



Project Manager (PM): YURA Kei  
Professor, Ochanomizu University

## Food and feed production for human based on insects fed by food and feed wastes

We aim to solve global food problems by integrating domestic and international efforts that advance technologies for insect production. This project should be super-accelerated by gathering wisdom of all generation with innovative minds from academia, industrial and government sectors. We will promote complementary and synergistic interdisciplinary collaboration and realize social innovation through launching start-up businesses. We will build a complete recycling food production platform that enables our next step to space development.

### **Insect-Based Sustainable Food Production Systems toward Global Food Security and Human Space Exploration Project**

Keywords: insect domestication, multiomics, high functional food, fishmeal substitute feed ingredients, fishery environmental management, space food production

#### Background

#### Insects show promise in solving protein crisis

Current pace of worldwide population growth will imminently bring on the protein crisis, the situation that the demand of dietary protein exceeds the supply. Insects attract much attention as new protein sources with low environmental impact. We will solve the protein crisis by a sustainable mass production system of high-quality insects for food and feed.

#### Research Contents

#### Food production based on waste-recycling insect feeding

This project develops insects that can convert crop residues, food wastes and so forth into useful proteins and introduces them as raw materials for marine and livestock feed by 2030. The insects are utilized as a new biological resource to support human food, health, and the global environment. The project develops insect production systems available to any environment on Earth by 2040. The project advances the systems to complete recycling food production platforms that provide safe, secure and healthy food even in space.



#### Scenario for achieving the goals

- Introduce genome editing, breeding, and selection for insect production.
- Develop a recycling insect feed made from crop wastes and others.
- Establish a system for evaluating the safety of crickets as a highly functional foodstuff.
- Establish a sustainable mass production system of high-quality crickets.
- Establish a package of insect production system and commercialize the cricket production.
- Establish a supply system for cricket and black soldier fly, and commercialize them.
- Build a complete recycling food production system that links different sectors.
- Develop a hybrid food production system that can produce insects in any environment.

Successful trace of the scenario above with collaborations of academia, industrial and governmental sectors enables building a fully recycling food production system with insects to solve the food problem by 2050. The solution also enables supporting safe and secure food production system for human in space.



## Targets by 2030

By 2030, we will achieve the following

- (1) Production package of crickets and fish feed from black soldier fly.
- (2) Establish a sustainable mass production system of high-quality insects.

To achieve these goals, the following actions will be taken in fiscal year 2022

- (1) Development of feed management and evaluation of nutrition for "cricket feeding standard."
- (2) Breeding of superior traits of black soldier fly, and evaluation of test feed for fish farming.

## Joint Research Institute

Ochanomizu University, Tokyo University of Agriculture and Technology, University of Tokushima, Nagahama Bio University, Waseda University, Fisheries Research and Education Agency, National Agriculture and Food Research Organization, International Research Center for Agricultural Sciences, Tokyo University of Marine Science and Technology, RIKEN



Moonshot Research and Development Program for agriculture, forestry and fisheries [Project Overview]