GEPHE SUMMARY

Gephebase Gene
phytochrome D (PHYD)

GephelD
GP00000874

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

Trait #1
Trait Category
Morphology

Trait
Leaf morphology (increased petiole length)

Trait State in Taxon A
Arabidopsis thaliana

Trait State in Taxon B
Arabidopsis thaliana Ws

Trait #2
Trait Category
Morphology

Trait
Cotyledon morphology (reduced cotyledon area)

Trait State in Taxon A
-

Trait State in Taxon B
-

Trait #3
Trait Category
Morphology

Trait
Coloration (anthocyanin accumulation in seedling stems)

Trait State in Taxon A
-

Trait State in Taxon B
-

Trait #4
Trait Category
Physiology

Trait
Plant size (diminished effect of end-of-day pulse of far red light on hypocotyl elongation)

Trait State in Taxon A
-

Trait State in Taxon B
-

Trait #5
Trait Category
Morphology

Trait
Plant architecture (decrease in number of rosette leaves at onset of flowering)

Trait State in Taxon A
-

Trait State in Taxon B
-

Ancestral State
Taxon A

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 Infraspecies?
No

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 Infraspecies?
Yes

Taxon B Description
Arabidopsis thaliana Ws

GENOTYPIC CHANGE

Generic Gene Name
PHYD

Synonyms
DL4165C; FCAALL.323; phytochrome D; PHYTOCHROME D; At4g16250; dl4165c

String
3702.AT4G16250.1

Sequence Similarities
Belongs to the phytochrome family.

GO - Molecular Function
GO:0042802 : identical protein binding
GO:0042803 : protein homodimerization activity
GO:0000155 : phosphorelay sensor kinase activity
GO:0009881 : photoreceptor activity

GO - Biological Process
GO:0006355 : regulation of transcription, DNA-templated
GO:0018298 : protein-chromophore linkage
GO:0009585 : red, far-red light phototransduction
GO:0009584 : detection of visible light
GO:0017006 : protein-tetrapyrrole linkage

GO - Cellular Component
GO:0005634 : nucleus

Presumptive Null
Yes

Molecular Type
Coding

Aberration Type
Deletion

Deletion Size
10-99 bp

Molecular Details of the Mutation
14bp deletion causing premature stop codon

Experimental Evidence
Candidate Gene

Main Reference

UniProtKB Arabidopsis thaliana
P42497

GenebankID or UniProtKB
X76609

A deletion in the PHYD gene of the Arabidopsis Wassilewskija ecotype defines a role for phytochrome D in red/far-red light sensing. (1997)

Authors

Aukerman MJ; Hirschfeld M; Wester L; Weaver M; Clack T; Amasino RM; Sharrock RA

Abstract

The PHYD gene of the Wassilewskija (Ws) ecotype of Arabidopsis contains a 14-bp deletion (the phyD-1 mutation) beginning at amino acid 29 of the reading frame, resulting in translation termination at a nonsense codon 138 nucleotides downstream of the deletion end point. Immunoblot analyses showed that Ws lacks phyD but contains normal levels of phyA, phyB, and phyC. By backcrossing into the Ws and Landsberg erecta genetic backgrounds, we constructed sibling pairs of PHYD+ and phyD-1 lines and of phyB- PHYD+ and phyB- phyD- lines. Hypocotyl lengths after growth under white or red light increased sequentially in strains that were B+D+, B+D-, B-D+, and B-D-. In the Ws genetic background, an increase in petiole length, a reduction in cotyledon area and in anthocyanin accumulation in seedling stems, a diminished effect of an end-of-day pulse of far-red light on hypocotyl elongation, and a decrease in the number of rosette leaves at the onset of flowering were also seen sequentially in these lines. Thus, phyD, which is approximately 80% identical in amino acid sequence to phyB, acts in conjunction with phyB in regulating many shade avoidance responses. The existence of the apparently naturally occurring phyD-1 mutation indicates that phyD is not essential in some natural environments.

Additional References

RELATED GEPHE

Related Genes

8 (ACD6 = ACCELERATED CELL DEATH 6, ACS11, AGAMOUS-Like6, AtGA20ox1 (=GA5=Sd1), ERECTA, HUA2, PAP1, PAP2)

Related Haplotypes

No matches found.

COMMENTS

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