GEPHE SUMMARY

Gephebase Gene
MYB1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^MYB1^#gephebase-summary-title)

GepheID
GP00001396

Entry Status
Published

Main curator
Arnoult

PHENOTYPIC CHANGE

Trait Category
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait
Coloration (inner flesh) (https://www.gephebase.org/search-criteria?/and+Trait=^Coloration (inner flesh)^#gephebase-summary-title)

Trait State in Taxon A
Red flesh Y

Trait State in Taxon B
White flesh y

Ancestral State
Unknown

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

Taxon A

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

Common Name
-

Synonyms
Beta altissima; beet; Beta altissima Steud.; Beta vulgaris L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; Caryophyllales; Chenopodiaceae; Betoideae; Beta

Parent
Beta () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3554)

NCBI Taxonomy ID
161934 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 161934)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
-

Synonyms
Beta altissima; beet; Beta altissima Steud.; Beta vulgaris L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; Caryophyllales; Chenopodiaceae; Betoideae; Beta

Parent
Beta () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3554)

NCBI Taxonomy ID
161934 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 161934)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
MYB1

Synonyms
Bv2g027795_jkkr; Bv_jkkr

String
-

Sequence Similarities
-

GO - Molecular Function
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)

GO - Biological Process
-

GO - Cellular Component
GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)

UniProtKB Beta vulgaris
M1ETA5 (http://www.uniprot.org/uniprot/M1ETA5)

GenebankID or UniProtKB
104906847 (https://www.ncbi.nlm.nih.gov/nuccore/104906847)

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

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

Aberration Type

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

Molecular Details of the Mutation

unknown mutations within 460bp of putative 5 prime UTR

Experimental Evidence

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

Main Reference

The beet Y locus encodes an anthocyanin MYB-like protein that activates the betalain red pigment pathway. (2015) (https://pubmed.ncbi.nlm.nih.gov/25436858)

Authors

Hatlestad GJ; Akhavan NA; Sunnadeniya RM; Elam L; Cargile S; Hembd A; Gonzalez A; McGrath JM; Lloyd AM

Abstract

Nearly all flowering plants produce red/violet anthocyanin pigments. Caryophyllales is the only order containing families that replace anthocyanins with unrelated red and yellow betalain pigments. Close biological correlation of pigmentation patterns suggested that betalains might be regulated by a conserved anthocyanin-regulating transcription factor complex consisting of a MYB, a bHLH and a WD repeat-containing protein (the MBW complex). Here we show that a previously uncharacterized anthocyanin MYB-like protein, Beta vulgaris MYB1 (BvMYB1), regulates the betalain pathway in beets. Silencing BvMYB1 downregulates betalain biosynthetic genes and pigmentation, and overexpressing BvMYB1 upregulates them. However, unlike anthocyanin MYBs, BvMYB1 will not interact with bHLH members of heterologous anthocyanin MBW complexes because of identified nonconserved residues. BvMYB1 resides at the historic beet pigment-patterning locus, Y, required for red-fleshed beets. We show that Y and y express different levels of BvMYB1 transcripts. The co-option of a transcription factor regulating anthocyanin biosynthesis would be an important evolutionary event allowing betalains to largely functionally replace anthocyanins.

Additional References

RELATED GEPHE

Related Genes

1 (CYP76AD1) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^161934^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Y historical locus for red pigmentation; identified in 1936 by Keller in "Inheritance of some major color types in beets" (not in Pubmed base). R historical locus also identified in another paper encoded in GePhebase.