NU Tech
Technology Partnership of Nagoya University, Inc.

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# Clearsee: A Rapid Optical Clearing Reagent for Whole-Plant Fluorescent Imaging

## Background:

Imaging techniques for visualizing and analyzing precise morphology and gene expression patterns are essential for understanding biological processes during development in all organisms. However, it has been challenging to visualize 3D morphology with gene expression in intact plant tissues at the cellular level, for example, because of;

- Non-specific background fluorescence due to autofluorescent compounds
- Light scattering due to various compounds with different refractive indexes
- Exasperating sectioning required for high resolution images of deep plant tissues
- Difficulty to reconstruct a 3D presentation of gene expression patterns from mechanical sections

## Technology Overview:

Nagoya University researchers have invented an aqueous chemical reagent, termed ClearSee, that renders fixed plant tissues transparent to allow deep imaging by chemical screening. ClearSee rapidly diminishes chlorophyll autofluorescence while preserving the fluorescence of fluorescence proteins. Multicolor imaging with ClearSee enables observation of the precise 3D structure and specific gene expression patterns. Moreover, ClearSee is applicable to whole-root and leaf imaging.

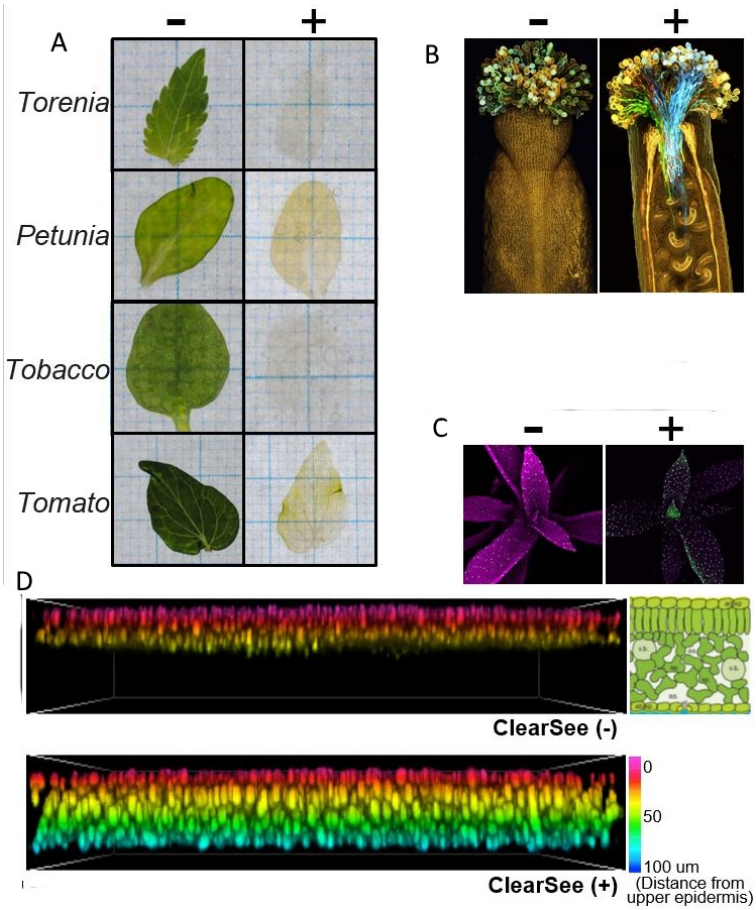


Figure 1. A: ClearSee treated leaves. B: ClearSee treated pistil. C: Fluorescence-labeled nuclear images of ClearSee treated P. patens. D: Effect of ClearSee on leaf under two-photon fluorescence excitation microscopy.

## Potential Applications:

- Applicable for a variety of organs: leaf, root, pistil and seeding
- Deep imaging of the whole leaf and root by not only two-photon excitation fluorescence microscopy but also confocal laser scanning microscopy (CLSM)
- Also, applicable to A. thaliana and moss P. patens; not only to angiosperm tissues but also non-vascular plant tissues

## Contact

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