Table S1. List of cabbage, kohlrabi, and broccoli materials used in this study with their flowering time.



Table S2. List of primers used in this study.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Purpose** | **Gene****identification number** | **Gene name** | **Primer information** |  |  |  |
|  |  |  | **Forward primer** |  | **Reverse primer** |  |
|  |  |  | **Name** | **Sequence (5'-3')** | **Name** | **Sequence (5'-3')** |
| genomic DNA cloning | *Bo9g173400* | *BoFLC1* | BoFLC1-gF | AGATCAAATTAGGGCGCAAAGC | BoFLC1-gR | ATTCGCCGATTAAAGGTAAC |
| 　 | *Bo3g100540* | *BoFLC2* | BoFLC2-gF | ACCGAACCGAACCTCAGGATC | BoFLC2-gR | GTAGTTTTTACACACGGGGTC |
| 　 | *Bo3g005470* | *BoFLC3* | BoFLC3-gF | CACTTGAACCGAACCTCTGG | BoFLC3-gR | ATTTCAGCCCCGTCTAAAGG |
| genomic DNA cloning(Contig) | *Bo9g173400* | *BoFLC1* | BoFLC1-F1  | CGCTGTGAGGTTGATGCT | BoFLC1-R1  | AGCATCAACCTCACAGCG |
|  |  | 　 | BoFLC1-F2 | CCAAGCGTTTAGTTTCGC | BoFLC1-R2 | GCGAAACTAAACGCTTGG |
|  |  | 　 | BoFLC1-F3 | ACGATTGCGTTTGCATGT | BoFLC1-R3 | ACATGCAAACGCAATCGT |
|  |  | 　 | BoFLC1-F4 | ATGTATTGGCATGCCCGC | BoFLC1-R4 | GCGGGCATGCCAATACAT |
|  |  | 　 | BoFLC1-F5 | AGTCTGCTTCATGAGGCC | BoFLC1-R5 | GGCCTCATGAAGCAGACT |
|  | *Bo3g100540* | *BoFLC2* | BoFLC2-F1  | GAGCAATGTCCTGATGAGC  | BoFLC2-R1  | GCTCATCAGGACATTGCTC |
|  |  | 　 | BoFLC2-F2 | ATTGTGCAGCCATTAACC | BoFLC2-R2 | GGTTAATGGCTGCACAAT |
|  |  | 　 | BoFLC2-F3 | TGGTTCACACCATGAGCTAC | BoFLC2-R3 | GTAGCTCATGGTGTGAACCA |
|  |  | 　 | BoFLC2-F4 | GAACCAGGGTTTGGCTAG | BoFLC2-R4 | CTAGCCAAACCCTGGTTC |
|  |  | 　 | BoFLC2-F5 | AATGAAGCCTGGATCTGG | BoFLC2-R5 |  CCAGATCCAGGCTTCATT |
|  | *Bo3g005470* | *BoFLC3* | BoFLC3-F1  | TTTGCATGTCCGTCAAGA | BoFLC3-R1  | TCTTGACGGACATGCAAA |
|  |  | 　 | BoFLC3-F2 | AGGAACAAGCATTCCTTTTC | BoFLC3-R2 | GAAAAGGAATGCTTGTTCCT |
|  |  | 　 | BoFLC3-F3 | GCCAACTCATAGCCTCAA | BoFLC3-R3 | TTGAGGCTATGAGTTGGC |
|  |  |  | BoFLC3-F4 | TGGAGGGTGTCCTTGAGA | BoFLC3-R4 | TCTCAAGGACACCCTCCA |
|  |  | 　 | BoFLC3-F5 | GAAGAAGAAACAACCAAGGC | BoFLC3-R5 | GCCTTGGTTGTTTCTTCTTC |
| Expression analysis | *Bo9g173400* | *BoFLC1* | BoFLC1-F | CGATAATGTAAGTGTGGGTTCC | BoFLC1-R | GGAGATTTGTCCAGGTGACACC |
|  | *Bo3g100540* | *BoFLC2* | BoFLC2-F | TCTGATGTAAGCGTCGATTCC | BoFLC2-R | CGGACAATTGATGTCAGAGATC |
|  | *Bo3g005470* | *BoFLC3* | BoFLC3-F | GAGCTATGGTTCACACAATGAGTTAC | BoFLC3-R | GGCTATCAACAAGCTTCAACATTAG |
|  | *Bo5g038860* | *BoGI* | BoGI-F | TGGCAAGTGCATCTGATCTC | BoGI-R | TGGGTGTGATAAGCACCGTA |
|  | *Bo9g173400* | *BoCOOLAIR* | BoCOOLAIR-F | TGATGGTTGGTAGGAAAAGA | BoCOOLAIR-R | CCGCAAGATTATTCTTCTCCA |
|  | *Bo3g019340* | *BoVIN3* | BoVIN3-F | TGGATTGCTTGTGAGGGTTGT | BoVIN3-R | TACATGCCGAGTCTCCTTCG |
| 　 | *Bol030974* | *BoACTIN1* | BoACTIN1-F | TTCTCTCTTCCACACGCCAT | BoACTIN1-R | CTTGTCCTGCGGGTAATTCG |

**Table S3.** Percent identity matrix of CDS multiple sequence alignment cabbage (FLC-CA1, -CA3, and -CA5), kohlrabi (FLC-KH7 and -KH8), and broccoli (FLC-BR10 and –BR11) (shown as in Table S1) having different flowering time.





**Supplementary Figure 1**. Comparisons of *BoFLC1* (A)*, BoFLC2* (B)*, and BoFLC3* (C) gene structure, respectively, between reference and early- (CAB1), Mid- (CAB3) and late- (CAB5) flowering lines.