

GEPHE SUMMARY

Gephebase Gene
BvCPSF73-1a

Entry Status
Published

GepheID
GP00001411

Main curator
Prigent

PHENOTYPIC CHANGE

Trait Category
Physiology

Trait
Bolting time

Trait State in Taxon A
Biennial sugar beet 93161P regularly bolting after winter

Trait State in Taxon B
biennial sugar beet BETA1773 never-bolting after winter

Ancestral State
Taxon A

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Beta vulgaris

Common Name
-

Synonyms
Beta altissima; beet; Beta altissima Steud.; Beta vulgaris L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; Caryophyllales; Chenopodiaceae; Betoideae; Beta

Parent
Beta () - (Rank: genus)

NCBI Taxonomy ID
161934

is Taxon A an Intraspecies?
Yes

Taxon A Description
Biennial sugar beet 93161P regularly bolting after winter

Taxon B

Latin Name
Beta vulgaris

Common Name
-

Synonyms
Beta altissima; beet; Beta altissima Steud.; Beta vulgaris L.

Rank
species

Lineage
cellular organisms; Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliophyta; Mesangiospermae; eudicotyledons; Gunneridae; Pentapetales; Caryophyllales; Chenopodiaceae; Betoideae; Beta

Parent
Beta () - (Rank: genus)

NCBI Taxonomy ID
161934

is Taxon B an Intraspecies?
Yes

Taxon B Description
biennial sugar beet BETA1773 never-bolting after winter

GENOTYPIC CHANGE

Generic Gene Name
CPSF73-1

Synonyms
cleavage and polyadenylation specificity factor 73-1; T7P1.15; T7P1L15; At1g61010

String
3702.AT1G61010.1

Sequence Similarities
Belongs to the metallo-beta-lactamase superfamily. RNA-metabolizing metallo-beta-lactamase-like family. INTS11 subfamily.

GO - Molecular Function
GO:0003723 : RNA binding
GO:0008409 : 5'-3' exonuclease activity
GO:0004521 : endoribonuclease activity

GO - Biological Process
GO:0006398 : mRNA 3'-end processing by stem-loop binding and cleavage
GO:0006378 : mRNA polyadenylation
GO:0098789 : pre-mRNA cleavage required for polyadenylation
GO:0031126 : snoRNA 3'-end processing

UniProtKB Arabidopsis thaliana
Q9C952

GenebankID or UniProtKB

GO:0034247 : snoRNA splicing
GO:0016180 : snRNA processing
GO:0006369 : termination of RNA polymerase II transcription

GO - Cellular Component
GO:0005634 : nucleus
GO:0005847 : mRNA cleavage and polyadenylation specificity factor complex

Presumptive Null

Yes

Molecular Type

Coding

Aberration Type

Deletion

Deletion Size

1-9 bp

Molecular Details of the Mutation

2bp deletion causing a frameshift resulting in a two third truncated protein

Experimental Evidence

Linkage Mapping

Main Reference

[A Detailed Analysis of the BR Locus Suggests a New Mechanism for Bolting after Winter in Sugar Beet \(*Beta vulgaris* L.\). \(2016\)](#)

Authors

Tränkner C; Lemnian IM; Emrani N; Pfeiffer N; Tiwari SP; Kopisch-Obuch FJ; Vogt SH; Mähler AE; Schilhabel M; Jung C; Grosse I

Abstract

Sugar beet (*Beta vulgaris* ssp. *vulgaris*) is a biennial, sucrose-storing plant, which is mainly cultivated as a spring crop and harvested in the vegetative stage before winter. For increasing beet yield, over-winter cultivation would be advantageous. However, bolting is induced after winter and drastically reduces yield. Thus, post-winter bolting control is essential for winter beet cultivation. To identify genetic factors controlling bolting after winter, a F population was previously developed by crossing the sugar beet accessions BETA 1773 with reduced bolting tendency and 93161P with complete bolting after winter. For a mapping-by-sequencing analysis, pools of 26 bolting-resistant and 297 bolting F plants were used. Thereby, a single continuous homozygous region of 103 kb was co-localized to the previously published BR QTL for post-winter bolting resistance (Pfeiffer et al., 2014). The BR locus was narrowed down to 11 candidate genes from which a homolog of the *Arabidopsis* CLEAVAGE AND POLYADENYLATION SPECIFICITY FACTOR 73-I (CPSF73-I) was identified as the most promising candidate. A 2 bp deletion within the BETA 1773 allele of BvCPSF73-Ia results in a truncated protein. However, the null allele of BvCPSF73-Ia might partially be compensated by a second BvCPSF73-Ib gene. This gene is located 954 bp upstream of BvCPSF73-Ia and could be responsible for the incomplete penetrance of the post-winter bolting resistance allele of BETA 1773. This result is an important milestone for breeding winter beets with complete bolting resistance after winter.

Additional References

RELATED GEPHE

Related Genes

No matches found.

Related Haplotypes

No matches found.

EXTERNAL LINKS

COMMENTS