Mozuku farming in Tonga: Treasure under the sea!

Mozuku nets fixed to the seabed. (image: Masa Kawaguchi)

Mozuku is a unique brown seaweed known scientifically as* Cladosiphon okamuranus.** ***This algae is popular in Japanese cuisine and has been farmed for more than 35 years on the island of Okinawa, where it is a key element of the local economy. Mozuku brown algae has also been found to be naturally occurring in Tongan waters where it is locally known as* *limu tanga'u*. *There are very limited studies regarding the distribution of this species in the Pacific Islands region, although certain researchers have mentioned its existence in New Caledonia (Isle of Pines) and Samoa, in small amounts. A preliminary survey was conducted in 1996[1] around Tongatapu in Tonga (during the algae's gametophyte phase) to assess its general occurrence.

Mozuku belongs to the brown seaweed family, which plays a key role in the ecology of oceans. Brown algae are also called 'seaweed beds' or 'underwater forests' because many marine organisms use these algae as nursery grounds.

On top of its ecological benefits, mozuku has important health properties, because it is a natural source of fucoidan, which has unique tumour-suppressant and anti-coagulant properties. It has exhibited anti-cancer characteristics during laboratory tests. The aquaculture sector believes that ensuring consistent production levels of mozuku would allow widespread consumption of this healthy seaweed, which is already used in food supplements.

Seaweed consumption has been actively promoted by nutritionists due to the high levels of certain micronutrients, such as tyrosine, vitamins A, B, C, E and K, minerals (iodine, selenium, calcium and iron), and a wide variety of antioxidant compounds (flavonoids, carotenoids and fucoxanthin, among others). Although the protein levels are not very high in any of the edible seaweeds, they are slightly higher than in most green vegetables. The brown algae mozuku has other qualities as well: a unique texture and flavour, which is sought after by culinary enthusiasts.

Tongans have been harvesting mozuku from their coastal waters for many years, and a number of attempts have been made to culture the species. The local enterprise South Pacific Mozuku Tonga Ltd has been involved in harvesting and farming seaweeds since 2015. Farming activities started to be relatively successful in 2017, when around 72 tonnes of wet mozuku were produced and exported to different markets in Japan, the European Union and the United States. Production increased slightly in 2018, with around 80 tonnes of wet mozuku produced and exported to similar markets.

[1] Bueno P.R. 2014. Lessons from past and current aquaculture initiatives in selected Pacific Island countries. TCP/RAS/3301. FAO Sub-Regional Office for the Pacific Islands. Rome, Italy: Food and Agriculture Organization of the United Nations. 146 p.

[2] Sporulation: algae form special cells called spores, which can produce new individuals without the need for another parent (asexual reproduction).

Mozuku brown algae is naturally occurring in Tongan waters (left). (image: Masa Kawaguchi)
Harvested mozuku being processed at South Pacific Mozuku Tonga Ltd facilities (right). (image: Masa Kawaguchi)

The manager of the enterprise, Masa Kawaguchi, has been extremely active in finding new markets for this species, including the pharmaceutical industry, thanks to mozuku's high levels of bioactive ingredients. It should be noted that the price paid per kilo of wet mozuku by pharmaceutical companies could double the price paid by food companies.

Thanks to the establishment of a modern processing plant in Tongatapu, South Pacific Mozuku Tonga Ltd is also assessing new processing and value-adding strategies. Some of the final products offered by the company are dried seaweed, dried and pressed seaweed, salted seaweed, powdered seaweed, and fresh and frozen seaweed.

The farming area is on one of the small outer islands near Tongatapu, where around 300 farming nets (each net is 12 m long x 3 m wide) are deployed in May, when the natural mozuku sporulation[2] takes place, until August, when the nets are fully covered by the seaweed and are brought in.

The Pacific Community (SPC) is providing technical assistance to the private company and to the Ministry of Fisheries through the evaluation of new farming sites and farming strategies. SPC is also assisting the private company with the qualitative analysis of the final product(s), as a way to improve and increase market access. Different seaweed products (fresh, frozen, dry and salted) are being analysed to assess the following parameters: proximate analysis, the presence and content of heavy metals, and the presence and content of bioactive ingredients.

Hopefully, based on this initial assistance, South Pacific Mozuku Tonga Ltd will be able to increase mozuku production in Tonga and maintain and improve market access for the final products. At the same time, SPC is assisting the Ministry of Fisheries in Tonga with the amendment of the current Aquaculture Regulation (2005), in order to incorporate articles related to processing and exports of aquaculture products. This amendment will assist local aquaculture enterprises in their attempt to engage in fair-trading practises.

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