GEPHE SUMMARY

Gephebase Gene

PER36 (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^PER36^#gephebase-summary-title)

Entry Status

Published

GepheID

GP00001273

Main curator

Arnoult

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Arabidopsis thaliana- Col-0

Trait State in Taxon B

Arabidopsis thaliana Sk-1-1

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; 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?

Yes

Taxon A Description

Arabidopsis thaliana- Col-0

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 B an Infraspecies?

Yes

Taxon B Description

Arabidopsis thaliana Sk-1-1

GENOTYPIC CHANGE

Generic Gene Name

PER36

Synonyms

PER36; peroxidase 36; P36; At3g50990; F24M12.30

String

3702.AT3G50990.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT3G50990.1)

Sequence Similarities

Belongs to the peroxidase family. Classical plant (class III) peroxidase subfamily.

GO - Molecular Function

GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872)
GO:0020037 : heme binding (https://www.ebi.ac.uk/QuickGO/term/GO:0020037)
GO:0004601 : peroxidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004601)

GO - Biological Process

UniProtKB Arabidopsis thaliana

Q9SD46 (http://www.uniprot.org/uniprot/Q9SD46)

GenebankID or UniProtKB

824263 (https://www.ncbi.nlm.nih.gov/nuccore/824263)

GO:0006979 : response to oxidative stress
(https://www.ebi.ac.uk/QuickGO/term/GO:0006979)
GO:0042744 : hydrogen peroxide catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0042744)
GO:0044347 : cell wall polysaccharide catabolic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0044347)
GO:0080001 : mucilage extrusion from seed coat
(https://www.ebi.ac.uk/QuickGO/term/GO:0080001)

GO - Cellular Component

GO:0005576 : extracellular region (https://www.ebi.ac.uk/QuickGO/term/GO:0005576)
GO:0009505 : plant-type cell wall (https://www.ebi.ac.uk/QuickGO/term/GO:0009505)

Presumptive Null

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

Molecular Type

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

Aberration Type

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

SNP Coding Change

Nonsense

Molecular Details of the Mutation

Tyrosine @position 262bp to a stop codon

Experimental Evidence

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

	Taxon A	Taxon B	Position
Codon	-	-	-
Amino-acid	-	-	-

Main Reference

A naturally occurring mutation in an Arabidopsis accession affects a beta-D-galactosidase that increases the hydrophilic potential of rhamnogalacturonan I in seed mucilage. (2007) (https://pubmed.ncbi.nlm.nih.gov/18165330)

Authors

Macquet A; Ralet MC; Loudet O; Kronenberger J; Mouille G; Marion-Poll A; North HM

Abstract

The Arabidopsis thaliana accession Shahdara was identified as a rare naturally occurring mutant that does not liberate seed mucilage on imbibition. The defective locus was found to be allelic to the mum2-1 and mum2-2 mutants. Map-based cloning showed that MUCILAGE-MODIFIED2 (MUM2) encodes the putative beta-D-galactosidase BGAL6. Activity assays demonstrated that one of four major beta-D-galactosidase activities present in developing siliques is absent in mum2 mutants. No difference was observed in seed coat epidermal cell structure between wild-type and mutant seed; however, weakening of the outer tangential cell wall by chemical treatment resulted in the release of mucilage from mum2 seed coat epidermal cells, and the mum2 mucilage only increased slightly in volume, relative to the wild type. Consistent with the absence of beta-D-galactosidase activity in the mutant, the inner layer of mucilage contained more Gal. The allocation of polysaccharides between the inner and outer mucilage layers was also modified in mum2. Mass spectrometry showed that rhamnogalacturonan I in mutant mucilage had more branching between rhamnose and hexose residues relative to the wild type. We conclude that the MUM2/BGAL6 beta-D-galactosidase is required for maturation of rhamnogalacturonan I in seed mucilage by the removal of galactose/galactan branches, resulting in increased swelling and extrusion of the mucilage on seed hydration.

Additional References

Spatiotemporal secretion of PEROXIDASE36 is required for seed coat mucilage extrusion in Arabidopsis. (2013) (https://pubmed.ncbi.nlm.nih.gov/23572548)

RELATED GEPHE

Related Genes

2 (mucilage-modified 2 (mum2), PMEI6) (https://www.gephebase.org/search-criteria?/or+Taxon ID=^3702^/and+Trait=Mucilage/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

Null mutation