

GEPHE SUMMARY

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

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=~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+TaxonomicStatus=~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)	Common Name		Common Name
-	Synonyms		Synonyms
wild soybean; Glycine soja Siebold & Zucc.	Rank		Rank
species	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/millettioid clade; Phaseoleae; Glycine; Soja	Parent		Parent
Soja () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 1462606)	NCBI Taxonomy ID		NCBI Taxonomy ID
3848 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3848)	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No			
			Taxon B Description
			Glycine soja -light purple isolate

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Solanum melongena
CYP75A2	Synonyms	P37120 (http://www.uniprot.org/uniprot/P37120)
CYP75; CYPEG1	String	GenebankID or UniProtKB ABQ96219 (https://www.ncbi.nlm.nih.gov/nuccore/ABQ96219)
-	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:0009718 : anthocyanin-containing compound biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009718>)

GO - Cellular Component

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

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

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

Nonsynonymous

V210M (uncertain); no expression level differences detected

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

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.

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.

RELATED GEPHE

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>)

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

