GEPHE SUMMARY

Gephebase Gene

ACD6 = ACCELERATED CELL DEATH 6 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^ACD6 = ACCELERATED CELL DEATH 6^#gephebase-summary-title)

GepheID

GP00000025

Entry Status

Published

Main curator

Martin

PHENOTYPIC CHANGE

Trait #1

Trait Category

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait

Plant size (https://www.gephebase.org/search-criteria?/and+Trait=^Plant size^#gephebase-summary-title)

Trait State in Taxon A

Arabidopsis thaliana

Trait State in Taxon B

Arabidopsis thaliana

Trait #2

Trait Category

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait

Pathogen resistance (plant microbes) (https://www.gephebase.org/search-criteria?/and+Trait=^Pathogen resistance (plant microbes)^#gephebase-summary-title)

Trait State in Taxon A

-

Trait State in Taxon B

-

Trait #3

Trait Category

Physiology (https://www.gephebase.org/search-criteria?/and+Trait Category=^Physiology^#gephebase-summary-title)

Trait

Herbivore resistance (https://www.gephebase.org/search-criteria?/and+Trait=^Herbivore resistance^#gephebase-summary-title)

Trait State in Taxon A

-

Trait State in Taxon B

-

Ancestral State

Data not curated

Taxonomic Status

Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic Status=^Intraspecific^#gephebase-summary-title)

Taxon A

Latin 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; 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;

Taxon B

Latin 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; 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)
(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)

is Taxon A an Infraspecies?

No

Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis

Parent

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)

is Taxon B an Infraspecies?

No

GENOTYPIC CHANGE

Generic Gene Name

ACD6

Synonyms

ACCELERATED CELL DEATH 6; DL3240W; FCAALL.190; At4g14400; dl3240w

String

3702.AT4G14400.1
(http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT4G14400.1)

Sequence Similarities

-

GO - Molecular Function

-

GO - Biological Process

GO:0008219 : cell death (https://www.ebi.ac.uk/QuickGO/term/GO:0008219)
GO:0071446 : cellular response to salicylic acid stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0071446)
GO:0009816 : defense response to bacterium, incompatible interaction
(https://www.ebi.ac.uk/QuickGO/term/GO:0009816)
GO:1900426 : positive regulation of defense response to bacterium
(https://www.ebi.ac.uk/QuickGO/term/GO:1900426)
GO:1902290 : positive regulation of defense response to oomycetes
(https://www.ebi.ac.uk/QuickGO/term/GO:1902290)
GO:0016567 : protein ubiquitination (https://www.ebi.ac.uk/QuickGO/term/GO:0016567)
GO:1900150 : regulation of defense response to fungus
(https://www.ebi.ac.uk/QuickGO/term/GO:1900150)
GO:2000031 : regulation of salicylic acid mediated signaling pathway
(https://www.ebi.ac.uk/QuickGO/term/GO:2000031)
GO:0009617 : response to bacterium (https://www.ebi.ac.uk/QuickGO/term/GO:0009617)
GO:0050826 : response to freezing (https://www.ebi.ac.uk/QuickGO/term/GO:0050826)
GO:0009416 : response to light stimulus
(https://www.ebi.ac.uk/QuickGO/term/GO:0009416)
GO:0009751 : response to salicylic acid
(https://www.ebi.ac.uk/QuickGO/term/GO:0009751)
GO:0009615 : response to virus (https://www.ebi.ac.uk/QuickGO/term/GO:0009615)

GO - Cellular Component

GO:0016020 : membrane (https://www.ebi.ac.uk/QuickGO/term/GO:0016020)
GO:0005887 : integral component of plasma membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0005887)
GO:0030176 : integral component of endoplasmic reticulum membrane
(https://www.ebi.ac.uk/QuickGO/term/GO:0030176)

UniProtKB Arabidopsis thaliana

Q8LPS2 (http://www.uniprot.org/uniprot/Q8LPS2)

GenebankID or UniProtKB

CP002687 (https://www.ncbi.nlm.nih.gov/nuccore/CP002687)

Presumptive Null

Unknown (https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Unknown^#gephebase-summary-title)

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

Various

Experimental Evidence

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

Main Reference

Natural allelic variation underlying a major fitness trade-off in Arabidopsis thaliana. (2010) (https://pubmed.ncbi.nlm.nih.gov/20520716)

Authors

Todesco M; Balasubramanian S; Hu TT; Traw MB; Horton M; Epple P; Kuhns C; Sureshkumar S; Schwartz C; Lanz C; Laitinen RA; Huang Y; Chory J; Lipka V; Borevitz JO; Dangl JL; Bergelson J; Nordborg M; Weigel D

Abstract

Plants can defend themselves against a wide array of enemies, from microbes to large animals, yet there is great variability in the effectiveness of such defences, both within and between species. Some of this variation can be explained by conflicting pressures from pathogens with different modes of attack. A second explanation comes from an evolutionary 'tug of war', in which pathogens adapt to evade detection, until the plant has evolved new recognition capabilities for pathogen invasion. If selection is, however, sufficiently strong, susceptible hosts should remain rare. That this is not the case is best explained by costs incurred from constitutive defences in a pest-free environment. Using a combination of forward genetics and genome-wide association analyses, we demonstrate that allelic diversity at a single locus, ACCELERATED CELL DEATH 6 (ACD6), underpins marked pleiotropic differences in both vegetative growth and resistance to microbial infection and herbivory among natural Arabidopsis thaliana strains. A hyperactive ACD6 allele, compared to the reference allele, strongly enhances resistance to a broad range of

pathogens from different phyla, but at the same time slows the production of new leaves and greatly reduces the biomass of mature leaves. This allele segregates at intermediate frequency both throughout the worldwide range of A. thaliana and within local populations, consistent with this allele providing substantial fitness benefits despite its marked impact on growth.

Additional References

Genome-wide association study of 107 phenotypes in Arabidopsis thaliana inbred lines. (2010) (https://pubmed.ncbi.nlm.nih.gov/20336072)

RELATED GEPHE

Related Genes

24 (AtGA20ox1 (=GA5=Sd1), CYP81F2, Epithiospecifier protein (ESP), ERECTA, RAC1, Resistance related Kinase 1 (RKS1), RLM1, RLM2 cluster, RLM3, RPM1, RPP1-WsA, RPP1-WsB, RPP1-WsC, RPP13, RPP2A-RPP2B, RPP4, RPP5, RPP8, RPS2, RPS4, RPS5, RRS1, WRR4, phytochrome D (PHYD)) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Plant size/or+Taxon ID=^3702^/and+Trait=Pathogen resistance/or+Taxon ID=^3702^/and+Trait=Herbivore resistance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@Pleiotropy @GxE