JOINT NEWS RELEASE

Singapore, 22 July 2024

NTU Singapore and food and agribusiness firm Bunge to produce new food flavour additives, such as umami and 'meat', through the fermentation of soy and oilseed products

Nanyang Technological University, Singapore (NTU Singapore) and **Bunge**, a leading global agriculture, food, and ingredients company, are collaborating to produce new food flavours through fermentation, including umami, or savouriness, one of the five basic tastes.

Umami, which means "pleasant savoury taste" in Japanese, is recognised scientifically[1] as one of the five basic tastes along with sweet, sour, bitter, and salty. Its characteristic savoury and meaty flavour profile enhances the taste of food by adding depth and richness.

In a research collaboration agreement, Bunge will develop the new flavours by leveraging the research capabilities and technologies at NTU's **Food Science and Technology Programme (FST).** This agreement is also the first successful partnership under the **Singapore Agri-food Innovation Lab (SAIL)**.

Funded by Enterprise Singapore (ESG), SAIL aims to enhance the agri-food innovation ecosystem by connecting solution providers with multinational corporations, which are looking for market-driven solutions.

Bunge will supply fats and oils derived from oilseeds - soybean, canola, and sunflower - as well as oilseed meal and oilseed cake, which are formed after oil is extracted from the oilseeds.

The technology not only produces enzymes, acids, or flavours for food production, but also offers a new use for oilseed meal and cake, which are normally used in livestock feed.

[1] Physiological roles of dietary glutamate signaling via gut–brain axis due to efficient digestion and absorption, *Journal of Gastroenterology (2013).*

To develop the new flavours, which will be used in alternative protein and plant-based protein products, NTU's FST, led by its **Director, Professor William Chen**, will be employing a technology called solid-state fermentation (SSF), which is more cost-effective than conventional fermentation techniques, as it uses fewer resources such as water and electricity.

Professor Chen said: "In this collaboration with Bunge, NTU Singapore will be replicating meat flavours that allow for culinary versatility, enabling the creation of diverse plant-based dishes that align with traditional tastes and cultural preferences. This strategic approach aims to make alternative proteins competitive, nutrient-dense, and appealing to a broad audience, including those transitioning from traditional meat-based diets. Our solid-state fermentation technique would also present a solution to byproducts, such as oilseed cake, and find a way to value-add to them and unlock the essential proteins within." Prof Chen is also **Director of the Singapore Agri-food Innovation Lab**.

Dr. YouChun Yan, Senior Director of Innovation – Asia at Bunge, said: "As a global leader in agribusiness, food, and ingredients, Bunge understands the imperative to continuously innovate in food taste. By leveraging our expertise and resources, we can drive meaningful change in the food supply chain while pushing the boundaries of flavour innovation. Our commitment to sustainability and culinary excellence positions us to shape a future where food is not only abundant but also delights the senses, reflecting our dedication to nourishing communities and enriching lives worldwide".

Although there has been a rise in adopting plant-based foods in diets worldwide, with the average annual growth in global plant-based food launches increasing by 58 per cent annually between 2015 and 2019[2], producers face a challenge in finding the right flavour for their products, as nearly half (46 per cent) of plant-based meat consumers say they are looking for a "real meaty taste".

Meat and umami flavours are crucial in alternative protein and plant-based foods for their ability to enhance sensory appeal and familiarity. These flavours provide a satisfying taste experience, making plant-based options more palatable and enjoyable for consumers.

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[2] Plant Based Food Statistics - Size & Growth 2023, Strategic Market Research (2023).

Media contact:

Mr Joseph Gan
Manager, Media Relations
Corporate Communications Office
Nanyang Technological University, Singapore
Email: joseph.gan@ntu.edu.sg

Bunge Media Contact
Email: news@bunge.com

About Nanyang Technological University, Singapore

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 35,000 undergraduate and postgraduate students in the Business, Computing & Data Science, Engineering, Humanities, Arts, & Social Sciences, Medicine, Science, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Earth Observatory of Singapore, Nanyang Environment & Water Research Institute and Energy Research Institute @ NTU (ERI@N).

Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

Ranked amongst the world's top universities, the University's main campus is also frequently listed among the world's most beautiful. Known for its sustainability, NTU has achieved 100% Green Mark Platinum certification for all its eligible building projects. Apart from its main campus, NTU also has a medical campus in Novena, Singapore's healthcare district.

For more information, visit www.ntu.edu.sg

About Bunge

At Bunge (NYSE: BG), our purpose is to connect farmers to consumers to deliver essential food, feed and fuel to the world. With more than two centuries of experience, unmatched global scale and deeply rooted relationships, we work to strengthen global food security, increase sustainability where we operate, and help communities prosper.

As a world’s leader in oilseed processing and a leading producer and supplier of specialty plant-based oils and fats, we value our partnerships with farmers to bring quality products from where they’re grown to where they’re consumed. At the same time, we collaborate with our customers to develop tailored and innovative solutions to meet evolving dietary needs and trends in every part of the world. Our Company has its registered office in Geneva, Switzerland and its corporate headquarters in St. Louis, Missouri. We have approximately 23,000 dedicated employees working across approximately 300 facilities located in more than 40 countries.