

FUNDING PROGRAM FOR NEXT GENERATION WORLD-LEADING RESEARCHERS

Project Title: Research on improvement of plant biomass production through the optimization of photosynthetic electron transport

Name: Maki KAWAI-YAMADA

Institution: Saitama University

1. Background of research

Plants have ability to convert light energy to chemical energy, and use carbon dioxide to produce organic compounds through photosynthesis. In this process, several rate-limiting factors inhibit the biomass production. Thus, the optimization of the photoelectron transport, in which light energy is converted to ATP or NADPH, is a key process to achieve the maximum plant photosynthesis and biomass production.

2. Research objectives

In recent years, the excess carbon dioxide in atmosphere is focused as a major problem to be addressed immediately. To solve this problem, plant photosynthesis, in which carbon dioxide is absorbed and fixed into organic compounds, is noted. In this research, an improvement of chloroplastic redox pool and metabolic pathway will be done to achieve the molecular breeding of the plants with high carbon dioxide absorption and high biomass production.

3. Research characteristics (incl. originality and creativity)

NAD(P)(H), coenzymes in the cellular redox reaction, are involved in the control of life span and metabolic regulation in animals. A feature of this research is to focus on the metabolic modification of plant specific chloroplastic coenzyme metabolism. Our group is a pioneer in this research field.

4. Anticipated effects and future applications of research

The research will mainly conducted in a model cereal plant, rice. In future, a contribution to biomass increase in non-edible rice biomass production and other industrial crops (oilseed rapes, trees etc) is also expected.

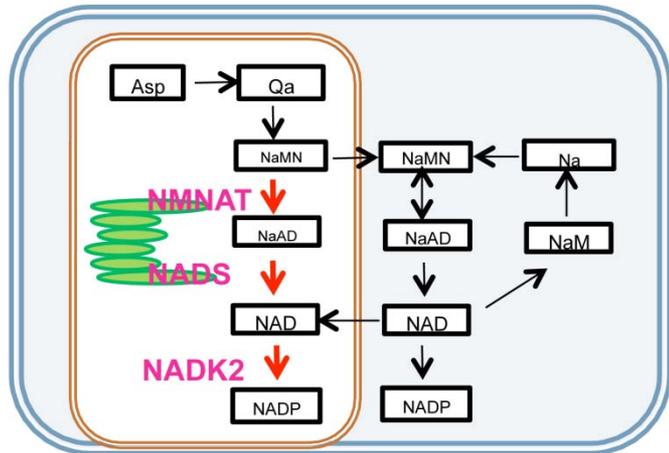
Efficient use of light energy is a key for carbon dioxide fixation

< objectives >

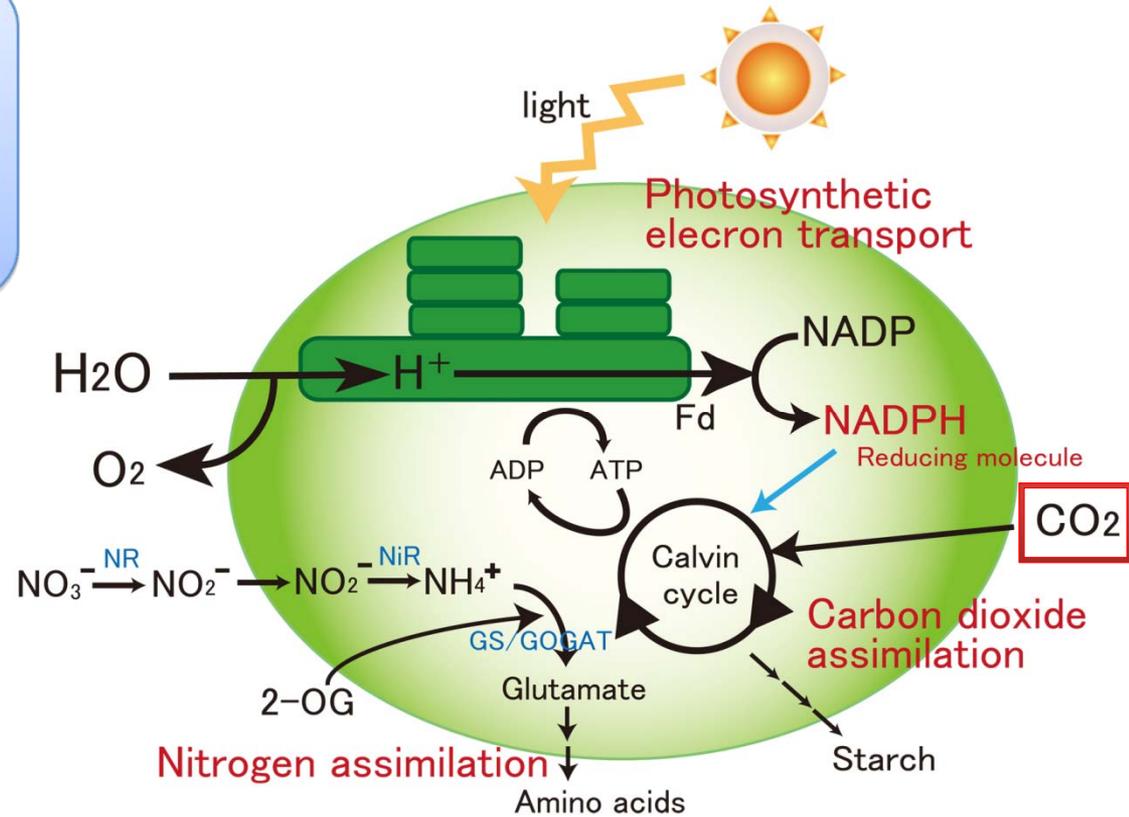
Improvement of plant biomass production through the optimization of photosynthetic electron transport



Molecular breeding of plants with high carbon dioxide absorption and high biomass production



Chloroplast redox metabolic pathway, which will be newly introduced in this study



Plants convert light energy to chemical energy, and fix carbon dioxide to organic compounds through photosynthesis. In this research, the improvement of chloroplast redox metabolic pathway will be done to achieve the molecular breeding of the plants with high carbon dioxide absorption and high biomass production.