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Characterization of an Arabidopsis chlorophyll-deficient mutant

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Objectives

The objective of this study is to elucidate the function of DJ-1 protein in Arabidopsis.

Materials and Methods

1. Material

Plant - *Arabidopsis thaliana* Columbia ecotype

2. Methods

Total RNA from Arabidopsis was used for RT-PCR. Arabidopsis T-DNA insertion mutants were provided from Salk Institute. Plasmids were introduced by PEG mediated transformation into Arabidopsis protoplast prepared from leaf tissues.

Results and Discussion

DJ-1 is a multi-functional protein that plays roles in transcriptional regulation and anti-oxidative stress, and loss of its function is thought to result in onset of Parkinson's disease. The DJ-1 protein belongs to the DJ-1/PfpI family of proteins conserved in many different organisms. However the biological and biochemical functions of these proteins in plants are unknown. We isolated four kinds of DJ-1 like genes to elucidate the function of plant DJ-1 proteins. Two Arabidopsis T-DNA insertion mutants of each gene were provided by the Salk Institute. Seedlings were screened by PCR for the presence of a T-DNA insertion in chromosome. Amplification of a specific band in several individual plants confirmed the incorporation of the T-DNA in each gene. One of homozygous DJ-1 mutant showed albino phenotype. Progeny from a self-pollinated heterozygous plant segregates green and albino in a 3:1 ratio. In order to study the effect of this mutation on chloroplast development, leaf sections of Arabidopsis wild type and mutant plants were examined by transmission electron microscopy. Compared with wild type chloroplast, the mutant has rudimentary internal membrane. Thus we supposed that this protein might be closely related to chloroplast biogenesis. We also investigated the import of DJ-1 protein into chloroplast using protoplasts derived from leaf tissues of Arabidopsis. Fluorescence microscopy analyses revealed that AtDJ-1::GFP is efficiently imported into chloroplast.

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