筑波大学
University of Tsukuba

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MINISTRY OF EDUCATION, CULTURE, SPORTS, SCIENCE AND TECHNOLOGY-JAPAN

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Channeling agriculture innovation transfer from universities and research centre to vocational high schools: Lesson learned from Indonesia

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SEAMEO BIOTROP

Introduction

- SEAMEO BIOTROP has succeeded in establishing the School Garden Programme in Indonesia, which was initiated in March 2016 as part of SEAMEO College Research 6: A Participatory Action Research on School and Community-based Food and Nutrition Programme for Literacy, Poverty Reduction and Sustainable Development with funding support from the Japan Fund for Poverty Alleviation through the Asian Development Bank.
- Lesson learned from the programme, was that technology transfer to schools from a research and development centre like SEAMEO BIOTROP, is more effective and sustainable compares to direct transfer to the community.
- If a model has been established in a school, operated by students and supervised by skillful teachers, the model could become the learning object for not only students, but also the surrounding community, especially parents of the students.

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- Following the successful implementation of the School Garden Programme, SEAMEO BIOTROP also launched another programme called Establishment of School Fruit Garden for Education, Production, Genetic Conservation, and Entrepreneurship in Vocational Senior High Schools in Agriculture (SMARTS-BE) in February 2018 during its 50th-anniversary celebration.
- The Agricultural Vocational Senior High Schools could play a significant role in disseminating knowledge and mature technology on fruit trees cultivation, production, and processing to the surrounding communities/farmers.
- The schools could also become the hubs for technology transfer from SEAMEO BIOTROP (i.e., together with its partner universities and research centres) to the community.

- Besides SMARTS-BE programme, SEAMEO BIOTROP has also been assigned by the Directorate of Technical and Vocational Education to train and supervise Vocational Senior High Schools in Agriculture in Indonesia to support food security and teaching factory programmes. With this programme, SEAMEO BIOTROP could transfer more expertise to the vocational schools, not only limited to fruit gardening.

Activities

- SMARTS-BE programme: 1) selection of target schools in each cluster; 2) setup coordination with the selected schools; 3) capacity building training for Head Masters, Teachers, and Student representatives from each school on fruit trees cultivation and fruit processing; 4) identification of the source of seeds and seedlings; 5) distribution of seeds and seedlings to schools; 6) planting; and 7) monitoring and evaluation.
  - Target schools were selected from those nominated by the Directorate of Technical and Vocational Education of MoEC Indonesia (36 schools across Indonesia)
  - 13 500 fruit trees have been planted, mostly non-seasonal fruit trees, such as orange, guava, etc. (planted in the field and pot)
  - Fruit processing: soft candy, fruit juice, concentrated fruit juice

- Food Security and Teaching Factory programme: training and supervision on tissue culture technique, production and processing of edible mushrooms, hydroponic, aquaponic, cultivation and processing of lemon, cultivation and extraction of plant essential oils, processing of essential oil to become various products, and soymilk production.
  - The schools were directly selected by the Directorate of Technical and Vocational Education. There were 40 schools selected in 2018 and become 80 schools in 2019 from 27 provinces in Indonesia.
  - The schools free to select subjects they wanted to choose, to suit their school setting
  - Teachers attended training for several days at SEAMEO BIOTROP, then they implement what they learn when return to their respective schools, few months later experts from SEAMEO BIOTROP supervise the schools to observe the progress and to provide technical support.

SMARTS-BE PROGRAMME

SMARTS-BE PROGRAMME

FOOD SECURITY & TEACHING FACTORY PROGRAMME

Plant tissue culture

Mushroom production

Soymilk Production In the Schools (Teaching Factory)

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Soymilk production and marketing by group of students at home

FOOD PROCESSING
Training at IBTE Brunei Darussalam
23-11-2018

IBTE
MUNGBEAN JUICE
258 ML

TOP GLOVE

DO NOT USE
OUT OF ORDER

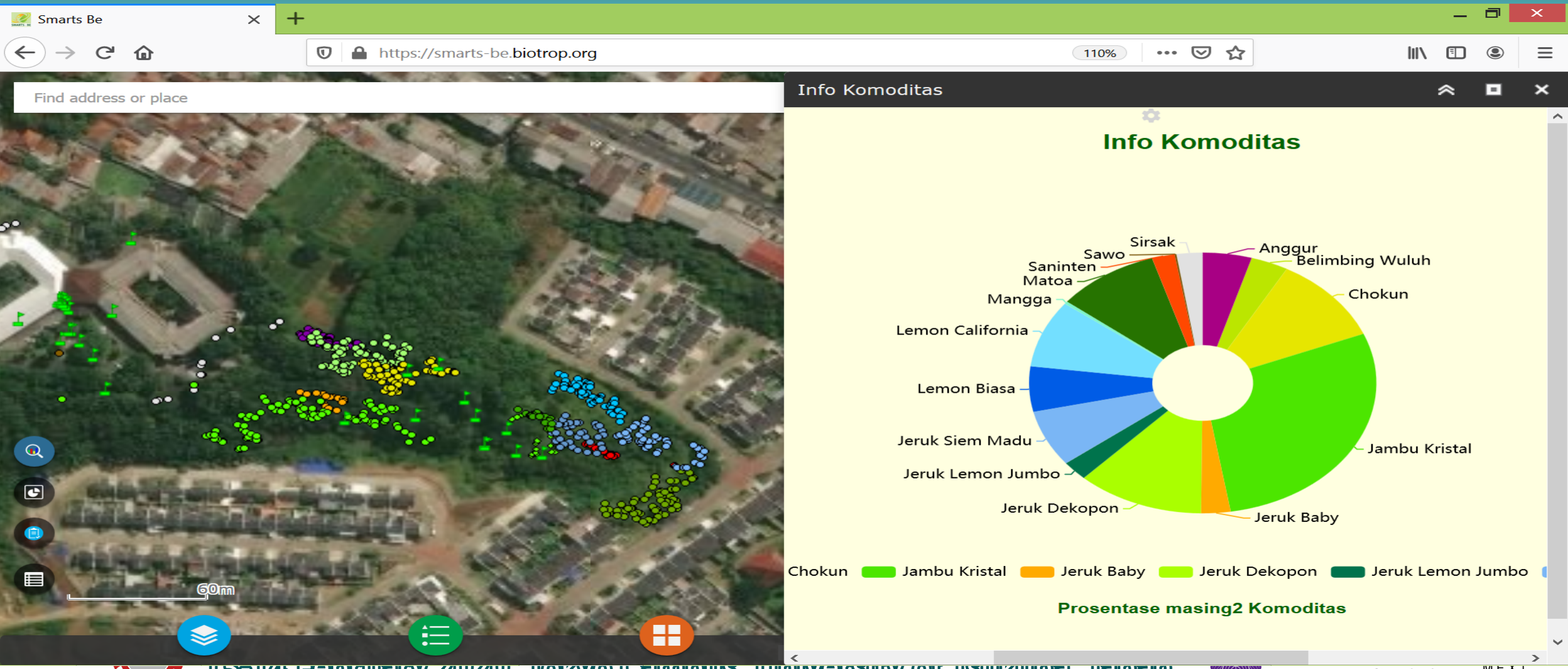
Introduction of Industry 4.0

- SMARTS-BE programme monitoring through application
  - Geo-tagging has been done for all the fruit trees planted in each schools
  - Students under teacher supervision will conduct regular measurement and take picture of each tree then send the data through an application to SEAMEO BIOTROP
- Food Security & Teaching Factory Programme (ready to be transferred to schools)
  - Scientists at SEAMEO BIOTROP have developed model to monitor real time food security in a particular area
  - In collaboration with IPB University have developed model to evaluate nutrient status of oil palm in a large scale
- Communication and consultation through social media group, especially WhatsApp

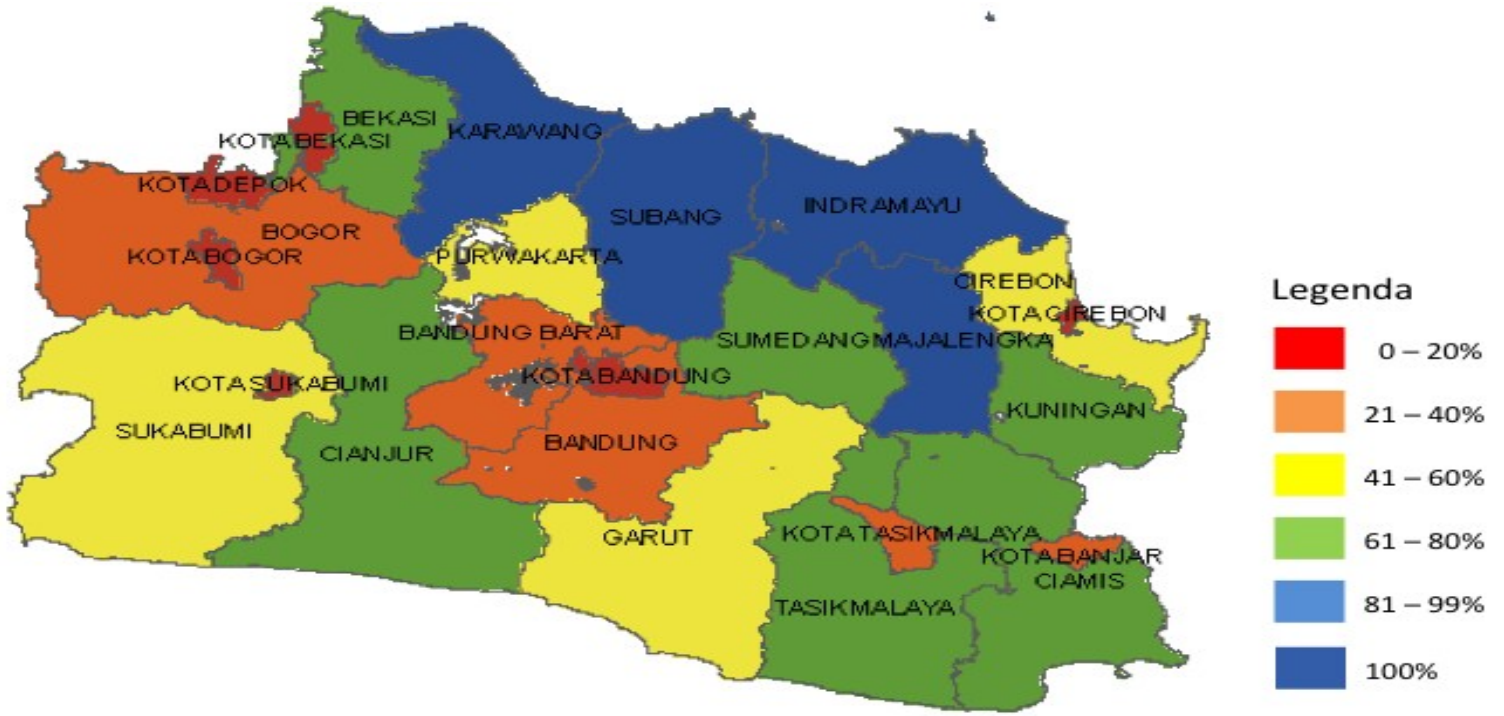
GIS/Remote Sensing for Natural Resource Management at SEAMEO BIOTROP

FRUIT TREE MONITORING

Interface WebGIS

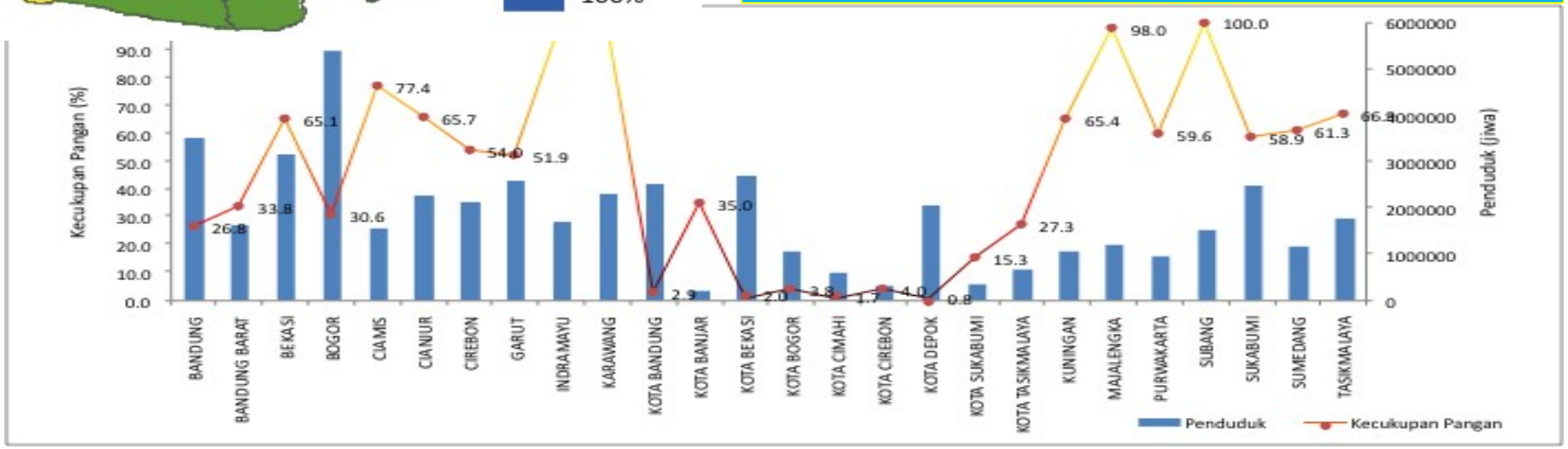


EFFECT OF RICE FIELD CONVERSION ON FOOD (RICE) SUFFICIENCY



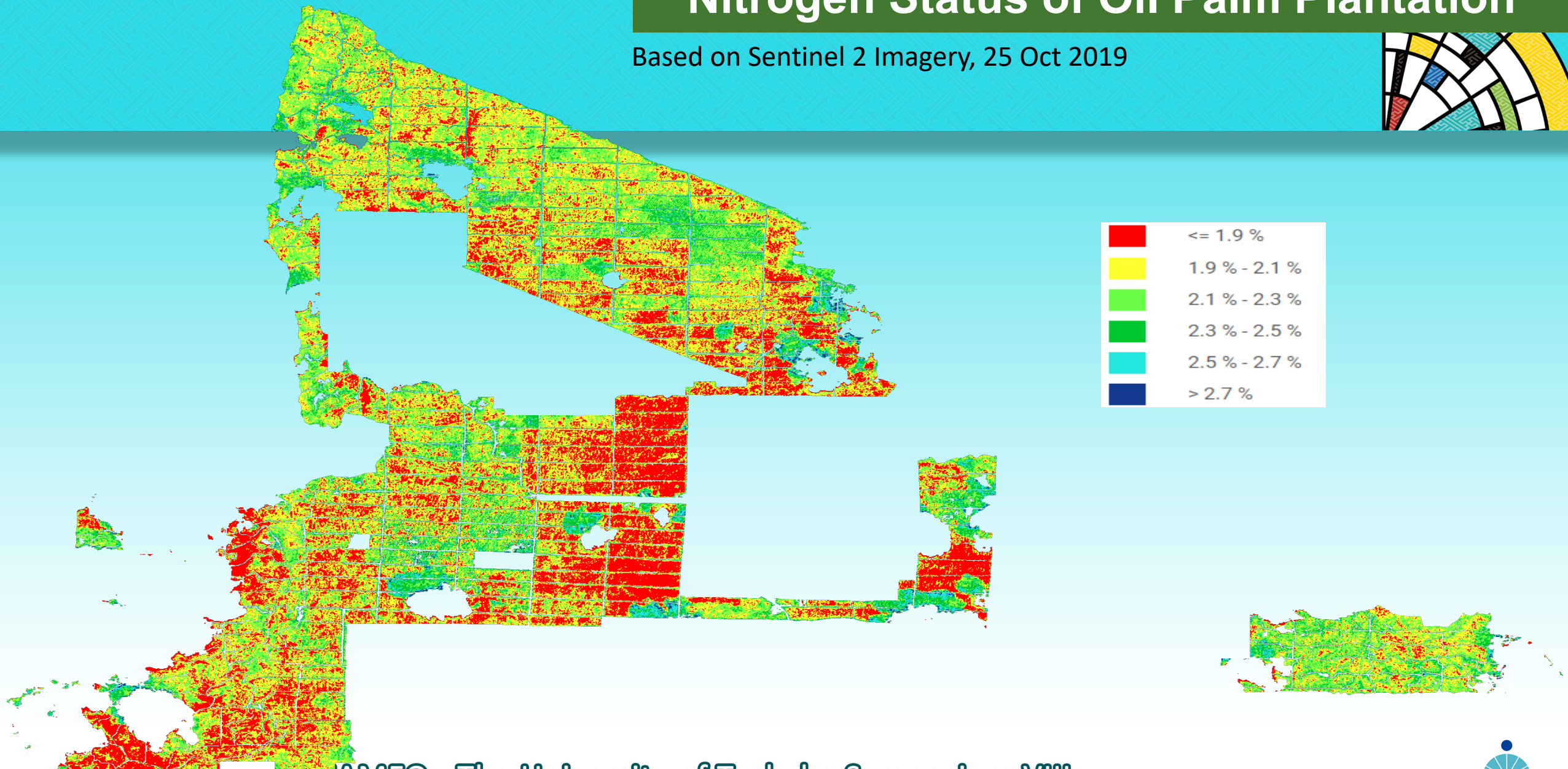
Result of Scenario 1:

- **consumption per capita 139 kg/year (FAO);**
- **rice surplus is distributed to any other provinces;**
- **no rice field conversion allowed;**
- **temperature is normal.**



Nitrogen Status of Oil Palm Plantation

Based on Sentinel 2 Imagery, 25 Oct 2019



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CONCLUSION

- Channeling agriculture innovation transfer from universities and research centre to vocational high schools is an effective and sustainable path to deliver technology to the community
- Universities could focus on the proliferating innovation and develop technology
- Research centres would work on the adoption, adaptation, and transfer the technology to technical vocational schools
- The technical vocational schools would become the front liner to upgrade the capacity of teachers and student, and finally diffuse the technology to the surrounding community
- In the era industry 4.0 the roles of the vocational schools even greater since the new technology could not be simply transferred to the existing traditional farmers