

# Summary of JICA research trip to Thailand June 2024

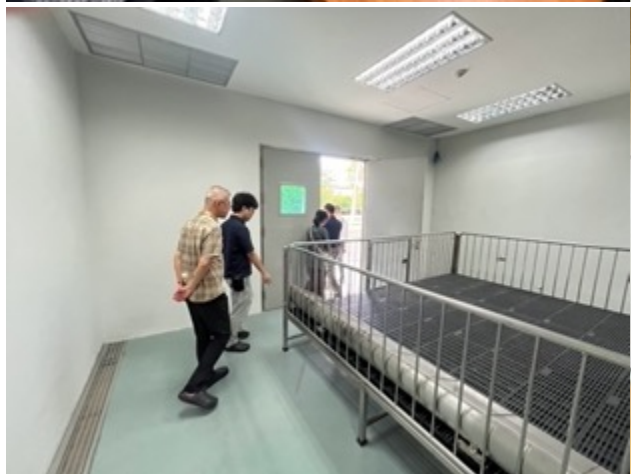
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**Tuesday Jun 4, 2024 Kasetsart University, Kamphaeng Saen Campus**  
(<https://maps.app.goo.gl/XZe1jEJHBmJg12gi8>)

Dr. Ekaphan Kraichak, accompanied by Siwaporn Jansantia, a botany graduate student, led a group of Japanese researchers consisting of Dr. Masaaki Morikawa, Dr. Tokitaka Oyama, and Dr. Tomoaki Muranaka on a visit to various departments at the Kamphaeng Saen Campus of Kasetsart University. The campus, which spans over 13 square kilometers, includes extensive areas dedicated to experimental farms and research facilities.

During the morning, the group visited the recently established [Kasetsart University Laboratory Animal Center](https://web.facebook.com/people/Kasetsart-University-Laboratory-Animal-Center-KULAC/61554107121400/?paipv=0&eav=AfZ0MgWXxK-clsiz0_yWWeHK3FzDm_n-5eHgBCe4mYvPaSW0ZK1lqy1fpUQ0-h69XdM&rdc=1&_rdr) ([https://web.facebook.com/people/Kasetsart-University-Laboratory-Animal-Center-KULAC/61554107121400/?paipv=0&eav=AfZ0MgWXxK-clsiz0\\_yWWeHK3FzDm\\_n-5eHgBCe4mYvPaSW0ZK1lqy1fpUQ0-h69XdM&rdc=1&\\_rdr](https://web.facebook.com/people/Kasetsart-University-Laboratory-Animal-Center-KULAC/61554107121400/?paipv=0&eav=AfZ0MgWXxK-clsiz0_yWWeHK3FzDm_n-5eHgBCe4mYvPaSW0ZK1lqy1fpUQ0-h69XdM&rdc=1&_rdr)).

Dr. Visanu Boonyawiwat, the Director of the KU Laboratory Animal Center, and Dr. Chanwit Kaewtapee from the Department of Animal Science, Faculty of Agriculture, provided an overview of the center and guided the tour through the state-of-the-art facilities for pigs, rodents, and aquaculture. By the third quarter of 2024, the new facility aims to offer animal researchers a convenient one-stop service, providing high-quality research facilities at Biosafety Level 1 (BSL1). Additionally, the facility includes a feed mixing station that uses dry duckweed as a supplement for animal feed.





In the afternoon, Dr. Chanwit's team took us around the campus to search for naturally occurring duckweeds in the extensive network of canals and ponds. In a single pond on the campus, we were able to find all four species from Thailand: *Lemna aequinoctialis*, *Spirodela polyrhiza*, *Landoltia punctata*, and *Wolffia globosa*.

Afterward, the JICA researcher team visited the Department of Soil Science, Faculty of Agriculture, Kasetsart University, Kamphaeng Saen Campus. Dr. Napaporn Phankamolsil, the Head of Department, warmly welcomed the team and guided them on a tour of the department. The team visited three main labs, which included the Soil Analytical Chemistry Laboratory, Soil



Physics Laboratory, and Soil Microbiology Laboratory. During the visit to the Soil Microbiology Laboratory, Dr. Sirinapa Chungopast, the Principal Investigator of the lab and a researcher in Duckweed Holobiont Research, presented her work on using biofertilizer to enhance the growth of duckweed in a natural environment. Additionally, Mr. Santipong Fonkoksung, an undergraduate researcher, shared his thesis work on the effects of chemical and biological fertilizers on the growth and chemical composition of duckweeds. Mr. Fonkoksung also demonstrated the determination of nitrogen content in duckweeds using the Kjeldahl method.









**Wednesday Jun 5, 2024 Amphawa Area (<https://maps.app.goo.gl/KZ3d8nrUsWR71cCFA>)**

Dr. Kraichak, along with graduate students (Siwaporn Jansantia and Chawanakorn Doungnetngam), led Dr. Oyama and Dr. Muranaka on a visit to Amphawa District in Samut Songkhram Province. This district is located southwest of Bangkok, next to the Mae Klong River, which is one of the major tributaries of the Chao Phraya River. Amphawa is well-known for its abundant coconut plantations and a weekend floating market. The coconut production in this area is mainly from the Dwarf variety, which has shorter trunks and fragrant coconut water.

Most plantations in Amphawa have a similar layout, with several columns of soil banks for planting coconut trees, alternating with small shallow canals. These canals are filled with duckweed and azolla ferns, as farmers usually leave these plants in the canal. The water in these canals is available year-round and can be either freshwater or brackish water, depending on the season. Sometimes, cyanobacteria and other aquatic plants, such as Hydrilla, are also found in this area alongside duckweed. We found all four species throughout the area, but most canals have one to two species per canal. This area has the potential to provide a large amount of duckweed for large-scale experiments that require a high biomass of duckweed.









**Thursday Jun 6, 2024 Suan Luang Rama IX Garden**  
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In the morning, Dr. Kraichak, along with botany graduate students Athita Senayai and Siwaporn Jansantia, led a group of Japanese researchers - Dr. Morikawa, Dr. Oyama, and Dr. Muranaka - on a visit to the Suan Luang Rama IX Garden. This garden is one of the largest public gardens in Bangkok Metropolitan and is home to a wide variety of native and decorative plants from



around the world. It also features an extensive network of canals and ponds, which are home to duckweeds.

Upon arrival at the garden, the group was warmly welcomed by Dr. Weerachai Nanakorn, the President of the Botanical Society of Thailand under Royal Patronage, as well as Khunying Suchada Sripen, a member of the garden's executive committee. They provided a personal tour of various areas of the garden, including the 0.8 sq.km main garden and the 0.96 sq.km Nong Bon recreational lake. It's worth noting that this lake also serves as a passive reservoir for wastewater treatment for the greater Bangkok metropolitan area.



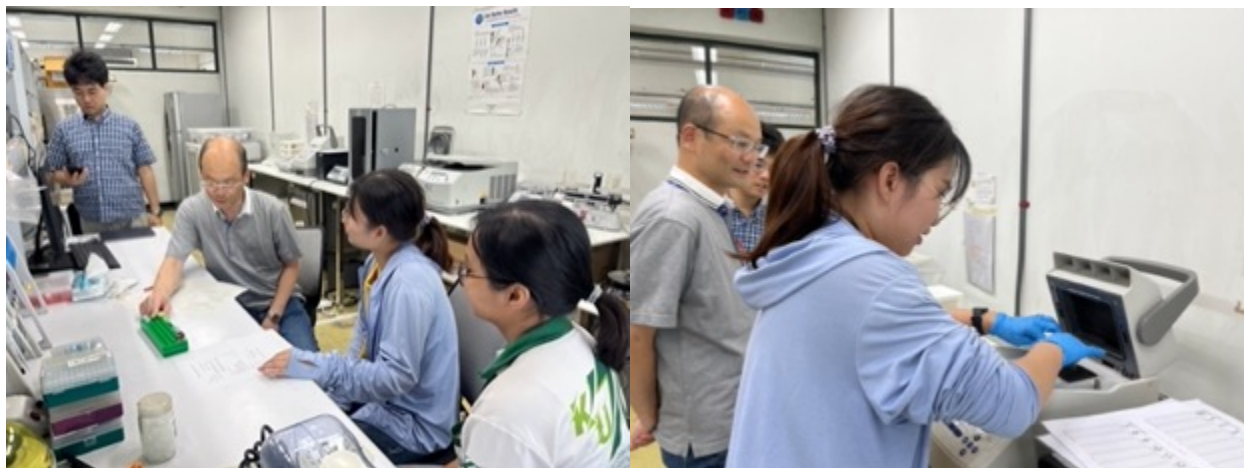




Three species of duckweed (*Spirodela polyrhiza*, *Wolffia globosa*, and *Lemna aequinoctialis*) were observed in various areas of the garden, particularly in the small pots and ponds. However, duckweeds were not present in the larger ponds and canals at the time due to a cyanobacterial bloom and being consumed by local fish. We also observed flowering *Lemna* in the wild for the first time in this trip

In the afternoon, Dr. Morikawa held meetings with several research groups, including G4-4 on Functional Food (led by Dr. Suvimol Charoensiddhi), G2 on Microbes (led by Drs. Kannika Duangmal and Chanita Boonmak), and G3 on Genomics (led by Dr. Arinthip Thamchaipenet) at the Duckweed Holobionts Resource Research Center.

Dr. Oyama and Dr. Muranaka conducted a demonstration of genotyping techniques using a tubulin protein in *Lemna* species for Botany graduate students at the plant molecular biology laboratory, Department of Botany, Kasetsart University. This technique will enable researchers to identify genetic diversity within each species of duckweed. The group also examined the specimens of flowering *Lemna* obtained from the Garden.





### Friday Jun 7, 2024 Lotus Museum, Rajamangala University of Technology Thanyaburi

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In the morning, Dr. Kraichak, along with botany graduate students Athita Senayai and Siwaporn Jansantia, led a group of Japanese researchers - Dr. Oyama, and Dr. Muranaka - to the Lotus Museum on the campus of Rajamangala University of Technology Thanyaburi, Pathum Thani Province, while Dr. Morikawa visited the research laboratory of Dr. Chart Chiemchaisri at the Faculty of Engineering Kasetsart University.

At the Lotus Museum, the group found several large populations of all four duckweed species in Thailand in the lotus and water lily ponds around the museum. We also observed a number of other aquatic plant species co-occurring with duckweeds, including giant salvinia (*Salvinia molesta*), Azolla, and water lettuce (*Pistia*). The museum also showcased many cultivated varieties of water lily (*Nymphaea*) from 20 years of breeding programs along with handicraft products from lotus and water lily.









In the afternoon, Dr. Oyama, and Dr. Muranaka visited living collections of duckweeds in the plant nursery and in the culture room of KU Duckweed Holobiont Resource Research Center. In the plant nursery, the group found flowering individuals of *Lemna* and *Spirodela* in the same pond. The samples were collected to observe under the microscope.





Then, we continued with the genotyping demonstration by checking the results of the polymerase chain reaction (PCR) performed on the previous day. The products were visualized with gel electrophoresis. The results showed that the individuals from Thailand and Japan could be clearly separated by the size of the PCR product. The demonstrated protocol showed promising results for the future screening of population differences in Thailand.

