

(05-1-23)

## Isolation and differential expression of FLOWERING LOCUS C gene in *Brassica rapa* L. *ssp* *pekinensis*

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### Objectives

Low temperature treatment (vernalization) is required to induce flowering in Chinese cabbage (*Brassica rapa* L. *ssp* *pekinensis*). FLC (FLOWERING LOCUS C) gene encoding a MADS box transcription factor plays an important role in control of flowering time as a floral repressor. The objective of this study is to isolate FLC gene family from Chinese cabbage and investigate the expression pattern in Chinese cabbage with different flowering time and *Arabidopsis*

### Materials and Methods

#### 1. Material

*Brassica rapa* L. *ssp* *pekinensis* Chiifu was used for isolation of FLC gene family. Early, intermediate and late flowering Chinese cabbage plants (provided by DONGBU HANNONG Co.) were used for investigation of expression pattern of each FLC gene.

#### 2. Methods

Chiifu BAC clone sequence was used to design the specific primers for isolation of each FLC gene. RT-PCR was performed to isolate and investigate the expression of FLC gene in Chinese cabbage.

### Results and Discussion

Chinese cabbage (*Brassica rapa* L. *ssp* *pekinensis*) seems to have more than four FLC genes. We isolated 3 FLC genes from inbred line Chiifu by specific primers designed on HindIII BAC clones. BrFLC 1 (621bp), BrFLC 2 (591bp) and BrFLC 3 (594bp) were isolated from Chiifu by RT-PCR and had a high homology. The expression level of FLC and AGL20 genes was examined in early, intermediate and late flowering type of Chinese cabbage plants (provided by DONGBU HANNONG Co.) vernalized under cold condition (4 °C). The expression of FLC gene was high in nonvernalized plant, however reduced to very low level during vernalization. The late flowering plant showed higher expression of FLC gene than early flowering plant during vernalization. AGL20 was expressed higher in early flowering plant than in intermediate and late flowering plant after 40 day vernalization. BrFLC 1, BrFLC 2 and BrFLC 3 specific primers were designed to distinguish each of FLC gene expression in Chinese cabbage. BrFLC genes (BrFLC 1, BrFLC 2, BrFLC 3) showed higher expression in late flowering plant than early flowering. The expression of BrFLC 1 and BrFLC 2 was higher than BrFLC 3. BrFLC 1 and BrFLC 2 were expressed strongly in leaf and apical tissue and BrFLC 3 was rarely detected in roots. BrFLC 1, BrFLC 2 and BrFLC 3 genes were inserted to pB2GW7 vector by using gateway system and introduced into *Arabidopsis thaliana* Columbia ecotype. Transformants with these BrFLC genes showed delay in flowering time.

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