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Research

UMPSA students develop Cropfit Compost Maker to help mushroom farmers manage waste sustainably

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PEKAN, 11 August 2025 – The issue of the accumulation of old block waste in small oyster mushroom farms in Malaysia is becoming increasingly concerning, as most of this waste is either burned or left in open areas, which not only causes environmental pollution but also attracts pests that can disrupt farm operations.

Seeing this situation, a research led by a final-year student of the Faculty of Electrical and Electronics Engineering Technology (FTKEE), Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), together with group members, Muhammad Nabil Najmi Alli, Muhammad Che Abdullah, Veneffa Michelle Anak Edward, Sri Prashad Palani, and Deniis Chelliah, produced the Cropfit Compost Maker, the latest and best version initiated in Semester I 2024/2025 under the Integrated Design Project (BEL3724) course.

According to Sudhish Rao, the potential of this waste material to be turned into a useful resource caught their attention after the owner of Ada Fresh Farm in Batu Pahat, Johor, Rasyada A Rahman@Rahim, who is also a Biotechnology graduate, developed fertiliser and bokashi formulations from oyster mushroom waste.

“The farm owner also sent samples to the FTKEE laboratory to be studied and validated by final-year students.

“The idea of developing the Cropfit Compost Maker emerged after an interview session with the owner of Ada Fresh Farm.

“She shared the challenges of producing compost manually, as the process required high labour and could not be monitored accurately in terms of nutrient content,” he explained.

He added that to overcome the problem, his team developed a semi-automated system that combines the functions of an automatic crusher and real-time monitoring.

“This system is equipped with NPK, temperature, humidity, and EC sensors, an LCD, and integration of notifications via the Telegram app to ensure consistent compost quality control.

“It will operate in two phases: in the first phase, farmers set the time and motor speed for the mushroom block compost crushing process, and then, sensors are manually inserted to monitor nutrient content in real time.

“The readings are displayed on the LCD and sent to Telegram, making it easier to monitor compost quality,” he said.

This research was also supported under the guidance of FTKEE Lecturer, Dr. Nur Huda Ramlan, and Rasyada A Rahman@Rahim.

So far, they have successfully produced a fully functional prototype after going through the design, development, and field-testing phases.

Sudhish Rao added that the main objectives of the research are to reduce environmental pollution,

lessen farmers' manual workload, speed up the compost fertiliser preparation process, and improve the accuracy of nutrient monitoring to support sustainable agriculture.

"The production cost of one unit is estimated at around RM1,000, and the proposed selling price is RM1,600 per unit.

"We plan to add full automatic control functions for monitoring and mixing processes, as well as integrate AI-based data analysis to predict compost fertiliser maturity periods.

"We hope to expand the use of this system to more farmers in Malaysia and explore funding opportunities for large-scale production," he said.

The success of this research was proven when the Cropfit Compost Maker won first place in the UMPSA Inovatech Challenge 2025.

Since 2022, the collaboration between UMPSA and Ada Fresh Farm has produced various innovations in mushroom block waste management, including Myorganic Certification from the Department of Agriculture Malaysia, a gold medal at the Johor State Department of Agriculture Innovation Day 2023 for the 'Green Technology Mushroom House'.

In addition, a gold medal at the Creation, Innovation, Technology and Research Exposition (CITREX) 2023 for producing 'Bokashi from Mushroom Block Waste and Producing Organic Compost Fertiliser from Mushroom Block Waste', a silver medal at CITREX 2023 for the 'Mushroom Block Waste Crusher Machine', a gold medal at CITREX 2024 for the 'Smart Mushroom Compost Bin Monitoring', and a silver medal at the Johor State Department of Agriculture Innovation Day 2025 for the 'Organic Compost Catalyst'.

Most recently, the team was also one of the three groups representing UMPSA at the Innovathon Season 3 auditions, an initiative under the Ministry of Economy and the Ministry of Science, Technology and Innovation (MOSTI) in collaboration with ASTRO, held on 4 and 5 August 2025 at Universiti Malaya (UM), Kuala Lumpur.

By: Nur Hartini Mohd Hatta, Centre for Corporate Communications

Translation by: Dr Rozaimi Abu Samah, UMPSA Press