

Thai watermeal tipped as ‘green gold’ of future food

Thailand is pushing watermeal, or pham, as a future superfood with high protein, low resource use and strong export potential.

Once dismissed as a common aquatic plant, pham, or Thai watermeal, is being promoted as a potential “green gold” for Thailand’s superfood industry, as rising demand for healthy and sustainable food opens new opportunities for alternative protein crops..



Nantapong Chiralerspong, director-general of the Office of Trade Policy and Strategy under the Commerce Ministry, said consumer behaviour has shifted significantly towards health-conscious eating, while the global agricultural sector is placing greater emphasis on sustainability.

Against that backdrop, pham, a traditional Thai local food plant, fits both the health and sustainability trends. It contains around 30-50% protein by dry weight, with essential amino acids close to those found in animal protein. It is also rich in fibre, vitamin A, vitamin B, iron, calcium and antioxidants, making it suitable for consumers looking for alternative protein and minimally processed natural health foods.

Earlier food coverage has also highlighted watermeal’s potential as a Thai superfood, noting that it is commonly found in swamps in the North and Northeast, where local communities use it in dishes such as curries, fried eggs and steamed eggs. It can also be adapted into salads, pizza, bread, cookies, ice cream, smoothies, meatballs, sausages, noodles and instant drinks.

A low-resource crop with bioeconomy potential

Pham also has environmental advantages. It absorbs carbon dioxide well, grows quickly and requires few resources. As a freshwater plant, it uses less water and less land, can be cultivated in limited spaces and does not require pesticides.

These qualities make its production cost lower than many other protein crops. It can also be harvested and sold every day, creating a steady stream of income for growers and offering the potential to become a new economic crop that supports the bioeconomy.

The plant’s potential aligns with the rise of food-tech start-ups, including Advanced GreenFarm Co Ltd, the developer of the flo Wolffia brand, as well as Farm Ban Khai Pham, Wolffia Bangkok and

Wolffia Plus. These operators have shown that innovation in closed-system farming can raise the protein content of pham to as high as 40%.

The private sector has also demonstrated the added value that can be created from processing fresh pham into premium products, especially dried protein powder, which can reach 3,000-5,000 baht per kilogram.

Thailand's 'green gold' in alternative protein

Several Thai operators are now accelerating exports to markets in the United States, Europe, the Middle East and Japan, where demand is growing for low-carbon plant protein with vitamin B12, a nutrient rarely found in ordinary plants.

The growing interest is not new. Khai pham, or watermeal, as one of Thailand's promising superfoods, supported by the global rise of plant-based protein. It cited Kasikorn Research Center projections that the global market value for plant proteins derived from aquatic plants such as duckweed, wolffia and khai pham would reach US\$98.9 million in 2025 and expand to US\$244.8 million by 2034, with a compound annual growth rate of 10.6%.

State agencies and universities race to upgrade pham

Government agencies and academic institutions are also working to raise the potential of Thai pham. They include the Department of Agriculture, the National Innovation Agency, Suranaree University of Technology, Mahasarakham University and Mahidol University.

Between 2024 and 2025, public-sector research and development data showed that Thailand had succeeded in developing three high-quality superfood-grade pham strains, with protein content of 46-48.6%.

Authorities are now accelerating technology transfer through commercial industrial model pham farms under Good Agricultural Practices (GAP) standards. The aim is to ensure that production is clean, safe and free from contamination, paving the way for international certification and positioning pham as a future food that can support global food security sustainably.

High processing costs remain key obstacle

Nantapong said the Office of Trade Policy and Strategy, together with Kasetsart University, had conducted field visits under a project studying how to promote and develop functional ingredient businesses into high-value functional foods.

During the project, Asst Prof Dr Metha Meetam, founder of Advanced GreenFarm Co Ltd, owner of the flo Wolffia brand, outlined his vision of pushing Thai pham as a "Global Solution to Sustainability & Health", a product that responds to global demand for both health and sustainability.

Metha said the company's cultivation technology enables pham to grow efficiently on a continuous basis, helping increase its protein and nutrient content above that of pham generally found in natural water sources.

However, despite the expansion of the farming ecosystem from small farms to large-scale operations capable of producing more than 500 kilogrammes of fresh pham per day, a major obstacle remains: processing cost.

The cost of drying pham remains high, and there is still no industrial machinery specifically designed for drying the plant.

Metha proposed that the public and private sectors support the establishment of processing centres to break through the cost barrier and create production standards. This would help consumers access pham products at more affordable prices.

He also urged the government to speed up public communication on the benefits of pham to stimulate market demand and encourage the food industry to adopt it more concretely as a main raw material.



Global market projected to keep growing

The Office of Trade Policy and Strategy has also studied international research data pointing to business opportunities for pham.

A report by DataM Intelligence estimated that the global duckweed protein market, which covers plants in the same family as pham, would be worth around US\$179.57 million in 2025 and grow to US\$344.88 million by 2033, with a compound annual growth rate of 8.5%.

The Asia-Pacific region holds the largest market share at 45%. This is in line with a report by Global Market Insights, which found that duckweed products in powder form account for the largest market share, at more than 66.3%, due to demand from the food and beverage industry.

The trend can also be seen in the case of US food-tech start-up Plantible Foods, which raised US\$30 million, or around 1 billion baht, in Series B funding to expand production capacity for duckweed protein.

Meanwhile, Japanese start-up Floatmeal is preparing to expand industrial-scale production of Wolffia in Thailand. It highlights the plant's sustainability benefits, saying pham uses dozens of times less water and land than many traditional agricultural crops.

Nantapong said the growth of the global market sends a clear signal of opportunity for Thailand's pham industry and the wider duckweed-family plant sector — an opportunity Thai entrepreneurs should not miss.

From raw material to future food

Nantapong said pham gives Thai entrepreneurs an opportunity to shift from selling raw materials to processing superfoods.

He said the public sector could help promote the qualities and benefits of pham more widely, as the plant still has significant room for growth in line with the fast-growing health market.

With its strengths in plant-based food and clean-label positioning, pham has the potential to move beyond a niche market and become a future food that opens the door to high-purchasing-power markets in a sustainable way.

“The business opportunity is not about producing more, but about producing in a way that better meets the needs of the market and consumers,” Nantapong said.

Source: The Nation on 15 May 2026

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