

ONLINE PRESENTATION CATEGORY



Dhiaela Kuruvilla

Research Title

Sonochemical Coating of Medical Wound Bandages with Antibacterial Nanoparticles

Hospital acquired infections have become a commonplace problem within the medical and healthcare industry, consequently causing substantial harm to inflicted patients. The infections also have the potential to be transmitted to healthcare practitioners and the general public. One of the origins from these hospital acquire infections most commonly stem from improper care around an open wound or surgical site of patients. In order to control and minimise the rate of infectivity, a number of studies have been carried out regarding the potential use of an To date, different antibacterial agents can be used to coat the bandages, however the study of nanoparticles is a very promising field strategy as the physicochemical properties of nanoparticles can be tuned to strongly inhibit bacterial growth. This study was aimed to investigate the prospects of utilising sonochemical coating of medical wound bandages with antibacterial nanoparticles. The

use of ultrasonic waves also allows for the antibacterial nanoparticles to be synthesised in situ, reducing the number of processing steps and increasing cost effectiveness and productivity. In this study, different mechanisms associated with sonochemical deposition functions are examined during the synthesis process to determine which method of sonochemical coating can achieve the highest rate of deposition with the least amount of resources used. Additionally, the correlation between the synthesis functions to the antibacterial properties of nanoparticles is optimised to obtain the most effective sonochemical coating of medical wound bandages. It is anticipated the application of the plate an roller sonochemical method of coating with zinc oxide antibacterial nanoparticles could produce a medical wound bandage that is effective at inhibiting bacterial growth and can be widely applied within the healthcare industry worldwide.

Climate change is an alarming issue mainly caused by fossil-fuel emissions. A total of 197 countries have ratified the 2015 Paris Agreement in response to climate emergency. Over the next decade, Malaysia has pledged a 23% share of renewables in its primary energy supply and a 45% reduction in greenhouse gas emissions intensity based on 2005 levels. Malaysia is the second largest global producer of palm oil, and the industry produces large amounts of first- and second-generation feedstocks which can be used for the production of renewable energy. In this work, we evaluated the availability and overall potential of palm bioenergy in addressing Malaysia's climate-related targets. Our findings reveal that palm bioenergy has a total energy potential of 63 million tonnes-of-oil-equivalent, which could theoretically make up 64% of Malaysia's primary energy supply. We also developed a model energy mix which maximizes

the use of second-generation palm feedstocks (i.e., trunks, fronds, empty fruit bunches, mesocarp fibers, kernel shells and kernel cake) to produce palm biofuels. These collectively comprise of biodiesel, biogas, combined heat and power, and pyrolysis products, which are used to displace non-renewables in the existing mix. Through the model mix, 29 million tonnes-of-oil-equivalent of the total potential could be realistically unlocked, which could propel Malaysia towards a 35% share of renewables and 54% reduction in greenhouse gas emissions intensity. In going forward, technological advancements, feedstock tracking, green financing, tax benefits and policy changes are urgently needed to realize this aspiration.



Wail Gourich

Research Title

Malaysia's Commitment to the Paris Agreement on Climate Change: Is Palm Bioenergy a Feasible Solution?

Palm bunch ash (PBA) has long been known as an effective organic fertiliser for soil acidity amendment and plant nutrient supplements. Glutathione (GSH), a bioactive tripeptide, is a well-known powerful antioxidant that has been proposed as a potential regulator that modulates plant growth and development. To assess the potential individual and the combinatory effects of PBA and GSH on vegetative plant growth performance, an outdoor well-watered okra plantation model of experimentation was utilised for examination. Different growth parameters such as plant height, stem girth, number of leaves and leaf surface area were evaluated for two months. The results showed that the application of PBA and GSH had significantly influenced plant growth parameters. The GSH-treated group recorded the tallest plant height (47.19 cm) compared to the control group, PBA-treated group, and combination group of PBA and GSH. Whereas the

combination group of PBA and GSH gave rise to the best improvement in terms of stem girth (4.45 mm), number of leaves per plant (6.35), leaf surface area (118.38 cm²) and have greater resistance to diseases. These observations implied that the combinatory application of PBA and GSH led to a synergistic effect on okra plant growth quality. Our findings suggest that the combination of PBA and GSH application is recommended to improve okra plant growth and development.



Yi Sze Koh

Research Title

Assessing the Effects of Palm Bunch Ash and Glutathione on Plant Growth

PAPER WRITING CATEGORY



Yi Sze Koh

Research Title

Assessing the Effects of Palm Bunch Ash and Glutathione on Plant Growth

Palm bunch ash (PBA) has long been known as an effective organic fertiliser for soil acidity amendment and plant nutrient supplement. Glutathione (GSH) is a bioactive tripeptide the well-known powerful antioxidant has been proposed to as a potential regulator that modulate plant growth and development. To assess the potential individual and the combinatory effects of PBA and GSH on vegetative plant growth performance, an outdoor well-watered okra plantation model of experimentation was utilized for examination. Different growth parameters such as seedling emergence, plant height, stem girth, number of leaves and leaf surface area were evaluated for over a period of two months. The results showed that the application of PBA and GSH had significantly influenced plant growth parameters. The GSH-treated group recorded the tallest plant height (47.19 cm) as compared to the control

group, PBA-treated group, and combination group of PBA and GSH. Whereas the combination group of PBA and GSH gave rise to the best improvement in terms of stem girth (4.45 mm), number of leaves (6.35), leaf surface area (118.38 cm²) with greater resistance of plants to diseases. These observations implied that the combinatory of PBA and GSH might had leading to a synergistic effect on okra plant growth quality. Our findings suggest the combination of PBA and GSH application is indeed recommended for improvement of okra plant growth and development.

To date, the irregularity and the lack of power supply remains a global problem in the rural areas of the under-developed and developing countries. This paper proposes a new concept for the off-grid electrification of rural areas by using palm oil mills to co-produce biodiesel from sludge palm oil (SPO). We performed a case study based on a medium-sized palm oil mill in Central Kalimantan. Approximately 2.5 tonnes of biodiesel could be produced daily using a one-pot enzymatic batch process and this amount could potentially support around 670 households in the surrounding areas, translating to about 2,700 people. Subsequently, we performed life cycle assessment (LCA) and techno-economic assessment (TEA) to study the feasibility of the concept for rural electrification using the enzymatic biodiesel as opposed to commercial diesel. Compared to the commercial B20 diesel, the electrification route using enzymatic biodiesel co-produced by palm oil mill offers significantly improved climate benefits and resource conservation with notably lesser impacts on human

health. A discount rate of 10% was applied to incentivize the local community to use the biodiesel. From our analysis, the rural electrification concept was found to be commercially viable with a return of investment of 29% and a breakeven period less than 4 years of operation. Barring the short-term impacts of COVID-19 pandemic and the price fluctuations of diesel and crude palm oil, the long-term commercial prospect of this rural electrification concept is attractive. In conclusion, the co-production of biodiesel in palm oil mills is a feasible concept to produce renewable and environmentally friendly fuel that could financially benefit both the rural community and the mill operators. This electrification concept, when taken in a broader context, could improve renewable energy access in the rural areas of many palm-oil producing countries, and help preserve the environment.



Ng Wei Zhe

Research Title

Assessment on the Enzymatic Biodiesel Co-production in Palm Oil Mills as Renewable Fuel for Rural Electrification