/search-criteria?/and+Gene Gephebase= [^] EPSPS [^] #gephebase-summary-title)	Gephebase Gene	GP00001888	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) (https://www.gephebase.org/search-criteria?/and+Trait = [^] Xenobiotic resistance (herbicides; glyphosate) [^] #gephebase-summary-title)	Trait		
Eleusine indica - sensitive	Trait State in Taxon A		
Eleusine indica - 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	
Eleusine indica (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Eleusine indica [^] #gephebase-summary-title)	Latin Name	Eleusine indica (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms= [^] Eleusine indica [^] #gephebase-summary-title)	Latin Name
goosegrass	Common Name	goosegrass	Common Name
goosegrass; crabgrass; fowl foot grass; wire grass; yardgrass; Eleusine indica (L.) Gaertn.	Synonyms	goosegrass; crabgrass; fowl foot grass; wire grass; yardgrass; Eleusine indica (L.) Gaertn.	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Chloridoideae; Cynodonteae; Eleusininae; Eleusine	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Chloridoideae; Cynodonteae; Eleusininae; Eleusine	Lineage
Eleusine () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4510)	Parent	Eleusine () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4510)	Parent
29674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29674)	NCBI Taxonomy ID	29674 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=29674)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

At2g45300	Generic Gene Name	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		
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 (https://www.ebi.ac.uk/QuickGO/term/GO:0009073)	GO - Biological Process		
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>)

No (<https://www.gephebase.org/search-criteria?/and+Presumptive Null=^No^#gephebase-summary-title>)

Presumptive Null

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

Molecular Type

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

Aberration Type

Nonsynonymous

SNP Coding Change

Pro106Ser leading to 2-4-fold resistance

Molecular Details of the Mutation

Candidate Gene (<https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Candidate Gene^#gephebase-summary-title>)

Experimental Evidence

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	Pro	Ser	106

Main Reference

Glyphosate-resistant goosegrass. Identification of a mutation in the target enzyme 5-enolpyruvylshikimate-3-phosphate synthase. (2002) (<https://pubmed.ncbi.nlm.nih.gov/12114580>)

Authors

Baerson SR; Rodriguez DJ; Tran M; Feng Y; Biest NA; Dill GM

Abstract

The spontaneous occurrence of resistance to the herbicide glyphosate in weed species has been an extremely infrequent event, despite over 20 years of extensive use. Recently, a glyphosate-resistant biotype of goosegrass (*Eleusine indica*) was identified in Malaysia exhibiting an LD(50) value approximately 2- to 4-fold greater than the sensitive biotype collected from the same region. A comparison of the inhibition of 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) activity by glyphosate in extracts prepared from the resistant (R) and sensitive (S) biotypes revealed an approximately 5-fold higher IC(50)(glyphosate) for the (R) biotype. Sequence comparisons of the predicted EPSPS mature protein coding regions from both biotypes revealed four single-nucleotide differences, two of which result in amino acid changes. One of these changes, a proline to serine substitution at position 106 in the (R) biotype, corresponds to a substitution previously identified in a glyphosate-insensitive EPSPS enzyme from *Salmonella typhimurium*. Kinetic data generated for the recombinant enzymes suggests that the second substitution identified in the (R) EPSPS does not contribute significantly to its reduced glyphosate sensitivity. *Escherichia coli* aroA- (EPSPS deficient) strains expressing the mature EPSPS enzyme from the (R) biotype exhibited an approximately 3-fold increase in glyphosate tolerance relative to strains expressing the mature EPSPS from the (S) biotype. These results provide the first evidence for an altered EPSPS enzyme as an underlying component of evolved glyphosate resistance in any plant species.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 (<https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^29674^/or+Gene Gephebase=^EPSPS^/and+Taxon ID=^29674^#gephebase-summary-title>)

EXTERNAL LINKS

COMMENTS