

## GEPHE SUMMARY

	Gephebase Gene	GephelD
EARLY FLOWERING 3(ELF3) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a> Gephebase=^EARLY FLOWERING 3(ELF3)^#gephebase-summary-title)	GP00000244	
	Entry Status	Main curator
Published	Martin	

## PHENOTYPIC CHANGE

	Trait Category	
Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a> Category=^Physiology^#gephebase-summary-title)	Trait	
Flowering time ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=^Flowering">https://www.gephebase.org/search-criteria?/and+Trait=^Flowering</a> time^#gephebase-summary-title)	Trait State in Taxon A	
Arabidopsis thaliana - Sha	Trait State in Taxon B	
Arabidopsis thaliana- Bay-0	Ancestral State	
Data not curated	Taxonomic Status	
Intraspecific ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a> Status=^Intraspecific^#gephebase-summary-title)		
Taxon A		Taxon B
	Latin Name	Latin Name
Arabidopsis thaliana ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title</a> )		Arabidopsis thaliana ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title</a> )
thale cress	Common Name	Common Name
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	Synonyms	thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress
species	Rank	Rank
	Lineage	Lineage
cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis		cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; Arabidopsis
Arabidopsis () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701</a> )	Parent	Parent
3702 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702</a> )	NCBI Taxonomy ID	NCBI Taxonomy ID
Yes	is Taxon A an Infraspecies?	is Taxon B an Infraspecies?
Arabidopsis thaliana - Sha	Taxon A Description	Taxon B Description

## GENOTYPIC CHANGE

ELF3	Generic Gene Name	UniProtKB Arabidopsis thaliana
EARLY FLOWERING 3; F17H15.25; PYK20; At2g25930; T19L18.26	Synonyms	GenebankID or UniProtKB
3702.AT2G25930.1 ( <a href="http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT2G25930.1">http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT2G25930.1</a> )	String	AY062963 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/AY062963">https://www.ncbi.nlm.nih.gov/nuccore/AY062963</a> )
-	Sequence Similarities	
GO:0003700 : DNA-binding transcription factor activity ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0003700">https://www.ebi.ac.uk/QuickGO/term/GO:0003700</a> )	GO - Molecular Function	
GO:0009733 : response to auxin ( <a href="https://www.ebi.ac.uk/QuickGO/term/GO:0009733">https://www.ebi.ac.uk/QuickGO/term/GO:0009733</a> )	GO - Biological Process	

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

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

Indel Size

100-999 bp

Molecular Details of the Mutation

Background-dependent effects of extensive polyQ coding variation

Experimental Evidence

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

Main Reference

Network analysis identifies ELF3 as a QTL for the shade avoidance response in Arabidopsis. (2010) (<https://pubmed.ncbi.nlm.nih.gov/20838594>)

Authors

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Abstract

Quantitative Trait Loci (QTL) analyses in immortal populations are a powerful method for exploring the genetic mechanisms that control interactions of organisms with their environment. However, QTL analyses frequently do not culminate in the identification of a causal gene due to the large chromosomal regions often underlying QTLs. A reasonable approach to inform the process of causal gene identification is to incorporate additional genome-wide information, which is becoming increasingly accessible. In this work, we perform QTL analysis of the shade avoidance response in the Bayreuth-0 (Bay-0, CS954) x Shahdara (Sha, CS929) recombinant inbred line population of *Arabidopsis*. We take advantage of the complex pleiotropic nature of this trait to perform network analysis using co-expression, eQTL and functional classification from publicly available datasets to help us find good candidate genes for our strongest QTL, SAR2. This novel network analysis detected EARLY FLOWERING 3 (ELF3; AT2G25930) as the most likely candidate gene affecting the shade avoidance response in our population. Further genetic and transgenic experiments confirmed ELF3 as the causative gene for SAR2. The Bay-0 and Sha alleles of ELF3 differentially regulate developmental time and circadian clock period length in *Arabidopsis*, and the extent of this regulation is dependent on the light environment. This is the first time that ELF3 has been implicated in the shade avoidance response and that different natural alleles of this gene are shown to have phenotypic effects. In summary, we show that development of networks to inform candidate gene identification for QTLs is a promising technique that can significantly accelerate the process of QTL cloning.

Additional References

Combining genome-wide association mapping and transcriptional networks to identify novel genes controlling glucosinolates in *Arabidopsis thaliana*. (2011)

(<https://pubmed.ncbi.nlm.nih.gov/21857804>)

Genetic mapping of natural variation in a shade avoidance response: ELF3 is the candidate gene for a QTL in hypocotyl growth regulation. (2011) (<https://pubmed.ncbi.nlm.nih.gov/20713464>)

Background-dependent effects of polyglutamine variation in the *Arabidopsis thaliana* gene ELF3. (2012) (<https://pubmed.ncbi.nlm.nih.gov/23129635>)

## RELATED GEPHE

### Related Genes

12 (AGAMOUS-LIKE 50, Cryptochrome 2 (CRY2) EDI allele, FLC (Flowering Locus C), FLM (MAF1), Flowering locus T (FT), Frigida (FRI), Frigida like 1 (FRL1), Frigida like 2 (FRL2), MADS AFFECTING FLOWERING 2 (MAF2), SVP (SHORT VEGETATIVE PHASE), VIN3, HUA2) ([#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+TaxonID=^3702/and+Trait=Flowering+time/and+groupHaplotypes=true))

Related Haplotypes

No matches found.

## EXTERNAL LINKS

## COMMENTS

@Pleiotropy @GxE

