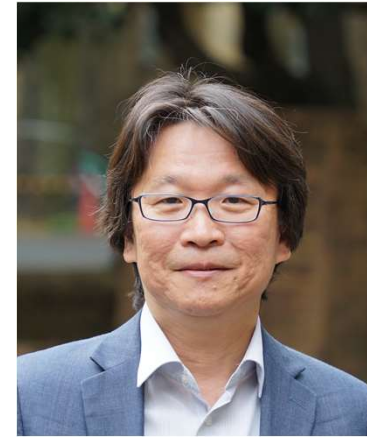# Green Biotechnology

R&D Project Title: Development of a new breeding method to improve the function of crop× microbiome holobiont driven by crop improvement

Project Leader : Hiroyoshi Iwata
Professor, Grad. Sch. Agr. Life Sciences, The University of Tokyo

R&D Team : RIKEN, Nagoya University, University of Tsukuba, Tottori University

Summary :

In this research, the relationship between crops and microbiota will be modeled based on multi-omics data, and the resulting model will be used to develop breeding methods to improve the function of the "holobiont", an ensemble of crop and microbiota, driven by crop improvement. Specifically, we will model the effects of rhizosphere metabolites and root system structure on crop-microbiota interactions based on soybean root box trials. We will also model the interaction between two crops and rhizosphere microbiota based on intercropping trials of soybean and other crops. In the acceleration phase, we will also develop methods to improve "holobiont" through the identification of responsible genes and the construction of predictive models. In addition, we will develop a system to predict the optimal genotype for each environment based on data collected from various regions and cultivation systems. Soybean can produce protein more efficiently than animal protein sources and is also suitable for no-tillage and mixed cropping, which are sustainable agricultural practices. In this study, we will construct a breeding system that takes advantage of the interaction between soybean and microbiota to improve the carbon fixation and storage capacity of "holobiont".

Data-driven modeling of the carbon fixation and storage capacity of the crop × microbiota "holobiont" and identification and utilization of mechanisms to improve them