

The physiology of photosynthesis in land plants

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• Crop Science • Forward Genetics • Structural Physiology



Research background

- The world population has been increased with an enormous usage of chemical fertilizers.
- However, as a result of surplus applications of chemical fertilizers to agricultural lands, chemical fertilizers cause environmental pollution and decrease the efficiency of mineral utilization in crop plants.
- From these observations, I suggest that new strategies for improving crop yield and sustaining the food supply would be required without further consuming chemical fertilizers.

Research objectives

I focus on the chloroplasts in land plants and investigate the effects of various environmental factors such as light or mineral nutrition on photosynthesis.

From this study, I would like to understand the acclimation mechanisms in land plants to their growing conditions and identify the important factors to maintain their plasticity for their photosynthetic activities and their growth.

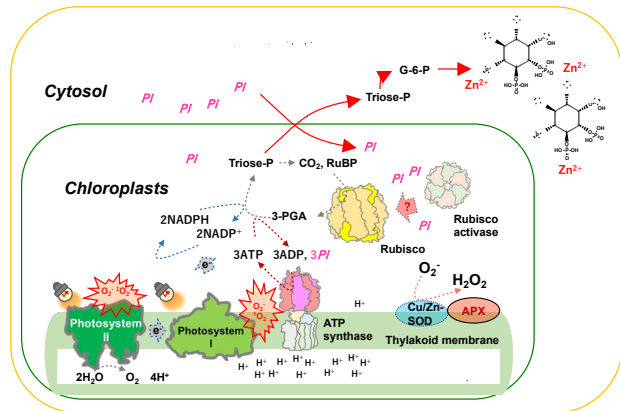
Based on the above study, I aim to increase photosynthesis activities and efficiencies in crop plants for improving crop yield.

Achievements

- The elucidation of the reactive oxygen species production mechanisms in chloroplasts. (Takagi et al., 2016 *Plant Physiol.* 171: 1626-1634).
 - The elucidation of the mechanisms of Phosphorus toxicity in rice plants. (Takagi et al., 2020 *Plant Cell Environ.* 43: 2033-2053).
- [Others;
https://www.researchgate.net/profile/Daisuke_Takagi3]

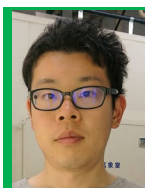


The comparison between rice plants grown under the control conditions (left) and those grown under the P toxicity conditions (right)



The mechanisms of P toxicity in rice leaves.

(Takagi et al., 2020 *Plant Cell Environ.*, DOI: 10.1111/pce.13772)



Prospects of Collaboration

[Agriculture and basic research of plant science]

- The investigation of the relationship between photosynthetic efficiency and crop yield.
- The screening of new crop cultivars focused on photosynthesis.