



Karengo (seaweed) – Research Overview

He tipu moana he oranga tangata: Revealing karengo as a high-value functional food

Principal Investigator – Dr Thomas Wheeler, Cawthron Institute

Industry partners: Te Runanga o Ngāi Tahu, Wakatū Incorporation

Other collaborators: Malaghan Institute for Medical Research, AgResearch Ltd, Hokkaido University

Food: Karengo (a type of edible seaweed)

Total research investment: \$596,000

Seaweed is a trending superfood. Nori (*Pyropia spp.*, formerly *Porphyra spp.*) commands the highest value of any edible seaweed type, and contains a range of health benefits, including suppressing inflammation. At least three *Pyropia* species grow along New Zealand's South Island coasts, with a preference for sites with high-water flows.

Collectively known as karengo, they are distinct from nori, and have a history of use as a traditional food by Māori, and was used as a medicine. However, to date its health-promoting attributes have not been scientifically tested.

Seaweed has been long-established as an element of culinary tradition throughout the coastal areas of Eastern Asia. Nori (*Pyropia spp.*, formerly *Porphyra spp.*) is central to this tradition, and has the highest commercial value of any seaweed. Nori contains a range of health-promoting micronutrients and compounds, including iodine, iron, vitamin B12, and the omega-3 polyunsaturated fatty acid EPA. Some of these substances have been shown to have anti-inflammatory activities in pre-clinical models. While clinical effects have been observed for some seaweeds, to date no clinical trials have been performed on *Pyropia* species.

Karengo is similar to nori, containing notably high levels of protein compared with other seaweeds, micronutrients, and a very high proportion of the anti-inflammatory lipid eicosopentanoic acid (EPA). However, no investigations of the detailed composition or bioactivities of karengo have been conducted.

Due to increasing demand and warming seas in traditional growing areas, high quality nori is in short supply, resulting in record prices. High quality distinctive product produced in New Zealand with an attractive indigenous tradition and provenance story coupled with evidence-based health benefits has great market potential, particularly as an ingredient of premium manufactured foods with health-promoting functionality. This programme will provide the detailed information on karengo composition, including metabolomic profile, and bioactivity necessary to realise this opportunity.

Our industry partners know that New Zealand's clean waters provide the value proposition for a high-value seaweed export market. Identifying which seaweed products are worthy of development is a key knowledge gap. This programme, 'He tipu moana he oranga tangata (growth from the sea, health to the people): Revealing karengo as a high-value functional food', will provide a definitive evidence dossier for one of New Zealand's most promising seaweed candidates, enabling Māori industry pioneers Wakatū Incorporation and Te Runanga o Ngāi Tahu (TRoNT), joint industry partners in this programme, to confidently develop sustainable production aquaculture systems and markets for valuable karengo-based products.

The research team will analyse the New Zealand species across their known geographical ranges to determine their compositional variation and how composition influences health-promoting benefits. The programme will identify the most promising species and environmental conditions for producing karengo of superior composition, thereby providing the focus for further research on human efficacy for chronic inflammatory conditions. Also, it will stimulate development of karengo aquaculture, ultimately leading to marketing of premium high-value foods or food ingredients in target Asian markets.

Karengo sampling and aquaculture evaluation will be led by TRoNT, who have strengths in karengo habitat and aquaculture. Establishing the path to market will be led by Wakatū Incorporation, who have experience in agriculture and aquaculture, food production and marketing. This programme will coordinate each of their complementary strengths to achieve a common goal – establishing a commercially successful value chain based on sustainable production, processing and export of a high-value karengo-based functional food or food ingredient.