New Phytologist Supporting Information Suppl. Figs 1–4 and Suppl. Tab 1

Article title: *SlTCP24* and *SlTCP29* synergistically regulate compound leaf development through interacting with *SlAS2* and directly activating transcription of *SlCKX2* in tomato

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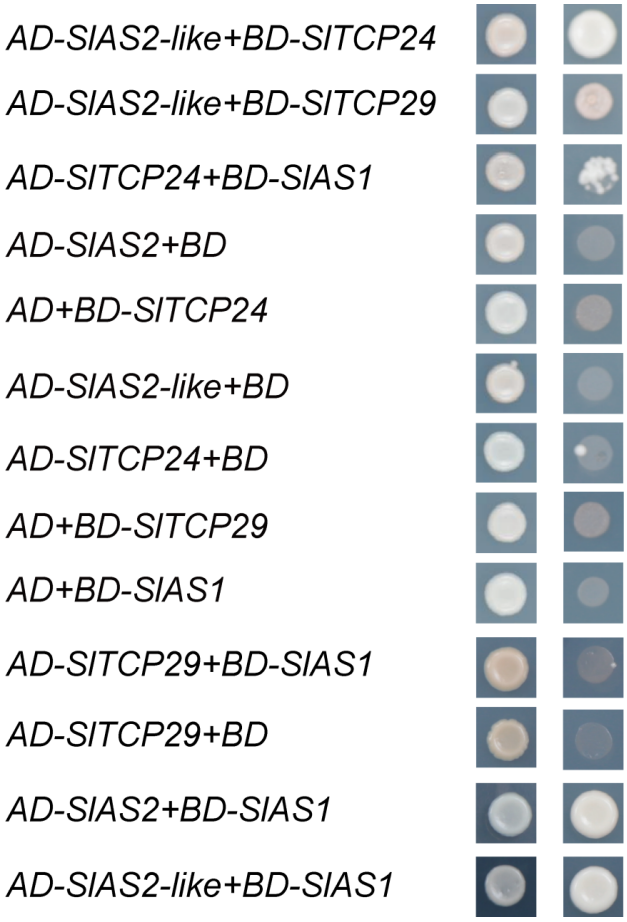
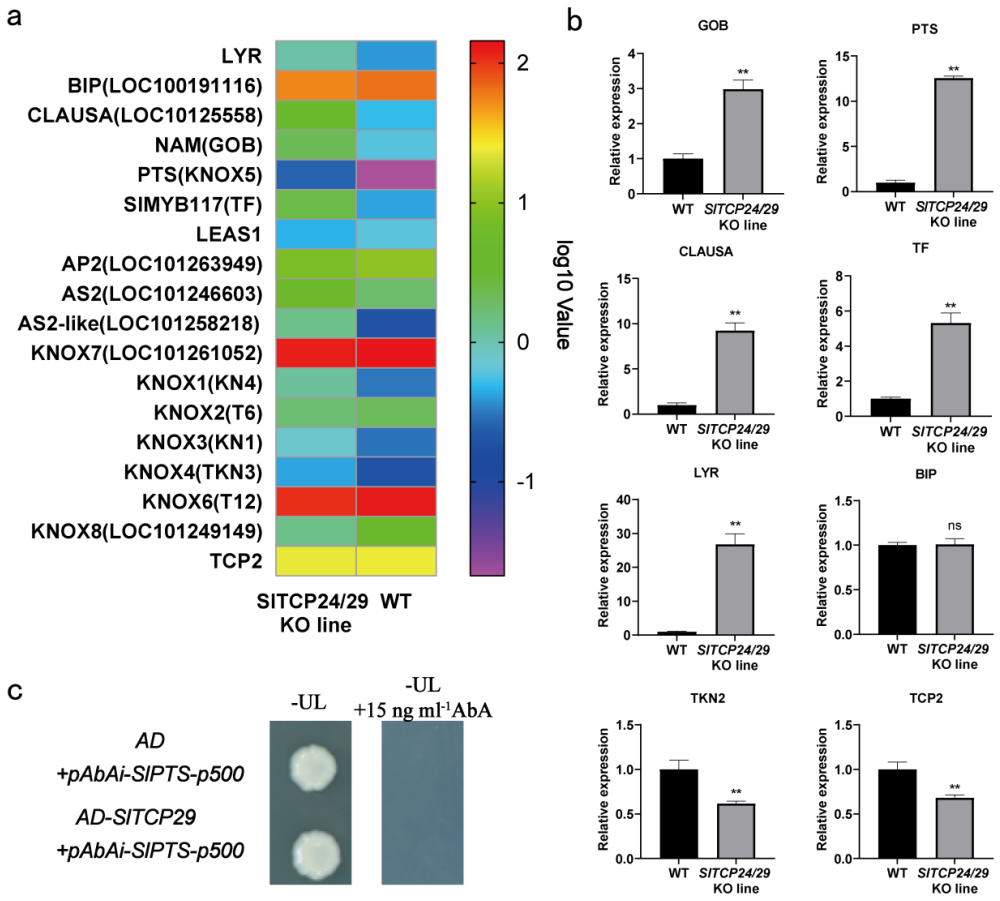
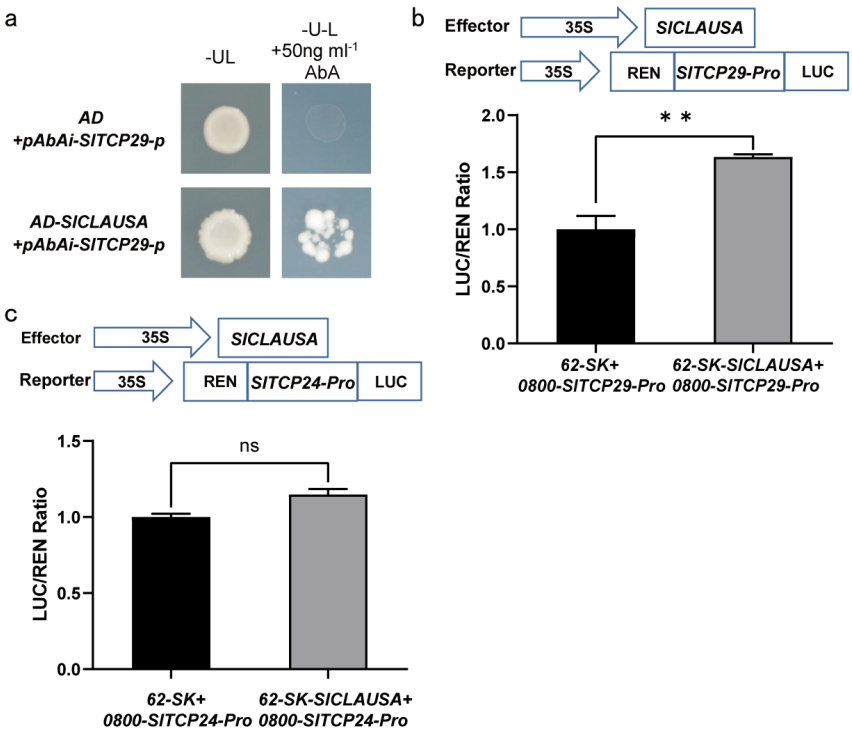


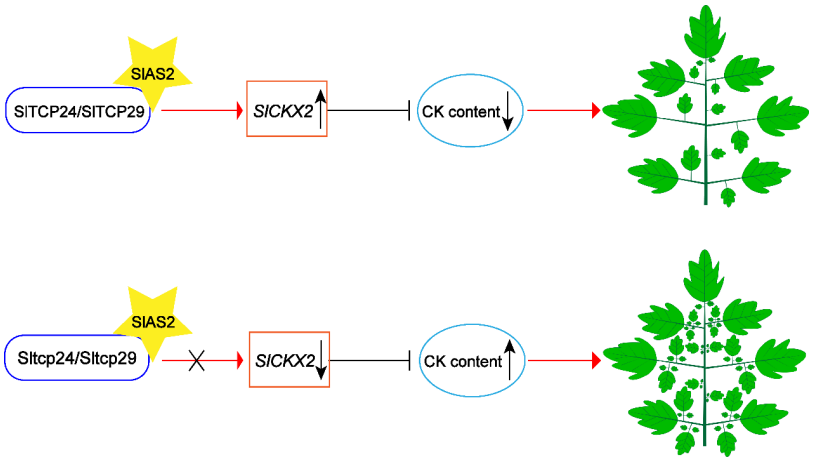
Supplemental Figure 1. Interactions of SlAS1, SlAS2, SlAS2-like, SlTCP29, and SlTCP24 in yeast two-hybrid system.



Supplemental Figure 2. Expression levels of genes related to compound leaf development in *SlTCP24/29-KO* line. **a** Heatmap of expression levels of compound leaf development-related genes in *SlTCP24/29-KO* line identified from transcriptome analysis. **b** Validation of the transcriptome data using qRT-PCR. The bars show the mean ± SE (n = 3). A One-way ANOVA and Dunnett's test were conducted. '*' and '**' indicate statistically significant differences with $P < 0.05$ and $P < 0.01$, and 'ns' means no significant difference. **c** Yeast one-hybrid assay showing lack of binding of SlTCP29 to the *SlPTS* promoter. Yeast strain Y1H Gold was transformed with the bait vector *pAbAi-SlPTS-p500* and the prey vector *AD-SlTCP29* and plated on SD/-Leu-Ura medium with or without aureobasidin A (15 ng mL^{-1}).



Supplemental Figure 3. Activation of *SlTCP29* expression by SlCLAUSA. **a** Yeast one-hybrid assay showing the binding of SlCLAUSA to the *SlTCP29* promoter. Yeast strain Y1H Gold was transformed with the bait vector *pAbAi-SlTCP29* and the prey vector *AD-SlCLAUSA*. Yeast cells were plated on SD/-Ura-Leu medium (-UL) in the absence or presence of aureobasidin A (AbA, 50 ng mL^{-1}). **b** Dual-luciferase reporter assays showing the activation of the *SlTCP29* promoter by SlCLAUSA. Values are means ±SD (n=6). ** indicates statistically significant differences at $P < 0.01$. A One-way ANOVA and Dunnett's test were conducted. **c** Dual-luciferase reporter assays showing the lack of activation of the *SlTCP24* promoter by SlCLAUSA. Values are means ±SD (n=6), 'ns' means no significant difference.



Supplemental Figure 4. Model of proposed *SlTCP24* and *SlTCP29* regulation of compound leaf development in tomato. In the wildtype tomato plants, SlTCP24 and SlTCP29 form homo- and hetero-dimers that further interact SlAS2. Formation of the protein complex promotes the expression *SlCKX2*, encoding cytokinin oxidase that degrades cytokinin. As a result, the reduced

level of cytokinin leads to development of normal compound leaves with simple leaflets. In the *SlTCP24/29-KO* double-gene knockout plants, the lack of functional SlTCP24 and SlTCP29 fails to activate *SlCKX2*, leading to reduced cytokinin oxidase activity and accumulation of cytokinin in developing leaves. As a result, the elevated level of cytokinin leads to development of more complex compound leaves in the knockout mutant plants.

Supplemental Table 1. Primers used in experiments of this work

Primers	Sequences (5'-3')	Experiments
35S-AS2-FW	CATTTGGAGAGGACACGCTCGAGATGGCTTCATCTTCTTCATTATCA	Over-expression of AS2
35S-AS2-RV	TCTCATTAAAGCAGGACTCTAGACTATCCTGTATCAAAATTGTTACTTCC	
AD-AS2-like-FW	ACGTACCAGATTACGCTCATATGATGTCATCTTCATCATCATTATCG	Yeast two hybrid
AD-AS2-like-RV	TACGATTCATCTGCAGCTCGAGCCTAAGATGGATCAACCGGTGT	
AD-AS2-FW	ACGTACCAGATTACGCTCATATGATGGCTTCATCTTCTTCATTATCA	
AD-AS2-RV	TACGATTCATCTGCAGCTCGAGCCTATCCTGTATCAAAATTGTTACTTCC	
AD-TCP24-FW	ACGTACCAGATTACGCTCATATGATGGAGGAGATTCGAACTGA	
AD-TCP24-RV	TACGATTCATCTGCAGCTCGAGCTCATAAAAAAAACAAATTAACACA	
BD-AS1-FW	TCTCAGAGGAGGACCTGCATATGATGAGGGAGAGGCAACGGTG	
BD-AS1-RV	TTATGCGGCCGCTGCAGGTCGACGTTAGCGGCCGCCATTAGG	
BD-TCP24-FW	TCTCAGAGGAGGACCTGCATATGATGGAGGAGATTCGAACTGA	
BD-TCP24-RV	TTATGCGGCCGCTGCAGGTCGACGTCATAAAAAAAACAAATTAACACA	
BD-TCP29-FW	TCTCAGAGGAGGACCTGCATATGATGAGTAACAAGGAGGATGA	
BD-TCP29-RV	TTATGCGGCCGCTGCAGGTCGACGCTAGTATAATATGATAAGCCTGT	
AD-TCP29-FW	ACGTACCAGATTACGCTCATATGATGAGTAACAAGGAGGATGA	Yeast two hybrid and Yeast one hybrid
AD-TCP29-RV	TACGATTCATCTGCAGCTCGAGCCTAGTATAATATGATAAGCCTGT	
AD-CLAU-FW	ACGTACCAGATTACGCTCATATGATGGGAAATTGTGGAAG	Yeast one hybrid
AD-CLAU-RV	TACGATTCATCTGCAGCTCGAGCTCATAATGCAATAGATAGA	
pAbai-CKX2-FW	AGCTTGAATTCGAGCTCGGTACCGTTGTTTGAGGACACATTAGATG	
pAbai-CKX2-RV	ACATACAGAGCACATGCCTCGAGAAAGAAACCGTATGAAGACTGAC	
pAbai-PTS-500-FW	AGCTTGAATTCGAGCTCGGTACCAAAAAAAGTAAGTAGGAGTA	
pAbai-PTS-500-RV	ACATACAGAGCACATGCCTCGAGGTCTTATTATGTAGAAGAAG	
pAbai-TCP29-Pro2000-FW	AGCTTGAATTCGAGCTCGGTACCATTGAGACCAAAGGAAATACCG	
pAbai-TCP29-Pro2000-RV	ACATACAGAGCACATGCCTCGAGTCTTGGAAATTTGCACTCCTTCTC	
pAbai-TCP29-Pro600-FW	AGCTTGAATTCGAGCTCGGTACCCTGATTATGGCTTTGGA	
pAbai-TCP29-Pro600-RV	ACATACAGAGCACATGCCTCGAGATATGGAGGTGAGTGGG	
pGreen-0800-CKX2-FW	CACTATAGGGCGAATTGGGTACCGTTGTTTGAGGACACATTAGATG	Dual-luciferase reporter assays
pGreen-0800-CKX2-RV	TATGTTTTTGGCGTCTTCCATGGAAAGAAACCGTATGAAGACTGAC	
pGreen-0800-TCP24-FW	CACTATAGGGCGAATTGGGTACCTGTACTTACACGATAAGCCTGGTG	
pGreen-0800-TCP24-RV	TATGTTTTTGGCGTCTTCCATGGGGAGGATAGATAGAGTGGAGAGCC	
pGreen-0800-TCP29-600-FW	CACTATAGGGCGAATTGGGTACCCTGATTATGGCTTTGGA	
pGreen-0800-TCP29-600-RV	TATGTTTTTGGCGTCTTCCATGGATATGGAGGTGAGTGGG	
pGreen62-SK-AS2-FW	GCCGCTCTAGAACTAGTGGATCCATGGCTTCATCTTCTTCATTATCA	
pGreen62-SK-AS2-RV	TTGGTACCGGGCCCCCCCTCGAGCTATCCTGTATCAAAATTGTTACTTCC	
pGreen62-SK-CLAUSA-FW	GCCGCTCTAGAACTAGTGGATCCATGGGAAATTGTGGAAG	

pGreen62-SK-CLAUSA-RV	TTGGTACCGGGCCCCCCCTCGAGTCATAATGCAATAGATAGA	
pGreen62-SK-TCP24-FW	GCCGCTCTAGAACTAGTGGATCCATGGAGGAGATTCGAACTGA	
pGreen62-SK-TCP24-RV	TTGGTACCGGGCCCCCCCTCGAGTCATAAAAAAAACAAATTAACACA	
pGreen62-SK-TCP29-FW	GCCGCTCTAGAACTAGTGGATCCATGAGTAACAAGGAGGATGA	
pGreen62-SK-TCP29-FW	GCCGCTCTAGAACTAGTGGATCCATGAGTAACAAGGAGGATGA	
pGreen62-SK-TCP29-RV	TTGGTACCGGGCCCCCCCTCGAGTTACTTCTTTTCTTTTCCTTTCTGATC	
pGreen62-SK-TCP29-RV	TTGGTACCGGGCCCCCCCTCGAGCTTCTTTTCTTTTCCTTTCTGATCTG	
pHBT-AS2-ha-FW	CTCCCCTTGCTCCGTGGATCCATGGCTTCATCTTCTTCATTATCA	Co-IP
pHBT-AS2-ha-RV	AACGTCGTATGGGTAAGGCCTTCCTGTATCAAAATTGTTACTTCC	
pHBT-TCP24-gfp-FW	CTCCCCTTGCTCCGTGGATCCATGGAGGAGATTCGAACTGA	
pHBT-TCP24-gfp-RV	CATCGTATGGGTACATAGGCCTTAAAAAAAACAAATTAACACA	
pHBT-TCP29-flag-FW	CTCCCCTTGCTCCGTGGATCCATGAGTAACAAGGAGGATGA	
pHBT-TCP29-flag-RV	TCCTTGTAGTCAGAAGGCCTGTATAATATGATAAGCCTGT	
pHBT-TCP29-ha-FW	CTCCCCTTGCTCCGTGGATCCATGAGTAACAAGGAGGATGA	
pHBT-TCP29-ha-RV	AACGTCGTATGGGTAAGGCCTGTATAATATGATAAGCCTGT	
CR-AS2-FW	GAATCTAACAGTGTAGTTTGGCGAATTTCTGAGGCTGATCGTTTTAGAGCTAGAAATAG	CRISPR/Cas9-mediated gene knockout
CR-AS2-RV	GCTATTTCTAGCTCTAAAACTAGACTGGATCTCGAAGGCGCAAACTACACTGTTAGATT	
CR-TCP24-NEW-FW	GAATCTAACAGTGTAGTTTGGATTGTAAAGTTTTATGGTGTTTTAGAGCTAGAAATAGC	
CR-TCP24-NEW-RV	GCTATTTCTAGCTCTAAAACTTCGACAGCCTTGCTGGGCCAAACTACACTGTTAGATTC	
CR-TCP29/TCP24-FW	GAATCTAACAGTGTAGTTTGTTAGAGTTTCTCGTGCATCGTTTTAGAGCTAGAAATAGC	
CR-TCP29/TCP24-RV	GCTATTTCTAGCTCTAAAACAGACGGTCTTGCAAATCATCAAACTACACTGTTAGATTC	
CR-TCP29-NEW-FW	GAATCTAACAGTGTAGTTTGAAAAGAGTGGTGACCTAGGGTTTTAGAGCTAGAAATAGC	
CR-TCP29-NEW-RV	GCTATTTCTAGCTCTAAAACCTCTACAACCTTGCTGGGCCAAACTACACTGTTAGATTC	
TCP24-CR-NEW-YJ-FW	CAAGCCCAAGAAGGTACCCC	Detection of gene editing
TCP24-CR-NEW-YJ-RV	CCACCCGTCAATAGCTCAGTGA	
TCP24-CR-YJ-FW	CAACAAGGAAGATGAGCAG	
TCP24-CR-YJ-RV	GGAAAGTGACAATCCAGAA	
TCP29-CR-NEW-YJ-FW	TGTAACAGGGGTATGGTGCT	
TCP29-CR-NEW-YJ-RV	TCTCAGAATTGCTACAACTTGG	
TCP29-CR-YJ-FW	TCCAAGAATGAGTAACAAGG	
TCP29-CR-YJ-RV	AAAGTGACAATCCAGAACC	
AS2-CR-YJ-FW	TGGCTTCATCTTCTTCATTATCATC	
AS2-CR-YJ-RV	GAGTGGTGCCTCCTCCTACATT	
TCP29-LUC-C-FW	TACGCGTCCCGGGGCGGTACCATGAGTAACAAGGAGGATGA	Luciferase complementation Imaging Analysis
TCP29-LUC-C-RV	ACGAAAGCTCTGCAGGTCGACCTAGTATAATATGATAAGCCTGT	
TCP29-LUC-N-FW	CGAGCTCGGTACCCGGGATCCATGAGTAACAAGGAGGATGAGCAG	
TCP29-LUC-N-RV	CGCGTACGAGATCTGGTCGACCTTCTTTTCTTTTCCTTTCTGATCTG	
AS2-LUC-N-FW	CGAGCTCGGTACCCGGGATCCATGGCTTCATCTTCTTCATTATCA	
AS2-LUC-N-RV	CGCGTACGAGATCTGGTCGACTCCTGTATCAAAATTGTTACTTCC	
LUC-C-TCP24-FW	TACGCGTCCCGGGGCGGTACCATGGAGGAGATTCGAACTGA	
LUC-C-TCP24-RV	ACGAAAGCTCTGCAGGTCGACTCATAAAAAAAACAAATTAACACA	
TCP29-mybsite-mt-FAM-FW	AAACTCTCAGATCTGGACAAAGTGG	EMSA
TCP29-mybsite-mt-RV	CCACTTTGTCCAGATCTGAGAGTTT	
TCP29-mybsite-wt-FAM-FW	AAACTCTCAGATCCAACAGAAGTGG	

TCP29-mybsite-wt-FW	AAACTCTCAGATCCAACAGAAGTGG	
TCP29-mybsite-wt-RV	CCACTTCTGTTGGATCTGAGAGTTT	
pET15d-CLAU-MBP-FW	TCTGTTCCAGGGGCCGCATATGATGGGAAATTGTGGAAG	
pET15d-CLAU-MBP-RV	TGTTAGCAGCCGGATCCTCGAGTCATAATGCAATAGATAGA	
pET15d-TCP24-MBP-FW	TCTGTTCCAGGGGCCGCATATGATGGAGGAGATTCGAACTGA	
pET15d-TCP24-MBP-RV	TGTTAGCAGCCGGATCCTCGAGTCATAAAAAAAACAAATTAACACA	
pET15d-TCP29-MBP-FW	TCTGTTCCAGGGGCCGCATATGATGAGTAACAAGGAGGATGA	
pET15d-TCP29-MBP-RV	TGTTAGCAGCCGGATCCTCGAGTTACTTCTTTTCTTTTCCTTTCTG	
Actin-q-FW	GTCCTCTTCCAGCCATCCAT	qRT-PCR
Actin-q-RV	ACCACTGAGCACAATGTTACCG	
CKX2-q-NEW-FW	TTAGCACCTAAATCCTGGACTG	
CKX2-q-NEW-RV	CATGAAAGAGGTCAGCATTCTG	
potato leaf-q-FW	TCATATGTAGAGCCCATTCCAC	
potato leaf-q-RV	CACATCATTTCCTCATTGCCAT	
mouse ear-q-FW	TCGTCTCTTGACTGCTTATCTC	
mouse ear-q-RV	CACCACTACTACTACTGCTACG	
LYR-q-FW	ACTCAAACTCCAACTATAGCCC	
LYR-q-RV	TTCTGGACTCCCTACATGACTA	
GOB-q-FW	CTACGTGATCGGAAGTATCCAA	
GOB-q-RV	TTCATACCAACAAGTGCACATG	
PTS-q-FW	TGGTCTTTTGGTTCAAACTCAC	
PTS-q-RV	TGATGATCCATTGTGTGTGAGA	
BIP-q-FW	ATTGCAGCATAGAGTAGAGGAC	
BIP-q-RV	CAGCTATCGTTTTCTCTTCGTG	
TF-q-FW	CTTGTTGCTATTTATGGCCCTC	
TF-q-RV	GTTCTTCACTGCATTGTCTGTT	
CLAU-q-FW	AGAATAGAGAGGTGCAGCATAC	
CLAU-q-RV	ACGTTCATCATCATCTTCTCGA	
9930-q-FW	TTCGAAGACCTTTTGAGACCTT	
9930-q-RV	ATCTGCTAAAAGTCGATCCTGT	
53400-q-FW	GAACTGTTGAAAATAGGCCTGG	
53400-q-RV	TCACGACATTATCAATGGTGGA	
8330-q-FW	CGAGTCATCGTTGTTCATGATC	
8330-q-RV	AGCTTCATCTGTTGTAACTCCT	
14990-q-FW	TGACTGGTTTCTTGGTGACGG	
14990-q-RV	TCCCCCTTTCTCTGTGGACTG	
8310-q-FW	TCCTCAATATCAAGACGAGTCG	
8310-q-RV	AAGTTGAACAGACATTCCAACG	
16220-q-FW	AAAGGGGGTTCTTCTCGAATAG	
16220-q-RV	GCCATAAAACGGTGACATATGG	
IPT3-q-FW	TGCTACTATGACGCACTAGAAG	
IPT3-q-RV	GAAAGATGTTGGGTGTACGAAC	
79930-q-FW	AACGTTGAGTGTTACAGCTTTC	
79930-q-RV	ATAGCCCATTGTTTATTACGCG	

16210-q-FW	AACAATGGTTTCTTGGTTACGG	
16210-q-RV	TCACAACGTTCTCAATAGTGGA	
CKX5-q-FW	CATTTCTATCTTCTGCCATGCC	
CKX5-q-RV	CTAGCAAATGTTTCCCATCGAG	
53120-q-FW	CCTTGCGATTTAGCCACTATTC	
53120-q-RV	CGAAATCACAGGGCTAAAGATG	
TKN2-q-FW	TCGTCTCTTGACTGCTTATCTC	
TKN2-q-RV	CACCACTACTACTACTGCTACG	
TCP2-q-FW	GCTGTGGATTGGCTTATCAAAA	
TCP2-q-RV	GCAGATGCAGTACCAATTGTAG	