

GEPHE SUMMARY

Gephebase Gene

EARLY FLOWERING 3(ELF3) [possible pseudo-replicate]

Entry Status

Published

GepheID

GP00001245

Main curator

Arnout

PHENOTYPIC CHANGE

Trait Category

Morphology

Trait

Plant growth (hypocotyl elongation ; temperature-dependent)

Trait State in Taxon A

Arabidopsis thaliana- Bay0

Trait State in Taxon B

Arabidopsis thaliana- Sha

Ancestral State

Data not curated

Taxonomic Status

Intraspecific

Taxon A

Latin Name

Arabidopsis thaliana

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)

NCBI Taxonomy ID

3702

is Taxon A an Intraspecies?

Yes

Taxon A Description

Arabidopsis thaliana- Bay0

Taxon B

Latin Name

Arabidopsis thaliana

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)

NCBI Taxonomy ID

3702

is Taxon B an Intraspecies?

Yes

Taxon B Description

Arabidopsis thaliana- Sha

GENOTYPIC CHANGE

Generic Gene Name

ELF3

Synonyms

EARLY FLOWERING 3; F17H15.25; PYK20; At2g25930; T19L18.26

String

3702.AT2G25930.1

Sequence Similarities

-

GO - Molecular Function

GO:0003700 : DNA-binding transcription factor activity

GO - Biological Process

GO:0009733 : response to auxin

GO:0009826 : unidimensional cell growth

GO:0009737 : response to abscisic acid

GO:0007623 : circadian rhythm

GO:0009409 : response to cold

UniProtKB Arabidopsis thaliana

O82804

GenebankID or UniProtKB

AY062963

GO:0009909 : regulation of flower development
GO:2000028 : regulation of photoperiodism, flowering
GO:0010031 : circumnutation
GO:0048573 : photoperiodism, flowering
GO:0009585 : red, far-red light phototransduction
GO:0010119 : regulation of stomatal movement

GO - Cellular Component
GO:0005634 : nucleus

Presumptive Null
No

Molecular Type
Coding

Aberration Type
SNP

SNP Coding Change
Nonsynonymous

Molecular Details of the Mutation
A362V

Experimental Evidence
Linkage Mapping

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

Natural variants of ELF3 affect thermomorphogenesis by transcriptionally modulating PIF4-dependent auxin response genes. (2015)

Authors

Raschke A; Ibañez C; Ullrich KK; Anwer MU; Becker S; Glöckner A; Trenner J; Denk K; Saal B; Sun X; Ni M; Davis SJ; Delker C; Quint M

Abstract

Perception and transduction of temperature changes result in altered growth enabling plants to adapt to increased ambient temperature. While PHYTOCHROME-INTERACTING FACTOR4 (PIF4) has been identified as a major ambient temperature signaling hub, its upstream regulation seems complex and is poorly understood. Here, we exploited natural variation for thermo-responsive growth in *Arabidopsis thaliana* using quantitative trait locus (QTL) analysis.

We identified GIRAFFE2.1, a major QTL explaining ~18 % of the phenotypic variation for temperature-induced hypocotyl elongation in the Bay-0 x Sha recombinant inbred line population. Transgenic complementation demonstrated that allelic variation in the circadian clock regulator EARLY FLOWERING3 (ELF3) is underlying this QTL. The source of variation could be allocated to a single nucleotide polymorphism in the ELF3 coding region, resulting in differential expression of PIF4 and its target genes, likely causing the observed natural variation in thermo-responsive growth.

In combination with other recent studies, this work establishes the role of ELF3 in the ambient temperature signaling network. Natural variation of ELF3-mediated gating of PIF4 expression during nightly growing periods seems to be affected by a coding sequence quantitative trait nucleotide that confers a selective advantage in certain environments. In addition, natural ELF3 alleles seem to differentially integrate temperature and photoperiod information to induce architectural changes. Thus, ELF3 emerges as an essential coordinator of growth and development in response to diverse environmental cues and implicates ELF3 as an important target of adaptation.

Additional References

RELATED GEPHE

Related Genes

5 (Enhanced shoot growth under mannitol stress 2 (EGM2), IIL1, TZP, FUMARASE 2, ICARUS1)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

diurnal cycling with an extensive light phase seems to be

