

Supplementary Informations

Title: Heterologous expression of xanthophyll esterase genes affects carotenoid accumulation in petunia corollas.

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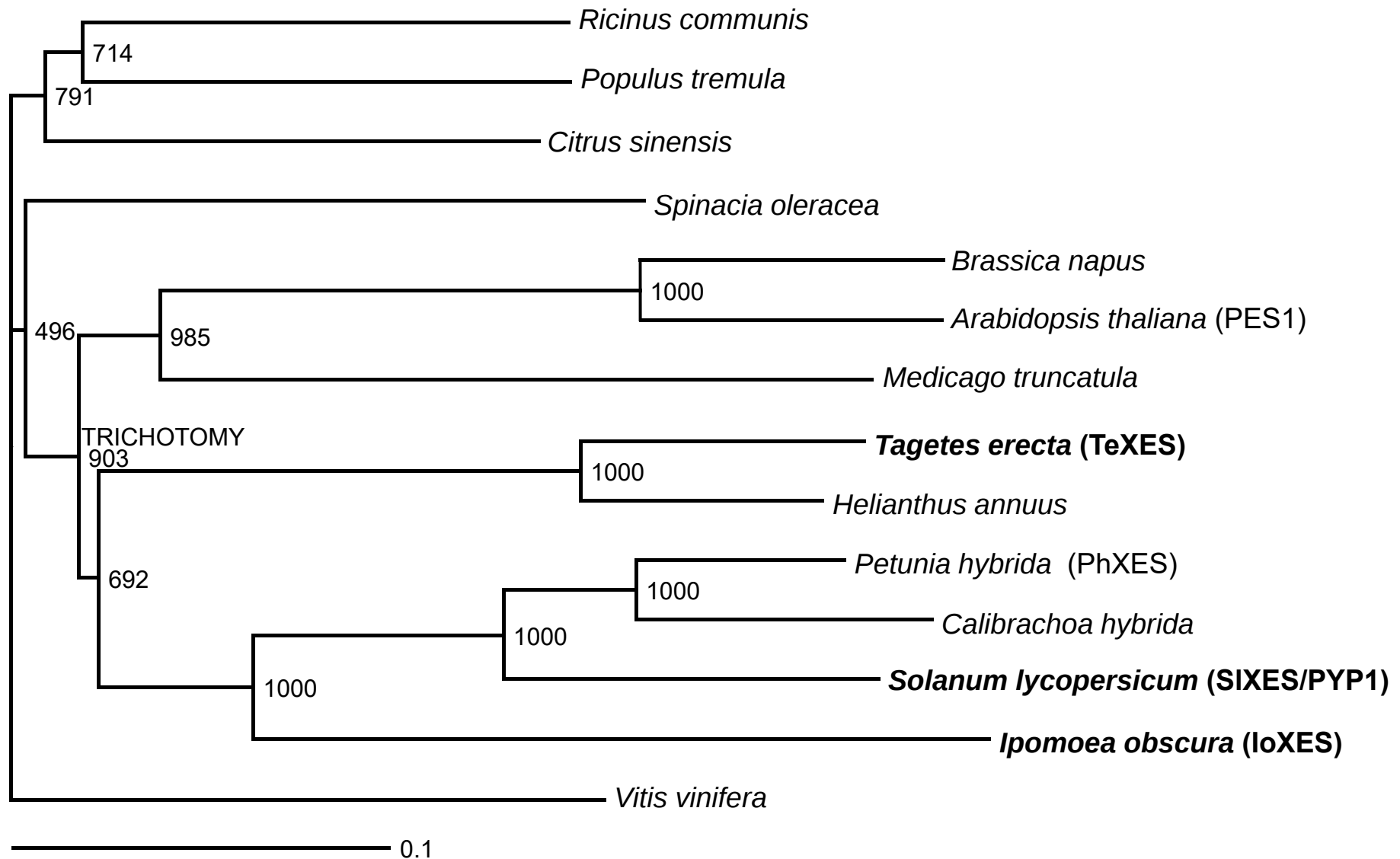
Supplementary Table S1. Primers used for cloning of *XES*s.

Gene	I. D.	Sequence
<i>IoXES</i>	GSP1	CCACCGGGATAGAGGAGCACATGA
	GSP2	CCTCCTTGAACGGCGATATGTGCT
	5' end-1F (3' RACE)	TTGGGAAGCATTGATTTTAGAGCCC
	5' end-2F (3' RACE)	ATGGCTTTGATTATGCAGAGTTTTAAATTA
<i>TeXES</i>	GSP1	GCCGGATGTGCTATACCACGAACGA
	GSP2	AAATAAGTGGCGCGAGTTCTAACCC
	5' end-1F (3' RACE)	CACATTCACCCAATTCTTGTAACACAGC
	5' end-2F (3' RACE)	ATGTTTGTAAGCTACAGCTTCAATTG
<i>SIXES</i>	F	ATGGCTTCTCTTCTGCATAATTC
	R	TCATCTAAAAATCAAATGTTGGGACA

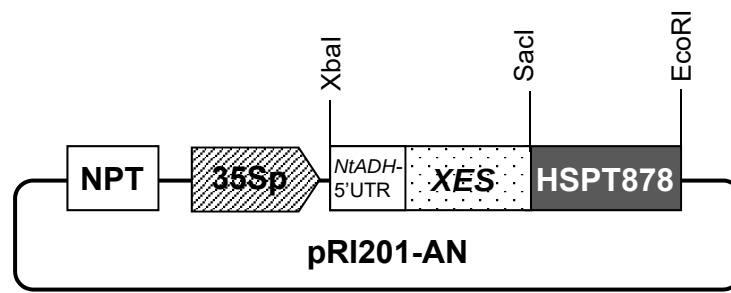
F, forward; R, reverse

Supplementary Table S2. Primers for RT-qPCR of introduced *XES* s.

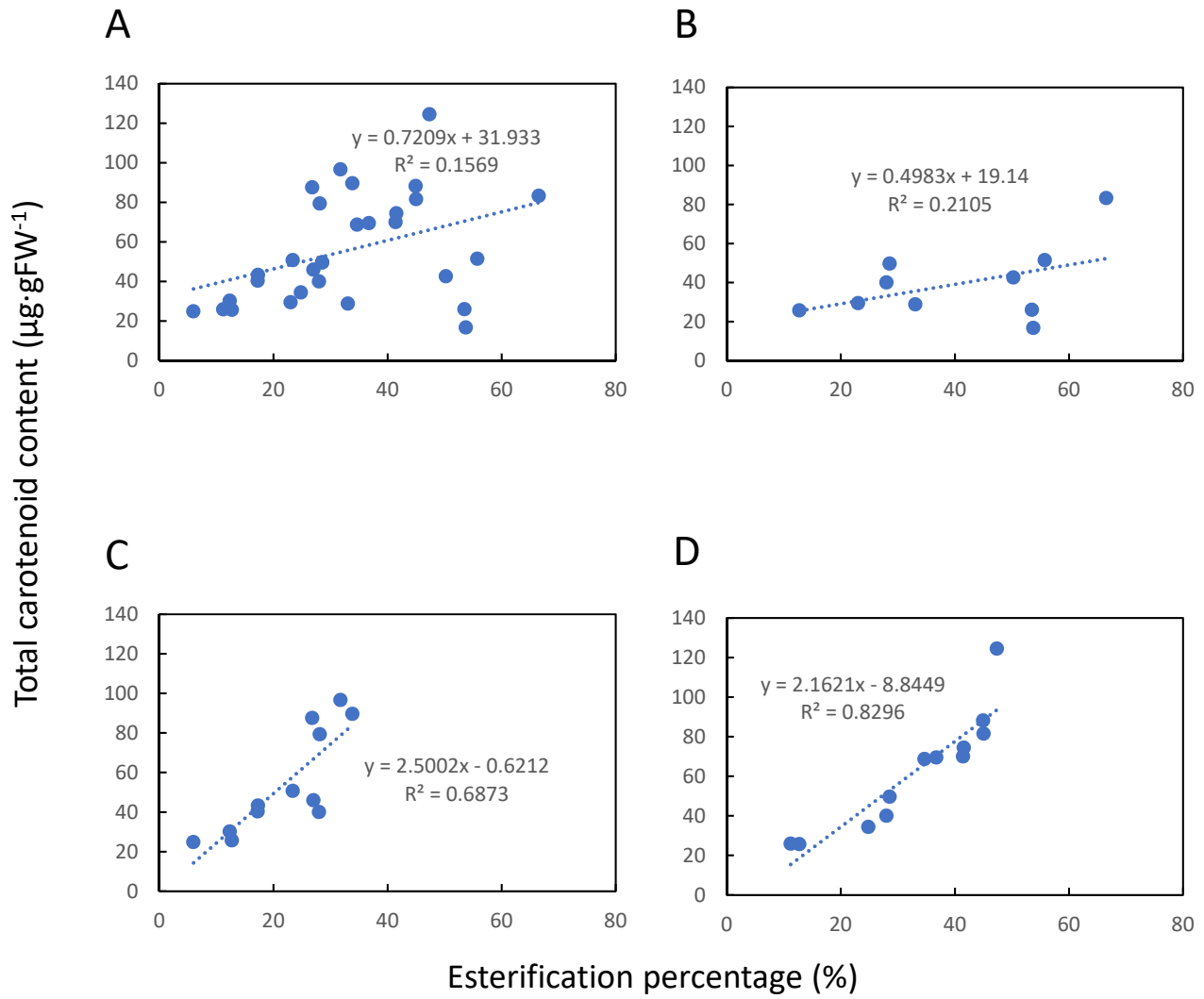
Target gene	Direction	Sequence
<i>IoXES</i>	Forward	TGGAGTAGCACACCCAACATGT
	Reverse	AGGTCGGTCTGGCCACATT
<i>SIXES</i>	Forward	CATCCATCGTTGTTTACTCAGCTGG
	Reverse	AGCCATTCTGATGAATTCTGGTTGG
<i>TeXES</i>	Forward	CCGGCACTTTTCACAAGGAGTTC
	Reverse	TTCTGGTTGATCAGGCCAAAACAA



Supplementary Figure S1. Alignment of deduced amino acid sequences of orthologs of *Solanum lycopersicum* SIXES/PYP1 (XM_004230093) in various plant species: *Arabidopsis thaliana* PES1 (NM_104335); *Brassica napus* (XM_013894821); *Calibrachoa hybrida* (LC335779); *Citrus sinensis* (XM_006471720); *Helianthus annuus* (XM_022154563); *Ipomoea obscura* IoXES (LC335777); *Medicago truncatula* (XM_003626323); *Petunia hybrida* PhXES (LC335778); *Populus tremula* (XM_006382665); *Ricinus communis* (XM_002512225); *Tagetes erecta* TeXES (LC335776); *Vitis vinifera* (XM_002271416). Numbers at branch points indicate bootstrap values (1000 replicates). XESs examined in this study are indicated in bold.



Supplementary Figure S2. XES-OX construction used in this study.



Supplementary Figure S3. The relationship between total carotenoid content and percentage of xanthophyll esterification in limbs and tubes of *XES*-OX and WT plants. The correlation was tested by Pearson's correlation analysis. Limbs and tubes of (A) all *XES*-OX and WT plants, (B) *loXES*-OX and WT plants, (C) *SIXES*-OX and WT plants, and (D) *TeXES*-OX and WT plants.