

# GEPHE SUMMARY

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

## PHENOTYPIC CHANGE

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

## GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Zea mays
PSY1	P49085 ( <a href="http://www.uniprot.org/uniprot/P49085">http://www.uniprot.org/uniprot/P49085</a> )	
pb1; PSY1; ZmPSY1; GRMZM2G300348; Y1; ZEAMMB73_Zm00001d036345	0	GenebankID or UniProtKB
4577.GRMZM2G300348_P02 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=4577.GRMZM2G300348_P02">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=4577.GRMZM2G300348_P02</a> )	String	
Belongs to the phytoene/squalene synthase family.	Sequence Similarities	
GO:0004310 : farnesyl-diphosphate farnesyltransferase activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0004310">https://www.ebi.ac.uk/QuickGO/term/GO:0004310</a> )	GO - Molecular Function	

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>)

Molecular Type

Coding (<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>)

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>)

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>)

## EXTERNAL LINKS

## COMMENTS

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