

GEPHE SUMMARY

CmWIP1 (https://www.gephebase.org/search-criteria/?and+GeneGephebase=CmWIP1#gephebase-summary-title)	Gephebase Gene	GP00000188	GephelD
	Entry Status	Martin	Main curator
Published			

PHENOTYPIC CHANGE

Trait Category			
Physiology (https://www.gephebase.org/search-criteria/?and+TraitCategory=Physiology#gephebase-summary-title)	Trait		
Flower sex determination (female vs. hermaphrodite) (https://www.gephebase.org/search-criteria/?and+Trait=^Flower+sex+determination+(female+vs.+hermaphrodite)^#gephebase-summary-title)			
Cucumis melo - monoecious	Trait State in Taxon A		
Cucumis melo - gynoecious	Trait State in Taxon B		
Taxon A	Ancestral State		
Taxonomic Status			
Domesticated (https://www.gephebase.org/search-criteria/?and+TaxonomicStatus=Domesticated#gephebase-summary-title)			
Taxon A		Taxon B	
Cucumis melo (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Cucumis+melo^#gephebase-summary-title)	Latin Name	Cucumis melo (https://www.gephebase.org/search-criteria/?and+Taxon+and+Synonyms=^Cucumis+melo^#gephebase-summary-title)	Latin Name
muskmelon	Common Name	muskmelon	Common Name
muskmelon; Oriental melon; Cucumis melo L., 1753; Cucumis melo var. markuwa Markino; Cucurbita melo L.	Synonyms	muskmelon; Oriental melon; Cucumis melo L., 1753; Cucumis melo var. markuwa Markino; Cucurbita melo L.	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Cucurbitales; Cucurbitaceae; Benincaseae; Cucumis	Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; fabids; Cucurbitales; Cucurbitaceae; Benincaseae; Cucumis	Lineage
Cucumis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3655)	Parent	Cucumis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3655)	Parent
3656 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3656)	NCBI Taxonomy ID	3656 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3656)	NCBI Taxonomy ID
No	is Taxon A an Infraspecies?	No	is Taxon B an Infraspecies?

GENOTYPIC CHANGE

WIP1	Generic Gene Name	UniProtKB Arabidopsis thaliana
	Synonyms	GenebankID or UniProtKB
Arabidopsis thaliana WPP domain interacting protein 1; AtWIP1; WPP domain interacting protein 1; At4g26455; M3E9.120		ACX85637 (https://www.ncbi.nlm.nih.gov/nuccore/ACX85637)
3702.AT4G26455.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT4G26455.1)	String	
-	Sequence Similarities	
GO:0046982 : protein heterodimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0046982)	GO - Molecular Function	GO - Biological Process
GO:0006997 : nucleus organization (https://www.ebi.ac.uk/QuickGO/term/GO:0006997)		

GO - Cellular Component

GO:0016021 : integral component of membrane
(<https://www.ebi.ac.uk/QuickGO/term/GO:0016021>)
GO:0009504 : cell plate (<https://www.ebi.ac.uk/QuickGO/term/GO:0009504>)
GO:0005635 : nuclear envelope (<https://www.ebi.ac.uk/QuickGO/term/GO:0005635>)
GO:0031965 : nuclear membrane (<https://www.ebi.ac.uk/QuickGO/term/GO:0031965>)

Presumptive Null

No (<https://www.gephebase.org/search-criteria?/and+Presumptive+Null=%22No%22#gephebase-summary-title>)

Molecular Type

Cis-regulatory (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=%22Cis-regulatory%22#gephebase-summary-title>)

Aberration Type

Insertion (<https://www.gephebase.org/search-criteria?/and+Aberration+Type=%22Insertion%22#gephebase-summary-title>)

Insertion Size

1-10 kb

Molecular Details of the Mutation

Promoter insertion of a Transcription Factor Binding Site allowing propagation of heritable methylation

Experimental Evidence

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=%22Linkage+Mapping%22#gephebase-summary-title>)

Main Reference

A transposon-induced epigenetic change leads to sex determination in melon. (2009) (<https://pubmed.ncbi.nlm.nih.gov/19847267/>)

Authors

Martin A; Troadec C; Boualem A; Rajab M; Fernandez R; Morin H; Pitrat M; Dogimont C; Bendahmane A

Abstract

Sex determination in plants leads to the development of unisexual flowers from an originally bisexual floral meristem. This mechanism results in the enhancement of outcrossing and promotes genetic variability, the consequences of which are advantageous to the evolution of a species. In melon, sexual forms are controlled by identity of the alleles at the andromonoecious (a) and gynoecious (g) loci. We previously showed that the a gene encodes an ethylene biosynthesis enzyme, CmACS-7, that represses stamen development in female flowers. Here we show that the transition from male to female flowers in gynoecious lines results from epigenetic changes in the promoter of a transcription factor, CmWIP1. This natural and heritable epigenetic change resulted from the insertion of a transposon, which is required for initiation and maintenance of the spreading of DNA methylation to the CmWIP1 promoter. Expression of CmWIP1 leads to carpel abortion, resulting in the development of unisexual male flowers. Moreover, we show that CmWIP1 indirectly represses the expression of the andromonoecious gene, CmACS-7, to allow stamen development. Together our data indicate a model in which CmACS-7 and CmWIP1 interact to control the development of male, female and hermaphrodite flowers in melon.

Additional References

RELATED GEPHE

1 (CmACS-7) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=%223656%22/and+Trait=Flower+sex+determination/and+groupHaplotypes=true#gephebase-summary-title>)

Related Genes

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE @Epigenetics