

GEPHE SUMMARY

|                                                                                                                                                                                                                                       |            |              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--------------|
| Gephebase Gene                                                                                                                                                                                                                        |            | GepheID      |
| MATE1/ZmMATE1 ( <a href="https://www.gephebase.org/search-criteria?/and+GeneGephebase=MATE1/ZmMATE1#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+GeneGephebase=MATE1/ZmMATE1#gephebase-summary-title</a> ) | GP00000566 |              |
| Entry Status                                                                                                                                                                                                                          | Martin     | Main curator |
| Published                                                                                                                                                                                                                             |            |              |

PHENOTYPIC CHANGE

|                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Trait Category                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                          |
| Physiology ( <a href="https://www.gephebase.org/search-criteria?/and+TraitCategory=Physiology#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TraitCategory=Physiology#gephebase-summary-title</a> )                                                                             |                                                                                                                                                                                                                                                                                                          |
| Trait                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                          |
| Metal tolerance ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=Metaltolerance#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=Metaltolerance#gephebase-summary-title</a> )                                                                                |                                                                                                                                                                                                                                                                                                          |
| Trait State in Taxon A                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                          |
| Zea mays - Cateto Al237 (Al-tolerant)                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                          |
| Trait State in Taxon B                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                          |
| Zea mays - Cateto L53 (Al-sensitive)                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                          |
| Ancestral State                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                          |
| Data not curated                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                          |
| Taxonomic Status                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                          |
| Domesticated ( <a href="https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=Domesticated#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TaxonomicStatus=Domesticated#gephebase-summary-title</a> )                                                                   |                                                                                                                                                                                                                                                                                                          |
| Taxon A                                                                                                                                                                                                                                                                                                  | Taxon B                                                                                                                                                                                                                                                                                                  |
| Latin Name                                                                                                                                                                                                                                                                                               | Latin Name                                                                                                                                                                                                                                                                                               |
| Zea mays ( <a href="https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=Zeamays#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=Zeamays#gephebase-summary-title</a> )                                                                               | Zea mays ( <a href="https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=Zeamays#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+TaxonandSynonyms=Zeamays#gephebase-summary-title</a> )                                                                               |
| Common Name                                                                                                                                                                                                                                                                                              | Common Name                                                                                                                                                                                                                                                                                              |
| -                                                                                                                                                                                                                                                                                                        | -                                                                                                                                                                                                                                                                                                        |
| Synonyms                                                                                                                                                                                                                                                                                                 | Synonyms                                                                                                                                                                                                                                                                                                 |
| Zea mays var. japonica; maize; Zea mays L.; Zea mays mays                                                                                                                                                                                                                                                | Zea mays var. japonica; maize; Zea mays L.; Zea mays mays                                                                                                                                                                                                                                                |
| Rank                                                                                                                                                                                                                                                                                                     | Rank                                                                                                                                                                                                                                                                                                     |
| species                                                                                                                                                                                                                                                                                                  | species                                                                                                                                                                                                                                                                                                  |
| Lineage                                                                                                                                                                                                                                                                                                  | Lineage                                                                                                                                                                                                                                                                                                  |
| cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea | cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea |
| Parent                                                                                                                                                                                                                                                                                                   | Parent                                                                                                                                                                                                                                                                                                   |
| Zea () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575</a> )                                                                                                                               | Zea () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575</a> )                                                                                                                               |
| NCBI Taxonomy ID                                                                                                                                                                                                                                                                                         | NCBI Taxonomy ID                                                                                                                                                                                                                                                                                         |
| 4577 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577</a> )                                                                                                                                                 | 4577 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577</a> )                                                                                                                                                 |
| is Taxon A an Intraspecies?                                                                                                                                                                                                                                                                              | is Taxon B an Intraspecies?                                                                                                                                                                                                                                                                              |
| Yes                                                                                                                                                                                                                                                                                                      | Yes                                                                                                                                                                                                                                                                                                      |
| Taxon A Description                                                                                                                                                                                                                                                                                      | Taxon B Description                                                                                                                                                                                                                                                                                      |
| Zea mays - Cateto Al237 (Al-tolerant)                                                                                                                                                                                                                                                                    | Zea mays - Cateto L53 (Al-sensitive)                                                                                                                                                                                                                                                                     |

GENOTYPIC CHANGE

|                                                                                                                                                                                                                         |  |                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------|
| Generic Gene Name                                                                                                                                                                                                       |  | UniProtKB                                                                                                              |
| -                                                                                                                                                                                                                       |  | GenebankID or UniProtKB                                                                                                |
| Synonyms                                                                                                                                                                                                                |  | AFW74381 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/AFW74381">https://www.ncbi.nlm.nih.gov/nuccore/AFW74381</a> ) |
| -                                                                                                                                                                                                                       |  |                                                                                                                        |
| String                                                                                                                                                                                                                  |  |                                                                                                                        |
| -                                                                                                                                                                                                                       |  |                                                                                                                        |
| Sequence Similarities                                                                                                                                                                                                   |  |                                                                                                                        |
| -                                                                                                                                                                                                                       |  |                                                                                                                        |
| GO - Molecular Function                                                                                                                                                                                                 |  |                                                                                                                        |
| -                                                                                                                                                                                                                       |  |                                                                                                                        |
| GO - Biological Process                                                                                                                                                                                                 |  |                                                                                                                        |
| -                                                                                                                                                                                                                       |  |                                                                                                                        |
| GO - Cellular Component                                                                                                                                                                                                 |  |                                                                                                                        |
| -                                                                                                                                                                                                                       |  |                                                                                                                        |
| Presumptive Null                                                                                                                                                                                                        |  |                                                                                                                        |
| Unknown ( <a href="https://www.gephebase.org/search-criteria?/and+PresumptiveNull=Unknown#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+PresumptiveNull=Unknown#gephebase-summary-title</a> ) |  |                                                                                                                        |

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Unknown ( <a +unknown+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Molecular+Type=">https://www.gephebase.org/search-criteria?/and+Molecular+Type="+Unknown+"#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Molecular Type                    |
| Unknown ( <a +unknown+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Aberration+Type=">https://www.gephebase.org/search-criteria?/and+Aberration+Type="+Unknown+"#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Aberration Type                   |
| unknown                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Molecular Details of the Mutation |
| Candidate Gene ( <a +candidate+gene+"#gephebase-summary-title"="" href="https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=">https://www.gephebase.org/search-criteria?/and+Experimental+Evidence="+Candidate+Gene+"#gephebase-summary-title</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Experimental Evidence             |
| Two functionally distinct members of the MATE (multi-drug and toxic compound extrusion) family of transporters potentially underlie two major aluminum tolerance QTLs in maize. (2010) ( <a href="https://pubmed.ncbi.nlm.nih.gov/20003133">https://pubmed.ncbi.nlm.nih.gov/20003133</a> )                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Main Reference                    |
| Maron LG; Piñeros MA; Guimarães CT; Magalhães JV; Pleiman JK; Mao C; Shaff J; Belicuas SN; Kochian LV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Authors                           |
| Crop yields are significantly reduced by aluminum (Al) toxicity on acidic soils, which comprise up to 50% of the world's arable land. Al-activated release of ligands (such as organic acids) from the roots is a major Al tolerance mechanism in plants. In maize, Al-activated root citrate exudation plays an important role in tolerance. However, maize Al tolerance is a complex trait involving multiple genes and physiological mechanisms. Recently, transporters from the MATE family have been shown to mediate Al-activated citrate exudation in a number of plant species. Here we describe the cloning and characterization of two MATE family members in maize, ZmMATE1 and ZmMATE2, which co-localize to major Al tolerance QTL. Both genes encode plasma membrane proteins that mediate significant anion efflux when expressed in <i>Xenopus</i> oocytes. ZmMATE1 expression is mostly concentrated in root tissues, is up-regulated by Al and is significantly higher in Al-tolerant maize genotypes. In contrast, ZmMATE2 expression is not specifically localized to any particular tissue and does not respond to Al. [(14)C]-citrate efflux experiments in oocytes demonstrate that ZmMATE1 is a citrate transporter. In addition, ZmMATE1 expression confers a significant increase in Al tolerance in transgenic <i>Arabidopsis</i> . Our data suggests that ZmMATE1 is a functional homolog of the Al tolerance genes recently characterized in sorghum, barley and <i>Arabidopsis</i> , and is likely to underlie the largest maize Al tolerance QTL found on chromosome 6. However, ZmMATE2 most likely does not encode a citrate transporter, and could be involved in a novel Al tolerance mechanism. | Abstract                          |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Additional References             |

RELATED GEPHE

|                   |                    |
|-------------------|--------------------|
| No matches found. | Related Genes      |
| No matches found. | Related Haplotypes |

EXTERNAL LINKS

COMMENTS