

## **Report for the Training Program under Research and Development Project on Duckweed Holobiont Resource Values towards Thailand BCG Economy**

**Training course:** Duckweed-based wastewater treatment: Biomass production and GHG evaluation

**Training period:** 22-28 February 2023 (21 February-1 March including travel)

**Host Institution:** 22-24 February (University of Yamanashi), 27-28 February (NIES)

**Participants:** Chart Chiemchaisri, Kasetsart University (trainee)  
Prof. Kazuhiro Mori/ Tadashi Toyama (host @ University of Yamanashi)  
Drs. Yoshitaka Ebie/ Yuka Ogata (host @ NIES)

### **Daily activities and reporting**

21 February 2023

Departure from Bangkok International Airport

22 February 2023

Arrival at Haneda International Airport, travel to Kofu by bus

### **Training on application of duckweed holobiont in wastewater treatment**

Prof. Mori has given his presentation on duckweed in wastewater treatment which includes basic concept of duckweed holobiont and factors leading to high performance of duckweed in treating wastewater. Based on his past experiences in conducting duckweed-based wastewater treatment researches, he has given several suggestions which are very useful for setting up experimental units and preparing duckweed holobiont for wastewater treatment at Kasetsart University.

Prof. Mori and Prof. Toyama have also introduced his research laboratories and facilities at University of Yamanashi. During the visit, demonstration of duckweed preparation by students was arranged. The facilities used for cultivation and reactor experiments of duckweed-based wastewater treatment were introduced



*Photos showing duckweed cultivation room (left, middle) and duckweed sample (right)*

Additional activities also included walk-through introduction of University of Yamanashi and dinner with host in the evening.

23 February 2023

Desk work - preparation of project document including summary of discussion and planning for collaborative activities in 2023

Prof. Mori and Prof. Toyama introduced Kofu city and visited some city highlights including city landscape and attraction spots. Dinner with host in the evening.



Photos of some Kofu city highlights

24 February 2023

Arrive at University of Yamanashi and thank Prof. Mori for his support and arrangement of training activities and further discussed with Prof. Toyama about ongoing project activities in 2022 and planned project activities in 2023.

The discussion included detailed procedures of duckweed preparation and reactor set-up at various scales of operation. The planning of training and demonstrations on duckweed experiments to be held on 8 March 2023 at Faculty of Engineering, Kasetsart University was discussed and finalized. A one-month training period for post-doctoral researcher from Kasetsart University at University of Yamanashi in 2023 was also planned.

Prof. Toyama also introduced outdoor (in greenhouse) experimental unit used to set-up for evaluating performance of duckweed-based wastewater treatment applying to real wastewater.



*Photos showing trainee with hosts (left) and outdoor research unit (middle, right)*

25-26 February 2023

Transfer from University of Yamanashi to NIES  
Depart Kofu for Tokyo (25 February) and Tsukuba (26 February) by trains

27 February 2023

### **Training on GHG evaluation from duckweed-based wastewater treatment**

Arrive at NIES and discuss with Dr. Ebie on greenhouse gas emission measurement techniques to be applied in laboratory-scale and bench-scale (or field-scale) experiments. Based from his experiences from greenhouse gas emission measurement from wastewater treatment system, set-up and operating conditions of dynamic chamber was explained. It is followed by a visit to research room where dynamic gas chamber was introduced. Dinner with host in the evening.



*Photo with host at NIES (left) and gas chamber (right)*

27 February 2023

Visit to research station of NIES where greenhouse gas measurement activity from on-site domestic wastewater treatment unit (Jokasou) is carried out. Several instruments used for the measurement of greenhouse gas including gas pump, handheld gas monitoring and gas chromatography were introduced.



*Photos showing Jokasou with gas emission measurement facilities*

After arrival back at NIES, further discussion with Dr. Ebie and Dr. Ogata about ongoing project activities in 2022 and planned project activities in 2023 was carried out. The planning of their visit to pig farm in Lopburi province as well as following further investigation on measurement of greenhouse gas emission from existing wastewater treatment system at farm was discussed. Thanks for the support from host upon the completion of the discussion.

1-2 March 2023

Travel from NIES to Tokyo International Airport (Haneda) and arrival back in Thailand