

GEPHE SUMMARY

	Gephebase Gene	GephelD
MYB1 (https://www.gephebase.org/search-criteria?/and+GeneGephebase=%MYB1%#gephebase-summary-title)	GP00001396	Main curator
Published	Entry Status	Arnoult

PHENOTYPIC CHANGE

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

Taxon A	Latin Name	Taxon B	Latin Name
Beta vulgaris (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=%Beta vulgaris%#gephebase-summary-title)		Beta vulgaris (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=%Beta vulgaris%#gephebase-summary-title)	
-	Common Name	-	Common Name
Beta altissima; beet; Beta altissima Steud.; Beta vulgaris L.	Synonyms	Beta altissima; beet; Beta altissima Steud.; Beta vulgaris L.	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; Caryophyllales; Chenopodiaceae; Betoideae; Beta	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; Caryophyllales; Chenopodiaceae; Betoideae; Beta	Lineage
Beta () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3554)	Parent	Beta () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3554)	Parent
161934 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 161934)	NCBI Taxonomy ID	161934 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 161934)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

MYB1	Generic Gene Name	UniProtKB Beta vulgaris
Bv2g027795_jkkr; Bv_jkkr	Synonyms	GenebankID or UniProtKB
-	String	
	Sequence Similarities	
GO:0003677 : DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0003677)	GO - Molecular Function	
	GO - Biological Process	
GO:0005634 : nucleus (https://www.ebi.ac.uk/QuickGO/term/GO:0005634)	GO - Cellular Component	
No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=%No%#gephebase-summary-title)		Presumptive Null
Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular Type=%Cis-regulatory%#gephebase-summary-title)		Molecular Type

Unknown (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=%5EUnknown%23gephebase-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=%5ECandidate+Gene%23gephebase-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=%5E161934%23gephebase-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.