GEPHE SUMMARY

Gephebase Gene

CLV3 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^CLV3^#gephebase-summary-title)

GepheID

GP00001565

Entry Status

Published

Main curator

Prigent

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Wild Solanum pimpinellifolium producing small bilocular fruits

Trait State in Taxon B

Cultivated tomato producing big multilocular fruits

Ancestral State

Taxon A

Taxonomic Status

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

Taxon A

Latin Name

Solanum pimpinellifolium (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Solanum pimpinellifolium^#gephebase-summary-title)

Common Name

-

Synonyms

Lycopersicon pimpinellifolium; Solanum pimpinellifolium var. racemigerum; currant tomato; Lycopersicon pimpinellifolium (L.) Mill.; Solanum pimpinellifolium L.

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum; Lycopersicon

Parent

Lycopersicon () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 49274)

NCBI Taxonomy ID

4084 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4084)

is Taxon A an Infraspecies?

No

Taxon B

Latin Name

Solanum lycopersicum (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Solanum lycopersicum^#gephebase-summary-title)

Common Name

tomato

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

Rank

species

Lineage

cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; asterids; lamiids; Solanales; Solanaceae; Solanoideae; Solaneae; Solanum; Lycopersicon

Parent

Lycopersicon () - (Rank: subgenus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 49274)

NCBI Taxonomy ID

4081 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4081)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

CLV3

Synonyms

AtCLV3; CLAVATA3; F12K2.17; F12K2_17; At2g27250

String

3702.AT2G27250.3 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT2G27250.3)

Sequence Similarities

Belongs to the CLV3/ESR signal peptide family.

GO - Molecular Function

GO:0033612 : receptor serine/threonine kinase binding (https://www.ebi.ac.uk/QuickGO/term/GO:0033612)

GO - Biological Process

GO:0045087 : innate immune response

UniProtKB Arabidopsis thaliana

Q9XF04 (http://www.uniprot.org/uniprot/Q9XF04)

GenebankID or UniProtKB

()

(https://www.ebi.ac.uk/QuickGO/term/GO:0045087)
GO:0007275 : multicellular organism development
(https://www.ebi.ac.uk/QuickGO/term/GO:0007275)
GO:0045168 : cell-cell signaling involved in cell fate commitment
(https://www.ebi.ac.uk/QuickGO/term/GO:0045168)
GO:0010074 : maintenance of meristem identity
(https://www.ebi.ac.uk/QuickGO/term/GO:0010074)
GO:0048507 : meristem development
(https://www.ebi.ac.uk/QuickGO/term/GO:0048507)
GO:0009934 : regulation of meristem structural organization
(https://www.ebi.ac.uk/QuickGO/term/GO:0009934)

GO - Cellular Component

GO:0005615 : extracellular space (https://www.ebi.ac.uk/QuickGO/term/GO:0005615)
GO:0048046 : apoplast (https://www.ebi.ac.uk/QuickGO/term/GO:0048046)

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

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

Inversion Size

100-1000 kb

Molecular Details of the Mutation

A 294 kb inversion with a breakpoint 1 kb upstream of CLV3

Experimental Evidence

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

Main Reference

A cascade of arabinosyltransferases controls shoot meristem size in tomato. (2015) (https://pubmed.ncbi.nlm.nih.gov/26005869)

Authors

Xu C; Liberatore KL; MacAlister CA; Huang Z; Chu YH; Jiang K; Brooks C; Ogawa-Ohnishi M; Xiong G; Pauly M; Van Eck J; Matsubayashi Y; van der Knaap E; Lippman ZB

Abstract

Shoot meristems of plants are composed of stem cells that are continuously replenished through a classical feedback circuit involving the homeobox WUSCHEL (WUS) gene and the CLAVATA (CLV) gene signaling pathway. In CLV signaling, the CLV1 receptor complex is bound by CLV3, a secreted peptide modified with sugars. However, the pathway responsible for modifying CLV3 and its relevance for CLV signaling are unknown. Here we show that tomato inflorescence branching mutants with extra flower and fruit organs due to enlarged meristems are defective in arabinosyltransferase genes. The most extreme mutant is disrupted in a hydroxyproline O-arabinosyltransferase and can be rescued with arabinosylated CLV3. Weaker mutants are defective in arabinosyltransferases that extend arabinose chains, indicating that CLV3 must be fully arabinosylated to maintain meristem size. Finally, we show that a mutation in CLV3 increased fruit size during domestication. Our findings uncover a new layer of complexity in the control of plant stem cell proliferation.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS