

Healthier and greener? Palm oil alternative partnership to scale up microalgae-based replacement

30 Oct 2023 --- In a move toward reducing F&B's reliance on palm oil, researchers in Singapore have joined forces with Eves Energy to scale up a palm oil replacer made from microalgae, through a microalgae oil producing plant in Indonesia. They deem it a nutritionally better, healthier and greener alternative to the widely used F&B fat that is often linked to deforestation and a range of human rights and environmental issues.

Indonesia is the world's biggest producer of palm oil, where historically the haze-generating slash-and-burn method is used to clear land for palm tree plantations. The country is now trying to eradicate the method.

For the project, Eves Energy, a Singapore-based company that focuses on scaling up sustainable innovations that promote clean energy systems, is partnering with Nanyang Technological University, Singapore (NTU), which developed the plant-based oil.

The technique was developed by a team led by Professor William Chen, the director of NTU's Food Science and Technology Programme.

"Microalgae exists in many different forms/species, rich in different macronutrients like carbohydrates, lipids, or proteins. Large scale cultivation of the species of choice would result in the benefits we want to have in terms of proteins or polyunsaturated oils," he tells **Food Ingredients First**.

"We have developed a proprietary separation technology which allows us to separate oils from the biomass without generating secondary organic waste. Applied to the industry scale of microalgae oil separation, there would be significant impact on the environmental sustainability of the separation process."

Currently, the oil extraction process takes less than an hour in the laboratory and the team is working to refine the process on industrial levels.

The production facility covering an area of 3,000 sq km will be constructed on Indonesia's Seram Island and is expected to be set up by 2026. The plant is expected to produce 1.2 million metric tons of microalgae oil and 1.2 million metric tons of algae cake, according to Dr. Lanz Chan, president & CEO of Eves Energy.



Dr. Chan projects that the crude algae oil and the dry algae cake can be sold at US\$600 per tonne (Image Credit: NTU).

"The microalgae oil produced from this endeavor could serve as a sustainable renewable energy source and a greener alternative to palm oil. The production process involves the use of pyruvic acid and ultraviolet (UV) light to stimulate photosynthesis in the algae," he tells us.

"In addition to being a palm oil alternative, the microalgae oil produced from this endeavor could also be a sustainable renewable energy source. The rest of the plant, which is edible, is then converted into algae cake, a nutrient-rich food product that can be converted into supplements, as well as used in food production as seaweed."

Palm oil woes

Dr. Chan flags that key issues with palm oil usage plague the F&B industry.

"Palm oil is known for being rich in saturated fat. The conscious consumer views this as unhealthy because saturated fat intake and hydrogenated fat are often associated with increased rates of cardiovascular disease."

He adds: "Many brands refuse to disclose their palm oil usage, making it difficult for consumers to make informed choices. For example, two-thirds of Singapore brands refuse to disclose their palm oil usage."

Moreover, the widely demanded palm oil has drastic environmental impacts, too.

"The high demand for palm oil has resulted in the destruction of large expanses of tropical rainforests to transform the land into oil palm plantations. This has a negative impact on wildlife and biodiversity caused by deforestation," he underscores.

"Further, the palm oil industry is frequently linked with sustainability issues including deforestation and open burning (slash-and-burn agriculture) to accommodate the cultivation or replanting of oil palm."

Palm oil production also faces the issue of being linked to labor exploitation.

"The US State Department has linked the palm oil industry in Malaysia and its neighbor Indonesia to exploitation and trafficking."

Meanwhile, innovative efforts to reduce the F&B industry's dependence on palm oil continue worldwide.

Last month, a team of researchers in Scotland discovered a [palm fat replacer](#) for bakery applications that claim to have the added benefits of being allergen-free, coconut-free and has no added sugar sweeteners.

AAK also introduced AkoVeg 117-14, a palm-free solution for [plant-based chicken nugget](#) formulations.

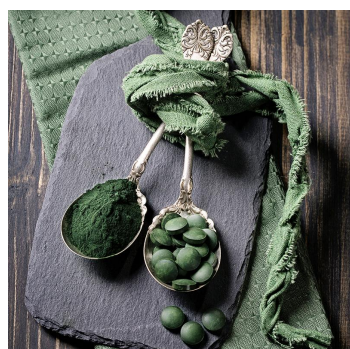
Further, WNN Food Labs has announced the launch of [palm oil-free bars](#) this week.

Regulatory pressures are also driving formulators to look beyond palm oil. For instance, China's infant formulas are exploring natural ingredients such as whole milk powder and milk fat that can reduce or [replace the need for palm oil](#), according to the head of innovation advanced nutrition at Fonterra, China.

Microalgae as "carbon sinks"

According to Dr. Chan, large-scale production of microalgae has the potential to lower the amount of carbon dioxide in the Earth's atmosphere by a projected 2.6 million metric tons. This happens because microalgae grow fast and undergo photosynthesis by absorbing gas and emitting oxygen, labeling them "carbon sinks."

"Moreover, microalgae are making waves for their highly nutritious content and status as a natural, plant-based and sustainable "superfood biomass." Therefore, the F&B industry might see this as an opportunity to incorporate a new, sustainable ingredient into their products while addressing environmental concerns related to palm oil production," he underscores.



F&B is tapping into microalgae species like spirulina and chlorella as protein sources, but more exploration is needed.

Exploring microalgae for F&B applications is essential since out of its estimated [200,000 to 800,000](#) different species; only a limited number are available commercially, Liat Shemesh at Solabia-Algatech Nutrition told us earlier this year.

The species currently being tapped as food sources of protein, iron, B vitamins, fatty acids and antioxidants include spirulina, chlorella and – the more recently approved EU novel food – tetraselmis.

Alleviating palm oil pushback?

According to Prof Chen, NTU's microalgae-based oil "alleviates" the pushback from the palm oil industry, and also provides those who are currently in the palm oil industry with a "new business option" and/or sustainable solution for their business development.

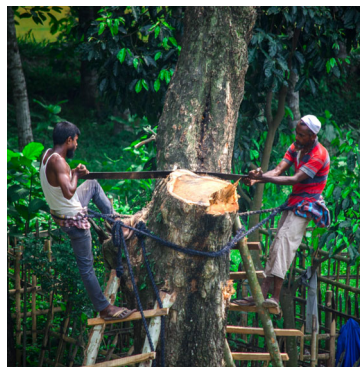
"The partnership would see industry adoption of NTU's food tech innovation and its application in real world situations, including new options for sustainable aviation fuel (SAF), alternative to palm oil and also new sources of foods/nutrients."

Dr. Chan, too, is hopeful of the innovation's potential and expects the F&B industry to have a positive reaction to the use of microalgae oil as a palm oil replacement.

"This is because microalgae have recently attracted considerable interest worldwide due to their extensive application potential in the renewable energy, biopharmaceutical, and nutraceutical industries. They are seen as renewable, sustainable, and economical sources of biofuels, bioactive medicinal products, and food ingredients," he concludes.

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High palm oil demand leads to rampant deforestation of tropical rainforests for oil palm plantations.