GEPHE SUMMARY

Gephebase Gene
MATE1/AltSB/SbMATE (https://www.gephebase.org/search-criteria?/and+Gene Gephebase=^MATE1/AltSB/SbMATE^#gephebase-summary-title)

GepheID
GP00000565

Entry Status
Published

Main curator
Martin

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
Sorghum bicolor- aluminum-tolerant SC283

Trait State in Taxon B
Sorghum bicolor - aluminum-sensitive BR007

Ancestral State
Data not curated

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

Taxon A

Latin Name
Sorghum bicolor (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Sorghum bicolor^#gephebase-summary-title)

Common Name
sorghum

Synonyms
Andropogon sorghum; Sorghum bicolor subsp. bicolor; Sorghum nervosum; Sorghum saccharatum; Sorghum vulgare; sorghum; broomcorn; milo; Andropogon sorghum (L.) Brot.; Sorghum bicolor (L.) Moench; Sorghum nervosum Besser ex Schult.; Sorghum saccharatum (L.) Moench; Sorghum vulgare Pers.; Sorghum bicolor milo; Sorghum_bicolor

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Sorghinae; Sorghum

Parent
Sorghum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4557)

NCBI Taxonomy ID
4558 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4558)

is Taxon A an Infraspecies?
Yes

Taxon A Description
Sorghum bicolor- aluminum-tolerant SC283

Taxon B

Latin Name
Sorghum bicolor (https://www.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Sorghum bicolor^#gephebase-summary-title)

Common Name
sorghum

Synonyms
Andropogon sorghum; Sorghum bicolor subsp. bicolor; Sorghum nervosum; Sorghum saccharatum; Sorghum vulgare; sorghum; broomcorn; milo; Andropogon sorghum (L.) Brot.; Sorghum bicolor (L.) Moench; Sorghum nervosum Besser ex Schult.; Sorghum saccharatum (L.) Moench; Sorghum vulgare Pers.; Sorghum bicolor milo; Sorghum_bicolor

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Sorghinae; Sorghum

Parent
Sorghum () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4557)

NCBI Taxonomy ID
4558 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4558)

is Taxon B an Infraspecies?
Yes

Taxon B Description
Sorghum bicolor - aluminum-sensitive BR007

GENOTYPIC CHANGE

Generic Gene Name
-

Synonyms
-

String
-

Sequence Similarities
-

GO - Molecular Function
-

GO - Biological Process
-

GO - Cellular Component
-

UniProtKB
()

GenebankID or UniProtKB
ABS89149 (https://www.ncbi.nlm.nih.gov/nuccore/ABS89149)

-

Presumptive Null

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

Molecular Type

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

Aberration Type

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

Molecular Details of the Mutation

unknown

Experimental Evidence

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

Main Reference

A gene in the multidrug and toxic compound extrusion (MATE) family confers aluminum tolerance in sorghum. (2007) (https://pubmed.ncbi.nlm.nih.gov/17721535)

Authors

Magalhaes JV; Liu J; GuimarÃ£es CT; Lana UG; Alves VM; Wang YH; Schaffert RE; Hoekenga OA; PiÃ±eros MA; Shaff JE; Klein PE; Carneiro NP; Coelho CM; Trick HN; Kochian LV

Abstract

Crop yields are significantly reduced by aluminum toxicity on highly acidic soils, which comprise up to 50% of the world's arable land. Candidate aluminum tolerance proteins include organic acid efflux transporters, with the organic acids forming non-toxic complexes with rhizosphere aluminum. In this study, we used positional cloning to identify the gene encoding a member of the multidrug and toxic compound extrusion (MATE) family, an aluminum-activated citrate transporter, as responsible for the major sorghum (Sorghum bicolor) aluminum tolerance locus, Alt(SB). Polymorphisms in regulatory regions of Alt(SB) are likely to contribute to large allelic effects, acting to increase Alt(SB) expression in the root apex of tolerant genotypes. Furthermore, aluminum-inducible Alt(SB) expression is associated with induction of aluminum tolerance via enhanced root citrate exudation. These findings will allow us to identify superior Alt(SB) haplotypes that can be incorporated via molecular breeding and biotechnology into acid soil breeding programs, thus helping to increase crop yields in developing countries where acidic soils predominate.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS