GEPHE SUMMARY

Gephebase Gene
SELF PRUNING 5G (SP5G) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^SELF PRUNING 5G (SP5G)^#gephebase-summary-title)

GepheID
GP00001564

Entry Status
Published

Main curator
Courtier

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Wild relative of tomato (Solanum pimpinellifolium & S. cheesmaniae & S. galapagense)

Trait State in Taxon B
Cultivated tomato

Ancestral State
Unknown

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
SP5G

Synonyms
101254900

String
4081.Solyc05g053850.2.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=4081.Solyc05g053850.2.1)

Sequence Similarities
-

GO - Molecular Function
-

GO - Biological Process
GO:0009911 : positive regulation of flower development (https://www.ebi.ac.uk/QuickGO/term/GO:0009911)

UniProtKB Solanum lycopersicum
Q84XK9 (http://www.uniprot.org/uniprot/Q84XK9)

GenebankID or UniProtKB
()

GO:0009909 : regulation of flower development (https://www.ebi.ac.uk/QuickGO/term/GO:0009909)
GO:0048573 : photoperiodism, flowering (https://www.ebi.ac.uk/QuickGO/term/GO:0048573)
GO:0010119 : regulation of stomatal movement (https://www.ebi.ac.uk/QuickGO/term/GO:0010119)

GO - Cellular Component

GO:0005737 : cytoplasm (https://www.ebi.ac.uk/QuickGO/term/GO:0005737)
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

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

Molecular Details of the Mutation

several candidate SNPs and structural variants

Experimental Evidence

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

Main Reference

Variation in the flowering gene SELF PRUNING 5G promotes day-neutrality and early yield in tomato. (2017) (https://pubmed.ncbi.nlm.nih.gov/27918538)

Authors

Soyk S; MÃ¼ller NA; Park SJ; Schmalenbach I; Jiang K; Hayama R; Zhang L; Van Eck J; JimÃ©nez-GÃ³mez JM; Lippman ZB

Abstract

Plants evolved so that their flowering is triggered by seasonal changes in day length. However, day-length sensitivity in crops limits their geographical range of cultivation, and thus modification of the photoperiod response was critical for their domestication. Here we show that loss of day-length-sensitive flowering in tomato was driven by the florigen paralog and flowering repressor SELF-PRUNING 5G (SP5G). SP5G expression is induced to high levels during long days in wild species, but not in cultivated tomato because of cis-regulatory variation. CRISPR/Cas9-engineered mutations in SP5G cause rapid flowering and enhance the compact determinate growth habit of field tomatoes, resulting in a quick burst of flower production that translates to an early yield. Our findings suggest that pre-existing variation in SP5G facilitated the expansion of cultivated tomato beyond its origin near the equator in South America, and they provide a compelling demonstration of the power of gene editing to rapidly improve yield traits in crop breeding.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS