



Live Green@NUS

OUR SUSTAINABLE FUTURE STARTS TODAY
by NUS Sustainability

How can we produce and consume food in a way that causes less harm to our environment?

In this issue, we look at some possible answers including **alternative proteins**, **growing our own food** and **upcycling food waste**.



Alternative proteins were the topic of discussion at a workshop co-hosted by the **Lloyd's Register Foundation Institute for the Public Understanding of Risk (IPUR)** and the new **Bezos Centre for Sustainable Protein** at NUS in January.

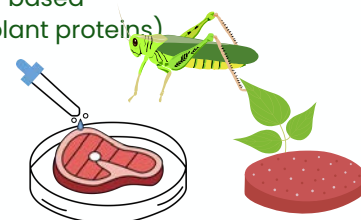
Dr Michael Siegrist, Professor in Consumer Behaviour at the Institute for Environmental Decisions, ETH Zurich, gave the keynote address.

IPUR shares some key takeaways from the workshop with our community.

What are alternative proteins?

Research has suggested that animal-based products contribute to **nearly 20 per cent** of human-caused **greenhouse gas emissions**. Alternative proteins are designed to replace traditional animal-based products and currently come in three main forms: **plant-based meat** ("meat" made from plant proteins), **cultured meat** (meat grown in lab from animal cells), and **insects**.

However, alternative proteins are often perceived to be unnatural and unhealthy compared to animal-based meats. Cultural and psychological factors also play an important role in the acceptance of novel food technologies. For example, there is food neophobia, or the fear of trying new foods.



Why choose alternative proteins?

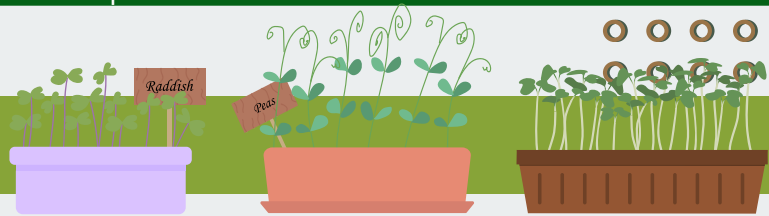
- Alternative proteins such as plant-based and cultured meat have co-benefits such as being **more climate-friendly**, **protecting animal welfare** and **having health benefits**.
- Alternative proteins offer **options for those with dietary restrictions**, such as dairy or gluten allergies.
- There is a misperception that only animal-based meats are rich in protein, when in fact, **plant proteins** such as **beans, lentils and chickpeas** are just as suitable alternatives.
- Another reason to lower meat consumption: **studies** have shown that people following **vegan or vegetarian diets** have **lower incidences of chronic diseases**.

Alternative protein research@NUS

**DID YOU
KNOW?**

The Bezos Centre for Sustainable Protein at the NUS was set up last September, the first of its kind in Asia to advance research in alternative proteins. The NUS centre joins similar Bezos Centres in the United Kingdom and the United States. Its priority areas include **microalgae** and **biomass fermentation**, supported by complementary research into **cultivated meat** and **plant-based technologies**.

GREEN NUGGETS



Keen to do your part to promote a sustainable food system and see the results in one to two weeks?

Then learn to grow your own microgreens!

A workshop on growing microgreens was one of several activities held at the **Heartland Market – Go Vocal for Local** event organised by **NUS Libraries and Beyond FST Classroom** in February.

If you have missed the workshop, fret not. Take a look below at how you can get started on growing your own microgreens or refer to [this set of slides](#) shared during the event. But first, here are some fun facts about these baby plants!

DID YOU KNOW?

Microgreens are more nutrient-dense and generally easier to grow than sprouts. They contain up to 40 times more nutrients than mature plants.

They can be used as garnishes in salads, sandwiches, soups, appetisers, desserts and drinks among others.

Microgreens are plants that grow in soil for one to two weeks before their stems and leaves are harvested. They are slightly older than sprouts, which are seeds that grow in water for a few days and are then eaten whole (including the seeds).

Grow your own nutrient-packed greens

1 Soak the seeds and then sow them

After soaking the seeds overnight, sow them on a layer of substrate, e.g., moist peat moss. Good seeds to start with are maple pea (dou miao) and sunflower seeds.



3 Move to a bright space

Two days after sowing the seeds, the seedlings should have started to grow. Remove the weight and also any seeds that have turned mouldy or have not germinated. Move the set-up to a bright place.



2 Weigh the seeds down

Fill a container with some water and place it on top of the sown seeds to press them down so that they have good contact with the substrate, and placed the set-up in a cool shaded place.



4 Harvesting

The microgreens are ready for harvesting when the cotyledons or seed leaves begin to appear and before the leaves open up, i.e., about seven – 10 days after sowing. Cut them near the base. Avoid delay as microgreens can become fibrous. The substrate and the roots can be composted and used to pot up other plants.



Avoid these three common mistakes!

Remember to soak the seeds overnight to “prime” them and promote germination.

When sowing the seeds, ensure that there is only one layer of moist peat moss and leave some space between the seeds so that the seedlings don’t overlap as they grow.

Keep the substrate moist, but not soaked through. This means you probably need to water the substrate every day.



BE INSPIRED

Dr Chua Jian Yong, an alumnus and part-time lecturer from NUS Department of Food Science and Technology (FST), became interested in **upcycling food waste or food side stream** when he was doing his PhD.

He later co-founded a start-up, Mottainai Food Tech, to look into this important area. Food waste formed a significant part – about 11 per cent – of the total waste generated in Singapore in 2023.

Dr Chua also started the voluntary group, Beyond FST Classroom, to bring food science out of the classroom into the NUS community through events such as microgreen workshops and farm visits.

We catch up with the 34-year-old to find out more about his food side stream upcycling journey.

Dr Chua Jian Yong

Co-founder and lead scientist at Mottainai Food Tech



What inspired your interest in upcycling food waste?



As an undergraduate, my research interest was in alcohol fermentation and my final year project was on durian wine fermentation. When I was doing my PhD in 2016, however, my PhD advisor, Professor Liu Shaoquan, asked me if I wanted to transfer my knowledge and skillsets in alcohol fermentation to food processing side stream upcycling, in other words, to upcycle unwanted by-products produced during food processing into valuable products.

At that time, research in this area was just picking up and I saw the potential in the research and commercialisation of such products. I went on to do my PhD project on upcycling soy whey, a by-product from tofu production, into alcoholic beverages and I have not looked back since.

You co-founded a start-up to upcycle food side stream. Tell us more!

After teaching for some years, I realised that I lacked industry experience, which limited how much I could share with students about applying the knowledge that they have learnt in class. After my contract with NUS ended in mid-2024, I went over to Mottainai Food Tech to take on the role of lead scientist. Mottainai is Japanese for "what a waste". Hence, we wanted to demonstrate that it is a waste to discard food side stream.

Our flagship product, Jiromeat, is a plant-based minced meat upcycled from soybean pulp, which we are hoping to upscale from lab to pilot.



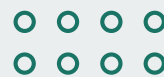
Besides working on our own project, we also provide consultation services to food companies. Our goal is to become a leader in the food waste upcycling scene in Singapore and globally.

Why are you optimistic about the future of upcycled food products?

Ultimately consumers only care about two things: price and taste. If your product tastes good and the price is right, the consumers will buy your product. And upcycled food has already been in the market for a period of time. For example, the whey protein that gym goers consume is made from by-product of cheese production and the molasses we use in baking is a by-product from sugar production. Hence, the perception of upcycled food will not be a major hurdle.

Any tips for students who might be keen to embark on food side stream upcycling research?

Working with food side stream comes with additional challenges compared to working with the original ingredients. Additional considerations would have to be thought through to bring the technology from the lab to the market. It is often easy to come up with good ideas at lab scale, but the challenge arises when the technology needs to be scaled up to pilot or commercial level. Hence, I would advise students to always think one step ahead while working on their project to evaluate if the project is even possible to begin with.



GET INVOLVED

ATTEND TWO TALKS BY NUS INSTITUTES

26 MAR (WED) 9AM – 1.30PM

6th ESI Workshop on Carbon Pricing

By NUS Energy Studies Institute (ESI)

The ESI will share key findings from its research project, Carbon Pricing Strategies of Other Key Economies, which examined the international experiences of government-led and business-led carbon pricing schemes.

Free. Register.



27 MAR (THU) 12.30 – 1.30PM

Research Seminar on Connecting with Climate to Motivate Action

By LRF Institute for the Public Understanding of Risk

Dr Robyn Wilson, a behavioural decision scientist from Ohio State University, explores best practices for engaging individuals and communities both emotionally and cognitively to ensure climate communication inspires action.

Free. Register.



JOIN TWO EVENTS BY NUS SAVE

26 MAR (WED) 10.30AM – 3 PM

Farmer's Market @outside LT27 Faculty of Science

Discover fresh produce and sustainability initiatives from student-led gardens across NUS, in a collaboration with Pioneer House, Ridge View Residential College and City Sprouts.



Free. No registration needed.

29 MAR (SAT) 9.30 – 11.30AM

Invasive Species Management

Be part of NUS SAVE's monthly Invasive Species Management effort and help restore the balance of our forests! 🌿 Learn how to identify and remove invasive plants while making a real impact to Singapore's green spaces.

Free. Register.



CELEBRATE WORLD CIVET DAY

4 APR (FRI) 12.30 – 2 PM

Lessons from Our Wild Nocturnal Gardener

By NUS Libraries

Did you know the common palm civet can be found on our campus? Discover the fascinating world of Singapore's remarkable "night gardeners" at this short talk and then put your newfound knowledge to the test in an interactive game!

Free. Register.



If you have sustainability events to publicise, [email us](#).