

GEPHE SUMMARY

	Gephebase Gene	GephelD
EARLY FLOWERING 3(ELF3) [possible pseudo-replicate] (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^EARLY FLOWERING 3(ELF3) [possible pseudo-replicate]^#gephebase-summary-title)	GP00001245	
Published	Entry Status	Main curator

PHENOTYPIC CHANGE

	Trait Category		
Morphology (https://www.gephebase.org/search-criteria?/and+Trait Category=Morphology^#gephebase-summary-title)	Trait		
Plant growth (hypocotyl elongation ; temperature-dependent) (https://www.gephebase.org/search-criteria?/and+Trait=^Plant growth (hypocotyl elongation ; temperature-dependent)^#gephebase-summary-title)	Trait State in Taxon A		
Arabidopsis thaliana- Bay0	Trait State in Taxon B		
Arabidopsis thaliana- Sha	Ancestral State		
Data not curated	Taxonomic Status		
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)			
	Taxon A	Taxon B	
	Latin Name	Latin Name	
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Arabidopsis thaliana^#gephebase-summary-title)	Common 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	Synonyms
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	Rank	thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	Rank
species	Lineage	species	Lineage
cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis	Parent	cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphylophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis	Parent
Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3701)	NCBI Taxonomy ID	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)		3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 3702)	
Yes	is Taxon A an Infraspecies?	Yes	is Taxon B an Infraspecies?
Arabidopsis thaliana- Bay0	Taxon A Description	Arabidopsis thaliana- Sha	Taxon B Description

GENOTYPIC CHANGE

	Generic Gene Name	UniProtKB Arabidopsis thaliana
ELF3	Synonyms	GenebankID or UniProtKB
EARLY FLOWERING 3; F17H15.25; PYK20; At2g25930; T19L18.26	String	AY062963 (https://www.ncbi.nlm.nih.gov/nucleotide/AY062963)
3702.AT2G25930.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT2G25930.1)	Sequence Similarities	
-	GO - Molecular Function	
GO:0003700 : DNA-binding transcription factor activity (https://www.ebi.ac.uk/QuickGO/term/GO:0003700)		

GO - Biological Process

GO:0009733 : response to auxin (<https://www.ebi.ac.uk/QuickGO/term/GO:0009733>)
 GO:0009826 : unidimensional cell growth
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0009826>)
 GO:0009737 : response to abscisic acid
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0009737>)
 GO:0007623 : circadian rhythm (<https://www.ebi.ac.uk/QuickGO/term/GO:0007623>)
 GO:0009409 : response to cold (<https://www.ebi.ac.uk/QuickGO/term/GO:0009409>)
 GO:0009909 : regulation of flower development
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0009909>)
 GO:2000028 : regulation of photoperiodism, flowering
 (<https://www.ebi.ac.uk/QuickGO/term/GO:2000028>)
 GO:0010031 : circumnutation (<https://www.ebi.ac.uk/QuickGO/term/GO:0010031>)
 GO:0048573 : photoperiodism, flowering
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0048573>)
 GO:0009585 : red, far-red light phototransduction
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0009585>)
 GO:0010119 : regulation of stomatal movement
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0010119>)

GO - Cellular Component

GO:0005634 : nucleus (<https://www.ebi.ac.uk/QuickGO/term/GO:0005634>)

Presumptive Null

No ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive+Null=^No))

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsynonymous

Molecular Details of the Mutation

A362V

Experimental Evidence

Linkage Mapping ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+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) (<https://pubmed.ncbi.nlm.nih.gov/26269119/>)

Authors

Raschke A; Ibañez C; Ullrich KK; Anwer MU; Becker S; Glückner 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 night 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) ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon+ID=^3702#/and+Trait=Plant+growth#and+groupHaplotypes=true))

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

diurnal cycling with an extensive light phase seems to be