**Report on JICA training course (26 March to 1 April 2023)**
**Course title: "Duckweed functional food development and social implementation with focus on nutrition and digestion analysis"**

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**Purpose of the course:**

1) To know the latest information on functional foods research and development in Japan.
2) To learn social implementation methods of developed foods.
3) To obtain advanced lab techniques for nutritional value and digestion and absorption, which are useful for duckweed functional foods development.

**Outputs:**

1) Obtain the experience and information to improve related works in the Be-HoBiD by being exposed to Japan's realities on food development R&D and its social implementation.
2) Boost up the development of functional food research activities by applying the advanced lab techniques achieved from this training.

**Activities:**

**1. Saraya Co., Ltd. (Ibaraki): Foods and Health Laboratory/ Factory**
**27-28 March 2023**

**1) Discussion for future collaboration**

1.1) Kasetsart University

- Focus on the exploring health-promoting attributes of *Wolffia globosa* and its extracts (polysaccharides/oligosaccharides and proteins/peptides) as functional ingredients for food applications (Figure 1).
- Current studies of health benefits and functional food product development: Anti-microbial activity, modulate gut microbiota and metabolite production, and improve intestinal/ gut barrier function.
- Potential support Saraya company by providing technical knowledge for food product development.

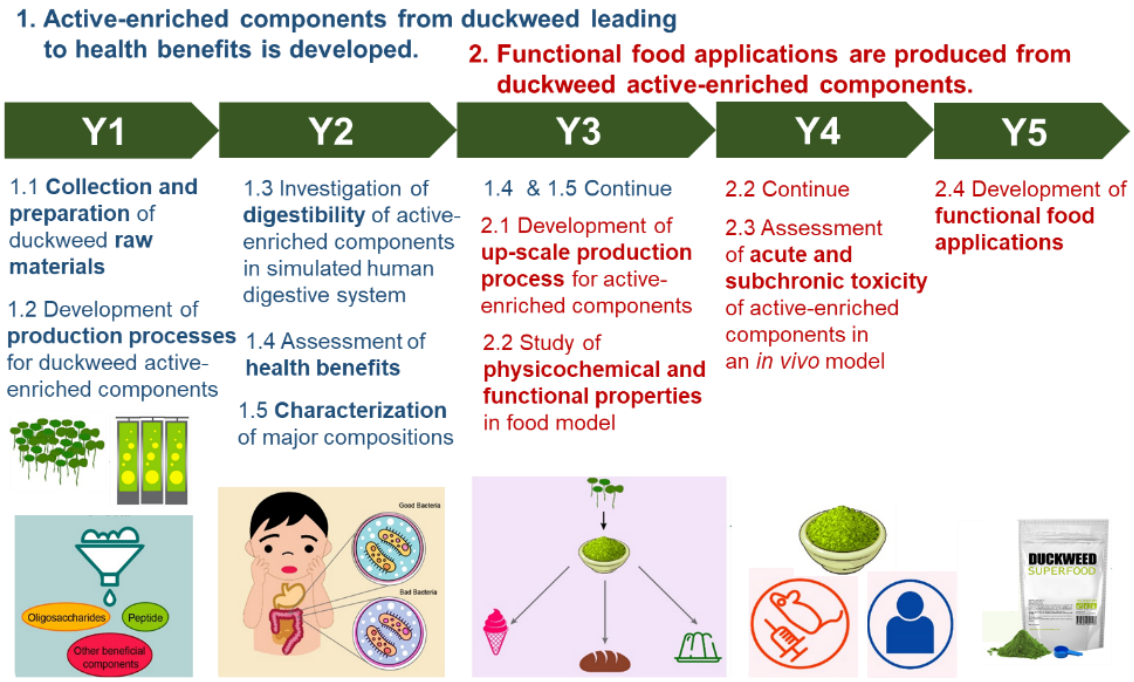



**Figure 1** Research plan for 5 years of G4-4 (Functional Food)

1.2) Advanced GreenFarm

- Demonstrate the company capability for commercialization such as product quality, safety, and nutrition of *Wolffia globosa* raw material, also the production capacity and collaboration with partners (chefs and restaurants, etc.).
- Potential *Wolffia globosa* supplier for Saraya company: Applying the concept to utilize *Wolffia globosa* for functional food development as a model in order to accelerate and increase an interest of *Wolffia globosa* for Thai people and farmers.

1.3) Saraya company

- Company introduction and current food product development such as
    - Testing functional properties of *Wolffia globosa* raw material in food system such as particle size of *Wolffia globosa* powder, dispersibility in water, foaming property, emulsifier property, water and oil absorption, and heating characteristics.
    - Product development such as cookies, smoothies, furikake seasoning, and warabi mochi.


**2) Factory visit (Saraya Kanto Factory)**

- Start: 4 March 2020
- Including Food and health research laboratory
- Focus on a sustainable world by improving global sanitation, environment, and health.
- Saraya SDGs: improvement of sanitation, healthcare hygiene, environmental considerations, global development, public health, food sanitation, natural consumer goods, and food that keeps you healthy.
- The production site is divided into 3 main areas.
    - Food additive area (alcohol, etc.)
    - Food area (Lakanto, etc.)
    - Quasi-drug area (hand soaps, dishwashing detergents, hand disinfectants, body soaps, etc.)

## 2. Saraya Co., Ltd. (Osaka): HQ and WAKUPAKU

**29 March 2023**

### 1) Meeting at HQ

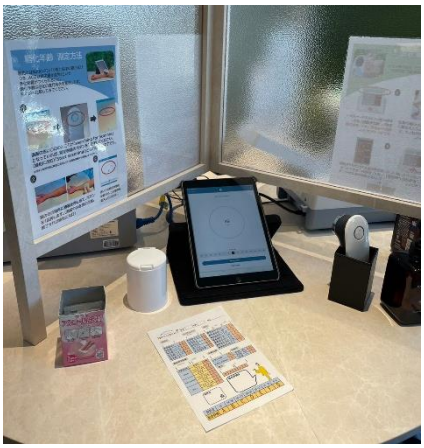
- Focus on protein alternatives- provider of new protein sources.
- Company profiles, products, and markets.
- Discussion on the potential import *Wolffia globosa* from Advanced GreenFarm such as form to import (frozen- using freezing technology from Saraya company, dried powder, etc.), safety issues (including the microbial load and oxalic acid content), quantity, quality, and regulation.

### 2) Visit WAKUPAKU

Health Studio & Restaurant, WAKU WAKU PARKS, Namba Parks 8 Floor

- What is WAKUPAKU? Saraya, which contributes to the improvement of "hygiene, environment, and health" in the world, is a concept shop created with the keyword "exercise + diet = health". The health studio mainly develops safe and effective studio programs. In the restaurant space, they provide delicious and nutritionally balanced meals. In the store, there is a corner where consumers can check their health and can also try out health equipment. All are designed for more personalized nutrition purposes.

- Health check
    - Monitor consumer health with various measuring instruments. Use several types of measuring instruments to measure and visualize current physical condition. Health equipment that can be experienced such as body composition monitor, blood pressure monitor, pulse wave monitor, capillary observation, glycation product measurement, etc.

- Restaurant
  - Concept: tasty, fun, and healthy. The aim is to provide more delicious, healthy, beauty-friendly meals using local ingredients. Focusing on the disordered eating habits and nutritional imbalances of busy modern people. Develop and provide menus that support a healthy and well-balanced life, while maximizing the natural deliciousness of vegetables and fruits. Use ingredients that are good for the body and serve them.

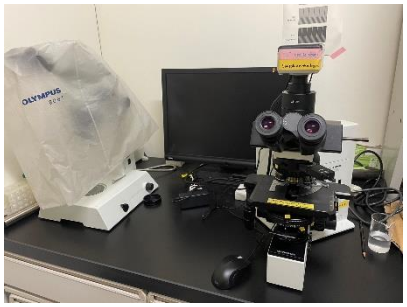

- Studio
  - A studio offers effective personal training and programs based on research to support what you want to be and have fun achieving it. Customers can receive advice from a dedicated trainer on "exercise," "nutrition," and "rest," so they can continue the training without worrying about overwork.

**3. Hokkaido University**

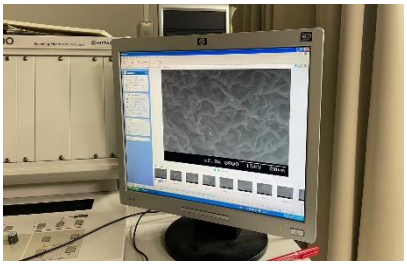
**30-31 March 2023**

1) **Visit Prof. Masaaki Morikawa laboratory** (Environmental Molecular Biology), Faculty of Environmental Earth Science, Hokkaido University
    - Research focuses on Hyperthermophiles & Extreme thermophiles for studying evolution of prokaryotic life, Hydrocarbon degrading bacteria for bioremediation technology, Biofilms for studying microbial strategy for survival and multi-cellular behavior, and Related duckweed research, etc.
    - Facilities: Plant culture room, Fluorescence microscopes, Phase-contrast microscopy, Genetic analyzer (Next-Generation Sequencing) and molecular analysis equipment, Anion exchange chromatography, Freeze dryer, and Anaerobic chamber, and Scanning electron microscope (SEM), etc.






**2) Visit Assoc. Prof. Tohru Hira Laboratory**

Research Faculty of Agriculture, Division of Fundamental Agriscience Research, Research Group of Bioscience and Chemistry, Laboratory of Nutritional Biochemistry

- Research focuses on Enteroendocrine cells, Gastrointestinal hormone, Nutritional physiology.
- Facilities: Animal house, Cell culture and Molecular analysis facilities
- Potential research collaboration

  Scope: (1) Improvement of glucose tolerance by food factors having Glucagon-Like Peptide-1 (GLP-1) releasing activity, (2) Effect of food components on metabolic syndrome and gut microbiome modulation. Food factors/ components and functional properties focus on *Wolffia globosa* powder/ its extracts and the GLP-1 secretion and short-chain fatty acids production, respectively.

  Plan: Apply funding and set up student exchange program






**4. Socialization and culture learning**

Apart from academic and research learning, this training also helps to build up the relationship between university and company both Thailand and Japan by socialization activities such as lunch and dinner, also cultural exchange. This activity provides more chances for discussion and facilitates connection and research collaboration.