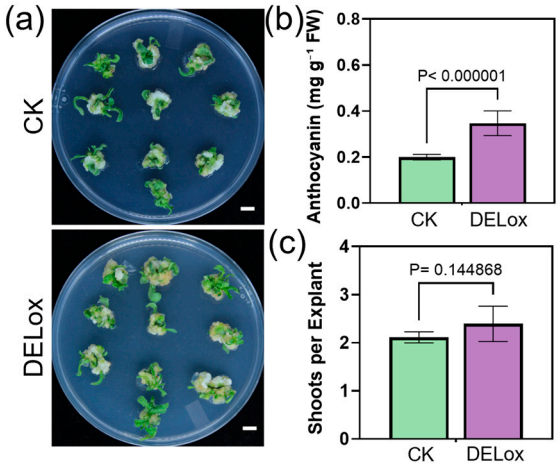
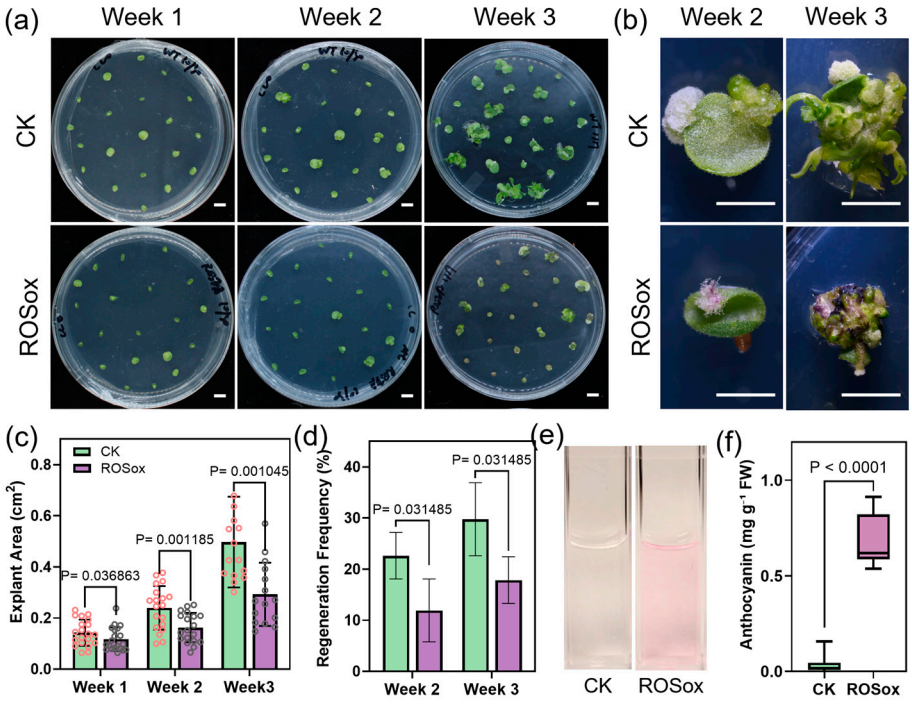
Supplementary materials:

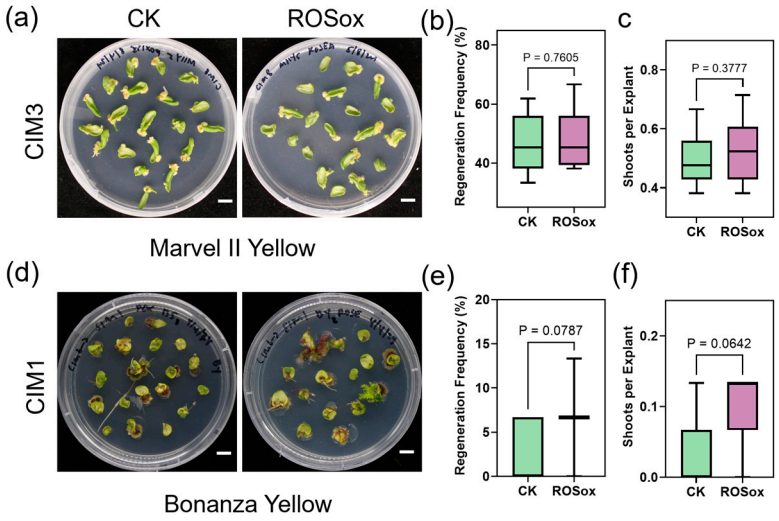


Supplementary Figure S1 Stable transgenic tomato lines overexpressing *DELILA* do not show an obvious regeneration penalty under the conditions tested. a, Representative regeneration phenotypes of control (CK) and *DELILA* overexpression (DELox) tomato lines during *in vitro* culture. Scale bars, 1 cm. b, Anthocyanin content (mg g^{-1} FW) in CK and DELox tissues at week 3 (n = 4 biological replicates; three technical replicates per biological replicate). c, Shoots per explant in CK and DELox lines at week 3. Data are presented as mean ± s.d. (n = 5 biological replicates; 20 explants per replicate). Statistical significance was assessed using two-tailed Student's *t*-tests; *P*-values are indicated.



Supplementary Figure S2 Repeated trials show a consistent reduction in regenerative output in stable transgenic petunia lines overexpressing *ROSEA1*. a, Time-course of regeneration from week 1 to week 3 in petunia explants for control (CK, top) and *ROSEA1* overexpression (ROSox-2 in Fig. 5, bottom) lines, showing reduced plantlet formation in ROSox. b, Representative close-up views of regenerating tissues at week 2 and week 3 for CK and ROSox. c, Explant area quantified from week 1 to week 3 (CK, green; ROSox-2, purple) (n = 20 explants measured per genotype at each time point). d, Regeneration frequency (%) at week 2 and week 3 in CK and ROSox-2 lines (n = 4 biological replicates; 20 explants per replicate). e, Representative anthocyanin extracts from CK and

ROSox tissues collected at week 3. f, Anthocyanin content (mg g^{-1} FW) at week 3 in CK and ROSox tissues (n = 4 biological replicates; 3 technical replicates per biological replicate). Data are presented as mean ± s.d. Statistical significance was assessed using two-tailed Student's *t*-tests; *P*-values are indicated. Scale bars, 1 cm (a) and 5 mm (b).



Supplementary Figure S3 The *ROSEA1*-associated regeneration phenotype is not detectable in marigold under high-cytokinin conditions or in the low-regenerating genotype 'Bonanza Yellow'. a, Representative Petri dishes of 'Marvel II Yellow' explants under control (CK, left) and *ROSEA1* (ROSox, right) treatments. b,c, Regeneration frequency (%) (b) and shoots per explant (c) for 'Marvel II Yellow' (CK, green; ROSox, purple). d, Representative Petri dishes of 'Bonanza Yellow' explants under CK (left) and ROSox (right) treatments on CIM1. e,f, Regeneration frequency (%) (e) and shoots per explant (f) for 'Bonanza Yellow' (CK, green; ROSox, purple). Data are presented as mean ± s.d. (n = 4 biological replicates; 15 explants per replicate). Statistical significance was assessed using two-tailed Student's *t*-tests; *P*-values are indicated. Scale bars, 1 cm (a,d).

Supplementary Table S1 List of primers used for qRT-PCR analysis

Gene name	Forward primer sequence（5'→3'）	Reverse primer sequence（5'→3'）	Note
SlACT2	TTGCTGACCGTATGAGCAAG	GGACAATGGATGGACCAGAC	
ROSEA1	ACGTTACTTGGCCGAGAGAA	AACTTCATCTTGTGGCGACG	
SlCHI	TGCAACAATGGAAGGGCAAA	CGACTTCTGCTAAGCGATCG	
SlF3H	CGGTTTGACATGTCTGGTGG	CGCCAGTCTTGAACCACTTC	qRT-PCR in tomato
SlF3′5′H	GGTTCAATGCCACATGTTGC	GCAACAACCATCCCACATGT	
SlDFR	GCTGGAGCGATTTGGACTTC	CAGCCTTCTCTGCCAGTATCTT	
SlPLT5	GTGGCTTGGCTTCTCACTTT	GCTTGGAAGAGGGAAAGTTGT	
SlWUS	TGTGCAGGCAAAGTAGTAGC	TGTTCAGCAGTTGGAGACCT	
SlLBD16	TGTTACACGTTCCTGTCCCC	AACTTTGTGCCAGCTGAGTC	
GFP	ACAAGTTCAGCGTGTCCG	TCACCTTGATGCCGTTCT	PCR