

## GEPHE SUMMARY

	Gephebase Gene	GephelD
Flavonoid 3'-hydroxylase (F3'H) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase="Flavonoid 3'-hydroxylase (F3'H)" "#gephebase-summary-title")	GP00000316	
	Entry Status	Main curator
Published	Martin	

## PHENOTYPIC CHANGE

	Trait Category	
Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category="Morphology">#gephebase-summary-title")	Trait	
Coloration (flowers; pubescence; seeds) ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Coloration%28flowers%3B+pubescence%3B+seeds%29">#gephebase-summary-title")</a>	Trait State in Taxon A	
Glycine max	Trait State in Taxon B	
Glycine soja	Ancestral State	
Taxon A	Taxonomic Status	
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status="Intraspecific">#gephebase-summary-title")		
Taxon A	Latin Name	Taxon B
Glycine max ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=%Glycine+max%23gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=%Glycine+max%23gephebase-summary-title</a> )		Glycine soja ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=%Glycine+soja%23gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=%Glycine+soja%23gephebase-summary-title</a> )
soybean	Common Name	-
soybean; soybeans; Glycine max (L.) Merr.; Glycine max; cv. Wye	Synonyms	wild soybean; Glycine soja Siebold & Zucc.
species	Rank	
cellular organisms; Eukaryota; Viridiplantae; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophytina; Magnoliophytina; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettoid clade; Phaseoleae; Glycine; Soja	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophytina; Magnoliophytina; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettoid clade; Phaseoleae; Glycine; Soja
Soja () - (Rank: subgenus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1462606">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1462606</a> )	Parent	Soja () - (Rank: subgenus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1462606">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=1462606</a> )
3847 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3847">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3847</a> )	NCBI Taxonomy ID	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?

## GENOTYPIC CHANGE

	Generic Gene Name		
CYP75B1	Synonyms	UniProtKB Arabidopsis thaliana	
CYP75B1; CYTOCHROME P450 75B1; D501; F13G24.190; F13G24_190; F3'H; FLAVONOID 3'-HYDROXYLASE; TRANSPARENT TESTA 7; TT7; Atg07990	String	Q9SD85 ( <a href="http://www.uniprot.org/uniprot/Q9SD85">http://www.uniprot.org/uniprot/Q9SD85</a> )	GenebankID or UniProtKB
3702.AT5G07990.1 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT5G07990.1">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT5G07990.1</a> )	Sequence Similarities	ABQ96219 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/ABQ96219">https://www.ncbi.nlm.nih.gov/nuccore/ABQ96219</a> )	
Belongs to the cytochrome P450 family.	GO - Molecular Function	GO:0020037 : heme binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0020037">https://www.ebi.ac.uk/QuickGO/term/GO:0020037</a> )	
		GO:0005506 : iron ion binding ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005506">https://www.ebi.ac.uk/QuickGO/term/GO:0005506</a> )	
		GO:0016709 : oxidoreductase activity, acting on paired donors, with incorporation or reduction of molecular oxygen, NAD(P)H as one donor, and incorporation of one atom of oxygen ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016709">https://www.ebi.ac.uk/QuickGO/term/GO:0016709</a> )	

## GO - Biological Process

GO:0009733 : response to auxin (<https://www.ebi.ac.uk/QuickGO/term/GO:0009733>)

GO:0009813 : flavonoid biosynthetic process

(<https://www.ebi.ac.uk/QuickGO/term/GO:0009813>)

## GO - Cellular Component

GO:0016021 : integral component of membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)GO:0016020 : membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0016020>)

GO:0005789 : endoplasmic reticulum membrane

(<https://www.ebi.ac.uk/QuickGO/term/GO:0005789>)

Presumptive Null

Yes (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=%Yes%#gephebase-summary-title>)

Molecular Type

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

Aberration Type

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

Deletion Size

1-9 bp

Molecular Details of the Mutation

-1bp at +1164 resulting in premature stop codon

Experimental Evidence

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

Main Reference

Allele-specific marker development and selection efficiencies for both flavonoid 3'-hydroxylase and flavonoid 3',5'-hydroxylase genes in soybean subgenus soja. (2013)

(<https://pubmed.ncbi.nlm.nih.gov/23463490>)

Authors

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Abstract

Color is one of the phenotypic markers mostly used to study soybean (*Glycine max* L. Merr.) genetic, molecular and biochemical processes. Two P450-dependent mono-oxygenases, flavonoid 3'-hydroxylase ( $F_3'H$ ; EC1.14.3.21) and flavonoid 3',5'-hydroxylase ( $F_3'5'H$ , EC1.14.13.88), both catalyzing the hydroxylation of the B-ring in flavonoids, play an important role in coloration. Previous studies showed that the T locus was a gene encoding  $F_3'H$  and the W1 locus co-segregated with a gene encoding  $F_3'5'H$  in soybean. These two genetic loci have identified to control seed coat, flower and pubescence colors. However, the allelic distributions of both  $F_3'H$  and  $F_3'5'H$  genes in soybean were unknown. In this study, three novel alleles were identified (two of four alleles for  $GmF_3'H$  and one of three alleles for  $GmF_3'5'H$ ). A set of gene-tagged markers was developed and verified based on the sequence diversity of all seven alleles. Furthermore, the markers were used to analyze soybean accessions including 170 cultivated soybeans (*G. max*) from a mini core collection and 102 wild soybeans (*G. soja*). For both  $F_3'H$  and  $F_3'5'H$ , the marker selection efficiencies for pubescence color and flower color were determined. The results showed that one  $GmF_3'H$  allele explained 92.2 % of the variation in tawny and two  $gmf_3'h$  alleles explained 63.8 % of the variation in gray pubescence colors. In addition, two  $GmF_3'5'H$  alleles and one  $gmF_3'5'h$  allele explained 94.0 % of the variation in purple and 75.3 % in white flowers, respectively. By the combination of the two loci, seed coat color was determined. In total, 90.9 % of accessions possessing both the  $gmf_3'h-b$  and  $gmf_3'5'h$  alleles had yellow seed coats. Therefore, seed coat colors are controlled by more than two loci.

Additional References

## RELATED GEPHE

## Related Genes

4 (flavonoid 3';5'-hydroxylase ( $F_3'5'H$ ), flavonoid 3'-hydroxylase ( $F_3'H$ ), PH4/GmMYB-G20-1, R/glyma09g36983) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=%3847%20%2f+and+Trait=Coloration/or+Taxon+ID=%3848%20%2f+and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title>)

## Related Haplotypes

4 (<https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=%Flavonoid+3'-hydroxylase+&Taxon+ID=%3847%20%2f+or+Gene+Gephebase=%Flavonoid+3'-hydroxylase+&Taxon+ID=%3848%20%2f+gephebase-summary-title>)

## EXTERNAL LINKS

## COMMENTS