ELM Inc.

Development of temperate vegetable cultivation technology in Brunei using the container-type robotic cultivation system "EcoNursery"

Object of the project

The purpose of this project is to examine the cultivation technology of temperate vegetables in Brunei, utilizing the "Eco Nursery®" container-type cultivation system (EN system). In Brunei, the establishment of cultivation technology under the severe environment to promote production of high value-added vegetables demanded by the market is an important challenge.
Based on the knowledge accumulated through joint research and the cultivation results using the EN system, it is possible to realize the government's goal for temperate vegetables by considering specific cultivation techniques using digital agriculture. This project is expected to serve as a catalyst for the realization of the national plan.

Cooperation with local companies/governments

The local company, Superfish Growers Sdn Bhd (“SF”) is an excellent company that has succeeded in producing Japanese varieties of muskmelon in Brunei in 2018 and has received high acclaim, and is expanding overseas, not only to department store chains in Brunei, but also to high-end department stores in ASEAN countries.
In this project, SF was in charge of procurement of agricultural materials in Brunei, operation and management of the EN system installed by ELM, and cultivation and growth survey of the test crops. The EN system was remotely monitored by ELM, and the project was carried out in close collaboration using WhatsApp and other means.

Targeted economic/social issues

More than 40% of the vegetables consumed in Brunei are temperate vegetables. In addition, temperate vegetables such as lettuce, cabbage, and cherry tomatoes account for more than three-quarters of imported vegetables.
To respond to the trend in vegetable demand, the Department of Agriculture of Brunei intends to promote the spread of digital agriculture and high-tech technologies to cultivate temperate vegetables which the market requires. However, It is difficult to procure the low-cost indoor hydroponic cultivation systems necessary to grow temperate vegetables in Brunei located in the tropics, and the reality is that few vegetables have been grown to date. The Department also has a plan to promote domestic production of crops that are currently imported, and to encourage to export them.
Therefore, Brunei is faced with a challenge of establishing cultivation technology under the harsh environment, and promoting domestic production of high value-added vegetables demanded by the market, in order to improve food security and, in turn, the quality of life of its people. In particular, the COVID-19 pandemic is hindering smooth vegetable imports, causing vegetable shortages and price hikes. In addition, from the perspective of controlling the youth unemployment rate that exceeds 20%, we believe that this project will contribute to solving Brunei's economic and social problems by promoting digital agriculture to the younger generation.

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Details of demonstration

With a view to future expansion in ASEAN, an EN system designed to comply with EU standards was installed in Brunei.
SF conducted cultivation trials in Brunei based on a recipe developed through preliminary trials in Japan, while receiving feedback on the growth conditions. In addition to checking and responding to local conditions remotely from Japan, SF also reported daily details on pH, EC, and seedling growth conditions via WhatsApp, and responded to any unclear points or problems as needed.
We confirmed that the EN system could cultivate seedlings in a shorter period than existing greenhouses, and that growth after planting was better.

In addition, weather observation equipment was installed in candidate sites for the field cultivation and observations were made over time, and the candidate sites were narrowed down based on the weather data obtained. Efforts to cultivate temperate vegetables in Brunei have continued after the completion of this project.

	ENsystem	Green house
Planting time		
11 Days after	Stem 9.5mmφ	Stem 6.97mmφ
	Height 390mm	Height 330mm
	Width 200mm	Width160mm

Project outcome / Future plans

We were able to develop an EN system that was adapted to the environment including the power supply conditions in Brunei, and to grow healthy seedlings. SF found a way to improve profitability by switching from purchasing seedlings to producing its own melons, its main products, and has continued to grow melons by making full use of the EN system even after the completion of the project.
While local guidance by ELM could not be provided as scheduled due to the COVID-19 pandemic, we were able to facilitate our business with various means. In addition, at BICAT2022, we made a presentation focusing on the results of cultivation with the EN system, which was well received by many people, including the Vice Minister of MPRT. The Vice Minister later visited SF to see the EN system, and we believe that the EN system has been well recognized within the government of Brunei.

We will continue to explore the possibility of establishing a joint venture with SF.
Brunei is geographically located in the center of ASEAN, and we would like to not only produce temperate vegetables in Brunei, but also export them to neighboring countries, and make it our ASEAN expansion business.