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CEL1 and *CEL2* Regulate Cell Size along the Leaf-Length Direction in *Arabidopsis*

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Objectives

Phenotypes of *cel1-1D* mutant showed long petiole, leaf blade and serrated leaf margin. This study was carried out to understand the relationship between plant molecular mechanism and morphological aspect in *Arabidopsis*.

Materials and Methods

1. Material:

Arabidopsis thaliana Col-0 (WT)

cel1-1D, *cel1-2*, *cel1-3*, *cel2-1*, *cel2-2* and *cel2-3*, *cel1-3/2-1* and *cel1-3/2-2*.

2. Methods:

Scanning electron microscope analysis, *Arabidopsis* transformation, Reverse transcription polymerase chain reaction and Section.

Results and Discussion

By screening *Arabidopsis* activation tagging lines, we obtained a dominant mutant, *cell elongator* (*cel1-1D*), that had long petioles, elongated leaves and slightly narrower leaf blades. The determination of T-DNA insertion site indicated the mutation was caused by the overexpression of At5g15580 gene (*CEL1*). Reverse transcription polymerase chain reaction (RT-PCR) analysis indicated that the At5g15580 gene was overexpressed in *cel1-1D*. By the scanning electron microscope analysis, *cel1-1D* had an altered epidermal cell shape, especially in the silique, petal, petiole and leaf blade. Database analysis indicated that *Arabidopsis* genome has another gene (At3g02170) that shows the high homology to *CEL1*. To investigate the role of the *CEL1* and *CEL2*, we analyzed T-DNA inserted *cel1*, *cel2*, and *cel1/cel2* double mutant. Phenotypic characters of *cel1* and *cel2-2* single mutants were similar to those of the wild type, whereas phenotype of *cel1/cel2* double loss of function mutant showed severe defect in leaves, short petiole and leaf blade. Palisade cells of *cel1-3/2-1* mutant showed reduced cell size in the length direction of the leaf blade, while those of the *cel1-1D* showed increased cell size in the length direction of the leaf blade. However, total numbers of cells in the *cel1-1D* and *cel1-3/2-1* mutants were similar to the wild type. Therefore, we propose that *CEL1* and *CEL2* are novel factors to regulate the polar cell elongation along the leaf-length direction in *Arabidopsis* leaf.

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