

GEPHE SUMMARY

	Gephebase Gene	GephelD
flavonoid 3';5'-hydroxylase (F3'5'H) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^flavonoid 3';5'-hydroxylase (F3'5'H)^#gephebase-summary-title)	GP00000323	Main curator
	Entry Status	Martin
Published		

PHENOTYPIC CHANGE

	Trait Category	
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category="Morphology">#gephebase-summary-title)	Trait	
Coloration (flowers) (https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (flowers)^#gephebase-summary-title)	Trait State in Taxon A	
Glycine soja	Trait State in Taxon B	
Glycine soja -light purple isolate	Ancestral State	
Data not curated	Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status="Intraspecific">#gephebase-summary-title)		
Taxon A		Taxon B
	Latin Name	Latin Name
Glycine soja (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Glycine+soja^#gephebase-summary-title)		Glycine soja (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Glycine+soja^#gephebase-summary-title)
-	Common Name	Common Name
wild soybean; Glycine soja Siebold & Zucc.	Synonyms	Synonyms
species	Rank	Rank
	Lineage	Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettoid clade; Phaseoleae; Glycine; Soja		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettoid clade; Phaseoleae; Glycine; Soja
Soja () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1462606)	Parent	Parent
3848 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3848)	NCBI Taxonomy ID	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
	Yes	Yes
		Taxon B Description
		Glycine soja -light purple isolate

GENOTYPIC CHANGE

CYP75A2	Generic Gene Name	UniProtKB Solanum melongena
CYP75; CYPEG1	Synonyms	GenebankID or UniProtKB
-	String	
	Sequence Similarities	
Belongs to the cytochrome P450 family.		
	GO - Molecular Function	
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)		
GO:0005506 : iron ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0005506)		
GO:0004497 : monooxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004497)		
GO:0016705 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen (https://www.ebi.ac.uk/QuickGO/term/GO:0016705)		

GO - Biological Process

GO:0009718 : anthocyanin-containing compound biosynthetic process

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009718>)

GO - Cellular Component

-	Presumptive Null
No (https://www.gephebase.org/search-criteria/?and+Presumptive+Null=%No%#gephebase-summary-title)	Molecular Type
Coding (https://www.gephebase.org/search-criteria/?and+Molecular+Type=%Coding%#gephebase-summary-title)	Aberration Type
SNP (https://www.gephebase.org/search-criteria/?and+Aberration+Type=%SNP%#gephebase-summary-title)	SNP Coding Change
Nonsynonymous	Molecular Details of the Mutation
V210M (uncertain); no expression level differences detected	Experimental Evidence
Linkage Mapping (https://www.gephebase.org/search-criteria/?and+Experimental+Evidence=%Linkage+Mapping%#gephebase-summary-title)	

Taxon A	Taxon B	Position
Codon	-	-
Amino-acid	-	-

A new allele of flower color gene W1 encoding flavonoid 3'5'-hydroxylase is responsible for light purple flowers in wild soybean *Glycine soja*. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20663233/>)

Takahashi R; Dubouzet JG; Matsumura H; Yasuda K; Iwashina T

Main Reference

Glycine soja is a wild relative of soybean that has purple flowers. No flower color variant of Glycine soja has been found in the natural habitat.

Authors

B09121, an accession with light purple flowers, was discovered in southern Japan. Genetic analysis revealed that the gene responsible for the light purple flowers was allelic to the W1 locus encoding flavonoid 3'5'-hydroxylase (F3'5'H). The new allele was designated as w1-lp. The dominance relationship of the locus was W1 >w1-lp>w1. One F2 plant and four F3 plants with purple flowers were generated in the cross between B09121 and a Clark near-isogenic line with w1 allele. Flower petals of B09121 contained lower amounts of four major anthocyanins (malvidin 3,5-di-O-glucoside, petunidin 3,5-di-O-glucoside, delphinidin 3,5-di-O-glucoside and delphinidin 3-O-glucoside) common in purple flowers and contained small amounts of the 5'-unsubstituted versions of the above anthocyanins, peonidin 3,5-di-O-glucoside, cyanidin 3,5-di-O-glucoside and cyanidin 3-O-glucoside, suggesting that F3'5'H activity was reduced and flavonoid 3'-hydroxylase activity was increased. F3'5'H cDNAs were cloned from Clark and B09121 by RT-PCR. The cDNA of B09121 had a unique base substitution resulting in the substitution of valine with methionine at amino acid position 210. The base substitution was ascertained by dCAPS analysis. The polymorphism associated with the dCAPS markers co-segregated with flower color in the F2 population. F3 progeny test, and dCAPS and indel analyses suggested that the plants with purple flowers might be due to intragenic recombination and that the 65 bp insertion responsible for gene dysfunction might have been eliminated in such plants.

B09121 may be the first example of a flower color variant found in nature. The light purple flower was controlled by a new allele of the W1 locus encoding F3'5'H. The flower petals contained unique anthocyanins not found in soybean and *G. soja*. B09121 may be a useful tool for studies of the structural and functional properties of F3'5'H genes as well as investigations on the role of flower color in relation to adaptation of *G. soja* to natural habitats.

Additional References

RELATED GEPHE

Related Genes

1 (Flavonoid 3'-hydroxylase (F3'H)) (<https://www.gephebase.org/search-criteria/?or+Taxon+ID=%3848%and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria/?or+Gene+Gephebase=%flavonoid+3';5'-hydroxylase+\(F3';5'H\)%and+Taxon+ID=%3848%or+Gene+Gephebase=%flavonoid+3';5'-hydroxylase+\(F3';5'H\)%and+Taxon+ID=%3848%#gephebase-summary-title](https://www.gephebase.org/search-criteria/?or+Gene+Gephebase=%flavonoid+3';5'-hydroxylase+(F3';5'H)%and+Taxon+ID=%3848%or+Gene+Gephebase=%flavonoid+3';5'-hydroxylase+(F3';5'H)%and+Taxon+ID=%3848%#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

