GEPHE SUMMARY

Gephebase Gene
VvMYBA1 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^VvMYBA1^#gephebase-summary-title)

GepheID
GP00002096

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

Trait State in Taxon A
Vitis vinifera - white-skinned cultivar - VvmybA1a allele

Trait State in Taxon B
Vitis vinifera - mild red-skinned variant (cv. 'Muscat Ã Petits Grains Rouge' - synonym cv. 'Moscatel Galego Roxo') - accumulation of di-hydroxylated anthocyanins

Ancestral State
Taxon A

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

Taxon A

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

Common Name
wine grape

Synonyms
Vitis vinifera subsp. vinifera; wine grape; Vitis vinifera L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; rosids incertae sedis; Vitales; Vitaceae; Viteae; Vitis

Parent
Vitis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3603)

NCBI Taxonomy ID
29760 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29760)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
wine grape

Synonyms
Vitis vinifera subsp. vinifera; wine grape; Vitis vinifera L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; rosids incertae sedis; Vitales; Vitaceae; Viteae; Vitis

Parent
Vitis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3603)

NCBI Taxonomy ID
29760 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 29760)

is Taxon B an Infraspecies?
Yes

Taxon B Description
cv. 'Muscat Ã Petits Grains Rouge' - synonym cv. 'Moscatel Galego Roxo'

GENOTYPIC CHANGE

Generic Gene Name
VvmybA1

Synonyms
mybA; MybA3; mybA1; VVMYBA1; VvmybA3; MYBA1; VIT_02s0033g00410

String
29760.VIT_02s0033g00410.t01 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=29760.VIT_02s0033g00410.t01)

Sequence Similarities
-

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

GO - Biological Process
-

GO - Cellular Component

UniProtKB Vitis vinifera
Q6L973 (http://www.uniprot.org/uniprot/Q6L973)

GenebankID or UniProtKB
FN596505 (https://www.ncbi.nlm.nih.gov/nuccore/FN596505)

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

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

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

Deletion Size

1-10 kb

Molecular Details of the Mutation

partial excision of the Gret1 retrotransposon from the promoter region of the MYBA1 anthocyanin regulator - associated with white-to-red berry skin color reversion

Experimental Evidence

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

Main Reference

Genetic analysis of a white-to-red berry skin color reversion and its transcriptomic and metabolic consequences in grapevine (Vitis vinifera cv. 'Moscatel Galego'). (2019) (https://pubmed.ncbi.nlm.nih.gov/31815637)

Authors

Ferreira V; Matus JT; Pinto-Carnide O; Carrasco D; Arroyo-GarcÃa R; Castro I

Abstract

Somatic mutations occurring within meristems of vegetative propagation material have had a major role in increasing the genetic diversity of the domesticated grapevine (Vitis vinifera subsp. vinifera). The most well studied somatic variation in this species is the one affecting fruit pigmentation, leading to a plethora of different berry skin colors. Color depletion and reversion are often observed in the field. In this study we analyzed the origin of a novel white-to-red skin color reversion and studied its possible metabolic and transcriptomic consequences on cv. 'Muscat Ã Petits Grains Blancs' (synonym cv. 'Moscatel Galego Branco'), a member of the large family of Muscats.

The mild red-skinned variant (cv. 'Muscat Ã Petits Grains Rouge', synonym cv. 'Moscatel Galego Roxo'), characterized by a preferential accumulation of di-hydroxylated anthocyanins, showed in heterozygosis a partially-excised Gret1 retrotransposon in the promoter region of the MYBA1 anthocyanin regulator, while MYBA2 was still in homozygosis for its non-functional allele. Through metabolic (anthocyanin, resveratrol and piceid quantifications) and transcriptomic (RNA-Seq) analyses, we show that within a near-isogenic background, the transcriptomic consequences of color reversion are largely associated to diminished light/UV-B responses probably as a consequence of the augment of metabolic sunscreens (i.e. anthocyanins).

We propose that the reduced activity of the flavonoid tri-hydroxylated sub-branch and decreased anthocyanin synthesis and modification (e.g. methylation and acylation) are the potential causes for the mild red-skinned coloration in the pigmented revertant. The observed positive relation between anthocyanins and stilbenes could be attributable to an increased influx of phenylpropanoid intermediaries due to the replenished activity of MYBA1, an effect yet to be demonstrated in other somatic variants.

Additional References

RELATED GEPHE

Related Genes

3 (VvMybA1 VvMybA2 VvMybA3 and VvMybA4, VvMYBA2, VvMYBA3) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^29760^/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

5 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^VvMYBA1^/and+Taxon ID=^29760^/or+Gene Gephebase=^VvMYBA1^/and+Taxon ID=^29760^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@TE