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Study on the expression of a cytosolic FBPase, a key enzyme in sucrose biosynthesis, from Chinese cabbage

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Objectives

To understand regulatory mechanism of the cytosolic FBPase, the importance of cytosolic FBPase in sucrose biosynthesis in photosynthesis tissues and in gluconeogenesis in nonphotosynthetic tissues, we describe the changes in enzyme activity and protein and transcript levels in Chinese cabbage.

Materials and Methods

1. Plant material

Brassica rapa L. ssp. *pekinensis* Inbred line Chiifu

2. Methods:

Sampling of Chinese cabbage → expression study → functional study

Results and Discussion

Chinese cabbage (*Brassica rapa* L. ssp. *pekinensis*) is one of the most important vegetable crop in Korea and other eastern Asian countries including China. We have isolated a gene for cytosolic fructose-1,6-bisphosphatase, a key regulatory enzyme of the gluconeogenic pathway and sucrose biosynthetic pathway from Chinese cabbage inbred line 'Chiifu'. Expression of BrFBPase protein was high during daytime when photosynthesis might be high. The level of BrFBPase transcript was decreased upon light-chilling treatment, but the levels gradually increased by further prolonged exposure. And the level of transcript and polypeptide for BrFBPase were higher in leaves after heavy frost than in leaves before that, and also total sugar contents were higher after head formation than before head formation in field grown Chinese cabbage. This result indicates that increased in the sugar content leads to increased sucrose biosynthesis followed by increased in the expression of enzymes involved in the pathway, like cytosolic FBPase. At low temperatures, growth and carbon export from leaves often decline more than photosynthesis, resulting in the accumulation of carbohydrate, which may inhibit sucrose synthesis. In particular FBPase activity, protein and transcript were low in immature leaves (sink), and increased in mature (source) photosynthetically activeleaves.

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