

## Differential Expression of Flavonoid Biosynthesis Genes and Accumulation of Phenolic Compounds in Common Buckwheat (*Fagopyrum esculentum*)

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### Objectives

We compared the expression levels of flavonoid biosynthesis genes, along with that of *F. esculentum* dihydroflavonol-4-reductase (DFR), which was previously isolated, in different organs of *F. esculentum* and in sprouts grown under light or dark conditions. Finally, we examined the effect of different growth conditions on the accumulation of phenolic compounds in the sprouts.

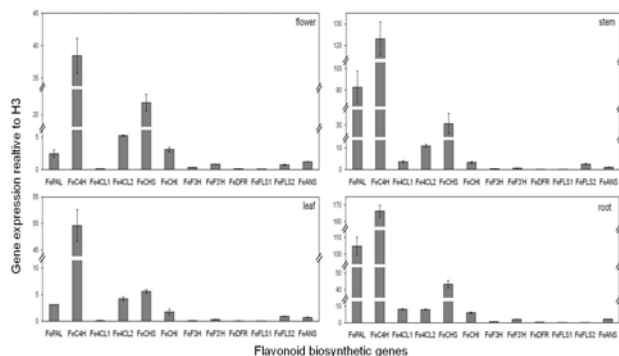
### Materials and Methods

- The seeds of common buckwheat (*F. esculentum* cv. Suwon-1) were germinated in a growth chamber at 25 °C with approximately 60% humidity for 10 d.
- RNA extraction and polymerase chain reaction analyses
- Cloning of cDNAs encoding flavonoid biosynthetic enzymes
- High Performance Liquid Chromatography Analysis

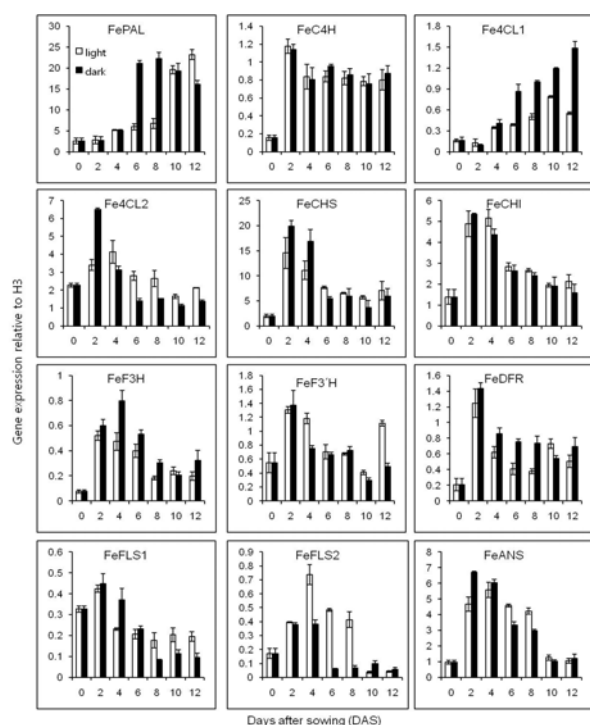
### Results

We isolated the cDNAs of 11 *F. esculentum* enzymes in the flavonoid biosynthesis pathway, namely, phenylalanine ammonia lyase (PAL), cinnamate 4-hydroxylase (C4H), 4-coumarate:CoA ligase (4CL) 1 and 2, chalcone synthase (CHS), chalcone isomerase (CHI), flavone 3-hydroxylase (F3H), flavonoid 3'-hydroxylase (F3'H), flavonol synthase (FLS) 1 and 2, and anthocyanidin synthase (ANS). Quantitative real-time polymerase chain reaction analysis showed that these genes were most highly expressed in the stems and roots. However, high performance liquid chromatography analysis indicated that their flavonoid products, such as rutin and catechin, accumulated in the flowers and leaves. These results suggested that flavonoids may be transported within *F. esculentum*. In addition, light and dark growth conditions affected the expression levels of the biosynthesis genes and accumulation of phenolic compounds in *F. esculentum* sprouts.

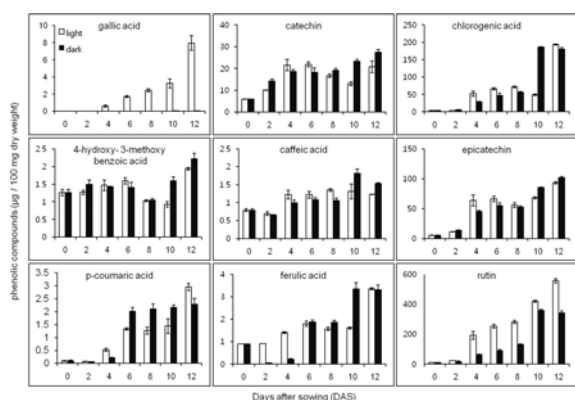
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**Fig. 1.** Expression levels of flavonoid biosynthesis genes in different organs of *F. esculentum*. The expression level of each gene is relative to that of the constitutively expressed histone H3 gene. Each value is the mean of three replicates  $\pm$  SD.



**Fig. 2.** Expression levels of flavonoid biosynthesis genes in non-germinated seeds (0 days after sowing, DAS) and sprouts (2 - 12 DAS) of *F. esculentum* grown under light or dark conditions. The expression level of each gene is relative to that of the constitutively expressed histone H3 gene.



**Fig. 3.** Content of phenolic compounds (mg per 100 g dry weight (DW)) in non-germinated seeds (0 days after sowing, DAS) and sprouts (2 - 12 DAS) of *F. esculentum* grown under light or dark conditions.

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