

BIOTROP Courier



2019 SMARTS-BE Programme in a Wrap: SMK...Yes, We Can!

**First BIOTROP's School Garden Training Course
Held Outside Indonesia**

**BIOTROP's Media Day, An Event to Disseminate Knowledge
and Expertise**

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Director's Message

Dear Readers,

For the last issue of this year, we summarised the implementation of our 2019 SMARTS-BE programme. We continued to encourage vocational high schools to develop entrepreneurship skill and to conserve vegetable and fruit species at once. We also conducted a Focus Group Discussion participated by school teachers to develop human resources toward industry 4.0. We are pleased that six schools joining SMARTS-BE programme were awarded as a model school, while another school obtained 2019 Bhakti Tani Award.

This year, we also collaborated with the Ministry of Education, Youth and Sport of Cambodia and the Royal University of Phnom Penh, Cambodia, in conducting our first in-country training on school garden in Cambodia this October for thirty Cambodian school teachers. This training activity was held back-to-back with our 2019 Government Board Meeting in Cambodia. We are also proud to have one of our 2018 action research grant recipients who concerned in developing a school garden at her school being awarded as one of the best speakers during the 2019 National Symposium for Natural Science Teachers by PPPPTK IPA last November.

As proof of our commitment to support the Indonesian government (GoI), we gathered experts and held a workshop on strategy for strengthening the water management and coastal ecosystems in Indonesia's coastal areas and small islands. Our another contribution to the GoI was by conducting a training course on supplying *Cottonii* seaweed seedlings using tissue culture techniques for twenty-six Central Sulawesi Marine and Fisheries Service staff. It is well-noted that our Centre is the first one which develops seaweed tissue culture technology in Asia.

We also held our last Quarterly Public Seminar in 2019 by featuring Prof Ir Indra Jaya, MSc, PhD, underwater acoustics and ocean instrumentation expert from IPB University, with the topic of the use of advanced technology for sustainable utilisation of marine and fisheries natural resources.

Throughout the last quarter of this year, we broaden our collaboration with other five institutions. We also continued to receive visitors from various institutions to learn our technologies and knowledge. In addition to delivering our knowledge, we had a media day by inviting the media to let them know deeper about our expertise and inform it to society.

These activities made the last quarter of this year memorable to us. We wish all our readers a productive year ahead of us.

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A participant grows a citrus plant



Dr Supriyanto shows the results of the application of Japanese sweet lemon to participants

The year 2019 marked the second phase of the SMARTS-BE (the Agriculture Vocational School on Vegetable and Fruit Orchards Establishment/Sekolah Mandiri Produksi Tanaman Sayur dan Buah Edukasi) Programme implementation. After accomplishing all activities of SMARTS-BE Programme in 2018, SEAMEO BIOTROP responded to the challenge to continue the programme in 2019.

SMARTS-BE is one of the Centre's priority programmes, initiated by Didik Suhardi, PhD, the Secretary-General of the Ministry of Education and Culture (MoEC) of the Republic of Indonesia, to revitalise SMK by developing students' entrepreneurship skills to reduce the unemployment rate in Indonesia. This programme is also inseparable from the Presidential Instruction No.9/2016 concerning Revitalisation of SMK in the Context of Improving the Quality and Competitiveness of Indonesian Human Resources. Launched in 2018, this programme has presented several prominent achievements such as establishing vegetable and fruit orchards in 30 vocational schools in 15 provinces in Indonesia, expanding vegetable and fruit orchards in six agricultural vocational schools in disaster areas and facilitating fruit orchards in vocational schools having small gardening space in urban Jabodetabek areas.

In 2019, the Committee of SMARTS-BE programme selected vocational schools that were involved in 2018, which have produced products and implemented proper agricultural activities constantly. Those schools were located in West Java, Central Java, East Java, Banten, Central Sulawesi, Southeast Sulawesi, East Kalimantan, South Kalimantan, Jakarta, Aceh, Riau, South Sumatera, Bangka Belitung, Lampung and Bali. Additionally, SMARTS-BE also involved six vocational schools affected by natural disaster in Aceh and Lampung.

Dr Supriyanto, the Programme Coordinator of SMARTS-BE, assisted by Dr Abdul Munif, Surapati, SP, Dr Ir. Omo Rusdiana, MScF, and Dr Ir. D. P. Tejo Baskoro, MScAg, has supervised the schools to develop fruit and vegetable plants, particularly local ones, in their respective schools. The schools also developed derivative products such as juice and fruit crackers to be promoted and marketed to generate income.

The activities under SMARTS-BE programme covering training course, research, consultancy and publication. In addition to the provision of knowledge on soil fertility for planting preparation, agricultural land optimisation and commodities selection, schools' students were also trained to plant fruit plants using tarpaulin pot instead of an open land field. An application of Monitoring, Evaluating and Reporting (MIRE) using Geospatial, developed by SEAMEO BIOTROP's expert (Harry Imantho and team), was also introduced to the schools. This application enabled SMARTS-BE committee to monitor and receive reports from schools all over Indonesia without visiting the sites. Field condition was captured using Geographic Information System (GIS) tools, and then recorded and submitted to the committee immediately.

From this programme, six vocational schools were awarded as a school model during the commemoration of national teacher's day on 25 November 2019, namely SMKN 57 Jakarta, SMKN 5 Jember, SMKN 2 Tulungagung, SMKN 2 Metro, SMKN 1 Bawen and SMKN 2 Subang. One vocational school, i.e., SMKN PP Saree Aceh, also obtained 2019 Bhakti Tani Award from Indonesia's Ministry of Agriculture for developing lemon. (rf)

BIOTROP Invites Schools to Develop a Productive Garden

SEAMEO BIOTROP held a training on developing intensive school fruit garden and various fruit-based products at its Campus in Bogor on 7-11 October 2019 for 32 teachers from 21 high schools across Indonesia. It was one of many activities under SMARTS-BE programme.

In his welcome remarks, Dr Supriyanto, as the training coordinator, stated that the revitalisation programme is aimed to generate vocational schools graduates in becoming job creators, not job seekers. Therefore, this training was conducted with the aims 1) to develop school fruit garden in vocational schools for elevating the nutritional status of students, teachers, and communities surrounding the schools, 2) to develop networks as resource sharing tools among vocational schools, and 3) to increase the unity of vocational schools for strengthening the independence of vocational schools.

The training was carried out in several sessions, including field trips to two model vocational schools, i.e., SMKN 1 Pacet and SMKN 1

Cibadak. Training materials presented and the resource persons were: 1) Overview of SMARTS-BE Programme (Dr Supriyanto); 2) The Use of Genetic Resources in Developing Intensive School Fruit Garden (Dr Supriyanto); 3) Analysis of Soil Fertility and Fertilisers to Develop Intensive School Fruit Garden (Dr Dwi Putro Tejo Baskoro); 4) Analysis of Land Suitability (Dr Omo Rusdiana); 5) Integrated Pest Management in Intensive School Fruit Garden (Dr Abdul Munif); 6) Technique of Setting Up Fruit Plants in Potted Media; 7) Practical works on Fruit Trees Planting (Dr Supriyanto); 8) Practical works on Setting Up Potted Fruit Plants (Surapati, SP); 9) Practical works on Integrated Pest Management (Dr Abdul Munif); 10) Practical works on Making Lemon Juice (Omit Sumitra); and 11) Practical works on Making Fruit and Aromatherapy Perfume Formulation (Dr Supriyanto).

In finalising the training, the participants testified that they all had new insights toward their school environment and would implement their new knowledge at their respective schools. (sis)



A group photo of training participants.



Demonstration of the use of mulch paper used for making planting beds.



A participant prepares a media for better fruit plants and forest.

Geospatial Training Course for SMARTS-BE Partner Schools

A total of thirty teachers of Indonesian Vocational Schools (SMK) joining the SMARTS-BE programme, participated in a training course on optimising spatial technology for monitoring fruit plants organised by SEAMEO BIOTROP on 14-18 October 2019 at the Centre's Headquarter in Bogor. This activity aimed to establish the geolocation-based monitoring system for partner schools which spread throughout Indonesia, to implement precision agriculture, and to integrate the pattern of non-seasonal fruit development with an independent learning system that is oriented to the potential of the region and local fruit resources.

In his remarks, Dr Supriyanto as the Coordinator of the SMARTS-BE program stated that BIOTROP has been assigned to implement the programme by the Ministry of Education and Culture (MoEC) of the Republic of Indonesia since 2018.

"We are optimistic that in the future, the success of SMK education will mark further development of Indonesia. Within these two years, a total of 36 SMKs in Indonesia has participated in the SMARTS-BE programme and produced a variety of technologies, knowledge and products. These results are ready to be published by the Centre as its Special Publication and disseminated to SMKs in Indonesia and the Southeast Asian region," said Dr Supriyanto.

In his opening remarks, the Centre's Acting Deputy Director for Programme, Dr Aslan, said that to support the SMARTS-BE programme, a continuous and integrated monitoring, reporting and evaluation system is needed to obtain data and information

regularly based on program indicators and objectives. In addition, the system can also be used to find out whether the ongoing activities follow agreed plans and procedures. "We combine the technology, geospatial in this case, and the agriculture practice to have the best monitoring system which is in line with the precision agriculture program and to answer the challenges of the agricultural 4.0 era," he said.

Five experts shared their expertise during this 5-day training course, namely Dr Supriyanto, Dr Aslan, Harry Imantho, MSc, and Slamet Widodo Sugiarto, SSI, from BIOTROP, and Benni Purwonegoro, SKom, from MSc in IT for NRM program of IPB University. Eight topics divided into practicum and classroom sessions were delivered to the participants: 1) The Concept of SMARTS-BE and Spatial Application-Based Monitoring, 2) Introduction to Geographic Information System (GIS) & Remote Sensing (RS), 3) GIS Application to Support Precision Agriculture, 4) Geodatabase Concept and Preparation for Fruit Plantation Data Management, 5) Data Acquisition and Survey with GPS (handheld and mobile), 6) Geotagging Application for Fruit Crop Inventory, 7) Introduction to Drone Application for Data Acquisition and Fruit Garden Management, and 8) Drone Data Processing for Rapid Accounting of Fruit Plants.

"In the future, we hope that the geodatabase, including the plantations and plants, of the schools participating in the SMARTS-BE programme, can be well integrated," said Slamet Widodo Sugiarto, SSI, as the coordinator of the activity. (zsp)



Smart-Be teachers participate in hands-on drone



Participants conduct geotagging practice for an inventory of fruit plants using GPS (Global Positioning System)

SMARTS-BE FGD: A Mean for Developing Human Resources toward Industry 4.0

"Industry 4.0 is not a burden, but a challenge to achieve more development in agriculture industry using more advanced technologies", said Dr Supriyanto, SMARTS-BE Programme Coordinator in his Welcome Remarks during the opening ceremony of the Focus Group Discussion (FGD) on Developing Human Resources toward Industry 4.0 in Agroindustry and Agribusiness conducted on 13-15 November 2019 at SEAMEO BIOTROP's Headquarter in Bogor.

Dr Supriyanto further emphasised the importance of developing and managing the entrepreneurship talents of the vocational school's graduates. Teachers are the key factor in expanding such talents, by dwelling and channelling students' skills and hobbies to reach excellence in each graduate.

Dr Zulhamsyah Imran, BIOTROP's Deputy Director for Administration, officially opened the FGD. In his Opening Remarks, he further underlined the importance of teachers' role in developing critical thinking habit through education to prepare human resources to face the era of industry 4.0.

The FGD was aimed to 1) evaluate SMARTS-BE programs carried out in 2018-2019; 2) formulate SMARTS-BE continuation programs in the year of 2020-2024; 3) identify issues and solution alternatives to develop human resources toward industry 4.0 in agroindustry and agribusiness; and 4) form agroindustry and agribusiness vocational schools' principals.

In realising these objectives, this FGD exercised four main agendas, i.e., 1) Policy; 2) Institution; 3) Management; and 4) Technology Transfer. Two expected outputs of this FGD were: 1) feasible inputs for the government in developing agroindustry and agribusiness human resources in the era of industry 4.0 and 2) alternative solutions and action plan to support food security in Indonesia and Southeast Asia.

Forty-three agroindustry and agribusiness vocational schools' principals from Central Java, East Java, West Java, Bali, Banten, Aceh, Lampung, Riau, South Sumatra, Bangka Belitung Islands, Papua, West Papua, West Nusa Tenggara, East Nusa Tenggara, DKI Jakarta, Southeast Sulawesi, Central Sulawesi, South Kalimantan, East Kalimantan, Jambi, Riau and Central Kalimantan Provinces participated in this FGD.

Resource persons and materials presented in this FGD were: 1) Dr Zulhamsyah Imran (The Prospect of Developing SMARTS-BE Programme and Food Security toward Industry 4.0); 2) Saryadi, ST, MBA (The Policy of Vocational Schools Revitalization in Indonesia to Produce Quality and Competitive Human Resources); 3) Dr Aslan (The Use of Spatial Technology for Fruits Orchards Management); 4) Dr Supriyanto (Technology Transfer in SMARTS-BE Program to Support Food Security in Indonesia); 5) Dra Ida Yuniati Surtika, MM (Managing Teaching Factory Agrotourism); 6) Drs Juanda, MSi (Developing Human Resource through Teaching Factory Implementation); and 7) Baban Sarbana, SE, MSi (The Institutional Agroindustry and Agribusiness Competence in Indonesia).

In the FGD closing ceremony held on 15 November 2019, the BIOTROP's Acting Deputy Director for Programme, Dr Aslan, voiced his expectation that this FGD provided useful knowledge and soft skills for the participants and that the Centre will hold similar or follow-up events in relevance to research, training and information dissemination.

Dr Supriyanto closed the FGD by introducing SMARTS-BE motto which is "SMK...Yes, We Can! SMK... Is GREAT! SMARTS-BE OK! NO FARM... NO FOOD... NO LIFE". (r/rl/sis)



A group photo with FGD's participants



Dr Supriyanto give his presentation to participants



All participants discuss and share knowledge during FGD

First BIOTROP's School Garden Training Course Held Outside Indonesia

SEAMEO BIOTROP conducted its first overseas training course on school garden for improving students' nutrition, literacy and entrepreneurship on 10-13 October 2019 at the Royal University of Phnom Penh (RUPP), Phnom Penh, Cambodia. This activity was held in collaboration with the Ministry of Education, Youth and Sport of Cambodia (MoEYS) and RUPP. A total of thirty Cambodian school teachers completed this activity.

In general, the training course was designed to offer knowledge and understanding to participants in the importance of School Garden programme, so that they can implement the programme in their respective institutions.

The training course was officially opened by H.E. Sok Sabayna, Under-Secretary of State of MoEYS. In his opening remarks, he underlined that the MoEYS always support schools to enhance their capacity not only related to learning activities but also to improve students' nutrition, literacy and entrepreneurship.

BIOTROP's Director Dr Irdika Mansur also welcomed participants during the opening ceremony. In his remarks, he said that the in-country training activity is the Centre's annual programme that has been started in 2016. Previously, the Centre has already conducted three training courses on school garden and trained a total of 122 school teachers in Indonesia.

Rector of RUPP, H.E. Chat Chealy, seven BIOTROP's Governing Board members and representatives; and SEAMEO Secretariat's Deputy Director for Administration and Communication attended the opening programme as guests of honour.



Two BIOTROP staff were busy working



Hydroponics tool sets provided by BIOTROP

The training course presented five experts, namely Dr Long Solida and Dr Ith Saveng from RUPP; Vou Vannarath from the Ministry of Agriculture, Forestry and Fisheries of Cambodia; Khean Puthy from Preah Novadom Sihanouk General Knowledge and Technical High School; and An Mouy Ngech from Kampong Prasat Village.

During the 4-day training activity, the participants received lectures and practical exercises from the abovementioned experts on the following topics: 1) National Policy of Agriculture Development in Cambodia, 2) The Importance of Nutrition in Development of Education and Learning Activity for Student, 3) Measuring Nutritional Status of Student, 4) Integration of School Garden Activity into School Learning Activities, 5) Hydroponic Production of Leafy and Fruit Vegetables, 6) Aquaponics, 7) Food Mushroom Production, 8) Facilitating School Gardening Learning through Online Material Development and Teaching, 9) Developing Schools and Students Entrepreneurship through School Gardening Activities, and 10) School Garden as Project-Based Learning. A field trip to a private company was also provided to gain insights into household scale composting of solid organic wastes, verticulture and soil-based gardening in limited spaces. As a training requirement, the participants also produced action plans to be implemented in their respective schools.

Dewi Suryani, MM, BIOTROP's Capacity Building Department Manager, officially closed the training course on behalf of BIOTROP's Director. In her closing remarks, she encouraged the participants to establish linkages between and among them and resource persons to obtain more sustainable relationship in developing school garden in their schools. (zsp)



Members of a meeting from MoEYS Minister (left) to H.E. Chat Chealy (right)

BIOTROP, Central Sulawesi Marine and Fisheries Service Take Follow-Up Action on MoA

"Central Sulawesi Province has a vast waters area stretching from Makassar Strait to Tomini Gulf, including straits between small islands scattered around the province. Therefore, it is important that we use the natural resources, including developing seaweed seedlings production using tissue culture technique to increase seaweed production in Central Sulawesi Province", said H. Moh. Arif Latjuba, SE, MSI, the Head of Central Sulawesi Marine and Fisheries Service in his Welcome Remarks during the opening ceremony of the Training Course on Supplying Cottonii Seaweed (*Kappaphycus alvarezii*) Seedlings using Tissue Culture Technique, held at the SEAMEO BIOTROP's headquarter in Bogor, on 05 November 2019.

The training course was conducted as one of the follow-up actions of the Memorandum of Agreement (MoA) signed on 14 February 2019 between the Centre and the Central Sulawesi Marine and Fisheries Service on the Development of Tissue Culture Technique to Produce Cottonii Seaweed Seedlings for the Communities in Central Sulawesi Province.

Twenty-six participants from Central Sulawesi Marine and Fisheries Service took part in this training course, which objectives were to develop and elevate the production of Cottonii seaweed using tissue culture technique, for the prosperity of Central Sulawesi communities. Central Sulawesi is the third-largest seaweed producer after South Sulawesi and East Nusa Tenggara Provinces.

Since 2010, BIOTROP has been developing tissue culture technique for seaweed propagation, with its expert, Dr Erina Sulistiani, as the first researcher who develops tissue culture technique for seaweed propagation. Since then, the technique has been going through several modifications to achieve perfection.

The training course was arranged in the classroom and practical works sessions. Training materials and resource persons were:

- 1) Tissue culture technique for producing plant seedlings (Dr Erina Sulistiani);
- 2) Tissue culture phases to propagate Cottonii seaweed (Dr Erina Sulistiani);
- 3) Facilities requirement for producing seaweed seedlings using tissue culture technique (Samsul A. Yani);
- 4) Contamination sources and aseptic technique (Samsul A. Yani);
- 5) Culture media used in seaweed tissue culture (Dr Erina Sulistiani);
- 6) Preparing PES and CW stock solutions (Dr Erina Sulistiani);
- 7) Preparing vitamins, BAP and IAA stock solutions (Samsul A. Yani);
- 8) Preparing media culture for seaweed propagation (Samsul A. Yani);
- 9) Acclimatization of seaweed parent stock and plantlet in greenhouse condition (Samsul A. Yani);
- 10) Acclimatization of seaweed parent stock in laboratory condition (Samsul A. Yani);
- 11) Preparing culture media and explant for sterilization process (Samsul A. Yani);
- 12) Seaweed explant sterilisation (Dr Erina Sulistiani);
- 13) Planting of seaweed explant to induce calluses growth (Dr Erina Sulistiani);
- 14) Subculturing seaweed calluses (Dr Erina Sulistiani);
- 15) Seaweed plantlets acclimatization and development of seaweed seedlings garden (Emy Rusyani, SPi, MSi);
- 16) Subculturing micropropagule (Dr Erina Sulistiani); and
- 17) Subculturing propagule in aerated condition (Dr Erina Sulistiani).

Further follow-up actions succeeding this training course are the building of seaweed tissue culture laboratory and seaweed seedlings garden in several parts in Central Sulawesi Province. (sis)



Samsul A. Yani (left) explained the acclimatization process of Cottonii seaweed to participants



Participants undergo a familiarization session during the training course



Dr Erina Sulistiani takes a photo with participants

BIOTROP Gathers Experts to Strengthen Indonesian Water Management and Coastal Ecosystems



Mr. Imran Amin gives his presentation



Dr. Zulhamsyah asks question from a participant



Meliana shares her knowledge to participants

Thirty experts from various institutions joined a workshop on strategy for strengthening the water management and coastal ecosystems held by SEAMEO BIOTROP on 10 December 2019 in its Campus in Bogor. This activity aimed to formulate a revitalisation and strengthening programme for management of freshwater and ecosystems in Indonesia's coastal areas and small islands.

The organisation of this workshop was motivated by the large potential of Indonesian waters that need to be explored and utilised for the community welfare without compromising its sustainability and conservation efforts. "Therefore, we consider an effective strategy for managing existing natural resources. It is also for improving the competitiveness of Indonesian fisheries and marine products to support business sustainability," said Dr Aslan, Acting Deputy Director for Programme, in his remarks.

Six speakers were presented at the event, namely Onrizal, PhD (Universitas Sumatera Utara), Imran Amin (The Nature Conservancy Indonesia), Dr Majarjana Krisanti (IPB University), Dr Zulhamsyah Imran (BIOTROP and IPB University), Gito Prawoko (PT Bukit Asam, Tbk.) and Tiyas Nurcahyani, MSi (the Ministry of Energy and Mineral Resources of the Republic of Indonesia). They presented six topics, consisting of 1) Inventory and Rehabilitation of Mangrove Ecosystems, 2) Management of Biodiversity in Coastal and Marine Areas, 3) Management of Aquatic Resources, 4) Water Management Ideas: Floating Garden, and 5) Ecosystem-Based Water Management: Utilisation of Ex-Mining Ponds, respectively.

In their presentation, the resource persons raised current issues and problems in the water management and coastal ecosystems, including 1) degradation of coastal ecosystems and inland waters, 2) changes in landscapes which affect the ecosystem balance, 3) pit lakes existence due to mining activities, 4) miss-management of ecosystem neglecting its carrying capacity, 5) illegal and destructive fishing that have occurred for a long time, 6) disposal of household and industrial waste into the waters, 7) exploitation of mangroves, seagrass and coral reefs, and 8) an increase in species invasive populations which decreases the number of local species.

To overcome these issues, several strategies had been formulated during the workshop, namely 1) establishing a participatory management system (social-ecological system) with indicators of each element that could be evaluated, 2) establishing proper mining waste management to conform to predetermined quality standards, 3) implementing sustainable use of the environment, 4) increasing the viability of coastal and aquatic ecosystems, 5) equating economic activities among stakeholders, 6) integrated waste management systems, 7) reducing the level of threats in waters and coastal ecosystems, 8) implementing good mining practice, 9) conducting social and institutional studies, 10) conducting aquatic biodiversity studies, and 11) using environmentally friendly fishing gear.

To implement these strategies, Dr Zulham added, effective cooperations from various parties including the government, NGOs, industry players, corporate CSR, research institutions, universities and coastal communities, especially fishermen, are needed so that the formulated action plans could run well to produce the expected outputs. (zsp)

Cyber-Physical System – An Integrated System to Better Manage Sustainable Fisheries

SEAMEO BIOTROP presented Prof Ir Indra Jaya, MSc, PhD, in its 4th 2019 Quarterly Public Seminar, held on 21 November 2019 at its Campus in Bogor, to talk over the importance of implementing advanced technology to optimise the sustainable utilisation of marine and fisheries natural resources. The topic also addressed fisheries as one of Indonesia's food security main pillars. A total of 30 participants from various Indonesian research institutions, private companies and universities joined this activity.

During the seminar, Prof Indra Jaya highlighted the significance of using a cyber-physical system (CPS) to better explore the sea biodiversity in the various depth of water. CPS refers to all technologies enabling computerised resources and physical objects to interact together in a coordinated, reliable and continuous manner for performing multiple given tasks.

"The technology development follows the development of the industry. During the Industrial Revolution (IR) 3.0, digital technology and programme/coding started to develop, including the use of sonar and radar. Meanwhile, in IR 4.0, CPS is introduced, which brings more practical work because of its integrated system," said Prof Indra Jaya.

Furthermore, he explained that CPS is a system controlled or monitored by computer-based algorithms. For fisheries and marine purposes, some of its technologies, namely wireless coastal and small islands network buoys, underwater television system (UTS), autonomous system and artificial intelligence (AI), are used. Wireless coastal and small islands network buoys are useful for obtaining data in signal-lacked areas, including remote islands. Underwater vegetation and coral reef ecosystem monitoring and

evaluation could be conducted using UTS, while the autonomous system is helpful in mapping and classifying the bottom of the waters including seagrass beds.

In terms of AI, Prof Indra Jaya said that it is commonly used for identification and classification of fishing patterns, optimisation of fishing operation, and fish position tracking, which leads to time and fuel efficiency. In fish cultivation, AI could help farmers to save feeds by estimating fish length. It could also be used for species identification as an indicator of coral reef health.

Ending his lecture, Prof Indra Jaya emphasised that people have to conserve and at the same time, sustainably use the oceans, seas and marine resources for sustainable development as stated in the Sustainable Development Goal No.14.

Prof Ir Indra Jaya, MSc, PhD, is a well-recognised expert in underwater acoustics and ocean instrumentation from the Marine and Fisheries Faculty of IPB University. He has produced more than 20 innovations, where 12 of which were selected as Indonesia's most prospective innovations by the Business Innovation Center (BIC) and Indonesia's Ministry of Research, Technology and Higher Education (Kemristekdikti) (2009-2018).

Prof Indra Jaya is also the Chairperson of the National Fish Resources Assessment Commission for 2017-2019 period. Currently, he actively acts as an assessor member of BAN-PT (2004-present) and joins Indonesian Fisheries Bachelor Association (ISPIKANI) and the IEEE Oceanic Engineering, Instrumentation and Measurement, Automation and Robotics Society. (zsp/sis/rf)



Prof Indra Jaya delivers his talk during the seminar

Participants pay attention to the seminar content

Secretary of State of the Ministry of Education, Youth and Sport of Cambodia Opens BIOTROP's 57th Governing Board Meeting



H.E. Yuok Ngoy (right) officially opens the GBM by striking the gong

H.E. Yuok Ngoy, the Secretary of State of the Ministry of Education, Youth and Sport of Cambodia officially opened the 57th Governing Board Meeting (GBM) of SEAMEO BIOTROP on 7 October 2019 at Sokha Phnom Penh Hotel and Residence, Cambodia.

In his opening address, H.E. Yuok Ngoy commended the Centre for producing significant accomplishments from implementing various research and community development programs and activities toward attaining its vision as 'A Leading Centre in promoting and enhancing the real value of tropical biology in Southeast Asia'. He also added that vocational education still becomes one of the priority issues in Southeast Asia, which is also addressed in the SEAMEO Seven Priority Areas no. 4: Promoting Technical and Vocational Education and Training and the SDGs goal no. 4: Quality Education. Regarding this, H.E. Yuok Ngoy expressed his support for the Centre to implement its school garden program in Cambodia's schools.

In addition to vocational education, BIOTROP's Director, Dr Irdika Mansur, during his opening remarks emphasised the efforts of the Centre in providing scientific knowledge and building capacities of institutions and communities through sustainable conservation and management of tropical biology in Southeast Asia. Under the 10th Five-Year Development Program (FYDP), SEAMEO BIOTROP carries out its activities under three program thrusts, namely restoration of degraded ecosystem, sustainable management of intensively used ecosystems/landscapes, and conservation and sustainable use of unique ecosystems/landscapes of high biodiversity, which are believed as current critical concerns

confronting the Southeast Asia region in general. The urgency to address these matters, particularly through applied research, would be significant for sustainable education development in the region.

The opening ceremony was also attended by the Ambassadors of SEAMEO member countries to Cambodia or their respective representatives, the Rector of the Royal University of Phnom Penh, the representative of the Royal University of Agriculture, Director of SEAMEO Technical Education Development and representative of Helen Keller International.

Six Governing Board members from Brunei Darussalam, Cambodia, Indonesia, Myanmar, Singapore and Thailand, two representatives from Lao PDR and the Philippines, SEAMEO Secretariat Deputy Director for Administration and Communication, observers from the Institute of Brunei Technology Education (IBTE), and Bureau of Foreign Affairs, Ministry of Education and Culture of Indonesia, attended the meeting to discuss eight working papers and six information papers respectively, including Appointment of New SEAMEO BIOTROP's Deputy Director for Programme in In-Camera session and Updates on Implementation of SMARTS-BE Programme.

The 57th SEAMEO BIOTROP GBM this year was conducted back to back with In-Country Training Activity on School Garden for Improving Student's Nutrition, Literacy and Entrepreneurship on 10-13 October 2019 in collaboration with the Ministry of Education, Youth and Sport of Cambodia and Royal University of Phnom Penh. (zsp/rf)

Last ICCM Concludes 7 SEAMEO Centres' Activities in 2019

A total of 35 representatives from six SEAMEO Centres in Indonesia, consisted of Board of Directors and staff, actively participated in the Inter-Centre Collaboration Meeting held on 17-18 December 2019 at SEAMEO BIOTROP's Headquarter in Bogor. The meeting agenda covered 1) Programme implementation evaluation year 2019 and 2) Preparation of presentation to the new Minister of Education and Culture of the Republic of Indonesia (MoEC).

During the two-day discussion, the meeting emphasised on the Government of Indonesia fund absorption by the seven SEAMEO Centres in Indonesia in Fiscal Year 2019 and the material to be presented to the Secretary-General of MoEC and staff of the MoEC that was planned to be proposed in January 2020. The material, including technical and administrative

aspects of the Centres in Indonesia and, was set following three primary concepts of the Minister of Education and Culture of Indonesia, namely: 1. Guru Penggerak (Motivating Teacher), 2. SDM Unggul (Superior Human Resource), and 3. Merdeka Belajar (Freedom of Learning).

Dr Gatot Priyowiranto, the Coordinator of seven SEAMEO Centres in Indonesia, in his closing remarks said that all Centre have to think smart and intelligent and to synergise with Units under MoEC. He also reminded the Centres to pay attention to the programmes that could be implemented in Southeast Asia and beyond. (rf)



A group photo of BIOTROP staff

Programme via BIOTROP Indonesia and

Recipient of BIOTROP's 2018 Action Research Grant Receives an Appreciation from PPPPTK IPA

Fera Maulidya Sukarno, MPd, a natural science teacher from SMPN 1 Subang, Indonesia, who received a 2018 action research grant from SEAMEO BIOTROP, was nominated as one of the best speakers at the National Symposium for Natural Science Teachers Year 2019 by the Development and Empowerment Centre for Natural Science Teachers and Educators (PPPPTK IPA) of the Ministry of Education and Culture of the Republic of Indonesia. Her scientific paper titled 'Enhancing Inquiry and Entrepreneurship Skills through the School Garden Program based on the Participation of Youth Scientific Group Students' funded by the Centre brought her to the award, which certificate was handed over on 27 November 2019 at Mercure Hotel, Jakarta.

Fera said that the school garden programme which is currently being socialised by the Ministry of Education and Culture to improve student literacy and nutrition is very good to be implemented by the school. However, the school garden implementation in her school is hindered by improper management and time limitations in the school curriculum. Therefore, to have effective school garden programme, she integrates school garden programme with an extracurricular activity called the Youth Scientific Group (KIR).

Through the implementation of this action research, she continued, the school garden becomes a laboratory for students to improve their inquiry skill following the STEM (science, technology, engineering and mathematics) mindset. Students learn urban farming method through the hydroponic system, develop an entrepreneurial skill and foster affection for vegetable crops. Students are challenged to implement a best practice system in managing school garden, including formulating research problems and hypotheses, designing tools, selecting materials and methods, managing yields and arranging the budget and finance.

"BIOTROP plays an active role in my action research. It introduces the school garden program and the hydroponic method in the teacher training program. In addition to providing a grant, the Centre also provides input and clear guidelines. BIOTROP monitors intensively every activity and progress achieved. I am very grateful for this great support so that my action research could go well," said Fera.

In the near future, Fera said that her school plans to develop hydroponic automation techniques, so that the application could be more efficient and effective. She also hopes that the effort she does could motivate other teachers and students. (zsp)

Timor Leste Looks Upon BIOTROP to Develop Agriculture

Hitu Calvalho de Jesus, the Education Attaché of Democratic Republic of Timor Leste Embassy for Indonesia, accompanied by Deni Sekarsari, a staff of Education Attaché, visited SEAMEO BIOTROP Bogor on 13 November 2019 to explore collaboration possibilities between Timor Leste and SEAMEO Centres in Indonesia, in particular on education development in Timor Leste. This objective was broken down into three important issues, i.e. 1) Agriculture Development based on Geographical Information System and Remote Sensing; 2) Development of Economic Agriculture, Countryside and Region; and 3) Joint Research.

The visit of Calvalho to SEAMEO BIOTROP was greeted by Dr Irdika Mansur, BIOTROP's Director; Dr Zulhamsyah Imran, Deputy Director for Administration; Dr Aslan, Acting Deputy Director for Program; Dr Jesus Fernandez, Deputy Director for Program of SEAMEO REC/FON; Prakaikan Schneit, Deputy Director for Program of SEAMEO SEAMOLEC; Dr Bambang Indriyanto, Director of SEAMEO QITEP in Language; Suharmoko, Deputy Director for Administration of SEAMEO QITEP in Language; Rizwan Darmawan, Secretary to BoD of SEAMEO QITEP in Science; and R. Lufky Muhammad, Head of Operation of SEAMEO CECCEP.

During the introduction session, each SEAMEO Centre presented their brief profiles as well as expressed their willingness to establish collaborations with Timor Leste in accordance with the respective Centre's expertise. In this session, Dr Irdika highlighted the Centre's SMARTS-BE Programme in developing school garden and entrepreneurship skill of vocational school students. Dr Irdika also mentioned about the Centre's



Visiting team around Analytical Laboratory

experience in developing collaboration with ETCI (East Timor Coffee Institute). In completing the explanation about the Centre's programmes, Dr Irdika led a campus tour to visit Natural Product, Tissue Culture and Entomology Laboratories, Mushroom Cultivation and Hydroponic Units, as well as nurseries and research field of the SMARTS-BE programme.

Upon intensely listened to presentations in the meeting room and in campus tour, Calvalho expressed his interest to implement School Garden Program in Timor Leste to increase agricultural production, which was enthusiastically welcomed by all representatives of SEAMEO Centres in Indonesia followed by a more detailed discussion during a lunch-meeting thereafter. As immediate action plan, BIOTROP is going to visit Timor Leste for preparing a more comprehensive collaboration master plan. (RHS)

BIOTROP Shares Creative Agriculture Strategies with Universitas Tanjungpura

In fulfilling its strategic plan of 2015-2019 for developing Universitas Tanjungpura as one of the competitive universities in providing exceptional learning in becoming state university as a legal entity (PTN BH), the Faculty of Agriculture of Universitas Tanjungpura visited SEAMEO BIOTROP on 3 December 2019.

The delegation from the Faculty was led by Ir Ismahan Umran, MSi, the Vice Dean for General Affairs and Finance, Faculty of Agriculture. In his remarks, Ismahan explained that the visit aimed to seek collaboration possibilities in agriculture with BIOTROP. The delegation members were Ir Sutarman Gafur, MSi, PhD (Head of Magister Study Program), Dr Ir Feira Budiarysah Arief, MSi (Team Leader of Master Plan Preparation for Developing Research, Educational and Tourist Garden), Prof Dr Ir Saeri Sagiman, MSc (Head of Soil Biology and Biotechnology Laboratory), and Dr Ir Purwaningsih, MSi (Head of Compost House for Education).

Dr Irdika Mansur, BIOTROP's Director, welcomed the delegation by showing several creative strategies in implementing agriculture to generate income in campus tour activity and discussions with several experts in BIOTROP. Units visited during campus tour were Tissue Culture Laboratory, Oyster Mushroom Production Unit, Hydroponic Unit, Aquaponic Unit, Nurseries, Entomology Laboratory and Natural Products Laboratory. (sis)



A visit to orange plantation of the Centre

BIOTROP's Media Day, An Event to Disseminate Knowledge and Expertise

SEAMEO BIOTROP shared its knowledge and expertise on tropical biology, especially in terms of research activities and human resource capacity building, during its media day on 04 December 2019 in its Campus in Bogor. This activity was also intended to build partnerships with the media. A total of 33 journalists from 31 national and local media joined this activity.

BIOTROP, established on 06 February 1968, is one of the regional centres of SEAMEO (Southeast Asian Ministers of Education Organisation) which focuses on tropical biology. The Centre has three main mandates, i.e., 1) research in the field of tropical biology, 2) improving the capacity of human resources in the field of tropical biology, and 3) dissemination of information in the field of tropical biology. Implementation of these mandates refers to the Centre's programme thrusts, namely: 1) restoration of degraded ecosystems, 2) sustainable management of ecosystems/landscapes that are used intensively, and 3) conservation and sustainable use of unique ecosystems/landscapes with high biodiversity.

"For the past 51 years, we have conducted many research and training courses to encourage capacity building of the Southeast Asian community, particularly Indonesian society. Through this event, we hope that the media will help us spread the knowledge and expertise that we have to the public. We want our knowledge and expertise would be utilised by our community, not only being stored in the library or documentation room," said Dr Irdika Mansur, BIOTROP's Director, in his remarks.

During the activity, the Centre introduced four excellent programmes by featuring its experts: 1) School Garden and Urban Agriculture, by Dr Irdika Mansur, 2) Research and Development of Tissue Culture Techniques for Provision of Plant Seedlings at SEAMEO BIOTROP, by Dr Erina Sulistiani, 3) Edible Mushroom Cultivation, by Samsul A. Yani, and 4) SMARTS-BE, by Dr Supriyanto.

In addition to presentation sessions, all journalists were also invited to visit the Centre's facilities. (zsp)



Rita Febriana introduces BIOTROP in general to the media



Dr Irdika Mansur, introduced by the media

Networking Development

For the fourth quarter of this year, we have established 5 Memoranda of Understanding (MoUs) with four institutions and one company as follows.

Date of signing: 01 October 2019

Partner: Universitas Syah Kuala

Topic: Collaboration in the field of education, research and community development

Duration: 3 years

Date of signing: 31 October 2019

Partner: Universitas Sultan Ageng Tirtayasa

Topic: Collaboration in the field of education, research and community development

Duration: 3 years

Date of signing: 14 November 2019

Partner: Agricultural Education Center, Agricultural Human Resources Development and Counseling Agency

Topic: Development of human resource capacity in the field of tissue culture in supporting sustainable agriculture programs

Duration: 3 years

Date of signing: 30 November 2019

Partner: PT Panorama JTB Tours Indonesia

Topic: Business travel of SEAMEO BIOTROP

Duration: 2 years

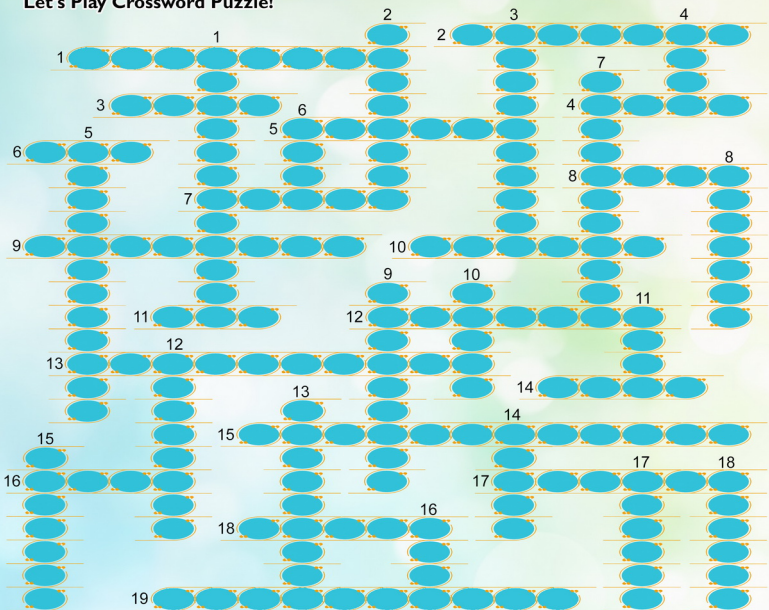
Date of signing: 04 December 2019

Partner: Al Bunyan Foundation

Topic: Water quality testing to support the Water for Life programme of Al Bunyan Amil Zakat Institution (LAZ)

Duration: 3 years

Let's Play Crossword Puzzle!



ACROSS

- the month SEAMEO BIOTROP was established
- a floral arrangement
- a genus in Chlorophyta
- fundamental structural unit of life
- a component of vascular tissue of plants
- $C_{10}H_{16}N_2O_{13}P_3$
- yeast (reversed)
- part of a vascular plant that is normally underground
- BIOTROP's special program for Vocational High School (SMK)
- second word of the latin name of an Indonesian flower mascot
- ribonucleic acid (abbreviation)
- a disaccharide formed from two units of glucose
- a ribonucleoprotein that adds a species-dependent telomere repeat sequence to the 3' end of telomeres
- functional unit of heredity
- variety of life on Earth at all its levels
- a rigid organ that constitutes part of the vertebrate skeleton
- womb
- SEAMEO BIOTROP's location
- combination of aquaculture and hydroponics

DOWN

- the process of replanting and rebuilding the soil of disturbed land
- the science and study of wooded plants and their taxonomic classifications
- unicellular organism with shape resembling the sole of a shoe
- a horn-like keratinous envelope covering the tips of the fingers and toes in most primates
- platelets
- a life cycle stage of many insects
- genus of one of the Indonesian animal mascots
- G-C-A-T
- the compound eyes of arthropods (plural)
- breach of the continuity of skin, epithelium or mucous membrane caused by sloughing out of inflamed necrotic tissue
- a coding region of a gene that contains the information required to encode a protein
- fibrous connective tissue that connects bones to other bones
- scientific journal published by SEAMEO BIOTROP
- group of horses, donkeys, and zebras
- a main body segment of insects
- water falling from the sky
- enzyme responsible for clotting milk
- white part of the eye