GEPHE SUMMARY

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

GepheID
GP00000375

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait #1

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
Arabidopsis thaliana- KAS-1

Trait State in Taxon B
Arabidopsis thaliana- TSU-1 (short FT; Low Water Use Efficiency)

Trait #2

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

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

Trait State in Taxon A
-

Trait State in Taxon B
-

Ancestral State
Taxon A

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

Taxon A

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Arabidopsis thaliana- KAS-1

Taxon B

Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)

Common Name
thale cress

Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)

NCBI Taxonomy ID
3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Arabidopsis thaliana- TSU-1 (short FT; Low Water Use Efficiency)

GENOTYPIC CHANGE

Generic Gene Name

FRI

Synonyms

-

String

-

Sequence Similarities

Belongs to the Frigida family.

GO - Molecular Function

-

GO - Biological Process

GO:0030154 : cell differentiation (https://www.ebi.ac.uk/QuickGO/term/GO:0030154)
GO:0009908 : flower development (https://www.ebi.ac.uk/QuickGO/term/GO:0009908)

GO - Cellular Component

GO:0016607 : nuclear speck (https://www.ebi.ac.uk/QuickGO/term/GO:0016607)

UniProtKB Arabidopsis thaliana

P0DH90 (http://www.uniprot.org/uniprot/P0DH90)

GenebankID or UniProtKB

AF228500 (https://www.ncbi.nlm.nih.gov/nuccore/AF228500)

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

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

Deletion Size

100-999 bp

Molecular Details of the Mutation

376 bp deletion within the promoter of the TSU-1 FRI allele

Experimental Evidence

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

Main Reference

Pleiotropy of FRIGIDA enhances the potential for multivariate adaptation. (2013) (https://pubmed.ncbi.nlm.nih.gov/23698015)

Authors

Lovell JT; Juenger TE; Michaels SD; Lasky JR; Platt A; Richards JH; Yu X; Easlon HM; Sen S; McKay JK

Abstract

An evolutionary response to selection requires genetic variation; however, even if it exists, then the genetic details of the variation can constrain adaptation. In the simplest case, unlinked loci and uncorrelated phenotypes respond directly to multivariate selection and permit unrestricted paths to adaptive peaks. By contrast, 'antagonistic' pleiotropic loci may constrain adaptation by affecting variation of many traits and limiting the direction of trait correlations to vectors that are not favoured by selection. However, certain pleiotropic configurations may improve the conditions for adaptive evolution. Here, we present evidence that the Arabidopsis thaliana gene FRI (FRIGIDA) exhibits 'adaptive' pleiotropy, producing trait correlations along an axis that results in two adaptive strategies. Derived, low expression FRI alleles confer a 'drought escape' strategy owing to fast growth, low water use efficiency and early flowering. By contrast, a dehydration avoidance strategy is conferred by the ancestral phenotype of late flowering, slow growth and efficient water use during photosynthesis. The dehydration avoidant phenotype was recovered when genotypes with null FRI alleles were transformed with functional alleles. Our findings indicate that the well-documented effects of FRI on phenology result from differences in physiology, not only a simple developmental switch.

Additional References

RELATED GEPHE

Related Genes

13 (AGAMOUS-LIKE 50, Cryptochrome 2 (CRY2) EDI allele, EARLY FLOWERING 3(ELF3), FLC (Flowering Locus C), FLM (MAF1), Flowering locus T (FT), Frigida like 1 (FRL1), Frigida like 2 (FRL2), MADS AFFECTING FLOWERING 2 (MAF2), SVP (SHORT VEGETATIVE PHASE), VIN3, HUA2, MPK12) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Flowering time/or+Taxon ID=^3702^/and+Trait=Water use efficiency/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

18 (https://www.gephebase.org/search-criteria?/or+Gene Gephebase=^Frigida (FRI)^/and+Taxon ID=^3702^/or+Gene Gephebase=^Frigida (FRI)^/and+Taxon ID=^3702^#gephebase-summary-title)

EXTERNAL LINKS

COMMENTS

@Pleiotropy