GEPHE SUMMARY

Gephebase Gene
ZmNAC111 (https://recette.gephebase.org/search-criteria?/and+Gene Gephebase=^ZmNAC111^#gephebase-summary-title)

GepheID
GP00002084

Entry Status
Published

Main curator
-

PHENOTYPIC CHANGE

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

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

Trait State in Taxon A
lower drought tolerance

Trait State in Taxon B
higher drought tolerance

Ancestral State
Taxon A

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

Taxon A

Latin Name
Zea mays (https://recette.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Zea mays^#gephebase-summary-title)

Common Name
-

Synonyms
Zea mays var. japonica; maize; Zea mays L.; Zea mays mays

Rank
species

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

Parent
Zea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4575)

NCBI Taxonomy ID
4577 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4577)

is Taxon A an Infraspecies?
No

Taxon B

Latin Name
Zea mays (https://recette.gephebase.org/search-criteria?/and+Taxon and Synonyms=^Zea mays^#gephebase-summary-title)

Common Name
-

Synonyms
Zea mays var. japonica; maize; Zea mays L.; Zea mays mays

Rank
species

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

Parent
Zea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4575)

NCBI Taxonomy ID
4577 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id= 4577)

is Taxon B an Infraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
-

Synonyms
-

String
-

Sequence Similarities
-

GO - Molecular Function
-

GO - Biological Process
-

GO - Cellular Component
-

UniProtKB
()

GenebankID or UniProtKB
()

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

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

Aberration Type

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

Insertion Size

1-10 kb

Molecular Details of the Mutation

MITE insertion within the ZmCCT promoter which results in histone hypermethylation and represses the expression of NAC; resulting in a higher drought tolerance.

Experimental Evidence

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

Main Reference

CACTA-like transposable element in ZmCCT attenuated photoperiod sensitivity and accelerated the postdomestication spread of maize. (2013) (https://pubmed.ncbi.nlm.nih.gov/24089449)

Authors

Yang Q; Li Z; Li W; Ku L; Wang C; Ye J; Li K; Yang N; Li Y; Zhong T; Li J; Chen Y; Yan J; Yang X; Xu M

Abstract

The postdomestication adaptation of maize to longer days required reduced photoperiod sensitivity to optimize flowering time. We performed a genome-wide association study and confirmed that ZmCCT, encoding a CCT domain-containing protein, is associated with the photoperiod response. In early-flowering maize we detected a CACTA-like transposable element (TE) within the ZmCCT promoter that dramatically reduced flowering time. TE insertion likely occurred after domestication and was selected as maize adapted to temperate zones. This process resulted in a strong selective sweep within the TE-related block of linkage disequilibrium. Functional validations indicated that the TE represses ZmCCT expression to reduce photoperiod sensitivity, thus accelerating maize spread to long-day environments.

Additional References

RELATED GEPHE

Related Genes

1 (ZmVPP1) (https://recette.gephebase.org/search-criteria?/or+Taxon ID=^4577^/and+Trait=Drought tolerance/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS

@TE - Postdomestication adaptation of maize to longer days (reduced photoperiod sensitivity to optimize flowering time). The TE insertion likely occurred after domestication and was selected as maize adapted to temperate zones. This process resulted in a strong @SelectiveSweep within the TE-related block of linkage disequilibrium.