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A cDNA Encoding Zeta-Carotene Desaturase Showing the Differential Expression Patterns During Fruit and Leaf Development in *Citrus*

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Objectives

We want to know the expression patterns of zeta-carotene desaturase and its relationship with carotenoid accumulation according to tissue development in *Citrus*.

Materials and Methods

1. Material

Plant - Miyagawa-wase (*Citrus unshiu* Mac. cv. Miyagawa)

2. Methods:

Citrus (*Citrus unshiu* Marc. cv. Miyagawa) was cultivated at the *Citrus* Experiment Station, Cheju (Korea) and used throughout this work. Plants were grown under greenhouse conditions and tissues including fruits, leaves, and flowers were sampled. The expression pattern was investigated by northern blot analysis.

Results and Discussion

A cDNA clone (*Zds*) encoding zeta-carotene desaturase (GenBank accession number) was isolated from the fruit cDNA library of *Citrus* (*Citrus unshiu* Marc.). Sequence analyses indicated that the clones is composed of 2,064 bp coding region, 118 bp 5' UTR, and 302 bp 3' UTR, and that cDNA contains an open reading frame encoding 570 amino acids (61.4 kDa). Phylogenetic dendrogram revealed that the cDNA showed significant similarity to those of other *Citrus* species. Genomic Southern blot analysis indicated that *Zds* gene is present as a single copy and the several isoforms are present in the *Citrus* genome. RNA blot analysis showed that the mRNA is expressed in the edible parts and peels of fruits, and leaves, as a single transcript. Also, during the ripening of fruits, the signal of *Zds* transcripts was very weak until break stage and its expression markedly increased to the maximum level in the latest stage. A similar pattern was also detected in peels. Also, the level of *Zds* transcripts is changed in the process of leaf development. Our results suggested that *Zds* is an important regulatory enzyme in carotenoid accumulation especially during fruit ripening. This is the report to characterize the relationship between the expression of *Zds* and fruit maturation in *Citrus*.