

GEPHE SUMMARY

	Gephebase Gene		GepheID
Flavonoid 3'-hydroxylase (F3'H) (https://www.gephebase.org/search-criteria?/and+GeneGephebase=~Flavonoid 3'-hydroxylase (F3'H)^#gephebase-summary-title)		GP00000317	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+TraitCategory=~Morphology^#gephebase-summary-title)		Trait	
Coloration (flowers; pubescence; seeds) (https://www.gephebase.org/search-criteria?/and+Trait=~Coloration (flowers; pubescence; seeds)^#gephebase-summary-title)		Trait State in Taxon A	
Glycine max		Trait State in Taxon B	
Glycine soja		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 max (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Glycine max^#gephebase-summary-title)		Glycine soja (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=~Glycine soja^#gephebase-summary-title)	
	Common Name		Common Name
soybean		-	
	Synonyms		Synonyms
soybean; soybeans; Glycine max (L.) Merr.; Glycine max; cv. Wye		wild soybean; Glycine soja Siebold & Zucc.	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; fabids; Fabales; Fabaceae; Papilionoideae; 50 kb inversion clade; NPAAA clade; indigoferoid/millettioid clade; Phaseoleae; Glycine; Soja		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; 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)		Soja () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 1462606)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
3847 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3847)		3848 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3848)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Arabidopsis thaliana
CYP75B1		Q9SD85 (http://www.uniprot.org/uniprot/Q9SD85)	
	Synonyms		GenebankID or UniProtKB
CYP75B1; CYTOCHROME P450 75B1; D501; F13G24.190; F13G24_190; F3'H; FLAVONOID 3'-HYDROXYLASE; TRANSPARENT TESTA 7; TT7; At5g07990		ABQ96219 (https://www.ncbi.nlm.nih.gov/nuccore/ABQ96219)	
	String		
3702.AT5G07990.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier= 3702.AT5G07990.1)			
	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: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 (https://www.ebi.ac.uk/QuickGO/term/GO:0016709)			

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

No ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title](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](https://www.gephebase.org/search-criteria?/and+Molecular+Type=~Coding~#gephebase-summary-title))

Aberration Type

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

Indel Size

1-9 bp

Molecular Details of the Mutation

a single base insertion of an adenine at position 965 as well as a single base deletion of adenine at position 973 resulting in N322K and Q324T - exact causing mutation(s) unknown

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=~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 (F3'H; EC1.14.3.21) and flavonoid 3',5'-hydroxylase (F3'5'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 F3'H and the W1 locus co-segregated with a gene encoding F3'5'H in soybean. These two genetic loci have identified to control seed coat, flower and pubescence colors. However, the allelic distributions of both F3'H and F3'5'H genes in soybean were unknown. In this study, three novel alleles were identified (two of four alleles for GmF3'H and one of three alleles for GmF3'5'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 F3'H and F3'5'H, the marker selection efficiencies for pubescence color and flower color were determined. The results showed that one GmF3'H allele explained 92.2 % of the variation in tawny and two gmf3'h alleles explained 63.8 % of the variation in gray pubescence colors. In addition, two GmF3'5'H alleles and one gmf3'5'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 gmf3'h-b and gmf3'5'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 (F3'5'H), flavonoid 3'-hydroxylase (F3'H), PH4/GmMYB-G20-1, R/glyma09g36983) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=~3847~/and+Trait=Coloration/or+Taxon ID=~3848~/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=~3847~/and+Trait=Coloration/or+Taxon+ID=~3848~/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

4 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~Flavonoid 3'-hydroxylase \(F3'H\)~/and+Taxon ID=~3847~/or+Gene Gephebase=~Flavonoid 3'-hydroxylase \(F3'H\)~/and+Taxon ID=~3848~#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~Flavonoid+3'-hydroxylase+(F3'H)~/and+Taxon+ID=~3847~/or+Gene+Gephebase=~Flavonoid+3'-hydroxylase+(F3'H)~/and+Taxon+ID=~3848~#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS