

GEPHE SUMMARY

ZmNAC111 (https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~ZmNAC111^#gephebase-summary-title)	Gephebase Gene	GP00002084	GepheID
Published	Entry Status	-	Main curator

PHENOTYPIC CHANGE

Morphology, Physiology (https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^/and+Trait+Category=~Physiology^#gephebase-summary-title)	Trait Category	
Drought tolerance (https://www.gephebase.org/search-criteria?/and+Trait=~Drought+tolerance^#gephebase-summary-title)	Trait	
lower drought tolerance	Trait State in Taxon A	
higher drought tolerance	Trait State in Taxon B	
Taxon A	Ancestral State	
Domesticated (https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Domesticated^#gephebase-summary-title)	Taxonomic Status	

Taxon A	Latin Name	Taxon B	Latin Name
Zea mays (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title)	Zea mays (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title)	Zea mays (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title)	Zea mays (https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Zea+mays^#gephebase-summary-title)
-	Common Name	-	Common Name
Zea mays var. japonica; maize; Zea mays L.; Zea mays mays	Synonyms	Zea mays var. japonica; maize; Zea mays L.; Zea mays mays	Synonyms
species	Rank	species	Rank
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Poaceae; PACMAD clade; Panicoideae; Andropogonodae; Andropogoneae; Tripsacinae; Zea	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	Lineage
Zea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575)	Parent	Zea () - (Rank: genus) (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4575)	Parent
4577 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577)	NCBI Taxonomy ID	4577 (https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=4577)	NCBI Taxonomy ID
No	is Taxon A an Intraspecies?	No	is Taxon B an Intraspecies?

GENOTYPIC CHANGE

-	Generic Gene Name	0	UniProtKB
-	Synonyms	0	GenebankID or UniProtKB
-	String		
-	Sequence Similarities		
-	GO - Molecular Function		
-	GO - Biological Process		
-	GO - Cellular Component		
Yes (https://www.gephebase.org/search-criteria?/and+Presumptive+Null=~Yes^#gephebase-summary-title)			Presumptive Null
Cis-regulatory (https://www.gephebase.org/search-criteria?/and+Molecular+Type=~Cis-regulatory^#gephebase-summary-title)			Molecular Type

Insertion (<https://www.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://www.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://www.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.