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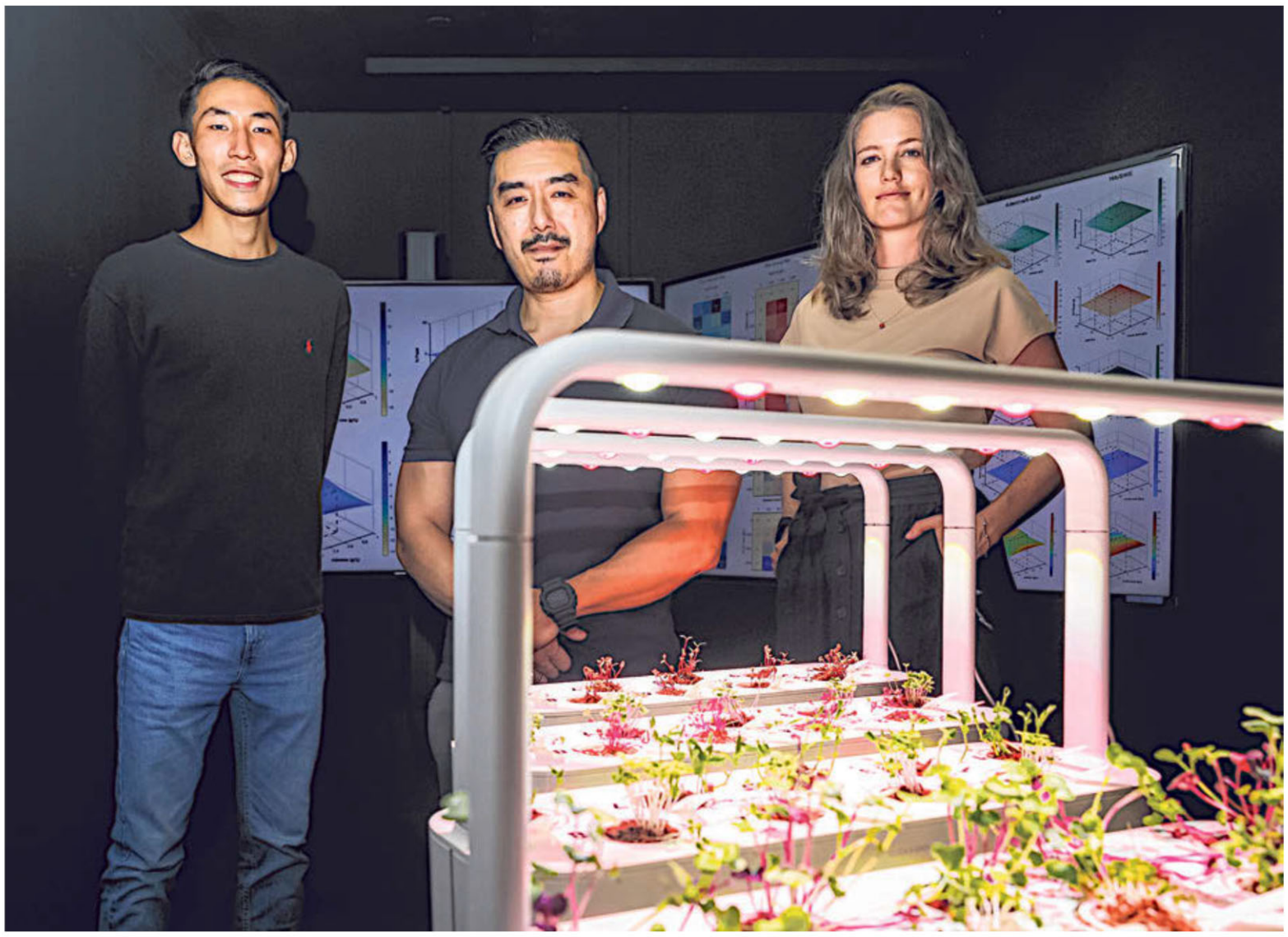

Professor Dean Ho (centre), seen here with Dr Agata Blasiak, NUS' N.1 Institute for Health head of digital health innovation, and research assistant Peter Wang, modified the AI system – IDentif.AI – which is able to determine the most accurate drug dose combination for treating diseases such as Covid-19. The modified platform was used to determine the optimal ingredients for use in soil to maximise plant yield without affecting nutritional value.
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Scientists in Singapore tapping AI to boost plant growth

Drug platform used for Covid-19 modified to find best mixture of soil for growing plants

Cheryl Tan

Scientists in Singapore are looking to boost plant growth by leveraging an artificial intelligence (AI) platform that has helped to determine possible combinations and doses of drugs used to treat Covid-19.

In a study, they found that when a modified version of the platform was used to determine the best mix for soil to boost plant growth, it led to improved yield without affecting the plant's nutritional value.

Professor Dean Ho, who led the study, said: "Artificial intelligence has been widely used in indoor farming – by means of remote monitoring, as well as to control the amount of water, light and fertiliser to improve crop yield."

Added Prof Ho, director of the Institute for Digital Medicine (WisDM) at the National University of Singapore's (NUS) Yong Loo Lin School of Medicine: "But we're looking to think differently, by leveraging AI to determine the optimal ingredients for use in soil to maximise plant yield."

Such a method could potentially see fewer ingredients used and, in turn, help urban farms improve productivity and cut costs. This could take the Republic a step closer to realising its vision of producing 30 per cent of its nutritional needs by 2030, Prof Ho said.

He modified his existing AI program, IDentif.AI, to study how manipulating different ingredients used in peat moss can impact the yield of red spinach.

"Coming up with the perfect soil mixture for growing plants is very much like medicine. These ingredients, just like drugs, have different dose or concentration-dependent synergy, meaning that they can complement one another when used in the right concentrations to help improve overall plant growth," said Prof Ho.

Under a new program known as WisDM Green, Prof Ho and his team trialled combinations of eight different types of ingredients.

They found that the two most effective combinations were a dynamic duo of 6-BAP and EDTA-Fe, as well as a combination of humic acid and seaweed extract.

The synthetic plant hormone 6-BAP is known to help plant cells divide to grow shoots and leaves, while the chemical compound EDTA-Fe helps to supply iron to the plants – which is important for them to function.

Humic acid, on the other hand, improves nutrient uptake of the plant, while seaweed extract helps to promote healthy growth and strong roots.

The first author of the study, Mr Peter Wang, a research assistant at the N.1 Institute for Health at NUS, said different concentrations of ingredients used for both combinations have helped to increase plant yield by between 15 per cent and 35 per cent.

The research paper was published on May 27 in the peer-reviewed journal Advanced Intelligent Systems.

The team is now testing the ingredient combinations on a selection of different plants, such as arugula and bok choy, to further validate their results.

"What we hope to do is to create a community garden in, say, a housing estate, where volunteers can try out different soil mixtures with varying concentrations of ingredients," said Prof Ho.

The team is also developing an AI imaging technology to create a diagnostic tool where farmers could one day take photos or videos of their plants to determine if certain crops will have a strong yield.

The parameters include plant height, shoot length and stem thickness.

"These could serve as biomarkers for a plant's potential harvest outcome – much like predictive healthcare," said Prof Ho.

He hopes to partner with urban farms here to trial these AI findings, as well as to look at how other factors, such as light and water, can be optimised to improve plant yield.

Mr Bjorn Low, executive director and co-founder of urban farm Edible Garden City, said that in broad strokes, any research to reduce costs and increase yields is beneficial.

But the bulk of the costs comes from overheads such as rental and high energy input costs, like cooling.

This is because the lights used for indoor growing can emit heat in an enclosed space despite being energy-efficient.

"For urban farms, which are limited by space, such improvements to crop yield may not have a significant impact on overall business.

"But for a large commercial outdoor farm, these improvements may be more impactful," Mr Low said.

tansuwen@sph.com.sg