

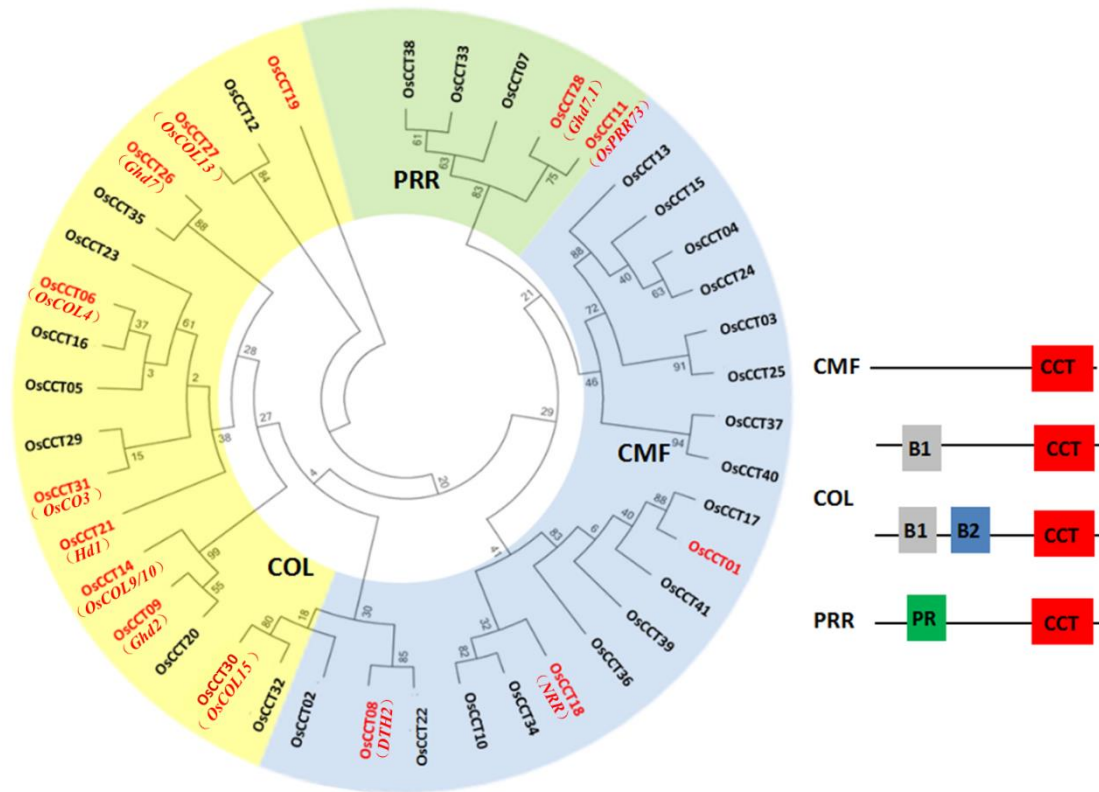


Figure S1. Phylogenetic tree and structures of CCT family genes

The phylogenetic tree was constructed based on the amino acid sequences of the proteins. The genes in the yellow, green and blue areas belong to the COL, PRR and CMF subclasses, respectively. Genes labeled in red have been cloned. Rectangles of different colors represent different domains of the CCT proteins.

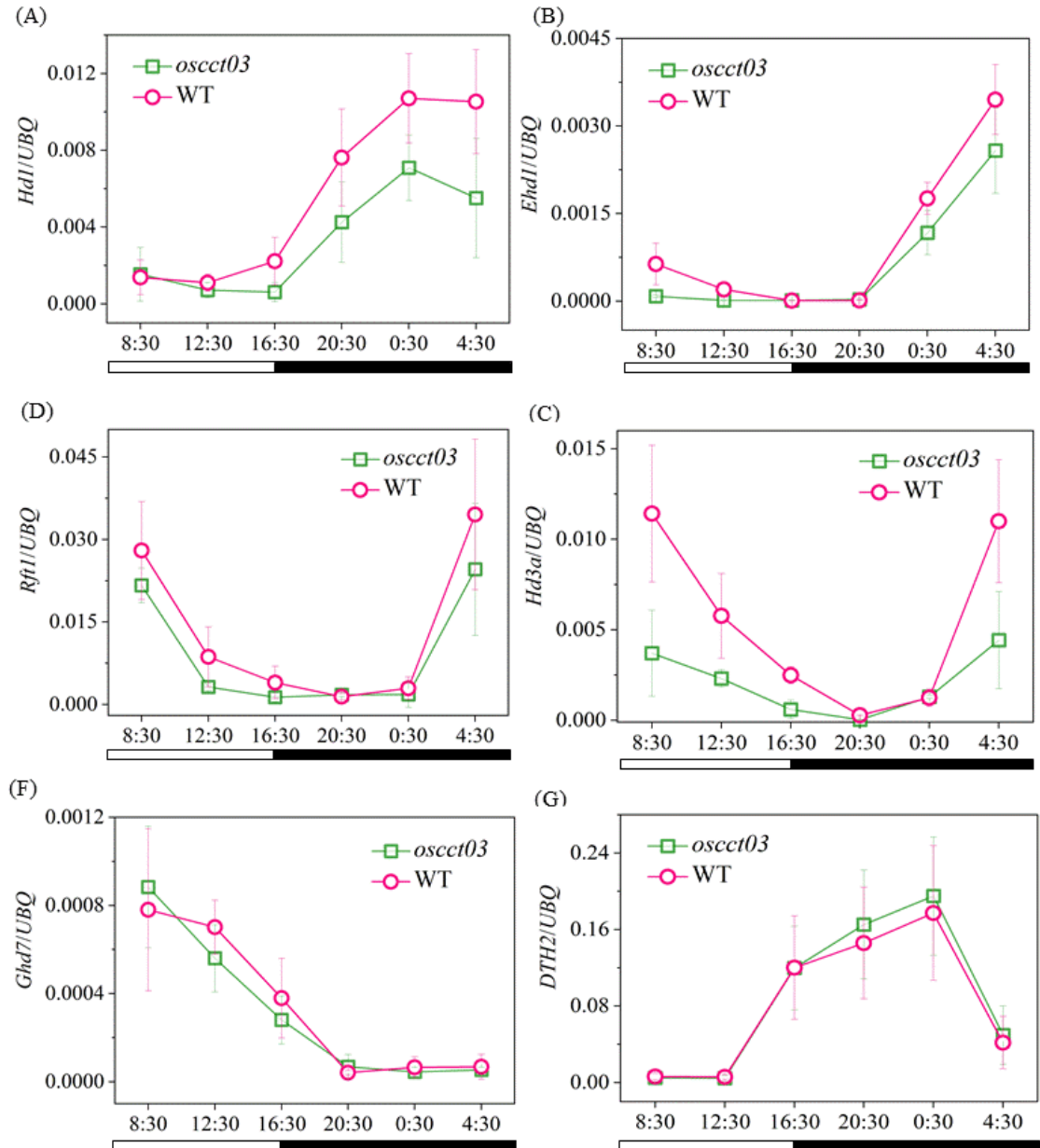


Figure S2. The diurnal expression patterns of major flowering genes in the *OsCCT03* mutant and wild type under SD.

Diurnal expression patterns of *Hdl1* (A), *Ehd1* (B), *Hd3a* (C), *RFT1* (D), *Ghd7* (E) and *DTH2* (F) in *oscct03* mutants and wild-type Zhonghua 11 in SD conditions. The X-axis indicates the time points for sampling, and the Y axis indicates the relative expression levels of the investigated genes relative to that of UBQ.

Table S1. Primers used for PCR and sequencing CCT family genes in ZH11

Genes	Forward primer (F)	Reverse primer (R)
<i>OsCCT01</i>	CCATGTTCCGCCATTCT	TACCGCCCGACCTTCTGT
<i>OsCCT02</i>	CACTCCCATTTCGTCCCATAC	AGGCGTACATTATCTGCTTGAC
<i>OsCCT03</i>	GAACCAGGCGTACAACGA	GTCCCTTCAATCTGAGTAACAA
<i>OsCCT04</i>	CGTCTTCGAGTCCGTTTC	TGATAGCCCAATGTCCCT
<i>OsCCT05</i>	TCGCTTGCTTGTTGGTG	GGAGCTGTACGACGGTTTGA
<i>OsCCT06</i>	GGCAAAGCGAAGCGAAGAAGA	ACCTCCGACGACGACAACCTG
<i>OsCCT07</i>	CCCATGCTCGTAGGGTTGTT	TCGCTGTCAAATGAGCTGGT
<i>OsCCT08</i>	TGGCTGTTCTTGTGGCACTC	GCACCTTAGGCGTCGTTGAA
<i>OsCCT09</i>	GCATCCTCATCGTGCTTC	CGTTTCTCCCTGTACCTC
<i>OsCCT10</i>	GGACTCTCAAGCCCCATAGC	GGCATTGGCAGTCCTGTTTG
<i>OsCCT11</i>	CTTCCCGAGACGATGTTA	GCTTCTGGCTATTGAACTAA
<i>OsCCT12</i>	GCTCCTCGGGATCTCCTA	GTTTGTCTGGTGGGTTTC
<i>OsCCT13</i>	CCGCATCACCGCCTTCCATT	GGGACATTTCGTGGGAGTAGCA
<i>OsCCT14</i>	TGGGTAGGCAGGGTGTTT	ATGCTTGCGGAGGTGATA
<i>OsCCT15</i>	AAATACGTGACCGTCCACCC	AGAGTACGCATTCTCTGGCG
<i>OsCCT16</i>	TGTGGCTCTGCGAGGTCTG	GGTTGATTGCTTACGCTGTGG
<i>OsCCT17</i>	AAAGCCATGTTCCATCCTT	CATTCATCGCCTGTTGTG
<i>OsCCT18</i>	TAAGCGAAGTATTATACGAG	TTTGAGTAAAGAAGCACC
<i>OsCCT19</i>	AAAATGAGGTGGGTTGCG	TGAGGGAGGTGGTGGTGT
<i>OsCCT20</i>	AGGAGGAAGAAGAAGAGGAGTG	TCGTAGTTGAGGCTGAGGG
<i>OsCCT21</i>	AGCAAGGCTACTTCGTTT	CTATCACCGTGCTGTCTG
<i>OsCCT22</i>	AAGTAGATGGCGGTAATA	TCATAAGGGTTGCACTAG
<i>OsCCT23</i>	TCCTAACCTACCCGCCTTCTTC	GACCACCGACGACGACATCT
<i>OsCCT24</i>	AAATAACCGAACGGCATCT	GCACCTACCACCGAGCAA
<i>OsCCT25</i>	ACAGAGCGGCCAGTGTCT	GCATTATCCCTTTCTATTTCTT
<i>OsCCT26</i>	ACAAGCATTTACAAACCCTA	TTGCTCGTATTACTTCTCAACA
<i>OsCCT27</i>	CGGTGCTGTGACTTCTGC	TTGCCATACTCTTGTCTGTTT
<i>OsCCT28</i>	TGGTGCCTCGTCGTCATTCT	TGCTTGCTTATCGTCCTTGTA
<i>OsCCT29</i>	TTGAGGAGATGATGGCAAGCG	CCACCACGGAATCAGAAAGC
<i>OsCCT30</i>	TTTGCGAGATGAAGGATG	GCACAACTGAGCACGAAC
<i>OsCCT31</i>	GCTTTGCCATTGCTGGAAACAC	GGAGGCGTCGTAGTCGGTAAT
<i>OsCCT32</i>	TTCGTTGTCGTCGGTGAAGT	TTGTCGCTGCCACTGCTAGA
<i>OsCCT33</i>	AGAGGAAGGTGGTGGACT	GAAGGAACGTGCCTAAAT
<i>OsCCT34</i>	ATGGTTACGAGTTGGTGGTT	CGTTTGAAATATGGGTTGG
<i>OsCCT35</i>	CTCGTGCCTCCCTACTTG	CACCGTTTGACATTTCTGC
<i>OsCCT36/39</i>	ATCAGGGCTGGAGCTCAT	GAGGAGACGCCGAGGTAG
<i>OsCCT37/40</i>	TCAAGCTGCTGGCGGTAAAGG	GCACCACCATCGCTGAGATTG
<i>OsCCT38</i>	AAAATGTCTCCCGACGCC	CCCGCCAAAATGAAGCAC
<i>OsCCT41</i>	CACCTCCTCGTCTTCCTC	CACATTGCATTGGTCGTT

Primers used for sequencing were labeled in red.

Table S2. Primers used for real-time PCR

Genes	Forward primer (F)	Reverse primer (R)
<i>OsCCT01</i>	TCCTACTACAACAACATCCA	GACGACGACGAGAAGAAT
<i>OsCCT02</i>	CATCCTCATCGTGTCAGA	CGTCCATCATCGGTAAC
<i>OsCCT03</i>	CCCTGAGAATGGAAATGGT	GGACTTGTTGAAGAAGAGATG
<i>OsCCT04</i>	ATCATCTTCAGCGGCATA	GCAACTTCCTTCCTAACAG
<i>OsCCT05</i>	GTCGTACAGCTCCTACAC	GACGAGGACATGCTATGG
<i>OsCCT06</i>	ATGCGGATGATGACCGGAGCAA	TATCCTCGTGGCTATTGTCGTCGG
<i>OsCCT07</i>	AGGTCTCTGTTGTTGTCA	TTGGTATTGGCGTCACTA
<i>OsCCT08</i>	CCAGTTTCAACGACGCCTAA	GTCTCCATATACGCTCCCATCA
<i>OsCCT09</i>	CAACGACCACCATTACTC	CGTACCGTATCTTCTTGGA
<i>OsCCT10</i>	GCACCAGCATACTATCCA	AACACTCGTCGTCATACC
<i>OsCCT11</i>	CAACATACATCAGCATTC	ATTAGCAATTCCTTCATCAACT
<i>OsCCT12</i>	CAACAACACAACACAACAC	CATCCACCATTCTCATAACC
<i>OsCCT13</i>	GCTGTTCTGTTATTGTTAGGA	GAATGTCTGTTCTCTGAAGTAA
<i>OsCCT14</i>	GAAACTGGACCTGGACAT	CTTCCTCTTCCTCTCCTC
<i>OsCCT15</i>	AAGAGTTGCTTCCTTAATGAG	TCCTTACGAACACTGTATCT
<i>OsCCT16</i>	TACCTCGACCTCGACTTC	GGATGATACGCTGTGGTT
<i>OsCCT17</i>	GCATTCTCTTACTCGTCTG	GGATGATGAAGTGGAGGA
<i>OsCCT18</i>	TTAAGCGAAGTATTATACGAGTG	GCAGCATAGGAATCTTGAC
<i>OsCCT19</i>	CAACAACGAGGAGAAGGA	CAGCAGTAGCAGTATTAGGA
<i>OsCCT20</i>	ATGCTGGACATCGACTTC	CTCGTAGTTGAGGCTGAG
<i>OsCCT21</i>	TCAGCAACAGCATCTCTTCTCATCA	TCTGGAATTTGGCATATCTATCACC
<i>OsCCT22</i>	AGTGGTGTGAGTAATCAAGA	TAGCAAGTGGAAGAAGGTT
<i>OsCCT23</i>	GAGCCACAGCGTAGTAAG	TTCTCCCTGTACCTCATCA
<i>OsCCT24</i>	CGCCATACAGTAAGAGGTT	CAATTCCGATGTTGCTTCA
<i>OsCCT25</i>	CGCCATACATCCATACATTAG	TCCACCAATCACTCTCATC
<i>OsCCT26</i>	GAAGAAGAGGTGCTACGA	CTATCTGAACCATTGTCCAAG
<i>OsCCT27</i>	AGTCTATGACATCGCCTAC	AATCTTCTGTTCTTCTCTTCT
<i>OsCCT28</i>	GCCTGGTGTATCTGGAAT	GAAGACATCATAATCACTGGAATA
<i>OsCCT29</i>	CAGAAGACCATCCGCTAC	GAGAAGGAGAGCCAGAAC
<i>OsCCT30</i>	CGTACACTTCACTGCTCAT	TCATCTTCGTCTCCAACAC
<i>OsCCT31</i>	GGAGAAGAGGAAGACGAGGC	TAGCTAAGCAACCAAGATGTA
<i>OsCCT32</i>	TGCCACGGAAGATATTGT	TTCAGGAGAAGAGTTCAGAG
<i>OsCCT33</i>	ATTCCAGCACACCAGTTA	TGAGCATCACCAGCATT
<i>OsCCT34</i>	GTTGATGAGCCTCTACCTT	TCGTGCGAGAAGTCATAG
<i>OsCCT35</i>	CAATCATGTCTTCTGTGG	GCTTCCTCTTCTCCTTGTA
<i>OsCCT36/39</i>	TAGTGGTGAGGTGGAGATA	ACGACGAAGATGATGATGA
<i>OsCCT3740</i>	GGCGGCAACGATAATAATG	GCACAGGTGGAGATTCAT
<i>OsCCT38</i>	AATCTTGTCCGTCTCACTT	TTCTATCCTCTTATTACCATACCT
<i>OsCCT39</i>	ATCATCTTCGTGTCGTC	AGCGTAGGTGATCTTCTTG
<i>OsCCT41</i>	GGATTAGCAGAAGTAGTGTC	GAGAGTAGAGGTTGATGGA
<i>qUbq</i>	AACCAGTGAGGCCCAAGA	ACGATTGATTAAACCAGTCCATGA

Table S3. Primers used to construct the vector, the sequence marked in red is the target site of the sgRNA

Genes	Forward primer (F)	Reverse primer (F)
<i>OsCCT01</i>	AGCGGCGGGTTACCTCACTT gttttagagctagaaatagcaagtta	AAGTGAGGTAACCCGCCGCTgccacggatcatctgcacaac
<i>OsCCT02</i>	AACGGCATATGATCAGTTAC gttttagagctagaaatagcaagtta	GTAAGTGATCATATGCCGTTgccacggatcatctgcacaac
<i>OsCCT03</i>	ACCATGAGGCTCCTGAGGTA gttttagagctagaaatagcaagtta	TACCTCAGGAGCCTCATGGTgccacggatcatctgcacaac
<i>OsCCT04</i>	ACGGGACCATCTCCCCGTG gttttagagctagaaatagcaagtta	CACGGGGAGATGGTGCCCCGTgccacggatcatctgcacaac
<i>OsCCT05</i>	ATGACCCGATCGGATGCACG gttttagagctagaaatagcaagtta	CGTGCATCCGATCGGGTCATgccacggatcatctgcacaac
<i>OsCCT06</i>	ACGGGGCGTTCCTGTGCGCC gttttagagctagaaatagcaagtta	GGCGCACAGGAACGCCCGGTgccacggatcatctgcacaac
<i>OsCCT07</i>	AGCAGCTCGTTCATGCGCAG gttttagagctagaaatagcaagtta	CTGCGCATGAACGAGCTGCTgccacggatcatctgcacaac
<i>OsCCT08</i>	AAGGGTTCTTGTATGCGCTC gttttagagctagaaatagcaagtta	GACGCCATAACAAGAACCCTTgccacggatcatctgcacaac
<i>OsCCT09</i>	ACCCGGCCGGATTCTTCTAC gttttagagctagaaatagcaagtta	GTAGAAGAATCCGGCCGGGTgccacggatcatctgcacaac
<i>OsCCT10</i>	AGAGGCTGCAAAATGCTCGG gttttagagctagaaatagcaagtta	CCGAGCAATTTGCAGCCTCTgccacggatcatctgcacaac
<i>OsCCT11</i>	ATGGGAGAGGACTTACCCAA gttttagagctagaaatagcaagtta	TTGGGTAAGTCCTCTCCCATgccacggatcatctgcacaac
<i>OsCCT12</i>	ACCGAGCTCGCCAATTCAGA gttttagagctagaaatagcaagtta	TCTGAATTGGCGAGCTCGGTgccacggatcatctgcacaac
<i>OsCCT13</i>	ACAACGCCGAGACCGGCTCC gttttagagctagaaatagcaagtta	GGAGCCGGTCTCGGCGTTGTgccacggatcatctgcacaac
<i>OsCCT14</i>	ATCAGACGACCCGACGCGC gttttagagctagaaatagcaagtta	GCGCGTCGGGTCTGCTGATgccacggatcatctgcacaac
<i>OsCCT15</i>	AGCTGACGCTCGTGACCAG gttttagagctagaaatagcaagtta	CTGGTACACGAGCGTCAGCTgccacggatcatctgcacaac
<i>OsCCT16</i>	AAGCCGGGTTCGGTGCCCA gttttagagctagaaatagcaagtta	TGGGCACCGGAACCCGGCTTgccacggatcatctgcacaac
<i>OsCCT17</i>	ACAGCTCCAAGTGAATTC gttttagagctagaaatagcaagtta	GGAATTTAGTTGGAGCTGTgccacggatcatctgcacaac
<i>OsCCT18</i>	AGAGACTATTTCTGAAGTGC gttttagagctagaaatagcaagtta	GCAGTTCAGAAATAGTCTCTgccacggatcatctgcacaac
<i>OsCCT19</i>	AACGACGGGGCCACGCTGTG gttttagagctagaaatagcaagtta	CACAGCGTGGCCCCGTCGTTgccacggatcatctgcacaac
<i>OsCCT20</i>	ACGACGCGTTCCTGTGCCAG gttttagagctagaaatagcaagtta	CTGGCACAGGAACGCGTCGTgccacggatcatctgcacaac
<i>OsCCT21</i>	AGAGGGGAGCGGCTGCCCAT gttttagagctagaaatagcaagtta	ATGGGCAGCCGCTCCCCCTTgccacggatcatctgcacaac
<i>OsCCT22</i>	AGGCATTTTCTACAAGGCAG gttttagagctagaaatagcaagtta	CTGCCTTGTAGAAAATGCCTgccacggatcatctgcacaac
<i>OsCCT23</i>	ACTGGGGCGTCGGCGGGCGG gttttagagctagaaatagcaagtta	CCGCCCCGCCGACGCCCCAGTgccacggatcatctgcacaac
<i>OsCCT24</i>	AGGACGCGCAACATCATGAG gttttagagctagaaatagcaagtta	CTCATGATGTTGCGCGTCTTgccacggatcatctgcacaac
<i>OsCCT25</i>	AATCATGGGCAAATCAGCA gttttagagctagaaatagcaagtta	TGCTGAGTTTGCCCATGATTgccacggatcatctgcacaac
<i>OsCCT26</i>	ATGGGACCAGCAGCCGAGAG gttttagagctagaaatagcaagtta	TCTCCGGCTGCTGGTCCCATgccacggatcatctgcacaac
<i>OsCCT27</i>	ACGGCTGGTGGTCCGCGAGC gttttagagctagaaatagcaagtta	GCTCGCGGACCACCAGCCGTgccacggatcatctgcacaac
<i>OsCCT28</i>	AAGCGCTCCCAGCAGACCTG gttttagagctagaaatagcaagtta	CAGGTCTGCTGGGAGCGCTTgccacggatcatctgcacaac
<i>OsCCT29</i>	AAGCTGACGAGCTGTGCTT gttttagagctagaaatagcaagtta	AACGACAGCTCGTTCGAGCTTgccacggatcatctgcacaac
<i>OsCCT30</i>	ACCACCTCGGGCGGGTCGCA gttttagagctagaaatagcaagtta	TGCGACCCGCCGAGGTGGTgccacggatcatctgcacaac
<i>OsCCT31</i>	ATGGGCGTGGTGGCTGCCCC gttttagagctagaaatagcaagtta	GGGGCAGCCACCACGCCCATgccacggatcatctgcacaac
<i>OsCCT32</i>	AGGCCAGGTTCTTTGCGCC gttttagagctagaaatagcaagtta	GGCGCAAAGGAACCTGGCCTgccacggatcatctgcacaac
<i>OsCCT33</i>	AGCACCCGCACCGGCATCCT gttttagagctagaaatagcaagtta	AGGATGCCGGTGCGGGTGCTgccacggatcatctgcacaac
<i>OsCCT34</i>	ATTCACCCAGATGCCTCTCC gttttagagctagaaatagcaagtta	GGAGAGGCATCTGGGTGAATgccacggatcatctgcacaac
<i>OsCCT35</i>	ATCGCGGCGGACCTGAACCG gttttagagctagaaatagcaagtta	CGGTTCAGGTCCGCCGCGATgccacggatcatctgcacaac
<i>OsCCT36/39</i>	AATTCATATTTGTGCGGAAGA gttttagagctagaaatagcaagtta	TCTTCCGACAAATATGAATTgccacggatcatctgcacaac
<i>OsCCT37/40</i>	ATGAGGTTAGGGGTGGAGGG gttttagagctagaaatagcaagtta	CCCTCCACCCCTAACCTCATgccacggatcatctgcacaac
<i>OsCCT38</i>	AGCACGCGGAGGGACCGCCG gttttagagctagaaatagcaagtta	CGGCGGTCCCTCCGCGTGCTgccacggatcatctgcacaac
<i>OsCCT41</i>	ATTTTCTAGGTTCAAGCTAC gttttagagctagaaatagcaagtta	GTAGCTTGAACCTAGAAAAATgccacggatcatctgcacaac
<i>OsU3</i>	CCCCTTTCGCCAGGGGTACCgtaattcatccaggctccaag	TACGAATTCGAGCTCGGTACCgctgtgccgtacacgggtacg

The sequence marked in red is the target site of the sgRNA.

Table S4. Mutation types of CCT genes' mutants

CCT-ID	LOC ID	SubC	Mutants type
<i>OsCCT01</i>	Os01g61900	CMF	-1 bp, -23 bp
<i>OsCCT02</i>	Os02g01990	CMF	+1 bp, -1 bp
<i>OsCCT03</i>	Os02g05470	CMF	-1 bp, -4 bp
<i>OsCCT04</i>	Os02g05510	CMF	+1 bp
<i>OsCCT05</i>	Os02g08150	COL	-4 bp, -49 bp
<i>OsCCT06(OsCOL4)</i>	Os02g39710	COL	-1 bp, -5 bp
<i>OsCCT07</i>	Os02g40510	PRR	-1 bp, -2 bp
<i>OsCCT08 (DTH2)</i>	Os02g49230	COL	-2 bp, -17 bp
<i>OsCCT09 (Ghd2)</i>	Os02g49880	COL	+1 bp, -5 bp
<i>OsCCT10</i>	Os03g04620	CMF	+1 bp, -1 bp, -2 bp
<i>OsCCT11 (OsPRR73)</i>	Os03g17570	PRR	-1 bp
<i>OsCCT12</i>	Os03g22770	COL	-5 bp
<i>OsCCT13</i>	Os03g47970	CMF	-1 bp, -4 bp
<i>OsCCT14 (OsCOL9/ OsCOL10)</i>	Os03g50310	COL	+1 bp, -17 bp
<i>OsCCT15</i>	Os03g52450	CMF	+1 bp,-1 bp,-11 bp
<i>OsCCT16</i>	Os04g42020	COL	+1 bp,-4 bp,-126 bp
<i>OsCCT17</i>	Os05g38990	CMF	-1 bp, -2 bp
<i>OsCCT18 (NRR)</i>	Os05g51690	CMF	+1 bp, -1 bp
<i>OsCCT19</i>	Os06g01340	COL	-1 bp, -4 bp
<i>OsCCT20</i>	Os06g15330	COL	+1 bp, +2 bp,-1 bp
<i>OsCCT21 (Hd1)</i>	Os06g16370	COL	+1 bp, -2 bp,-4 bp
<i>OsCCT22</i>	Os06g19444	COL	-1 bp, -8 bp
<i>OsCCT23</i>	Os06g44450	COL	-4 bp, -28 bp
<i>OsCCT24</i>	Os06g48534	CMF	-6 bp, -11 bp
<i>OsCCT25</i>	Os06g48610	CMF	+1 bp
<i>OsCCT26 (Ghd7)</i>	Os07g15770	CMF	+1 bp, -5 bp,-28 bp
<i>OsCCT27 (OsCOL13)</i>	Os07g47140	COL	+1 bp, -4 bp
<i>OsCCT28 (Ghd7.1)</i>	Os07g49460	PRR	-1 bp, -2 bp
<i>OsCCT29</i>	Os08g15050	COL	+1 bp, -41 bp
<i>OsCCT30 (OsCOL15)</i>	Os08g42440	COL	+1 bp, -28 bp, -504 bp
<i>OsCCT31 (OsCO3)</i>	Os09g06464	COL	-7 bp, -31 bp
<i>OsCCT32</i>	Os09g33550	COL	+1 bp, -3 bp
<i>OsCCT33</i>	Os09g36220	PRR	-1 bp, -2 bp
<i>OsCCT34</i>	Os10g32900	CMF	-1 bp, -2 bp
<i>OsCCT35</i>	Os10g41100	CMF	-1 bp, -3 bp
<i>OsCCT36/39</i>	Os11g01074.4	CMF	+1 bp
<i>OsCCT37/40</i>	Os11g01100	CMF	-1 bp, -4 bp
<i>OsCCT38</i>	Os11g05930	PRR	-1 bp
<i>OsCCT41</i>	Os12g16160	CMF	+1 bp

Table S5. The phenotypes of mutants *oscct08*, *oscct21*, *oscct26* and *oscct28*

Genotypes	LD Heading date (d)	SD Heading date (d)	LD Plant height (cm)	SD Plant height (cm)
WT	69.1±1.0	62.1±1.4	106.1±3.3	87.6±4.5
<i>oscct08</i> (-2 bp)	64.7±1.3 **	63.4±4.2	101.8±2.9 **	87.2±5.8
<i>oscct08</i> (-17 bp)	63.9±1.8 **	61.7±1.8	98.3±5.7 **	87.4±4.9
<i>oscct26</i> -1 (+1 bp)	56.7±1.4 **	62.7±2.1	90.4±4.2 **	86.3±7.3
<i>oscct26</i> -2 (-5 bp)	58.5±1.9 **	62.5±5.3	87.1±2.7 **	86.7±4.7
<i>oscct26</i> -3 (-28 bp)	58.0±1.0 **	61.3±6.0	89.7±6.5 **	87.5±6.0
<i>oscct21</i> -1 (-2 bp)	65.4±1.5 **	81.7±3.5 **	99.7±3.0 **	87.3±6.8
<i>oscct21</i> -2 (-4 bp)	64.5±0.9 **	84.8±2.1 **	98.0±3.7 **	85.4±8.2
<i>oscct28</i> -1 (-1 bp)	89.6±1.6 **	60.3±3.8	114.1±6.1 **	82.4±7.9
<i>oscct28</i> -2 (-2 bp)	89.2±1.5 **	63.6±5.1	112.8±4.0 **	86.8±10.3

WT represents negative transgenic plants, LD long day conditions, SD short day conditions. All data are presented as the mean ± SD (standard deviation). ** indicates P < 0.01.