#thaiRAIN “In Conversation” Series

Dr. Wichien Yongmanitchai

The Man Behind Microbial Solutions

Walking to Kasetsart University’s Microbiology Department felt like entering a science fiction film. Students in white lab coats examined materials under their microscopes, switching between Petri dishes and test tubes as if they were making a magical potion.

This field of science is increasingly recognized as promising in addressing the impacts of climate change. On November 11, 2024, the journal "Nature Microbiology" issued an article asking scientists and policymakers to scale up microbial solutions for a wide range of mitigation and adaptation measures.

These technologies can improve the capacity of soil and oceans to sequester carbon, mitigate the effects of methane and nitrogen emissions, produce biofuel, and break down hazardous compounds in the environment.

Most Friday afternoons, Ph.D. students can meet with Dr. Wichien Yongmanitchai, a leading microbiologist in Thailand. With a background in soil science, nutrition, and technology management, Dr. Wichien’s research on microorganisms has resulted in over 50 products for farming, livestock, and wastewater treatment.

He worked closely with #thaiRAIN to prove that microbial solutions can be a cost-effective and easy alternative to burning among Thai farmers as Research and Development Manager at Siam Agri Supply Co. Ltd.

We talked with him about the benefits of microbial solutions in tackling challenges and R&D in Thailand’s agrifood system.

#thaiRAIN: *I'm curious to hear your insights on the state of agriculture R&D in Thailand.*

Yongmanitchai: We must understand that investing efforts to create state-of-the-art research published in international journals is often disconnected from practical applications in Thailand. Thai farmers need practical and immediate solutions that can increase their income.

That fits the “appropriate technology” concept, which is the solution for specific local farmers’ needs. The right R&D for Thailand should combine existing technologies to create applicable solutions for the farmers who need it most. Simplicity is key as it results in affordable prices for farmers.

#thaiRAIN: Is Soil Digest microbial powder your proudest product?

My original product for SAS (Siam Agri Supply Co.) aimed to be animal feed. I intended to develop microbial products that can stimulate animal growth and serve as probiotics for livestock. We developed microbial products suitable for environmental applications, such as wastewater and waste treatment, before exploring ways to help reduce carbon footprints in the farming sector.

A common problem we found is that plants cannot efficiently uptake soil nutrients, so we use microbial bacteria solutions to help decompose matter.

These useful Bacillus bacteria are distracted by fermented beans and a special strain we found in cow guts, which effectively breaks down cellulose and methane.

We recently presented this product to the Rice Department, showing how it can help reduce the carbon footprint and greenhouse gas emissions in rice value chains. Thailand is one of the countries with the highest carbon deficit in the farming sector.

Many organizations are exploring microbial solutions in response to the looming threat of harmful PM2.5 haze. Around Bangkok and its metropolitan areas, smallholder farmers own 60 million hectares of paddy fields. These farmers have found straw management through commercial and tractor-plowing services impractical, leaving them with little option but to resort to burning the straw.

This microbial product can solve PM2.5 issues in Bangkok if provided to farmers as an alternative to burning. It can decompose rice stubbles in 14 days, faster than my original estimate of three weeks.

thaiRAIN: What do you think is the most effective way to change farmers' behavior?

Yongmanitchai: It is important to provide farmers with affordable access to technology that can help them adapt to or mitigate climate change. The government can achieve this through subsidies or other means, but it will require collaboration with the private sector. Siam Agri Supply is willing to support this initiative with #thaiRAIN by selling products as close to the production cost as possible.

#thaiRAIN: *What fascinates you about microorganisms in your R&D?*

Yongmanitchai: Many Thai people are unfamiliar with microbiology, even though 90% of natural processes rely on microbes. Adopting microbe bacteria solutions in the agrifood sector has become widespread and essential, whereas a decade ago, most problems were treated using chemicals. For example, in shrimp farming, microbial solutions play a key role in helping these shrimp survive since they assist in treating water.

In rice farming, microbes decompose stubbles faster, allowing farmers to clear their fields and grow rice with faster crop cycles. For applications with the environment, I opt for the minimum 80% success rate, which is sufficient. Over the past hundreds of years, there has never been a report that the microorganisms we use in the environment cause harm.

Numerous studies have explored microbial solutions that we can utilize. Thailand, situated in a tropical zone, offers favorable conditions for microbes and biodiversity. Microbes thrive in hot and humid environments. Good bacteria can be adapted and used to decompose waste and eliminate toxins and smells from bad bacteria.

#thaiRAIN: If you could turn back time, would you still choose to do what you're doing now?

Yongmanitchai: Absolutely. This is the field that I enjoy working in the most. While my research may not be a scientific breakthrough, it can be practically applied to solve problems. With #thaiRAIN promoting microbial powder as a decomposer for rice stubbles, this product has gained a wide reputation and recognition within the agrifood sector. This is truly impactful.