Issue 1, 2022

NEWSLETTER

Malaysian Society of Soil Science (MSSS)

51st MSSS Annual General Meeting and Pre-AGM Dialogue

The 51st MSSS annual general meeting (AGM) was successfully conducted on June 8th, 2022, at Bangi Resort Hotel, Bangi, Selangor. The event was attended by as many as 50 committed MSSS members from various backgrounds. The AGM took place right after a pre-AGM dialogue organized by the society. As usual, the topics covered during the AGM were annual report which covered all activities organized by the society; financial reports, membership fees and proposed future activities. Numerous thoughtful suggestions were received from our beloved members during the discussion of our journal edition. The election of a new MSSS management committee for 2022–2023 is the most awaited event on this AGM's agenda. You may check out the list of the newly elected committee on our official website. We look forward to the new committee to help MSSS become more well-known and attract more members, funds, and ideas. We look forward to a big and active engagement from MSSS members and working together, and we will encourage soils' responsible use.

Photos during MSSS 51st AGM. More photos inside

During the 51st annual general meeting of the Malaysian Society of Soil Science, a pre-AGM dialogue was conducted prior to the meeting. The dialogue was moderated by Dr. Wan Noordin Wan Daud, and four distinguished panels were selected to discuss about "Sustainable land use management towards achieving national food security". The dialogue was joined by members and interested individuals via online platform and face-to-face interaction at the hotel. Each panels were invited to discuss about what caused the land resources to degrade and what measures were deemed suitable to practice sustainability in land use management.

Photos during a token of appreciation giveaway and lunchtime

Photos during dialogue sessions where participants actively listen and discuss with the panels, including social gatherings among participants and panels. The registration of participants at the registration counter

By: Intan Nadhirah Masri, MARDI

Soil Familiarisation Tour 2022: Calcareous and Inland Soil

A very successful soil tour was organised by MSSS and the Department of Agriculture (DOA Putrajaya, Kelantan and Pahang) on the 24th and 25th of May 2022 at Gua Musang, Kelantan. The tour was attended by participants from Sime Darby, AAR, United Plantation, FRIM, MARDI, RISDA, KOSMA, UM and UiTM.

Participants were gathered in KESEDAR Inn and were brought to examined six pedons in total over the two-days course. Detailed descriptions of pedons were given by the instructors and participants were invited to join them in examining the characteristics of pedons.

Participants identified the soil horizons and soil colour by referring to the Munsell Soil Colour Chart

Participants were invited to describe the pedons. Also a group photo. One for memory

By: Mohamad Nasrol Rabidi, MARDI

Community Outreach Program

"Kg. Kuantan - Transformasi Pengurusan Sisa Sungai untuk Kelestarian Alam Sekitar"

The Malaysian Society of Soil Science, supported by the Kuala Selangor Municipal Council (MPKS), Selangor Water Authority Board (LUAS) and ISNPIRASI KAWA, held a community outreach program with the community of Kg. Kuantan at the Fireflies Sanctuary on the 27th March 2022.

About thirty participants from Kg. Kuntan attended the program and were taught to turn their waste into a biochar product by adopting a controlled-burning method.

The outreach program was also covered by our local newspaper, the New Straits Times. Way to go MSSS!!!

An informative presentation on waste management at Kampung Kuantan including a demonstration on biochar by Universiti Malaya

By: Intan Nadhirah Masri, MARDI

Meeting with Soil Resource Development Institute (SDRI), Bangladesh

A short meeting between MSSS committee members and Soil Resource Development Institute (SDRI) delegates from Bangladesh was held on 21st of April 2022 at the German Malaysian Institute in Kajang. The meeting was requested by the SDRI delegates to discuss on topics related to prevention and control methods for soil degradation, development of sustainable soil management practices and latest fertilizing techniques.

Meeting chaired by our president, Dr. Rosazlin Abdullah and discussion among delegates from Bangladesh

By: Intan Nadhirah Masri, MARDI

Community Outreach Program

"Program Penanaman Pokok Pesisir Pantai Untuk Kelestarian Rendah Karbon dan Pembangunan Mampan"

A total of 1,000 mangrove trees were planted at the mouth of Sungai Sepang Besar during the Coastal Tree Planting Program for Low Carbon Sustainability and Sustainable Development, which was held on the 27th February 2022. MSSS, through Balai Ikhtisas Malaysia (BIM) were invited to join the activity organised by the Sepang Municipal Council (MPSepang), Forestry Institute of Malaysia (IRIM), Balai Khtisas Malaysia and Selangor State Forestry Department.

Mangrove trees planted among MSSS and BIM members and group photos during the events

By: Intan Nadhirah Masri, MARDI

Soil and Food Security

"An Interview with Radio Bernama"

Bernama Radio, through their "KARTINI Bicara Wanita" section has invited our Madam President Dr. Rosazlin Abdullah for an on-air radio interview to talk about "Sains Tanah dan Sekuriti Makanan". The live radio show was broadcasted on the 30th June 2022 where our Madam President define food security as "equal access to food" and further described the relationship of physical, chemical and biological characteristics with the food security.

Congratulation Dr. Rosazlin on highlighting the MSSS and good job on promoting food security.

Poster of KARTINI program section on Bernama Radio

By: Intan Nadhirah Masri, MARDI

Sustainable Development Goals: How can Organic Farming Contribute

The Sustainable Development Goals (SDG) consist of 17 interlinked global goals created to achieve a better and more sustainable future for all. One hundred fifty countries adopt the SDG as a transformation agenda for sustainability. With only nine years left to achieve this goal, organic farming significantly impacts SDG completion. Organic farming contribution may falls under SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG6 (Clean water and sanitation), SDG8 (Decent work and economic growth), SDG12 (Responsible consumption and production), SDG13 (Climate action), SDG14 (Life below water) and SDG15 (Life on land).

Organic farming could reduce crop yield loss and enhance healthy soils, contributing to SDG2 (Zero hunger) and SDG15 (Life on land). The minimal or non-presence of inorganic fertilizer increases the soil biodiversity, such as a microorganism which positively influences soil health. High soil biodiversity benefited the soil by decreasing soil-borne diseases and heavy metals. It also increases plant fitness against disease and climate and improves soil enzymes for soil function. These would enhance the quality and yield of the crop. Crop integration in organic farming improves the soil properties and beneficially contributes to the growers' income. Integrating crops and livestock also maximizes farmers' income through efficient and sustainable resource use. Bioresource generated from the conversion of agricultural waste such as compost and organic fertilizer can be used back in the soil, contributing to SDG12 (Responsible consumption and production) and SDG8 (Decent work and economic growth).

The Sustainable Development Goals or Global Goals are a collection of 17 interlinked global goals

Sustainable Development Goals are addressing climate change in SDG13 (Climate action) and organic farming influences the mitigation of climate change by reducing the release of greenhouse gases. In addition, by not using inorganic fertilizer, organic farming offers a solution to climate change. The emission of anthropogenic nitrous oxide due to agricultural activity was partly contributed by nitrogenous fertilizer. Thus, the emission of greenhouse gases could lessen with this approach. Furthermore, organic food has been linked to a healthy lifestyle associated with SDG3 (Good health and well-being).

Sustainable Development Goals also focused on water sustainability. Organic farming enhanced water sustainability through SDG14 (Life below water) and SDG6 (Clean water and sanitation). The risk of ground and surface water pollution could be minimized when organic farming is applied due to the prohibition of synthetic chemicals such as pesticides. Exorbitant inorganic fertilizer and pesticides not only remain in the soil but also in the groundwater, causing algae bloom and consequently eutrophication. Organic farming encourages healthy soil, providing good water holding capacity and reducing water loss from heavy rain. This assists in the conservation of freshwater. Sustainable Development Goals are set to achieve in 2030, and with the time left, organic farming could be one of the many ways to achieve the SDG.

Effect of global warming on the world and what we can do to slow down the impact (Source: Google)

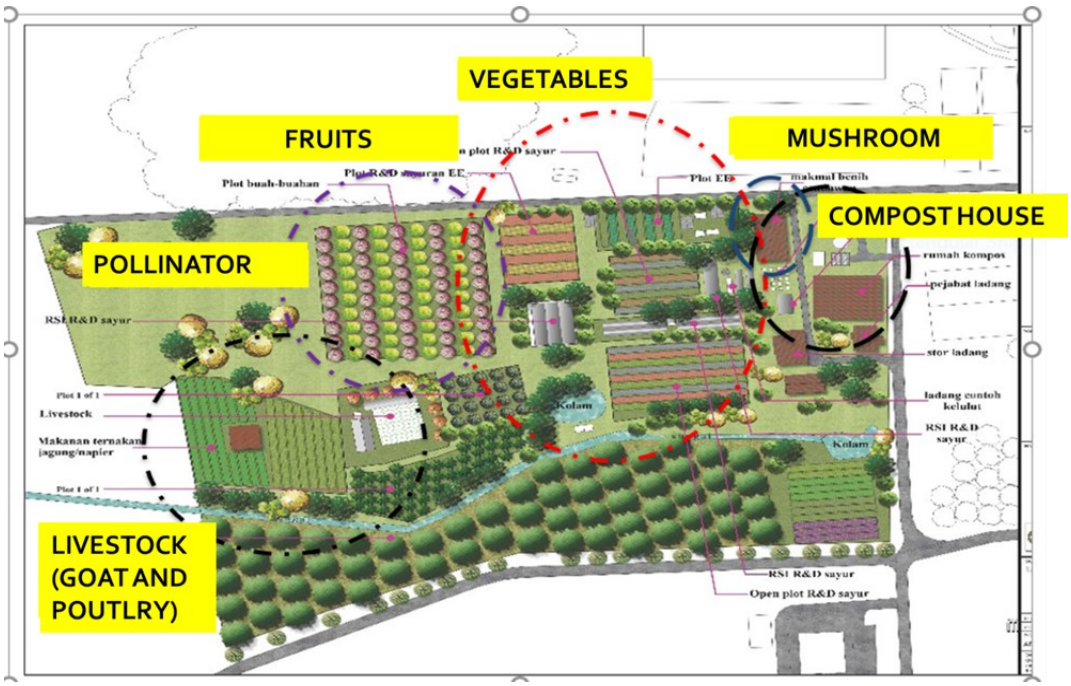
By: Dr. Nor Ayshah Alia Ali Hassan, MARDI

Integrated Organic Farming for Sustainable Organic Agriculture Production:

MARDI's Role through Research and Development

Organic agriculture is a holistic food production system which improves the health and sustainability of the agricultural ecosystem. Organic farming supplies chemically free and nutritious foods that are very essential to human well-being and livelihood. Malaysia's organic food production value target is 200 million by 2025 to meet the high demand for organic food in the country and the export market. In Malaysia, organic farm certification is carried out by the Department of Agriculture Malaysia to ensure the guideline and proper procedure is followed by all farms producing organic produce. Among the issues of organic farming in Malaysia is the low productivity of organic crops due to inefficient farm management, which leads to an insufficient supply of local produce and an increase in imports.

In addition, the cost of producing organic farms is also high due to the high labour usage and imported organic inputs. MARDI plays a vital role in providing technical support to organic farmers in overcoming farm issues and serving as a reference point for organic farming. An integrated organic farm model at 5.5ha is located in Head Quarters of Malaysian Agriculture Research and Development Institute, Serdang. This farm is developed by integrating crop, livestock and agroecological components. It aimed to support target groups by providing complete hands-on knowledge and training to achieve sustainable management of the organic farming system. The model farm consists of rain shelters, insect proof structure, compost house, stingless bee house and chicken and goat barns which has received myOrganic certification since 2015.



Layout of integrated organic farm, MARDI Serdang

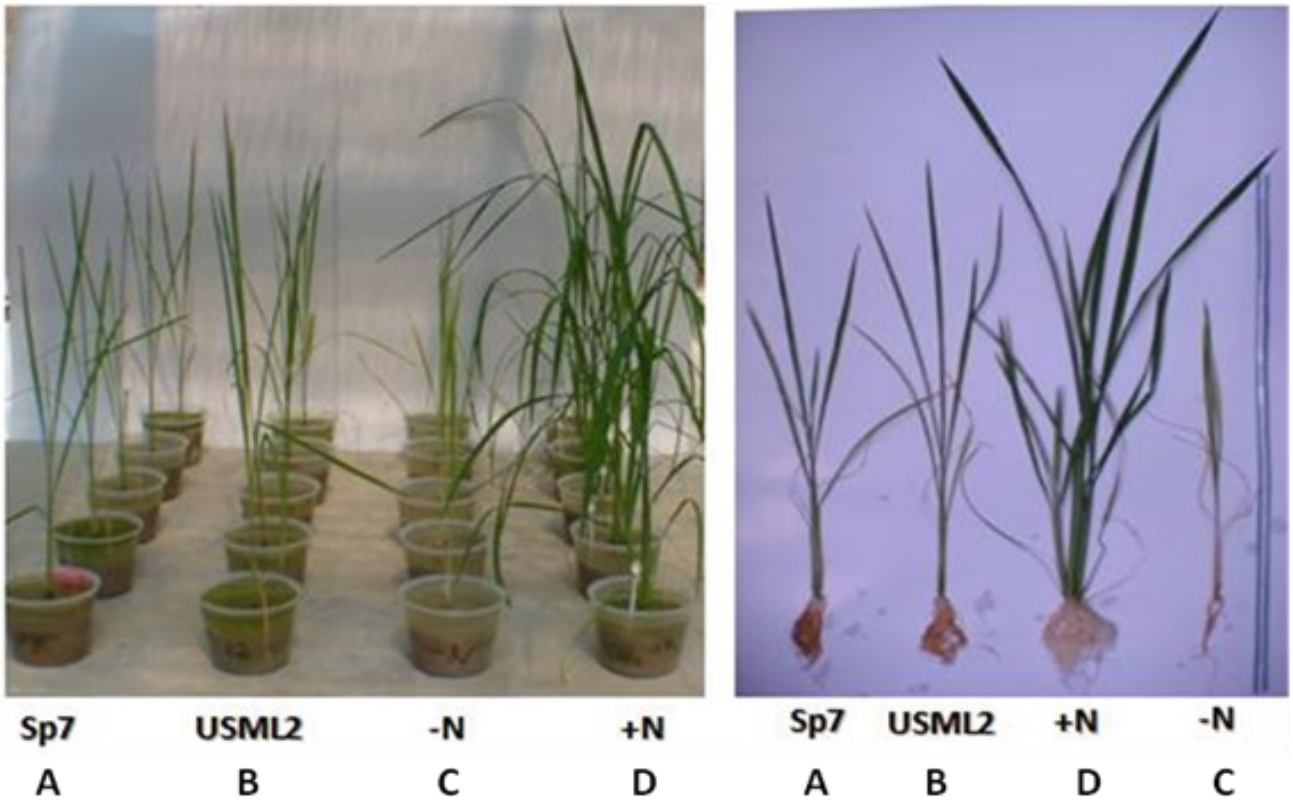
The model farm provides sub-plots for training and referral point service for entrepreneurs with livestock-vegetable/ fruits integration system, zero waste management and complete organic crop management. Circular agriculture techniques and a self-sustainable farming system were being main research components in this farm and demonstrated to farmers and visitors. The compost facility is used for zero waste management via composting agricultural wastes, including green wastes from the MARDI campus. Organic liquid fertiliser and vermicompost are produced at the facility using various biomasses collected on the farm and from surrounding areas. Sustainable crop agronomy management through an integrated nutrient management package based on indigenous soil fertility, critical crop nutrient requirements and a variety of organic fertiliser for cultivating fruits and vegetables are practised. Crop pest and disease management are carried out using bio-pesticide, botanical spray and ecological engineering techniques. Currently, this farm has engaged a few organic growers for an on-farm training and given them the opportunity for short-term attachment to acquire complete learning on the system. MARDI Integrated Organic Farm welcomes local and international visitors to provide opportunities to observe demonstrations on organic fertiliser production, composting process and organic crop management.

Briefing on integrated organic farming and overview of a farm located in MARDI Serdang

By: Theeba Manickam, MARDI

Escherichia coli, The Beneficial Plant Growth Promoting Endophyte

Escherichia coli has been recognised as a member of the natural soil biota. However, recently, it has been discovered in the tissues of vegetables and crops. This includes *E. coli* USML2, which was locally isolated from inner leaf tissues of a surface-sterilised healthy oil palm (*Elaeis guineensis* Jacq.). *E. coli* with the ability to live and persist inside the plant or in planta are known as endophytes. They usually possess close symbiotic relationships with their host plants. Inoculation of *E.coli* USML2 in the rhizosphere of rice seedlings also exhibited its ability to colonise the root surface and interior tissues of root, stem, and leave. Strategies for the in planta ascending migration are initial root adherence, invasion, colonisation, and establishment. *E. coli* internalisation and colonisation of the host plant demonstrated the adaptability of this bacterial species to survive in a condition different from its conventional ecological niche or habitat. Its persistence in planta is likely due to its hardiness, metabolic flexibility, and breadth of substrate utilisation. *E. coli* USML2 in planta also enhanced plant growth promotion comparable to a well-known plant growth enhancer, *Azospirillum brasilense* Sp7.

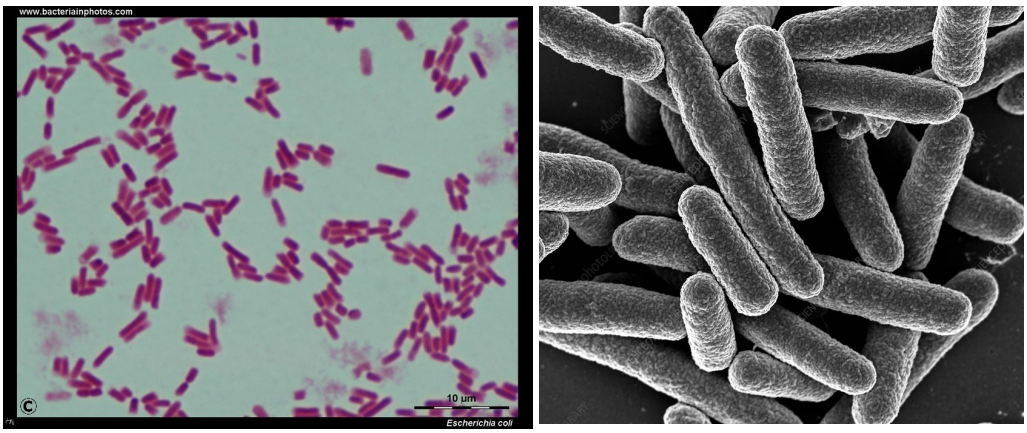


Rice seedlings inoculated with E. coli USML2 exhibited significant plant growth promotion 42 days after transplantation (DAT) under plant house condition; A) + A. brasilense Sp7, B) + E. coli USML2, C) – N and D) + N

In understanding factors that permit its survivability in planta and how it benefits the host plant, study on the genomic information of *E. coli* USML2 using robust bioinformatics tools is crucial to shed some valuable insights into its endophytic lifestyle in the host plant. The bioinformatics tool used to annotate the *E. coli* USML2 genome was a web-based automated annotation pipeline for bacterial and archaeal genomes: Rapid Annotation using Subsystem Technology tool kit (RASTtk) version 2.0. The RAST web server predicted 486 subsystems. Among these subsystems, carbohydrate (18.9%), amino acids and derivatives (12.5%), and protein metabolism (9.5%) are the most abundant.

These subsystems are essential for the survival and adaptation of *E. coli* USML2, which also signifies its symbiotic lifestyle. Annotation of *E. coli* USML2 genome sequence revealed the presence of genes involved in the movement towards the root (flagella, chemotaxis), root adhesion (pili, quorum sensing, EPS), invasion (cellulose and pectin degradation enzymes), and plant growth promotion (nitrogen, phosphorus, potassium, IAA, ACC, acetoin, siderophore, trehalose, sulphur, magnesium transporter, chorismate, choline, taurine, riboflavin, pyridoxine, phenylpropanoids, membrane transporters). The presence of these genes highlighted the potential of *E. coli* USML2 as a plant growth-promoting endophyte. Besides that, the genomic island also predicted several genes required for symbiosis, adaptation, in planta ascending migration, and plant growth promotion. No pathogen-associated gene was predicted.

Additionally, the comparative analysis also elucidated *E. coli* USML2 as a non-pathogenic strain as it is most closely related to *E. coli* K-12 sbstr. MG1655 which is a non-pathogenic *E. coli* strain. Genes required for root adhesion (uncharacterised protein YdeU and outer membrane autotransporter barrel-domain containing protein) were also revealed as unique genes in *E. coli* USML2. The Discovery of numerous genes involved in invasion, colonisation, and plant growth promotion in this study nominates *E. coli* USML2 as a beneficial plant growth promoting endophyte.



Escherichia coli observed under a microscope and scanning electron microscope (SEM) (Source: Google)

By: Dr. Munirah Tharek, MARDI; Dr. Mohd Nazalan Mohd Najimudin, USM; Dr. Amir Hamzah Ahmad Ghazali, USM

Supplementing the Soil with Organic Foliar Fertiliser

Foliar application of plant nutrients provides rapid response micronutrient (Fe, Zn, Cu and B) uptake in crops. In organic crop production, the foliar nutrient application is even more critical since most organic fertiliser sources generally contain lower nutrient content, especially the macronutrients nitrogen, fewer or incomplete micronutrients, and organic acids. In Malaysia, chicken manure and compost are widely used as organic fertilisers to supply the macronutrients N, P and K, containing lesser than 2%. The nutrient rates are insufficient for crop production, especially the high nutrient demanding crops such as cucumber, tomato, pepper, cabbage and cauliflower. To supply the required nutrients for optimal growth, farmers need to apply more than 10 Mt/ha of these organic Most of the local organic farmers who operate myOrganic certified farmers in Malaysia found to apply solid organic fertilisers by mixing with soil. As a result, the farmers could not achieve and sustain high yields for fruit and vegetables. Organic foliar fertilisers derived from bio-ferments such as fish amino acids and fermented plant extracts contain macro and micronutrients, amino acids, plant enzymes and organic acids required to enhance the yield and crop quality. There is good potential for using plant- and fish-based fermented products as foliar fertiliser in organic farming that could serve as one of the best management practices in providing the required nutrients to improve the yield and quality of the organic produce.

In MARDI, we have formulated organic foliar fertiliser and are being tested on organic vegetable production. The fertiliser formulation uses a bio ferment process of organic substrates such as fish, vegetable and fruit waste. The formulation was enriched with phosphate and potassium using natural minerals allowed by myOrganic scheme and guidelines. Applying these bio- ferments as foliar fertiliser ensures the plant's faster absorption of macro and micronutrients through the leaf surface. Research findings on organic cabbage and tomato production showed an increment in crop seedling growth, yield and photosynthesis rates under organic foliar fertiliser application treatments. The SPAD reading of cabbage seedlings at 30 DAS with organic foliar fertiliser application indicated more leaf chlorophyll content than the control without foliar application.

In Malaysia, applying bio- ferments as organic foliar fertiliser has high potential looking at the availability of resources from farms and wet market waste (vegetables, fruit waste and fish) with easy and low cost of processing. Moreover, using plant and fish-based fermented products as a nutrient supplement in organic farming could serve as one of the best management practices in providing the required nutrients to improve the yield and quality of organic produce.

Organic foliar fertiliser sprayed on tomato plant

By: Theeba Manickam, MARDI

Effects of Green Manures on Soil Microbial Communities

Fertilizers can directly stimulate the growth of microbial populations by supplying nutrients and may affect the composition of individual microbial communities in the soil. Applying chemical fertilizer generally improves crop production; however, concerns have been raised not only about the severe environmental problems posed by such practices but also about the long-term sustainability of such systems (Mader et al., 2002). On the other hand, using organic materials (e.g., animal manures, crop residues, green manures, etc.) as an alternative source is promising.

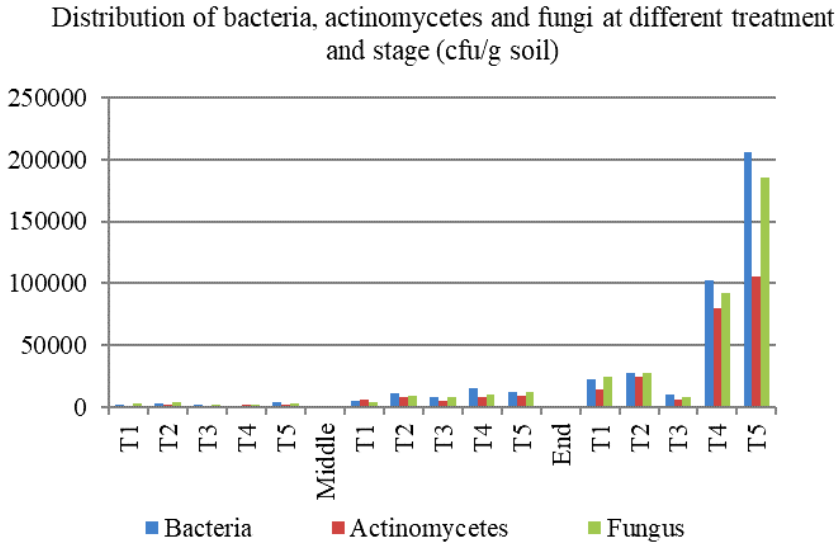
Example of legume plants promote soil microbial communities

According to Manici et al. (2004), green manuring enriches the soil by turning under fresh plant material either in situ or ex-situ, widely used in organic farming to maintain soil organic matter. It is mainly used as a soil amendment and nutrient source for subsequent crops. It can greatly increase soil organic matter, pest control, and crop productivity (Cherr et al., 2006). It could also increase soil organic matter, especially available nitrogen, and improve crops. The use of green manure could reduce soil exposure to the erosive processes, promote great nutrient cycling and improve the synchrony of nutrient release with crop demand (Cobo et al., 2002). Green manure legumes may improve microbial biomass and soil organic fertility. As N2 fixers, legumes are believed to increase soil fertility (Shah et al., 2003) and enhance soil quality when used green (Biederbeck et al., 2005).

Microbial diversity in soils is essential for maintaining the sustainability of agricultural production systems. It is widely believed that the return of legumes or other green manure improves soil fertility; however, it is not easy to measure improvement in soil fertility in the short term. Soil microorganisms play a crucial role in soil fertility because of their ability to carry out biochemical transformation and their importance as a source and sink of mineral nutrients (Nakhro and Dkhar, 2010). Soil microbes, the living part of soil organic matter, function as a transient nutrient sink and are responsible for releasing nutrients from organic matter for use by plants (e.g., N, P and S). Therefore, soil microbe, a small but labile component of soil, can be used as an early indicator of changes occurring in soil, responds quickly to changes in soil management, and is used as an indicator of soil quality (Biederbeck et al., 2005).

Example of legume plants

The experiment was conducted in the Integrated Organic Farm, MARDI and have five treatments and four replications. Total of 20 beds measuring 2 meter x 3 meter size for each treatment and replicate. The treatments were applied as follows: T1: Control; T2: Arachis pintoi (planted as a cover crop); T3: Medicago sativa (cultivated as a cover crop); T4: Gliricidia sepium (leaf as mulch); T5: Moringa oleifera (leaf as mulch). Soil analysis for microbial analysis was conducted at the beginning, middle and end of the experiment.



Bacteria dominated the microbial population, followed by fungus and actinomycetes

Table 1 showed that at the end of the experiment, soil amended with gliricidia and moringa had the highest microbial population compared to soil treated with medicago, arachis and control. In addition, the microbial population increased from the beginning to the end of the experiment. Using gliricidia as green manure minimizes the usage of chemical fertilizers that are very expensive and environmentally unfriendly and act as a barrier and filter to the rainwater running down the slope's surface. It improves the mobilization of native soil nutrients due to production of carbon dioxide and organic acids during decomposition of the plant material, adding valuable nutrients such as N, P, K, Ca, and Mg to the soil. Undoubtedly, the increased nutrient is beneficial for plant growth and the activity of soil microorganisms. In the present study, higher colony forming unit (CFU) values for the three microbes, i.e. bacteria, fungi and actinomycetes, were found in soil amendment with green manures. Moreover, it increased from the beginning towards the end of the experiment (Figure 2). Meanwhile, the number of bacteria and fungi in the non-treated green manure soil was lower.

In conclusion, the application of green manure increased the soil microbe population in the soil. Therefore, adopting green manure which is environmentally friendly and a soil improver will be the best option for a sustainable agricultural system.

The colony forming unit (cfu/g) of microbial population in the soil before and after application of green manures

Treatment	Before	After
T1: Control	$7.4x\ 10^{3b}$	$6.3x10^{4b}$
T2: *Arachis pintoi*	$1.0x10^{4a}$	$8.0x10^{4b}$
T3: *Medicago sativa*	$5.6\ x\ 10^{3b}$	$2.5x10^{4b}$
T4: *Gliricidia sepium*	$6.4\ x10^{3b}$	$2.8x10^{5a}$
T5: *Moringa oleifera*	$1.8x\ 10^{4a}$	$4.9x10^{5a}$

**Means followed by different letter(s) within a column differ significantly ($p<0.05$)*

By: Nur Liyana Iskandar, MARDI

Food Waste Composting: The Way Forward to Soil Sustainability

Food waste is food suitable for safe consumption but disposed of due to spoilage. It consists of pre-cooked and leftover streaming from various channels during the food production phase in the industries, households and hospitality sectors. According to FAO, nearly 1.3 billion tonnes of food, including fresh vegetables, fruits, meat, bakery and dairy products, are lost along the food supply chain. In Malaysia alone, 38,000 tonnes of domestic waste produced daily is sent to landfills for disposal. Approximately 17,000 tonnes (45%) of the domestic waste consists of food waste.

However, according to the Solid Waste Management and Public Cleansing Corporation (SWCorp), 4,080 tonnes of the food waste is still edible and enough to feed some three million people three meals per day. Food waste mainly consists of carbohydrates, proteins, lipids and traces of inorganic compounds that vary according to the types of food waste and its constituents. Due to high organic content, food waste creates a variety of adverse effects on the environment. Food waste disposed to the land fill is estimated to increase the emission of greenhouse gasses. Therefore, the public needs to be educated that wasting food affects a country's economic growth and to reduce food waste to ease pollution and global warming effects.

Food waste is converted into compost and ready to be applied to the soil

As an alternative, food wastes can be composted, and compost produced can be used to improve soil quality through proper nutrient management for crop growth. Composting techniques that can be engaged for food waste include:

Compost pile

Compost piles methods consist of both static and/or aerated piles. It is a conventional way of decomposition of waste lasting from 6-8 weeks depending on the characteristic of wastes and compost formulation. Static compost piles are usually covered with canvas for a better spread of heat produced from compost making. Meanwhile, aerated compost piles are tumbled manually or using machinery for better aeration for microorganism activities. Compost pile techniques require a spacious area, laborious, release odour and consume high management costs.

Rotary composting

The rotary composting method consists of composting in a barrel rather than in an open environment. Therefore, it can be an on-farm solution to accelerate the degradation process. It uses electrical energy to rotate barrels containing the waste mixture using the correct C/N ratio and uses the concept of aerobic degradation to produce compost. This system is portable, can be used by small-scale farm operators, and can be owned at a low cost. Furthermore, this system can produce compost faster and more efficiently than conventional methods if the correct degradation recipe is used. The advantages of a rotary composting system include a) improvement in the process of rapid removal of pathogens and weeds, b) installation of features that can be manipulated to control compost components, c) continuous composting process can be done even during rain and flood, d) creation of a clean environment with simple and proper waste management, e) provision of simple and safe technology and cost-effective to be purchased by farm operators at all levels, f) prevention mice and other small stars from compost piles and g) minimum maintenance and manpower requirements.

Vermicomposting

Vermicomposting is a process of decomposition using specific worms to consume organic waste and convert it into organic matter (Figure 3). Species most often used for composting include: *Eisenia fetida*, the red wiggler, *Lumbricus rubellus*, *Eisenia hortensis*, the European nightcrawlers and *Eudrilus eugeniae*, the African nightcrawlers. Vermicompost products are richer in nitrogen (N), phosphorus (P) and potassium (K) than conventional compost and suitable for plant growth. However, the selection of the correct species of worm is essential for vermicomposting.

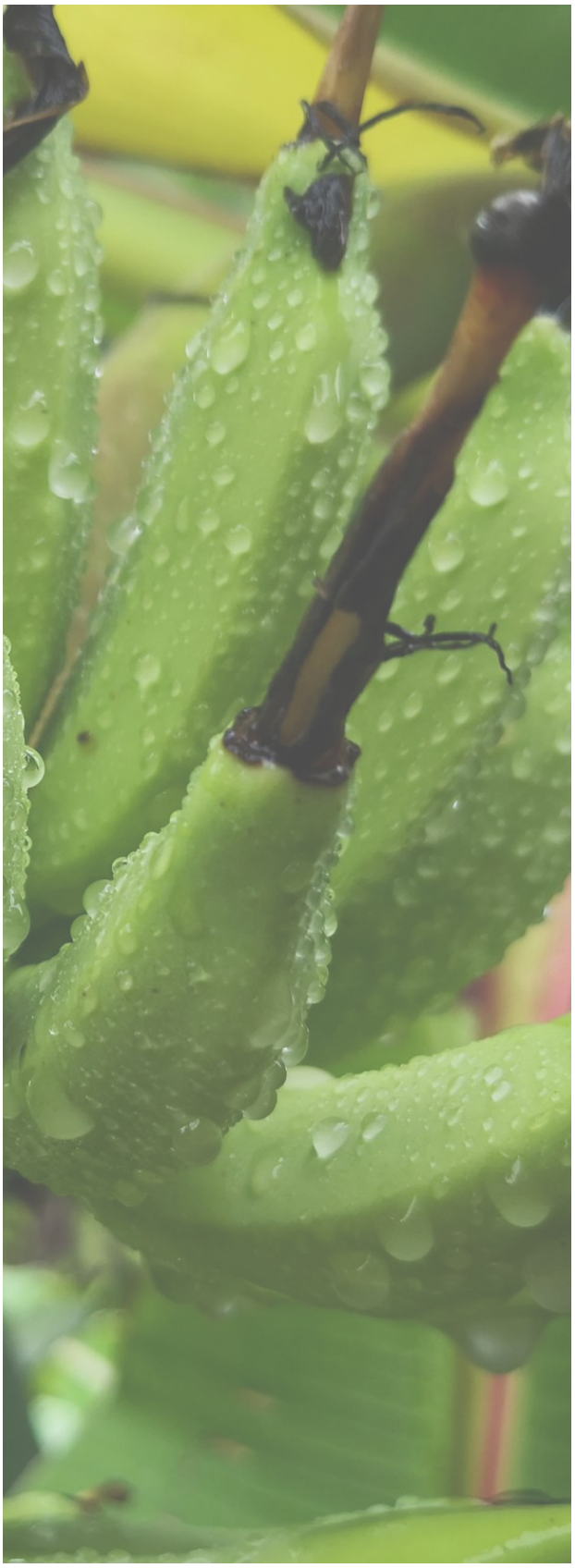
By: Dr. Sashikala Maruthai Pillai, MARDI

Field Trial on Micronutrients Spray on Banana Production

Exploration of micronutrient supplementation on mitigating biotic and abiotic stress was widely conducted in various crops. Most of the objectives are to suppress the diseases by blocking specific transmission paths. However, few of the micronutrients might have a superior effect on growth regulators, especially with a sufficient amount or concentration.

A field trial was conducted to find the effective concentration of selected micronutrients from zinc, boron, and silicon on Berangan and Tanduk varieties. The micronutrient concentration was developed based on recent findings by world producing countries such as India, China, Indonesia, etc. This trial focused on inducing growth of yield with superior characteristics of the bunch through spraying the flower bud.

The process started once the flower bud emerged on Berangan where close attention was given to record the last day of petals and remaining male flower drops. Then, the process started by spraying the whole flower bud and bagging it to reduce interference from environmental factors. The weekly observation was conducted to prevent the growth of mould and the possibility of missing the flower bud due to human and animal interference. However, the process was slightly different when involving Tanduk which the spray starts rightly after the flower bud emerges.



Banana variety of Berangan was sprayed with designated treatment

In recent findings, the optimum micronutrient concentration (<3%) successfully affects the hand and finger of a banana. Meanwhile, a higher concentration of silicon on Tanduk had a positive effect on the heavier finger of the banana but it swells and rupture. However, low pollinators, wild animals, and extreme weather conditions (heavy rainfall and wind) were major disturbances in this field trial. Since this study was in the middle of analysis, we are looking forward to share the optimum micronutrient concentration for the benefit of our agricultural industry. Besides, this research was made possible by the Fundamental Research Grant Scheme (FRGS/1/2019/WAB01/UPM/02/21).

Field study of banana located in UPMKB compromised of variety Berangan and Tanduk. The above picture on the right showed the effect of treatment on swelled and ruptured

By: Izzah Abd Hamid, UPMKB; Dr. Wan Asrina Wan Yahaya, UPMKB

UPCOMING EVENTS

YOU'RE INVITED!

ESAFS2022 will be organised on 22-26th August 2022 in Malaysia. Join us as participants (oral or poster presenter) and extend the research network among researchers inside or outside Malaysia!

PGPR2022 will be organised on 23-26th August 2022 in Malaysia. Join us as participants and gain knowledge in recent scientific discoveries from the development of beneficial microbes!

International Union of Soil Sciences (IUSS)

WHY JOIN THE IUSS?

The International Union of Soil Sciences (IUSS) is the global union of soil scientists. The objectives of the IUSS are to foster all branches of the soil sciences and their applications, and to give support to soil scientists in the pursuit of their activities. In addition, the IUSS aims to put soils and soil science on the global agenda. Annual subscriptions from National Soil Science Societies, either directly or indirectly via National Academies, are essential for maintaining a strong presence of the IUSS for effective promotion of soil science and its wide range of applications to fellow professionals, policy and decision makers, and the general public. This is critical to keep our discipline strong and viable and to enhance its visibility and impact in all parts of the world.

The IUSS is the umbrella organisation for six important regional societies, one in Asia (the "East and South East Asian Confederation of Soil Science Societies"), three in Africa (the "African Soil Science Society", the "East African Soil Science Society", and the "West and Central African Soil Science Society"), one in Latin America (the "Latin American Society of Soil Science Societies"), and one in Europe (the "European Confederation of Soil Science Societies"). All these regional organisations act under the umbrella of IUSS and have specific tasks for promoting soil science.

Source: https://www.iuss.org/about-the-iuss/why-join-the-iuss/

The IUSS song

It is our life! We call it soil

It is the stuff, in which we toil

From soil we've sprung, to soil we'll go

Protect the soil of this earth so we can grow

MSSS Membership

Membership is open to all professionals and graduate students, within and outside Malaysia. The membership fee is either:

(1) **RM50.00** per year for ordinary membership, or

(2) **RM400.00** for life membership (one time payment for life)

Please download (http://www.msss.com.my/Application.pdf) and complete the form and mail to us at:

Honorary Secretary,
Malaysian Society of Soil Science,
Department of Land Management,

Faculty of Agriculture,
43400 UPM Serdang, Selangor, Malaysia

All payment should be made payable to:

THE MALAYSIAN SOCIETY OF SOIL SCIENCE
(CIMB Bank Berhad)
A/C No.: 8602990800

**Please contact us to confirm or email your receipt/ bank-in slip for further action.*

Member ID	Name
1106	Darshini A/P Rawichandran
1107	Khairil Bin Mahmud (Dr.)
1108	Aaronn Avit Ajeng
1109	Grace Flavyeliz Sinong
1110	Wan Abd. Halim bin Wan Ilias
1111	Tengku Nur Ayuni Tuan Sabri
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