GEPHE SUMMARY

Gephebase Gene

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

Entry Status

Published

GepheID

GP00000100

Main curator

Martin

PHENOTYPIC CHANGE

Trait Category

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

Trait

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

Trait State in Taxon A

Arabidopsis thaliana- Bay-0

Trait State in Taxon B

Arabidopsis thaliana- Shahdara

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- Bay-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- Shahdara

GENOTYPIC CHANGE

Generic Gene Name

APR2

Synonyms

3′-PHOSPHOADENOSINE-5′-PHOSPHOSULFATE (PAPS) REDUCTASE HOMOLOG 43; 5′adenylylphosphosulfate reductase 2; ADENOSINE-5′-PHOSPHOSULFATE REDUCTASE; APS REDUCTASE; APSR; ATAPR2; F19K23.11; F19K23_11; PRH; PRH43; At1g62180

String

3702.AT1G62180.1 (http://string-db.org/newstring_cgi/show_network_section.pl?identifier= 3702.AT1G62180.1)

Sequence Similarities

Belongs to the APS reductase family.

GO - Molecular Function

GO:0033741 : adenylyl-sulfate reductase (glutathione) activity

UniProtKB Arabidopsis thaliana

P92981 (http://www.uniprot.org/uniprot/P92981)

GenebankID or UniProtKB

AF016283 (https://www.ncbi.nlm.nih.gov/nuccore/AF016283)

(https://www.ebi.ac.uk/QuickGO/term/GO:0033741)
GO:0009973 : adenylyl-sulfate reductase activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0009973)
GO:0004604 : phosphoadenylyl-sulfate reductase (thioredoxin) activity
(https://www.ebi.ac.uk/QuickGO/term/GO:0004604)

GO - Biological Process

GO:0045454 : cell redox homeostasis
(https://www.ebi.ac.uk/QuickGO/term/GO:0045454)
GO:0019344 : cysteine biosynthetic process
(https://www.ebi.ac.uk/QuickGO/term/GO:0019344)
GO:0000103 : sulfate assimilation (https://www.ebi.ac.uk/QuickGO/term/GO:0000103)
GO:0019379 : sulfate assimilation, phosphoadenylyl sulfate reduction by phosphoadenylyl-sulfate reductase (thioredoxin) (https://www.ebi.ac.uk/QuickGO/term/GO:0019379)

GO - Cellular Component

GO:0009507 : chloroplast (https://www.ebi.ac.uk/QuickGO/term/GO:0009507)
GO:0009570 : chloroplast stroma (https://www.ebi.ac.uk/QuickGO/term/GO:0009570)

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

Nonsynonymous

Molecular Details of the Mutation

A399E

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

Natural variation for sulfate content in Arabidopsis thaliana is highly controlled by APR2. (2007) (https://pubmed.ncbi.nlm.nih.gov/17589509)

Authors

Loudet O; Saliba-Colombani V; Camilleri C; Calenge F; Gaudon V; Koprivova A; North KA; Kopriva S; Daniel-Vedele F

Abstract

Most agronomic traits of importance, whether physiological (such as nutrient use efficiency) or developmental (such as flowering time), are controlled simultaneously by multiple genes and their interactions with the environment. Here, we show that variation in sulfate content between wild Arabidopsis thaliana accessions Bay-0 and Shahdara is controlled by a major quantitative trait locus that results in a strong interaction with nitrogen availability in the soil. Combining genetic and biochemical results and using a candidate gene approach, we have cloned the underlying gene, showing how a single-amino acid substitution in a key enzyme of the assimilatory sulfate reduction pathway, adenosine 5′-phosphosulfate reductase, is responsible for a decrease in enzyme activity, leading to sulfate accumulation in the plant. This work illustrates the potential of natural variation as a source of new alleles of known genes, which can aid in the study of gene function and metabolic pathway regulation. Our new insights on sulfate assimilation may have an impact on sulfur fertilizer use and stress defense improvement.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@GxE