

GEPHE SUMMARY

	Gephebase Gene		GepheID
phytoene synthase (https://www.gephebase.org/search-criteria?/and+Gene Gephebase= [^] phytoene synthase [^] #gephebase-summary-title)		GP00001718	
	Entry Status	Courtier	Main curator
Published			

PHENOTYPIC CHANGE

	Trait Category		
Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category= [^] Physiology [^] #gephebase-summary-title)			
	Trait		
Carotenoid content (fruit) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=<sup>^</sup>Carotenoid content (fruit)<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=[^]Carotenoid content (fruit)[^]#gephebase-summary-title)			
	Trait State in Taxon A		
red flesh			
	Trait State in Taxon B		
yellow flesh			
	Ancestral State		
Taxon A			
	Taxonomic Status		
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic Status= [^] Domesticated [^] #gephebase-summary-title)			
Taxon A		Taxon B	
	Latin Name		Latin Name
Solanum lycopersicum (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Solanum lycopersicum<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Solanum lycopersicum[^]#gephebase-summary-title)		Solanum lycopersicum (<a href="https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=<sup>^</sup>Solanum lycopersicum<sup>^</sup>#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Solanum lycopersicum[^]#gephebase-summary-title)	
	Common Name		Common Name
tomato		tomato	
	Synonyms		Synonyms
Lycopersicon esculentum var. esculentum; Solanum esculentum; Solanum lycopersicum var. humboldtii; tomato; Lycopersicon esculentum Mill.; Solanum esculentum Dunal; Solanum lycopersicum L.; Lycopersicon lycopersicum; Lycopersicum esculentum; Solanum lycopersicon		Lycopersicon esculentum var. esculentum; Solanum esculentum; Solanum lycopersicum var. humboldtii; tomato; Lycopersicon esculentum Mill.; Solanum esculentum Dunal; Solanum lycopersicum L.; Lycopersicon lycopersicum; Lycopersicum esculentum; Solanum lycopersicon	
	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; Lycopersicon		cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum; Lycopersicon	
	Parent		Parent
Lycopersicon () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=49274)		Lycopersicon () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=49274)	
	NCBI Taxonomy ID		NCBI Taxonomy ID
4081 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4081)		4081 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4081)	
	is Taxon A an Intraspecies?		is Taxon B an Intraspecies?
No		Yes	
			Taxon B Description
		yellow flesh - r[y] mutant	

GENOTYPIC CHANGE

	Generic Gene Name		UniProtKB Zea mays
PSY1		P49085 (http://www.uniprot.org/uniprot/P49085)	
	Synonyms		GenebankID or UniProtKB
pb1; PSY1; ZmPSY1; GRMZM2G300348; Y1; ZEAMMB73_Zm00001d036345		()	
	String		
4577.GRMZM2G300348_P02 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=4577.GRMZM2G300348_P02)			
	Sequence Similarities		
Belongs to the phytoene/squalene synthase family.			
	GO - Molecular Function		
GO:0004310 : farnesyl-diphosphate farnesyltransferase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004310)			

GO:0016767 : geranylgeranyl-diphosphate geranylgeranyltransferase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016767>)

GO:0046905 : phytoene synthase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0046905>)

GO:0051996 : squalene synthase activity

(<https://www.ebi.ac.uk/QuickGO/term/GO:0051996>)

GO - Biological Process

GO:0006696 : ergosterol biosynthetic process

(<https://www.ebi.ac.uk/QuickGO/term/GO:0006696>)

GO:0016117 : carotenoid biosynthetic process

(<https://www.ebi.ac.uk/QuickGO/term/GO:0016117>)

GO - Cellular Component

GO:0010287 : plastoglobule (<https://www.ebi.ac.uk/QuickGO/term/GO:0010287>)

Presumptive Null

Yes ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=~Yes^#gephebase-summary-title](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](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](https://www.gephebase.org/search-criteria?/and+Aberration+Type=~Insertion^#gephebase-summary-title))

Insertion Size

-

Molecular Details of the Mutation

insertion of a Rider transposable element within the coding region

Experimental Evidence

Linkage Mapping ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=~Linkage Mapping^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=~Linkage+Mapping^#gephebase-summary-title))

Main Reference

Identification and genetic analysis of normal and mutant phytoene synthase genes of tomato by sequencing, complementation and co-suppression. (1993)

(<https://pubmed.ncbi.nlm.nih.gov/8343597>)

Authors

Fray RG; Grierson D

Abstract

A tomato phytoene synthase gene, Psy1, has recently been isolated as the clone GTOM5 and shown by sequence identity to be the gene from which the major fruit-ripening cDNA clone TOM5 was derived. Sequence analysis of transcripts from two allelic yellow-fruited tomato mutants, mapped to chromosome 3, has shown the lack of carotenoids in fruit of these mutants to be due to the production of aberrant TOM5 transcripts which are unlikely to encode a functional phytoene synthase enzyme. In one mutant (yellow flesh) the aberrant transcript contained a sequence that, by its strong hybridization to a wide size range of genomic fragments, appeared to be repeated many times within the genome. Southern and PCR analysis of the phytoene synthase genes in the mutant revealed restriction fragment length polymorphisms, suggesting that the production of altered mRNAs was associated with specific genomic rearrangements. Constitutive over-expression of a TOM5 cDNA clone in transgenic mutant plants restored synthesis of the carotenoid lycopene in ripening fruit and also led to unscheduled pigment production in other cell types. In some mutant plants transformed with the TOM5 cDNA construct, inhibition of carotenoid production in immature green fruit, leaves and flowers was observed, due to the phenomenon of co-suppression, indicating that different insertion events with the same gene construct can lead to overexpression or co-suppression in transgenic plants. Green organs of these plants were susceptible to photobleaching, due to the lack of carotenoids. These results suggest the existence of separate Psy genes for carotenoid synthesis in green organs.

Additional References

Horizontal acquisition of transposable elements and viral sequences: patterns and consequences. (2018) (<https://pubmed.ncbi.nlm.nih.gov/29505963>)

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

1 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=~phytoene synthase^/and+Taxon ID=~4081^/or+Gene Gephebase=~phytoene synthase^/and+Taxon ID=~4081^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~phytoene+synthase^/and+Taxon+ID=~4081^/or+Gene+Gephebase=~phytoene+synthase^/and+Taxon+ID=~4081^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

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