GEPHE SUMMARY

Gephebase Gene
FLC (=Pep1) (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^FLC (=Pep1)^#gephebase-summary-title)

GepheID
GP00000329

Entry Status
Published

Main curator
Martin

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
Arabina alpina

Trait State in Taxon B
Arabina alpina -Paj accession (obligate vernalization)

Ancestral State
Data not curated

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

Taxon A

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

Common Name
gray rockcress

Synonyms
gray rockcress; alpine rockcress; Arabis alpina L.

Rank
species

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

Parent
Arabis (rockcress) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50451)

NCBI Taxonomy ID
50452 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50452)

is Taxon A an Infraspecies?
No

Taxon B

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

Common Name
gray rockcress

Synonyms
gray rockcress; alpine rockcress; Arabis alpina L.

Rank
species

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

Parent
Arabis (rockcress) - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50451)

NCBI Taxonomy ID
50452 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 50452)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Arabina alpina -Paj accession (obligate vernalization)

GENOTYPIC CHANGE

Generic Gene Name
FLC

Synonyms
AGAMOUS-like 25; AGL25; FLF; FLOWERING LOCUS C; FLOWERING LOCUS F; MADS BOX PROTEIN FLOWERING LOCUS F; REDUCED STEM BRANCHING 6; RSB6; T31P16.130; T31P16_130; At5g10140

String
3702.AT5G10140.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT5G10140.1)

Sequence Similarities
-

GO - Molecular Function
GO:0046983 : protein dimerization activity (https://www.ebi.ac.uk/QuickGO/term/GO:0046983)
GO:0003700 : DNA-binding transcription factor activity

UniProtKB Arabidopsis thaliana
Q9S7Q7 (http://www.uniprot.org/uniprot/Q9S7Q7)

GenebankID or UniProtKB
()

(https://www.ebi.ac.uk/QuickGO/term/GO:0003700)
GO:0000977 : RNA polymerase II regulatory region sequence-specific DNA binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0000977)
GO:0043565 : sequence-specific DNA binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0043565)
GO:0008134 : transcription factor binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0008134)
GO:0000982 : transcription factor activity, RNA polymerase II proximal promoter
sequence-specific DNA binding (https://www.ebi.ac.uk/QuickGO/term/GO:0000982)
GO:0044212 : transcription regulatory region DNA binding
(https://www.ebi.ac.uk/QuickGO/term/GO:0044212)

GO - Biological Process

GO:0007275 : multicellular organism development
(https://www.ebi.ac.uk/QuickGO/term/GO:0007275)
GO:0045944 : positive regulation of transcription by RNA polymerase II
(https://www.ebi.ac.uk/QuickGO/term/GO:0045944)
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:0009910 : negative regulation of flower development
(https://www.ebi.ac.uk/QuickGO/term/GO:0009910)
GO:0042752 : regulation of circadian rhythm
(https://www.ebi.ac.uk/QuickGO/term/GO:0042752)
GO:0009266 : response to temperature stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0009266)
GO:0010048 : vernalization response
(https://www.ebi.ac.uk/QuickGO/term/GO:0010048)

GO - Cellular Component

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

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

Aberration Type

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

Indel Size

1-10 kb

Molecular Details of the Mutation

complex structural variations

Experimental Evidence

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

Main Reference

PEP1 of Arabis alpina is encoded by two overlapping genes that contribute to natural genetic variation in perennial flowering. (2012) (https://pubmed.ncbi.nlm.nih.gov/23284298)

Authors

Albani MC; Castaings L; WÃ¶tzel S; Mateos JL; Wunder J; Wang R; Reymond M; Coupland G

Abstract

Higher plants exhibit a variety of different life histories. Annual plants live for less than a year and after flowering produce seeds and senesce. By contrast perennials live for many years, dividing their life cycle into episodes of vegetative growth and flowering. Environmental cues control key check points in both life histories. Genes controlling responses to these cues exhibit natural genetic variation that has been studied most in short-lived annuals. We characterize natural genetic variation conferring differences in the perennial life cycle of Arabis alpina. Previously the accession Pajares was shown to flower after prolonged exposure to cold (vernalization) and only for a limited period before returning to vegetative growth. We describe five accessions of A. alpina that do not require vernalization to flower and flower continuously. Genetic complementation showed that these accessions carry mutant alleles at PERPETUAL FLOWERING 1 (PEP1), which encodes a MADS box transcription factor orthologous to FLOWERING LOCUS C in the annual Arabidopsis thaliana. Each accession carries a different mutation at PEP1, suggesting that such variation has arisen independently many times. Characterization of these alleles demonstrated that in most accessions, including Pajares, the PEP1 locus contains a tandem arrangement of a full length and a partial PEP1 copy, which give rise to two full-length transcripts that are differentially expressed. This complexity contrasts with the single gene present in A. thaliana and might contribute to the more complex expression pattern of PEP1 that is associated with the perennial life-cycle. Our work demonstrates that natural accessions of A. alpina exhibit distinct life histories conferred by differences in PEP1 activity, and that continuous flowering forms have arisen multiple times by inactivation of the floral repressor PEP1. Similar phenotypic variation is found in other herbaceous perennial species, and our results provide a paradigm for how characteristic perennial phenotypes might arise.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS