

GEPHE SUMMARY

Gephebase Gene
D14 (KAL2 paralog)

Entry Status
Published

GepheID
GP00000213

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Seed dormancy (strigolactone responsiveness)

Trait State in Taxon A
Other spermatophytes

Trait State in Taxon B
Arabidopsis thaliana

Ancestral State
Taxon A

Taxonomic Status
Intergeneric or Higher

	Taxon A	Taxon B
Latin Name	<i>Spermatophyta</i>	<i>Arabidopsis thaliana</i>
Common Name	-	thale cress
Synonyms	seed plants	thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis...thaliana; Arbisopsis thaliana; thale kress
Rank	no rank	species
Lineage	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta	cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis
Parent	Euphyllophyta () - (Rank: no rank)	Arabidopsis () - (Rank: genus)
NCBI Taxonomy ID	58024	3702
is Taxon A an Intraspecies?	No	No

GENOTYPIC CHANGE

Generic Gene Name
D14

Synonyms
D14; D88; HTD2; Os03g0203200; LOC_Os03g10620

String
39947.LOC_Os03g10620.1

Sequence Similarities
Belongs to the AB hydrolase superfamily.

GO - Molecular Function
GO:0016787 : hydrolase activity

GO - Biological Process
GO:0010223 : secondary shoot formation
GO:1901601 : strigolactone biosynthetic process

GO - Cellular Component
GO:0005737 : cytoplasm
GO:0005634 : nucleus

Presumptive Null

UniProtKB *Oryza sativa* subsp. japonica
Q10QA5

GenebankID or UniProtKB

No

Molecular Type

Coding

Aberration Type

Unknown

Molecular Details of the Mutation

Ligand-binding pocket tuning

Experimental Evidence

Candidate Gene

Main Reference

PLANT EVOLUTION. Convergent evolution of strigolactone perception enabled host detection in parasitic plants. (2015)

Authors

Conn CE; Bythell-Douglas R; Neumann D; Yoshida S; Whittington B; Westwood JH; Shirasu K; Bond CS; Dyer KA; Nelson DC

Abstract

Obligate parasitic plants in the Orobanchaceae germinate after sensing plant hormones, strigolactones, exuded from host roots. In *Arabidopsis thaliana*, the β -glucuronidase D14 acts as a strigolactone receptor that controls shoot branching, whereas its ancestral paralog, KAI2, mediates karrikin-specific germination responses. We observed that KAI2, but not D14, is present at higher copy numbers in parasitic species than in nonparasitic relatives. KAI2 paralogs in parasites are distributed into three phylogenetic clades. The fastest-evolving clade, KAI2d, contains the majority of KAI2 paralogs. Homology models predict that the ligand-binding pockets of KAI2d resemble D14. KAI2d transgenes confer strigolactone-specific germination responses to *Arabidopsis thaliana*. Thus, the KAI2 paralogs D14 and KAI2d underwent convergent evolution of strigolactone recognition, respectively enabling developmental responses to strigolactones in angiosperms and host detection in parasites.

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Additional References

RELATED GEPHE

Related Genes

5 (DOG1 (DELAY OF GERMINATION 1), RDO5 REDUCED DORMANCY5, KAI2 paralogs, NCED4, TaPHS1)

Related Haplotypes

No matches found.

COMMENTS