

[16] SDG16: Peace, Justice and Strong Institutions

[16.3] Working with government

[16.3.3] Participation in government research

Undertake policy-focused research in collaboration with government departments

Bank Indonesia

“Experimental Project of Stingless Bee Based Business Model Development in Islamic Boarding School at Bengkulu, South Sulawesi, and West Nusa Tenggara”

Researchers:

Muhamad Sahlan^a, Heri Hermansyah^a, Rambat Lupiyoadi^b, Apriliana Cahya Khayarani^a, Kenny Lischer^a, Chairul Hudaya^c, Jeffry Lesmana^d, Yogi Hutomo^d, Muhammad Chandra^d, Akso Diana^d

^aDepartment of Chemical Engineering, Faculty of Engineering, Universitas Indonesia

^bDepartment of Management, Faculty of Economics and Business, Universitas Indonesia

^cDepartment of Electrical Engineering, Faculty of Engineering, Universitas Indonesia

^dIndonesia Beekeeper Association

*correspondence: sahlan@che.ui.ac.id

Stingless bee known as one of variant of bee that does not have sting in the tip of their abdomen. It is known as bee that cannot spread-out venom compound as defensive mechanism. It is also very productive in terms of production of bee-based product such as honey, propolis, bee bread, and wax. Recently, this variant of stingless-bee able to be domesticated. It means that stingless bee can be developed as new business for bee-based producer.

In other hand, Islamic boarding school is one of Muslim based school that exist across Indonesia. In this school, students are not only study about hard skill such as school subject but also soft skill. This soft skill can be learned through various of Islamic boarding school activities such as farming, fishing, breeding, or developing business to reaching financial independency for funding the students during the time they are registered in school. To do so, Universitas Indonesia with the support of Bank of Indonesia doing an experimental project to develop business model based on bee-based breeding product in Islamic boarding school.

It was done at three chosen Islamic boarding school which are Nurul Qur`an Islamic Boarding School at Bengkulu, Alam Indonesia Islamic Boarding School at South Sulawesi, and Al-Kahfi Islamic Boarding School at West of Nusa Tenggara start from September 2021 to June 2022. It start by providing facility regarding bee breeding and honey collection tools, training about how to breed bee, handling of honey harvesting, and post-harvesting technique, education about how to keep and multiply bee colonies to make it more sustainable, and accompaniment for developing bee breeding based on social community.

The impacts of the project are successfully produced. All three Islamic boarding schools, able to breed bee. Approximately 10% of total colony is ready to be harvested. In addition, all three boarding schools can sell honey that breed by themselves. Moreover, Nurul Qur`an Islamic Boarding Schools is successfully multiplied the total number of bee colony and can financially support the monthly expenditure. All this shows the promising business model that can be developed in other Islamic boarding school across Indonesia.

Keywords: Bee breeding, Islamic boarding schools, Bee based products, Business model

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Badan Pengelola Dana Perkebunan Kelapa Sawit (BPDPKS) Palm Oil Fund Management Agency

PalmCrete

Upcycle of Palm Kernel Shell as Lightweight Aggregates for Concrete towards Circular Economy in Palm Oil Industry

Researchers:

Sotya Astutiningsih, Nuraziz Handika, Bastian Okto Bangkit Santosa, Arian Dhini, Mochamad Adhiraga Pratama, Dwica Wulandari

Department of Metallurgy and Materials, Faculty of Engineering, Universitas Indonesia

*correspondence: sotya.astutiningsih@ui.ac.id

As the world's top producers of crude palm oil (CPO), Indonesia, together with Malaysia, have supplied around 85% of the world's demand. The amount of biomass waste generated was indeed significant. One of the types of waste is Palm Kernel Shell (PKS) which currently being sold, mostly to Japan, as biofuel as it has a high level of calorific value. This research was funded by Badan Pengelola Dan Perkebunan Kelapa Sawit (BPDPKS) to optimize and assess the valorization of PKS as aggregates in concrete compared to the current situation.

Concrete is a composite made up of aggregates bound with cement paste, which is cement mixed with water, as the matrix. Ordinary aggregates used in concrete is crushed natural stone which has a density of approximately 2.4 tons / m³. Substitution of crushed stone aggregates with a much lighter PKS will result in the significant decrease of the overall weight of concrete that will have an impact on the construction design and efficiency in concrete volume. Three aspects that will be studied in this research are: (i) optimization of PKS as lightweight aggregates; (ii) Life cycle analysis, comparison of the use of PKS as aggregates in concrete to its current usage and; (iii) its techno- economy analysis.

This multidisciplinary research involves material, civil, environmental and industrial engineering. Methods used include mechanical testing, numerical analysis, microstructure characterization such as electron microscopy and x-ray diffraction.

Numerical analysis using digital image correlation shows that concrete specimens made using PKS shows normal behavior under stress as the ordinary concrete with crushed stone aggregates and that the average compressive strength of 19.2 MPa for 150 mm cubic samples and 19.1 MPa for 15 mm X 30 mm cylindrical samples, meets the standard values for low rise building.

The analysis on the potential environmental impact on the process of producing CPO reveals that the biggest impact was at the stage of collecting fresh palm fruit bunches from the planting estate to the CPO factory. On the other hand, the utilization of PKS as fuel results in the emission of 1860 CO₂-eq for climate change; 5699 kg SO₂-eq for acidification and 6208 kg PO₄-eq for eutrophication.

Keywords: palm kernel shell, concrete, lightweight aggregates, life cycle analysis

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Badan Pengelola Dana Perkebunan Kelapa Sawit (BPDPKS) Palm Oil Fund Management Agency

Development of Ganoderma Boninense Early Detection Tool Using Portable DNA Detection Devices

Researchers:

Yudan Whulanza^{a*}, Siti Fauziah Rahman^a, Munammad Hanif Nadhif^b, Muhammad Imam Surya^c, Irfan Martiansyan^c

^a Faculty of Engineering, Universitas Indonesia

^b Faculty of Medicine, Universitas Indonesia

^c Indonesian Institute of Sciences

*correspondence: yudan.whulanza@ui.ac.id

One of the efforts to control Ganoderma in oil palm plantations includes environmental sanitation and the use of antagonistic agents such as Trichoderma fungi or endomikoriza and also synthetic chemical control with active fungicidal ingredients. However, the results of the control are still considered ineffective. Therefore, early detection of Ganoderma disease in plantations field is becoming more and more important. Early detection is a very important step in determining the containment method of the spreading Ganoderma disease. Molecular technology has been widely used in various industries both at the research level and its application in the field. Currently, molecular detection using Polymerase Chain Reaction (PCR) techniques has been developed to obtain more accurate results compare to the conventional methods ie visual method or other symptomp detection. It is aimed that early detection of Ganoderma and other antagonistic agents can help the containment method in oil palm plantations. However, the use of PCR instruments has been known for its complexity due to the difficulty of operating / requiring laboratory personnel with a certain skill, the high investment and cost of these instruments and the limited chemical reagents that require a certain storage temperature. In this proposal, we propose the development of PCR extraction device in the which has been widely used in the medical field. The device consist of preparation kit, extraction kit and ultimately the thermocycler kit that enable us to detect ganoderma in practical use. Therefore, detecting Ganoderma will be easier to implement in the field thus increases the productivity of oil palm plantations in a sustainable manner.

Keywords: ganoderma early detection, molecular detection kit, portable preparation and extraction kit, sustainable oil palm plantation.