

GEPHE SUMMARY

<p>AtGA20ox1 (=GA5=Sd1) (https://www.gephebase.org/search-criteria?/and+Gene) Gephebase=[^]AtGA20ox1 (=GA5=Sd1)[^]#gephebase-summary-title</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00000114</p> <p>Martin</p>	<p>GepheID</p> <p>Main curator</p>
Published			

PHENOTYPIC CHANGE

<p>Morphology (https://www.gephebase.org/search-criteria?/and+Trait) Category=[^]Morphology[^]#gephebase-summary-title</p>	<p>Trait Category</p>		
<p>Plant size (dwarfism) (https://www.gephebase.org/search-criteria?/and+Trait) (dwarfism)[^]#gephebase-summary-title</p>	<p>Trait</p>		
<p>Arabidopsis thaliana - Col</p>	<p>Trait State in Taxon A</p>		
<p>Arabidopsis thaliana - dwarf accession (see manuscript)</p>	<p>Trait State in Taxon B</p>		
<p>Taxon A</p>	<p>Ancestral State</p>		
<p>Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic) Status=[^]Domesticated[^]#gephebase-summary-title</p>	<p>Taxonomic Status</p>		
<p>Taxon A</p>		<p>Taxon B</p>	
<p>Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Arabidopsis thaliana[^]#gephebase-summary-title)</p>	<p>Latin Name</p>	<p>Arabidopsis thaliana (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=[^]Arabidopsis thaliana[^]#gephebase-summary-title)</p>	<p>Latin Name</p>
<p>thale cress</p>	<p>Common Name</p>	<p>thale cress</p>	<p>Common Name</p>
<p>thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress</p>	<p>Synonyms</p>	<p>thale cress; mouse-ear cress; thale-cress; Arabidopsis thaliana (L.) Heynh.; Arabidopsis thaliana (thale cress); Arabidopsis_thaliana; Arbisopsis thaliana; thale kress</p>	<p>Synonyms</p>
<p>species</p>	<p>Rank</p>	<p>species</p>	<p>Rank</p>
<p>cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis</p>	<p>Lineage</p>	<p>cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetalae; rosids; malvids; Brassicales; Brassicaceae; Camelineae; Arabidopsis</p>	<p>Lineage</p>
<p>Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)</p>	<p>Parent</p>	<p>Arabidopsis () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3701)</p>	<p>Parent</p>
<p>3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)</p>	<p>NCBI Taxonomy ID</p>	<p>3702 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=3702)</p>	<p>NCBI Taxonomy ID</p>
<p>Yes</p>	<p>is Taxon A an Intraspecies?</p>	<p>Yes</p>	<p>is Taxon B an Intraspecies?</p>
<p>Arabidopsis thaliana - Col</p>	<p>Taxon A Description</p>	<p>Arabidopsis thaliana - dwarf accession (see manuscript)</p>	<p>Taxon B Description</p>

GENOTYPIC CHANGE

<p>GA20OX1</p>	<p>Generic Gene Name</p>	<p>Q39110 (http://www.uniprot.org/uniprot/Q39110)</p>	<p>UniProtKB Arabidopsis thaliana</p>
<p>ARABIDOPSIS THALIANA GIBBERELLIN 20-OXIDASE 1; AT2301; ATGA20OX1; GA REQUIRING 5; GA5; GIBBERELLIN 20-OXIDASE; T30C3.90; T30C3_90; 20ox1; AT2301; At4g25420</p>	<p>Synonyms</p>	<p>U20872 (https://www.ncbi.nlm.nih.gov/nucore/U20872)</p>	<p>GenebankID or UniProtKB</p>
<p>3702.AT4G25420.1 (http://string-db.org/newstring.cgi/show_network_section.pl?identifier=3702.AT4G25420.1)</p>	<p>String</p>		
<p>Belongs to the iron/ascorbate-dependent oxidoreductase family. GA20OX subfamily.</p>	<p>Sequence Similarities</p>		
<p>GO:0046872 : metal ion binding (https://www.ebi.ac.uk/QuickGO/term/GO:0046872) GO:0051213 : dioxygenase activity (https://www.ebi.ac.uk/QuickGO/term/GO:0051213)</p>	<p>GO - Molecular Function</p>		

GO:0045544 : gibberellin 20-oxidase activity
(<https://www.ebi.ac.uk/QuickGO/term/GO:0045544>)

GO - Biological Process

GO:0009908 : flower development (<https://www.ebi.ac.uk/QuickGO/term/GO:0009908>)

GO:0009740 : gibberellic acid mediated signaling pathway
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009740>)

GO:0009686 : gibberellin biosynthetic process
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009686>)

GO:0048366 : leaf development (<https://www.ebi.ac.uk/QuickGO/term/GO:0048366>)

GO:0009739 : response to gibberellin
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009739>)

GO:0048575 : short-day photoperiodism, flowering
(<https://www.ebi.ac.uk/QuickGO/term/GO:0048575>)

GO:0009826 : unidimensional cell growth
(<https://www.ebi.ac.uk/QuickGO/term/GO:0009826>)

GO - Cellular Component

GO:0005737 : cytoplasm (<https://www.ebi.ac.uk/QuickGO/term/GO:0005737>)

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

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

Insertion Size

1-9 bp

Molecular Details of the Mutation

+7bp "G" at +961

Experimental Evidence

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

Main Reference

Arabidopsis semidwarfs evolved from independent mutations in GA20ox1, ortholog to green revolution dwarf alleles in rice and barley. (2013) (<https://pubmed.ncbi.nlm.nih.gov/24023067>)

Authors

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Abstract

Understanding the genetic bases of natural variation for developmental and stress-related traits is a major goal of current plant biology. Variation in plant hormone levels and signaling might underlie such phenotypic variation occurring even within the same species. Here we report the genetic and molecular basis of semidwarf individuals found in natural *Arabidopsis thaliana* populations. Allelism tests demonstrate that independent loss-of-function mutations at GA locus 5 (GA5), which encodes gibberellin 20-oxidase 1 (GA20ox1) involved in the last steps of gibberellin biosynthesis, are found in different populations from southern, western, and northern Europe; central Asia; and Japan. Sequencing of GA5 identified 21 different loss-of-function alleles causing semidwarfness without any obvious general tradeoff affecting plant performance traits. GA5 shows signatures of purifying selection, whereas GA5 loss-of-function alleles can also exhibit patterns of positive selection in specific populations as shown by Fay and Wu's H statistics. These results suggest that antagonistic pleiotropy might underlie the occurrence of GA5 loss-of-function mutations in nature. Furthermore, because GA5 is the ortholog of rice SD1 and barley Sdw1/Denso green revolution genes, this study illustrates the occurrence of conserved adaptive evolution between wild *A.thaliana* and domesticated plants.

Additional References

RELATED GEPHE

Related Genes

2 (ACD6 = ACCELERATED CELL DEATH 6, phytochrome D (PHYD)) (<https://www.gephebase.org/search-criteria?/or+Taxon+ID=~3702^/and+Trait=Plant+size/and+groupHaplotypes=true#gephebase-summary-title>)

Related Haplotypes

19 ([https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~AtGA20ox1\(=GA5=Sd1\)^/and+Taxon+ID=~3702^/or+Gene+Gephebase=~AtGA20ox1\(=GA5=Sd1\)^/and+Taxon+ID=~3702^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/or+Gene+Gephebase=~AtGA20ox1(=GA5=Sd1)^/and+Taxon+ID=~3702^/or+Gene+Gephebase=~AtGA20ox1(=GA5=Sd1)^/and+Taxon+ID=~3702^#gephebase-summary-title))

EXTERNAL LINKS

COMMENTS