GEPHE SUMMARY

Gephebase Gene
flavonoid 3′-hydroxylase (F3′H) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^flavonoid 3′-hydroxylase (F3′H)^#gephebase-summary-title)

GepheID
GP00002088

Entry Status
Published

Main curator
Courtier

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
Ipomoea tricolor - bright blue flowers

Trait State in Taxon B
Ipomoea tricolor - fuchsia mutant - stable reddish flowers

Ancestral State
Taxon A

Taxonomic Status
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Domesticated^#gephebase-summary-title)

Taxon A

Latin Name
Ipomoea tricolor (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Ipomoea tricolor^#gephebase-summary-title)

Common Name
-

Synonyms
Ipomoea rubro-caerulea; Ipomoea rubrocaerulea; Pharbitis rubro-caerulea; Pharbitis rubrocaeruleus; campanilla; flying-saucers; pearly-gates; yaxcelil; Ipomoea rubrocaerulea Hook., 1834; Ipomoea tricolor Cav., 1795; Pharbitis rubrocaeruleus (Hook.) Planch., 1854

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Convolvulaceae; Ipomoeeae; Ipomoea

Parent
Ipomoea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4119)

NCBI Taxonomy ID
89664 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89664)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Ipomoea tricolor (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Ipomoea tricolor^#gephebase-summary-title)

Common Name
-

Synonyms
Ipomoea rubro-caerulea; Ipomoea rubrocaerulea; Pharbitis rubro-caerulea; Pharbitis rubrocaeruleus; campanilla; flying-saucers; pearly-gates; yaxcelil; Ipomoea rubrocaerulea Hook., 1834; Ipomoea tricolor Cav., 1795; Pharbitis rubrocaeruleus (Hook.) Planch., 1854

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Convolvulaceae; Ipomoeeae; Ipomoea

Parent
Ipomoea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4119)

NCBI Taxonomy ID
89664 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 89664)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
CYP75B1

Synonyms
CYP75B1; CYTOCHROME P450 75B1; D501; F13G24.190; F13G24_190; F3′H; FLAVONOID 3′-HYDROXYLASE; TRANSPARENT TESTA 7; TT7; At5g07990

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

UniProtKB Arabidopsis thaliana
Q9SD85 (http://www.uniprot.org/uniprot/Q9SD85)

GenebankID or UniProtKB
()

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

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

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

Insertion Size

1-9 bp

Molecular Details of the Mutation

a single T insertion generating the stop codon TAG. The accumulation of the F3′H transcripts is drastically reduced by the nonsense-mediated RNA decay.

Experimental Evidence

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

Main Reference

Spontaneous mutations of the flavonoid 3′-hydroxylase gene conferring reddish flowers in the three morning glory species. (2003) (https://pubmed.ncbi.nlm.nih.gov/14581624)

Authors

Hoshino A; Morita Y; Choi JD; Saito N; Toki K; Tanaka Y; Iida S

Abstract

Among the Ipomoea plants, both Ipomoea nil and Ipomoea tricolor display bright blue flowers, and Ipomoea purpurea exhibits dark purple flowers. While all of these flowers contain cyanidin-based anthocyanin pigments, the mutants of I. nil, I. purpurea, and I. tricolor carrying the magenta, pink, and fuchsia alleles, respectively, produce reddish flowers containing pelargonidin derivatives, and all of them are deficient in the gene for flavonoid 3′-hydroxylase (F3′H). The magenta allele in I. nil is a nonsense mutation caused by a single C to T base transition generating the stop codon TGA, and the cultivar Violet carries the same mutation. Several tested pink mutants in I. purpurea carry inserts of the 0.55-kb DNA transposable element Tip201 belonging to the Ac/Ds superfamily at the identical site. No excision of Tip201 from the F3′H gene could be detected, and both splicing and polyadenylation patterns of the F3′H transcripts were affected by the Tip201 integration. The fuchsia allele in I. tricolor is a single T insertion generating the stop codon TAG, and the accumulation of the F3′H transcripts was drastically reduced by the nonsense-mediated RNA decay. Spontaneous mutations in Ipomoea, including a possible founder mutation in the pink allele, are also discussed.

Additional References

RELATED GEPHE

Related Genes

1 (bHLH2) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^89664^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS