

GEPHE SUMMARY

	Gephebase Gene	GephelD
mucilage-modified 2 (mum2) (https://www.gephebase.org/search-criteria?/and+Gene	GP00001276	
Gephebase=^mucilage-modified 2 (mum2)^#gephebase-summary-title)		Main curator
Published	Entry Status	Arnoult

PHENOTYPIC CHANGE

	Trait Category	
Physiology (https://www.gephebase.org/search-criteria?/and+Trait	Trait	
Category=^Physiology^#gephebase-summary-title)		
Mucilage (seeds) (https://www.gephebase.org/search-criteria?/and+Trait=^Mucilage	Trait State in Taxon A	
(seeds)^#gephebase-summary-title)		
Arabidopsis thaliana- Col-0 and other lines	Trait State in Taxon B	
Arabidopsis thaliana- Ale-8 & Sku-20	Ancestral State	
Data not curated	Taxonomic Status	
Intraspecific (https://www.gephebase.org/search-criteria?/and+Taxonomic		
Status=^Intraspecific^#gephebase-summary-title)		
Taxon A		Taxon B
	Latin Name	Latin Name
Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=^Arabidopsis+thaliana^#gephebase-summary-title)		
thale cress	Common Name	
thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress	Synonyms	
species	Rank	
	Lineage	
cellular organisms; Eukaryota; Viriplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelinae; 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)		NCBI Taxonomy ID
is Taxon A an Infraspecies?		is Taxon B an Infraspecies?
Yes	Taxon A Description	Taxon B Description
Arabidopsis thaliana- Col-0 and other lines		Arabidopsis thaliana- Ale-8 & Sku-20

GENOTYPIC CHANGE

BGAL6	Generic Gene Name	UniProtKB Arabidopsis thaliana
	Synonyms	GenebankID or UniProtKB
beta-galactosidase 6; BGAL6; MBK5.28; MBK5_28; MUCILAGE-MODIFIED 2; At5g63800		836500 (https://www.ncbi.nlm.nih.gov/nuccore/836500)
3702.AT5G63800.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier=3702.AT5G63800.1)	String	
Belongs to the glycosyl hydrolase 35 family.	Sequence Similarities	
GO:0004565 : beta-galactosidase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0004565)	GO - Molecular Function	
		GO - Biological Process

GO:0005975 : carbohydrate metabolic process
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0005975>)
 GO:0048354 : mucilage biosynthetic process involved in seed coat development
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0048354>)
 GO:0009827 : plant-type cell wall modification
 (<https://www.ebi.ac.uk/QuickGO/term/GO:0009827>)

GO - Cellular Component

GO:0005773 : vacuole (<https://www.ebi.ac.uk/QuickGO/term/GO:0005773>)
 GO:0048046 : apoplast (<https://www.ebi.ac.uk/QuickGO/term/GO:0048046>)
 GO:0005618 : cell wall (<https://www.ebi.ac.uk/QuickGO/term/GO:0005618>)

Presumptive Null

Yes ([https://www.gephebase.org/search-criteria?/and+Presumptive Null=%27Yes%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Presumptive%20Null=%27Yes%27#gephebase-summary-title))

Molecular Type

Coding ([https://www.gephebase.org/search-criteria?/and+Molecular Type=%27Coding%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Molecular%20Type=%27Coding%27#gephebase-summary-title))

Aberration Type

SNP ([https://www.gephebase.org/search-criteria?/and+Aberration Type=%27SNP%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration%20Type=%27SNP%27#gephebase-summary-title))

SNP Coding Change

Nonsense

Molecular Details of the Mutation

G->T @position 3425 causing premature stop

Experimental Evidence

Candidate Gene ([https://www.gephebase.org/search-criteria?/and+Experimental Evidence=%27Candidate Gene%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Experimental%20Evidence=%27Candidate%20Gene%27#gephebase-summary-title))

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

Main Reference

Local evolution of seed flotation in Arabidopsis. (2014) (<https://pubmed.ncbi.nlm.nih.gov/24625826>)

Authors

Saez-Aguayo S; Rondeau-Mouro C; Macquet A; Kronholm I; Ralet MC; Berger A; Sallé C; Poulain D; Granier F; Botran L; Loudet O; de Meaux J; Marion-Poll A; North HM

Abstract

Arabidopsis seeds rapidly release hydrophilic polysaccharides from the seed coat on imbibition. These form a heavy mucilage layer around the seed that makes it sink in water. Fourteen natural Arabidopsis variants from central Asia and Scandinavia were identified with seeds that have modified mucilage release and float. Four of these have a novel mucilage phenotype with almost none of the released mucilage adhering to the seed and the absence of cellulose microfibrils. Mucilage release was modified in the variants by ten independent causal mutations in four different loci. Seven distinct mutations affected one locus, coding the MUM2 ß-D-galactosidase, and represent a striking example of allelic heterogeneity. The modification of mucilage release has thus evolved a number of times independently in two restricted geographical zones. All the natural mutants identified still accumulated mucilage polysaccharides in seed coat epidermal cells. Using nuclear magnetic resonance (NMR) relaxometry their production and retention was shown to reduce water mobility into internal seed tissues during imbibition, which would help to maintain seed buoyancy. Surprisingly, despite released mucilage being an excellent hydrogel it did not increase the rate of water uptake by internal seed tissues and is more likely to play a role in retaining water around the seed.

Additional References

RELATED GEPHE

Related Genes

2 (PER36, PME16) ([https://www.gephebase.org/search-criteria?/or+Taxon ID=%273702%27/and+Trait=Mucilage/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Taxon%20ID=%273702%27/and+Trait=Mucilage/and+groupHaplotypes=true#gephebase-summary-title))

Related Haplotypes

4 ([https://www.gephebase.org/search-criteria?/or+Gene Gephebase=%27mucilage-modified 2 \(mum2\)%27/and+Taxon ID=%273702%27/or+Gene Gephebase=%27mucilage-modified 2 \(mum2\)%27/and+Taxon ID=%273702%27#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene%20Gephebase=%27mucilage-modified%20(mum2)%27/and+Taxon%20ID=%273702%27/or+Gene%20Gephebase=%27mucilage-modified%20(mum2)%27/and+Taxon%20ID=%273702%27#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS

Another null allele of MUM2 already found in 18165330

