

GEPHE SUMMARY

	Gephebase Gene		GepheID
dihydroflavonol reductase (DFR) (<a +dihydroflavonol+reductase+(dfr)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase="+dihydroflavonol+reductase+(DFR)+"#gephebase-summary-title)		GP00000226	
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Morphology (<a +morphology+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait+Category=">https://www.gephebase.org/search-criteria?/and+Trait+Category="+Morphology+"#gephebase-summary-title)		Trait	
Coloration (tuber skin) (<a +coloration+(tuber+skin)+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Trait=">https://www.gephebase.org/search-criteria?/and+Trait="+Coloration+(tuber+skin)+"#gephebase-summary-title)			
	Trait State in Taxon A		
Solanum tuberosum - red tuber		Trait State in Taxon B	
Solanum tuberosum -white tuber			
	Ancestral State		
Data not curated		Taxonomic Status	
Domesticated (<a +domesticated+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status="+Domesticated+"#gephebase-summary-title)			
	Taxon A		Taxon B
	Latin Name		Latin Name
Solanum tuberosum (<a +solanum+tuberosum+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Solanum+tuberosum+"#gephebase-summary-title)		Solanum tuberosum (<a +solanum+tuberosum+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms="+Solanum+tuberosum+"#gephebase-summary-title)	
	Common Name		Common Name
potato		potato	
	Synonyms		Synonyms
Solanum tuberosum subsp. tuberosum; potato; potatoes; Solanum tuberosum L.		Solanum tuberosum subsp. tuberosum; potato; potatoes; Solanum tuberosum L.	
	Rank		Rank
species		species	
	Lineage		Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum	
	Parent		Parent
Solanum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4107)		Solanum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4107)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
4113 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4113)		4113 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4113)	
is Taxon A an Intraspecies?		is Taxon B an Intraspecies?	
No		No	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Arabidopsis thaliana
DFRA		P51102 (http://www.uniprot.org/uniprot/P51102)	
	Synonyms		GenebankID or UniProtKB
dihydroflavonol 4-reductase; DIHYDROFLAVONOL 4-REDUCTASE; DIHYDROKAEEMPFEROL 4-REDUCTASE; M318; MJB21.18; MJB21_18; TT3; DFR; At5g42800		AAZ57436 (https://www.ncbi.nlm.nih.gov/nuccore/AAZ57436)	
	String		
3702.AT5G42800.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT5G42800.1)			
	Sequence Similarities		
Belongs to the NAD(P)-dependent epimerase/dehydratase family. Dihydroflavonol-4-reductase subfamily.			
	GO - Molecular Function		
GO:0016491 : oxidoreductase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0016491)			
GO:0050662 : coenzyme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0050662)			
GO:0016616 : oxidoreductase activity, acting on the CH-OH group of donors, NAD or NADP as acceptor (https://www.ebi.ac.uk/QuickGO/term/GO:0016616)			

GO:0045552 : dihydrokaempferol 4-reductase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045552>)
GO:0047890 : flavanone 4-reductase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0047890>)

GO - Biological Process

GO:0009718 : anthocyanin-containing compound biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009718>)

GO - Cellular Component

GO:0042406 : extrinsic component of endoplasmic reticulum membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0042406>)

No (https://www.gephebase.org/search-criteria?/and+Presumptive Null=~No~#gephebase-summary-title)	Presumptive Null
Coding (https://www.gephebase.org/search-criteria?/and+Molecular Type=~Coding~#gephebase-summary-title)	Molecular Type
Unknown (https://www.gephebase.org/search-criteria?/and+Aberration Type=~Unknown~#gephebase-summary-title)	Aberration Type
unknown; 10 a.a variable positions	Molecular Details of the Mutation
Linkage Mapping (https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping~#gephebase-summary-title)	Experimental Evidence
An allele of dihydroflavonol 4-reductase associated with the ability to produce red anthocyanin pigments in potato (<i>Solanum tuberosum</i> L.). (2003) (https://pubmed.ncbi.nlm.nih.gov/12955207)	Main Reference

De Jong WS; De Jong DM; De Jong H; Kalazich J; Bodis M

Authors

The potato R locus is necessary for the production of red pelargonidin-based anthocyanin pigments in any tissue of the plant, including tuber skin and flower petals. The production of pelargonidins in plants requires the activity of dihydroflavonol 4-reductase (DFR) to catalyze the reduction of dihydrokaempferol into leucopelargonidin. To test the hypothesis that potato R encodes DFR, portions of both dfr alleles were sequenced from a diploid potato clone known to be heterozygous Rr. Sequence comparison revealed a polymorphic BamHI restriction site. The presence or absence of this site was monitored in three diploid populations that segregated for R, as well as in a wide range of tetraploid breeding clones and cultivars, by amplifying a fragment of dfr and digesting the products with BamHI. An identically sized dfr restriction fragment lacking the BamHI site was present in all potato clones that produced red anthocyanin pigments, while the same fragment was absent in many potato clones with white tuber skin and flowers. An independent RFLP test using Dral to detect sequence polymorphism was performed on a subset of the potato clones. This test also revealed dfr-derived bands that were present in all red-colored potatoes and absent in several white clones. The presence of shared restriction fragments in all red-colored potatoes provides strong evidence that R does indeed code for DFR. The data are also consistent with a 48 year-old hypothesis by Dodds and Long, that R was selected just once during the domestication of potato. A cDNA clone corresponding to the red allele of dfr was sequenced and compared to two other alleles. The red allele is predicted to encode a 382 amino acid protein that differs at ten amino acid positions from the gene products of the two alternative alleles. Several of these differences map in a region known to influence DFR substrate specificity in *Gerbera*.

Abstract

The potato R locus codes for dihydroflavonol 4-reductase. (2009) (<https://pubmed.ncbi.nlm.nih.gov/19588118>)

Additional References

RELATED GEPHE

2 (an2-like (Stan2), flavonoid 3',5'-hydroxylase (F3'5'H)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=~4113~/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)	Related Genes
No matches found.	Related Haplotypes

EXTERNAL LINKS

COMMENTS