PNAS
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Supplementary Information for

CsBRC1 inhibits axillary bud outgrowth by directly repressing the auxin efflux carrier *CsPIN3* in cucumber

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Other supplementary materials for this manuscript include the following:

Datasets S1

www.pnas.org/cgi/doi/10.1073/pnas.1907968116

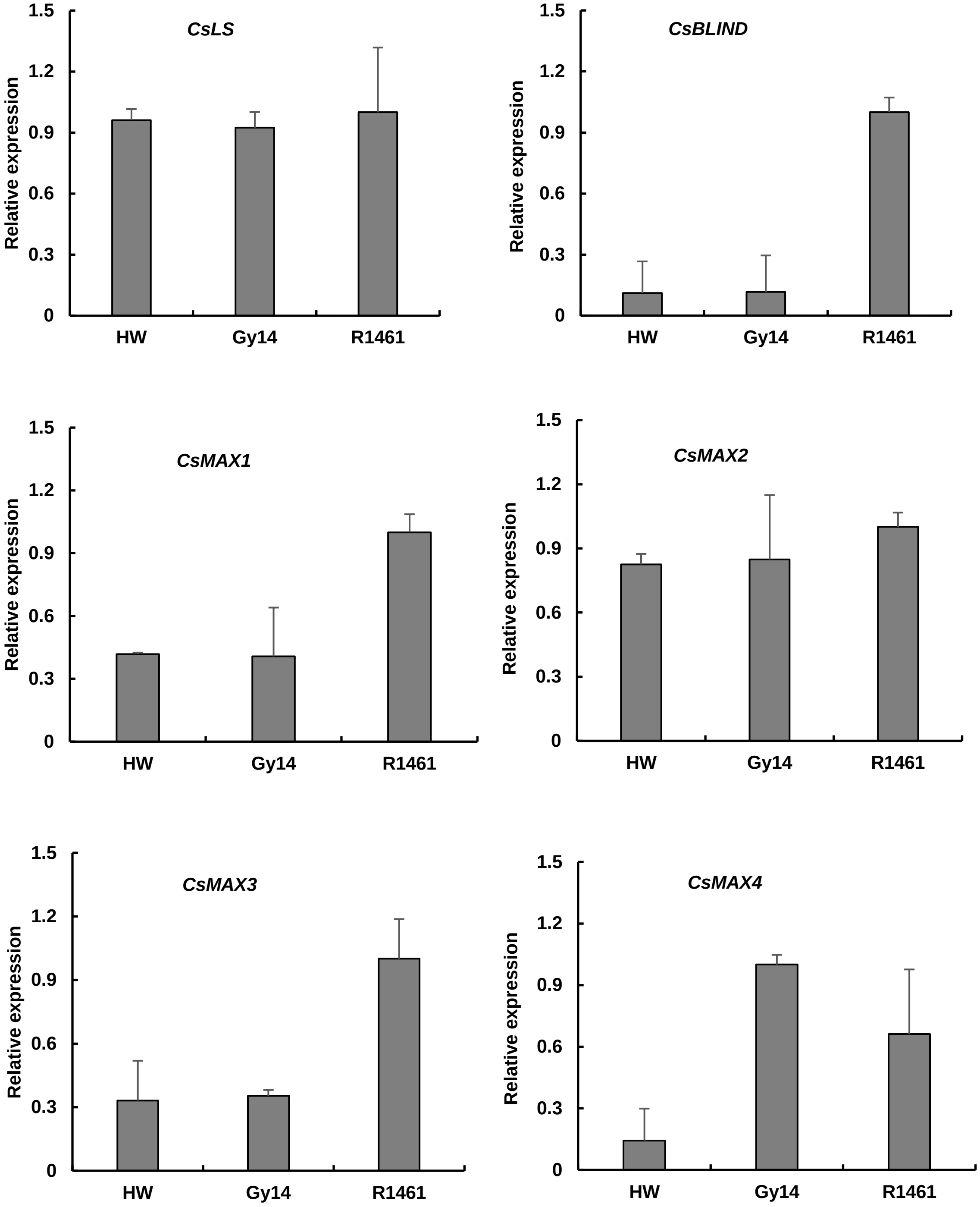

Fig. S1. Expression analyses of *CsLS* (*Csa3G039300*), *CsBLIND* (*Csa1G109320*), *CsMAX1* (*Csa4G646170*), *CsMAX2* (*Csa7G048640*), *CsMAX3* (*Csa6G106700*) *and CsMAX4* (*Csa2G373590*) by qRT-PCR in three cucumber lines. Values are means of three biological replicates of lateral buds from independent plants. Error bars represent ±SD. HW, *hardwickii*.

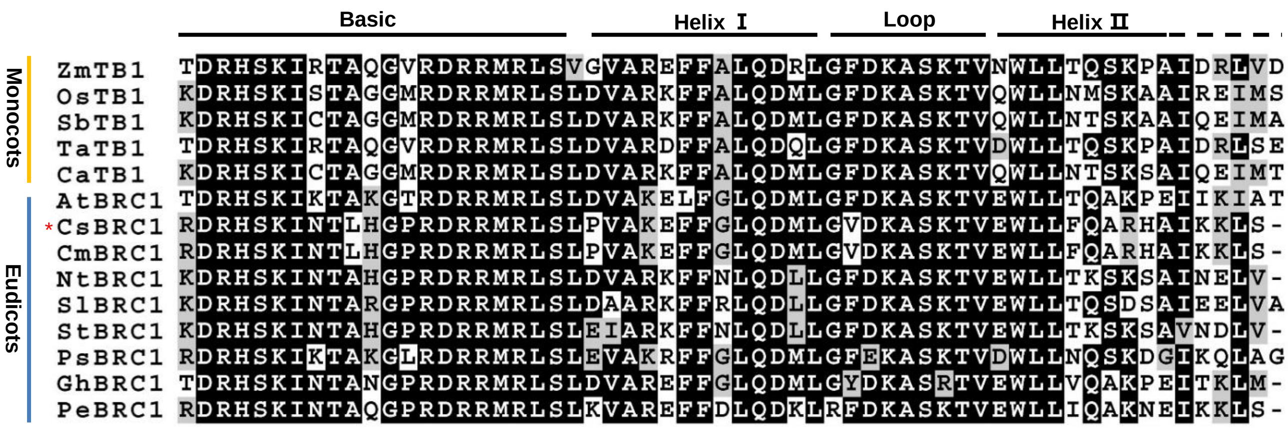

Fig. S2. Amino acid alignment of BRC1 and homologs from monocots and eudicots. Zm, *Zea mays*; Os, *Oryza sativa*; Sb, *Sorghum bicolor*; Ta, *Triticum aestivum*; Ca, *Cenchrus americanus*; At, *Arabidopsis thaliana*; *Cs*, *Cucumis sativus*; Cm, *Cucumis melo*; Nt, *Nicotiana tabacum*; Sl, *Solanum lycopersicum*; St, *Solanum tuberosum*; Ps, *Pisum sativum*; Gh, *Gossypium hirsutum*; Pe, *Populus euphratica.*

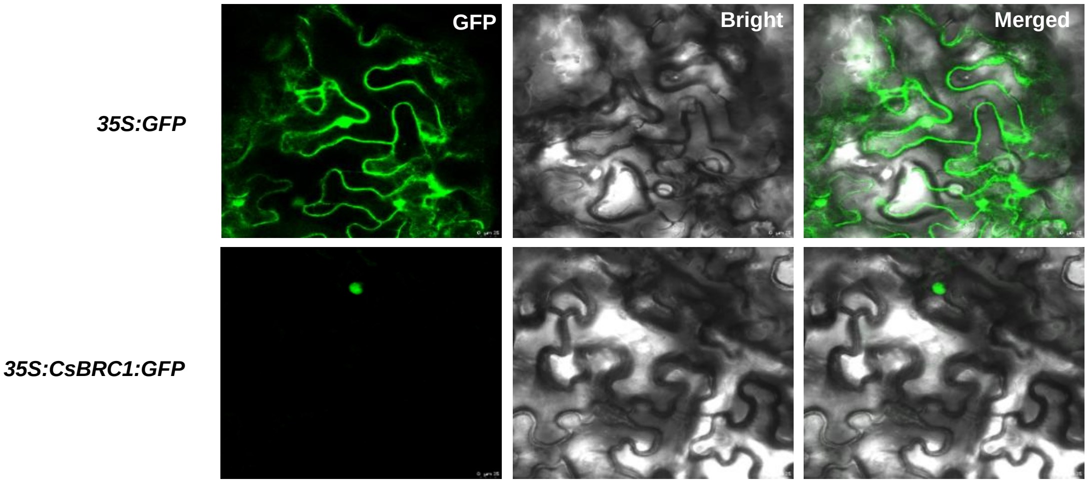

Fig. S3. Subcellular localization of CsBRC1 in tobacco leaves. GFP driven by the *35S* promoter was used as a control. GFP is shown in green. The left, middle and right panels represent pictures taken under dark field, bright field and merge views, respectively.

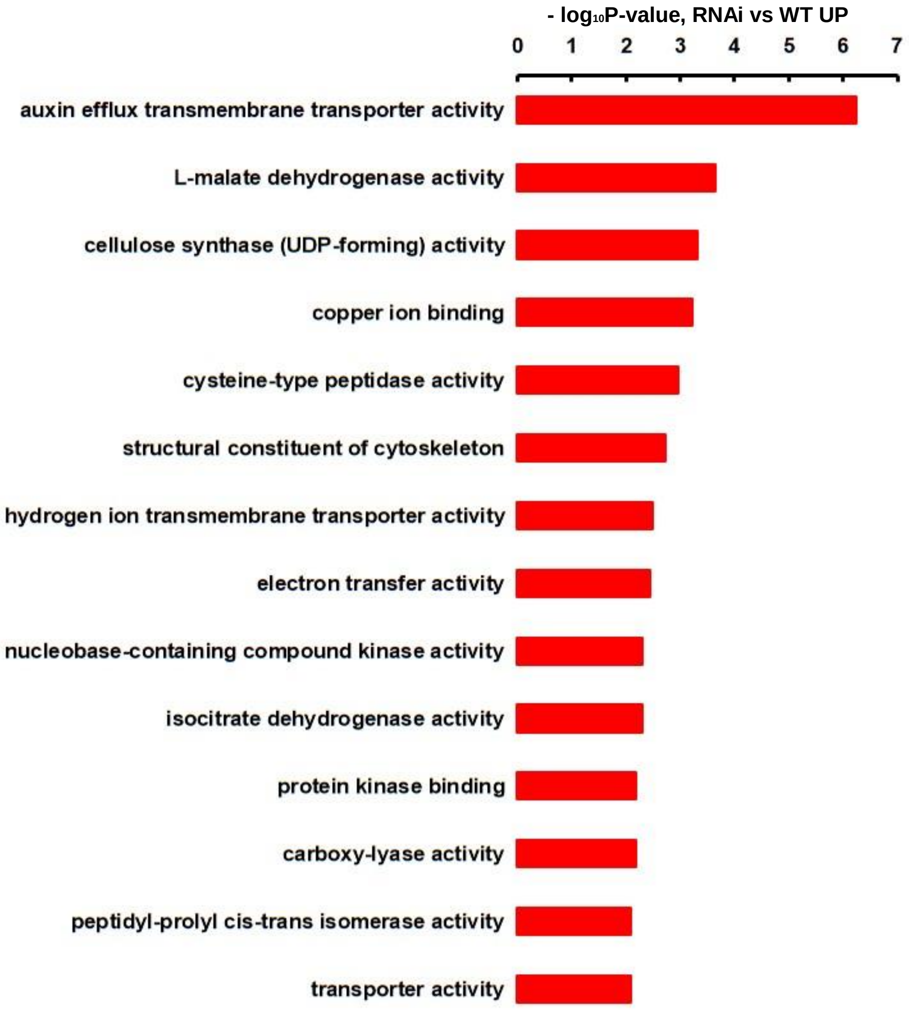

Fig. S4. Gene category enrichment of the up-regulated DEGs in axillary buds of *CsBRC1*-RNAi transgenic plants vs WT.

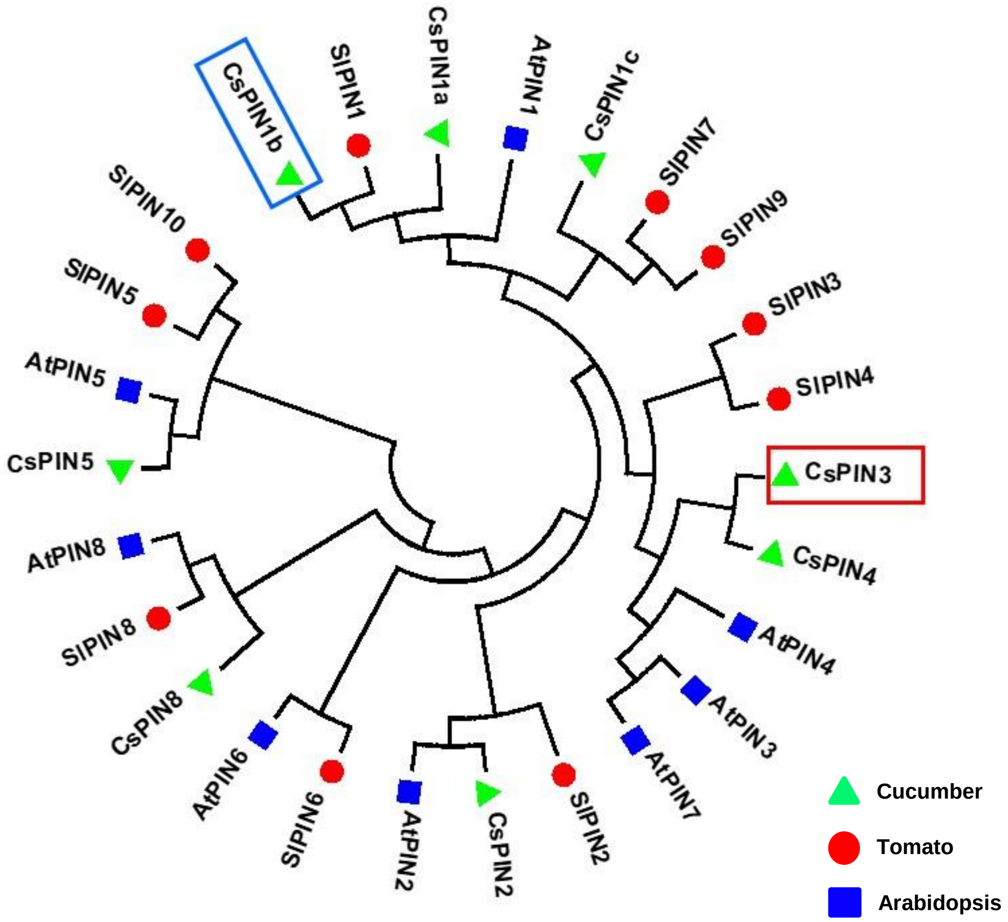

Fig. S5. Phylogenetic analysis of PIN family genes in cucumber, *Arabidopsis* and tomato. There are 8 PIN genes in *Arabidopsis* (blue square), 8 in cucumber (green triangle) and 10 in tomato (red circle). Blue and red squares indicate *CsPIN1b* and *CsPIN3*, respectively.

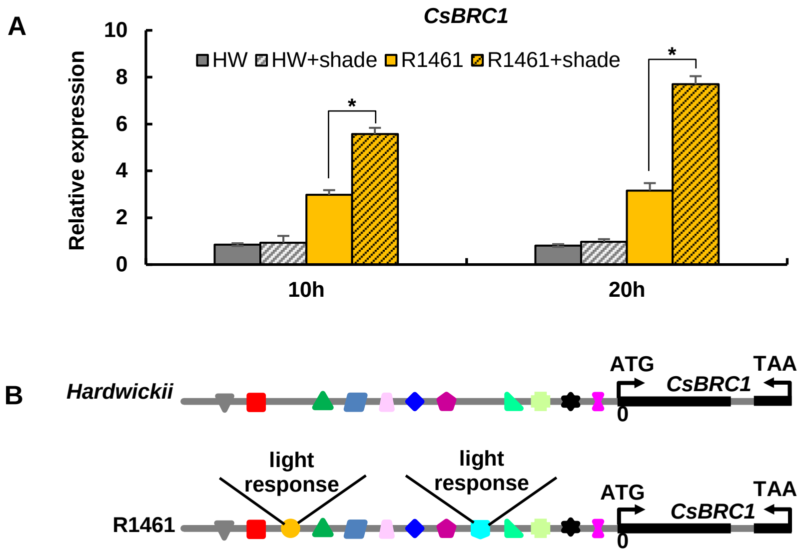

Fig. S6. Responses of *CsBRC1* expression to reduced light intensity in cucumber. (*A*) The relative expression level of *CsBRC1* in lateral buds upon shade treatment in *hardwickii* and R1461. Values are means of three biological replicates of lateral buds from independent plants. Error bars represent ±SD. Significance analysis was conducted with the two-tailed Student's t-tests (* $P < 0.05$). (*B*) Schematic diagram of *cis*-acting regulatory elements on *CsBRC1* promoter in *hardwickii* and R1461. From left to right in *hardwickii*: AAGAA-motif, ABRE, ARE, CAAT-box, CAT-box, ERE, G-box, MYB, P-box, TATA-box and TCA-element. There are two additional light response elements in *CsBRC1* of R1461: AE-box and GATA-motif.

Table S1. Summary of transcriptome sequencing data.

Sample id	Clean reads ratio	Clean bases ratio	Unique mapped reads ratio	Total mapped ratio
WT-1	96.66%	94.24%	88.92%	95.12%
WT-2	96.09%	93.45%	87.77%	93.70%
RNAi-1	96.00%	93.51%	87.05%	92.59%
RNAi-2	95.79%	93.23%	87.46%	93.60%

Table S2. Gene information used in this study.

Gene name	Species	Accession number
CsBRC1	*Cucumis sativus*	Csa1G020890
CsLS	*Cucumis sativus*	Csa3G039300
CsBLIND	*Cucumis sativus*	Csa1G109320
CsMAX1	*Cucumis sativus*	Csa4G646170
CsMAX2	*Cucumis sativus*	Csa7G048640
CsMAX3	*Cucumis sativus*	Csa6G106700
CsMAX4	*Cucumis sativus*	Csa2G373590
CsPIN1a	*Cucumis sativus*	Csa1G042820
CsPIN1b	*Cucumis sativus*	Csa1G025070
CsPIN1c	*Cucumis sativus*	Csa4G430820
CsPIN2	*Cucumis sativus*	Csa1G427480
CsPIN3	*Cucumis sativus*	Csa5G576590
CSPIN4	*Cucumis sativus*	Csa5G284520
CSPIN5	*Cucumis sativus*	Csa2G074170
CSPIN8	*Cucumis sativus*	Csa3G827360
AtPIN1	*Arabidopsis thaliana*	At1G73590
AtPIN2	*Arabidopsis thaliana*	At5G57090
AtPIN3	*Arabidopsis thaliana*	At1G70940
AtPIN4	*Arabidopsis thaliana*	At2G01420
AtPIN5	*Arabidopsis thaliana*	At5G16530
AtPIN6	*Arabidopsis thaliana*	At1G77110
AtPIN7	*Arabidopsis thaliana*	At1G23080
AtPIN8	*Arabidopsis thaliana*	At5G15100
SlPIN1	*Solanum lycopersicum*	NM_001247234
SlPIN2	*Solanum lycopersicum*	NM_001247241
SlPIN3	*Solanum lycopersicum*	NM_001247248
SlPIN4	*Solanum lycopersicum*	NM_001247255
SlPIN5	*Solanum lycopersicum*	NM_001247263
SlPIN6	*Solanum lycopersicum*	NM_001247270
SlPIN7	*Solanum lycopersicum*	NM_001247275
SlPIN8	*Solanum lycopersicum*	NM_001247275
SlPIN9	*Solanum lycopersicum*	NM_001247291
SlPIN10	*Solanum lycopersicum*	NM_001247301
AtBRC1	*Arabidopsis thaliana*	AT3G18550
CmBRC1	*Cucumis melo*	XP_008453366
NtTB1	*Nicotiana tabacum*	XP_016506815
SlBRC1	*Solanum lycopersicum*	NP_001234572
StBRC1	*Solanum tuberosum*	XP_006341644
PsBRC1	*Pisum sativum*	AEL12230
GhBRC1	*Gossypium hirsutum*	AVA17437
PeBRC1	*Populus euphratica*	XP_011012754
ZmTB1	*Zea mays*	NP_001152465
OsTB1	*Oryza sativa*	XP_015630237
SbTB1	*Sorghum bicolor*	AAL75986
TaTB1	*Triticum aestivum*	XP_020173868
CaTB1	*Cenchrus americanus*	AAU89660

Table S3. Primer information used in this study.

Primers for *CsBRC1* amplification and vector construction	
CsBRC1-clone-F	ATGTTTGTGTTCAATAGTTGTAGTAAC
CsBRC1-clone-R	TTAAGTTTGTTGATGTTTGGAATTTAC
ProCsBRC1-clone-F	ATACACACTATACATGTAAGTCGGAC
ProCsBRC1-clone-R	ATCTCTGATCTTTTAATCTCTCTTTT
CsBRC1-Sense-F	TTGGCGCGCCCTCTTTCAAGCTAGACATGCAA
CsBRC1-Sense -R	ATTTAAATAGTTTGTTGATGTTTGGAATTTA
CsBRC1-Antisense-F	GGACTAGTCTCTTTCAAGCTAGACATGCAA
CsBRC1-Antisense-R	CGGGATCCAGTTTGTTGATGTTTGGAATTTA
CsPIN1b-clone-F	ATGATTACATTATTAGACTTCTAC
CsPIN1b-clone-R	TCATAATCCCAACAAAATGTAGTA
CsPIN1b-OV-F	GCTCTAGAATGATTACATTATTAGACTTCTAC
CsPIN1b-OV-R	CGGGATCCTCATAATCCCAACAAAATGTAGTA
CsPIN3-clone-F	ATGATTTCATGGAAGGATCTTTACACCG
CsPIN3-clone-R	TTACAGACCCAGCAGAACATAGTAGAGC
CsPIN3-OV-F	GCTCTAGAATGATTTCATGGAAGGATCTTTACACCG
CsPIN3-OV-R	CGGGATCCTTACAGACCCAGCAGAACATAGTAGAGC
CsBRC1-1300-F	GCTCTAGAATGTTTGTGTTCAATAGTTGTAGTAAC
CsBRC1-1300-R	ACGCGTCGACAGTTTGTTGATGTTTGGAATTTACCTC
Primers for qRT-PCR	
CsBRC1-Q-F	TCACGAGGGAGTGTAGGGAGAA
CsBRC1-Q-R	GCAATAAATAGAGTTGGAGGGGC
CsLS-Q-F	GGTTTCAGTTTCACCCTTTG
CsLS-Q-R	CAATACTCGAACATCGTCCT
CsBLIND-Q-F	AATAACATTAGCCCTAGCCC
CsBLIND-Q-R	TCCAAACCCTAATAAGCAGC
CsMAX1-Q-F	CATATCTACTCCACAACGCA
CsMAX1-Q-R	CAGGACTTGTCTAAATGGCT
CsMAX2-Q-F	GATGAAGTTGGATTGCAGTG
CsMAX2-Q-R	GCCAATAATCGAGCTCTGTA
CsMAX3-Q-F	AGCCTGTGCTATATGGAGTA
CsMAX3-Q-R	GGTAGAAGCATATCCTCAGC
CsMAX4-Q-F	GAAGCTGCATTATTTCACCC
CsMAX4-Q-R	CTTCTGATGGTGAAGTTGGA
CsPIN1b-Q-F	GATTTTTACTCCATGATCGGC
CsPIN1b-Q-R	ATGTTCGGTGTAGGGTAATG
CsPIN3-Q-F	CGAACACGTATTCAAGTCTG
CsPIN3-Q-R	GCTAAACATAGCCATTCCAAG
CsUBIeq-Q-F	CACCAAGCCCAAGAAGATC
CsUBI-eq-Q-R	TAAACCTAATCACCACCAGC
Primers for *in situ* probes	
CsBRC1-SP6	GATTTAGGTGACACTATAGAATGCTATCAAGAAACTCTCAAAGGATCAAC
CsBRC1-T7	TGTAATACGACTCACTATAGGGGCAATAAATAGAGTTGGAGGGGC
CsPIN3-SP6	GATTTAGGTGACACTATAGAATGCTATGATTTCATGGAAGGATCTTTACACC
CsPIN3-T7	TGTAATACGACTCACTATAGGGCGGCGGAGGAGGCGGCGGTGGCTGAGG
Primers for yeast one-hybrid, LUC activity measure assay and Electrophoretic mobility shift assay	
ProCsPIN1b-P1-F	AGCTTATTTGGGGTCCATTATTTGGGGTCCATTATTTGGGGTCCATTG
ProCsPIN1b-P1-R	TCGACAATGGACCCCAAATAATGGACCCCAAATAATGGACCCCAAATA
ProCsPIN3-P3A-F	AGCTTGTAGGGCCCACCATGTAGGGCCCACCATGTAGGGCCCACCATG
ProCsPIN3-P3A-R	TCGACATGGTGGGCCCTACATGGTGGGCCCTACATGGTGGGCCCTACA
ProCsPIN3-P3B-F	AGCTTAGAGGTCCCACTCCAGAGGTCCCACTCCAGAGGTCCCACTCCG
ProCsPIN3-P3B-R	TCGACGGAGTGGGACCTCTGGAGTGGGACCTCTGGAGTGGGACCTCTA
ProCsPIN3-P3C-F	AGCTTGAAGGACCCACAGGGAAGGACCCACAGGGAAGGACCCACAGGG

ProCsPIN3-P3C-R	TCGACCCTGTGGGTCCTTCCCTGTGGGTCCTTCCCTGTGGGTCCTTCA
ProCsPIN3-P3D-F	AGCTTTGAGGGCCCAGTGGTGAGGGCCCAGTGGTGAGGGCCCAGTGGG
ProCsPIN3-P3D-R	TCGACCCACTGGGCCCTCACCACTGGGCCCTCACCACTGGGCCCTCAA
ProCsPIN3-P3E-F	AGCTTAGTGGGCCCAAATGAGTGGGCCCAAATGAGTGGGCCCAAATGG
ProCsPIN3-P3E-R	TCGACCATTTGGGCCCACTCATTTGGGCCCACTCATTTGGGCCCACTA
CsBRC1-AD-F	GGAATTCCATATGATGTTTGTGTTCAATAGTTGTAGTAA
CsBRC1-AD-R	CGGAATTCTTAAGTTTGTTGATGTTTGGAAT
ProCsPIN1b-0800-F	GGTATCGATAAGCTTTGACAAAATAATGCAAAGCTTCATC
ProCsPIN1b-0800-R	AGAACTAGTGGATCCTTTGAAAGAAGTTTGAATTCAGAGAG
ProCsPIN3-0800-F	GGTATCGATAAGCTTCTTTCATATATTCATGGGTTTTGACC
ProCsPIN3-0800-R	AGAACTAGTGGATCCGGCGGTTTTTGTTTGGTGAGTGGCAG
CsBRC1-62SK-F	GCTCTAGAATGTTTGTGTTCAATAGTTGTAGTAAC
CsBRC1-62SK-R	CGCGGATCCTTAAGTTTGTTGATGTTTGGAATTTACCTC
CsBRC1-MBP-F	CGGGATCCATGTTTGTGTTCAATAGTTGTAGT
CsBRC1-MBP-R	ACGCGTCGACTTAAGTTTGTTGATGTTTGGAATT
P1-CHIP-F	TTAAGAGAGAGTGTGGGAAAC
P1-CHIP-R	TAGTGGGAAGAGGAGAAAAGG
P3A-CHIP-F	GGATGTGAGTGAGAGAGGAT
P3A-CHIP-R	AACCGCCTACTATGGTTAGTT
P3B-CHIP-F	GGTCGATTGTCTAATTTCGG
P3B-CHIP-R	TTGAGGCTGAACGGCAGAGT
P3C-CHIP-F	TCAGCGGCAAAGAAGGGGAG
P3C-CHIP-R	TGCGCCGGCGGAAACTTTCC
P3DE-CHIP-F	AATCTTGGGCCTTGACCAGC
P3DE-CHIP-R	GGACTGTACAATGGATGGCA
P1-BIOTIN-F	GTGGGAAACAAAATTTGGGGTCCATTAAATATATATAT
P1- BIOTIN-R	ATATATATATTTAATGGACCCCAAATTTTGTTTCCCAC
P3A-BIOTIN-F	CACTTGTGCAAAGTAGGGCCCACCATAACCCGAATTGG
P3A- BIOTIN-R	CCAATTCGGGTTATGGTGGGCCCTACTTTGCACAAGTG
P3B-BIOTIN-F	GTTCAGTCCTCCAGAGGTCCCACTCCCCGGCCGTCAAA
P3B-BIOTIN-R	TTTGACGGCCGGGGAGTGGGACCTCTGGAGGACTGAAC
P3C-BIOTIN-F	GATGATCAGAAAGAAGGACCCACAGGCTCAACAGGAGA
P3C-BIOTIN-R	TCTCCTGTTGAGCCTGTGGGTCCTTCTTTCTGATCATC
P1-M-F	GTGGGAAACAAAATTTGGGGAAGATTAAATATATATAT
P1-M-R	ATATATATATTTAATCTTCCCCAAATTTTGTTTCCCAC
P3A-M-F	CACTTGTGCAAAGTAGGGTGTACCATAACCCGAATTGG
P3A-M-R	CCAATTCGGGTTATGGTACACCCTACTTTGCACAAGTG
P3B-M-F	GTTCAGTCCTCCAGAGGTGATACTCCCCGGCCGTCAAA
P3B-M-R	TTTGACGGCCGGGGAGTATCACCTCTGGAGGACTGAAC
P3C-M-F	GATGATCAGAAAGAAGGAAAGACAGGCTCAACAGGAGA
P3C-M-R	TCTCCTGTTGAGCCTGTCTTTCCTTCTTTCTGATCATC

Additional dataset S1 (separate file)

Dataset S1. List of genes that were differentially expressed in *CsBRC1*-RNAi plants.