Harnessing potential of seaplant industry in the Caribbean

Phil Cruver

GUEST COLUMNIST

Seaplant farming system PHOTOS COURTESY KZO SEA FARMS

Seaplant farm system surface

DURING THE past few years, seaweed has been considered a nuisance in the Caribbean, with its presence tarnishing pristine beaches and deterring tourism. The "weed" within its name doesn't help public perception, therefore, "seaplant" will be used for the balance of this narrative to improve its image.

With closer investigation, it becomes apparent that seaplants are hidden environmental champions that are underappreciated and not fully understood. Seaplants provide many ecosystem services and are a zero-input food crop that don't need fresh water, feed, fertilizers, or land that can be grown over massive ocean areas. Furthermore, seaplants can double their biomass within two weeks, sequestering massive amounts of CO2 as a nature-based solution for helping to decarbonise our planet.

GLOBAL SEAPLANT MARKET

According to the Food and Agriculture Organization (FAO) of the United Nations: "After half of a century while the wild production remained at 1.1 million tonnes, the cultivation production has increased to 35.8 million tonnes that accounted for 97 percent of the world seaplant production in 2019. World seaplant cultivation production tonnage increased 1,000-fold from 34.7 thousand tonnes to 34.7 million tonnes between 1950 and 2019."

Not counting China, Indonesia is the global seaplant leader, followed by the Philippines for producing over 80 per cent of the world's carrageenan, which is used as a thickening, emulsifying, or suspending agent in the food, chemical, and pharmaceutical industries. Other countries include South Korea, North Korea, Japan, Malaysia, and India. Zanzibar is also a major producer, employing about 25,000 farmers, of which about 80 per cent are women. In all these countries, seaplants are cultivated using traditional methodologies, including the fixed, off-bottom line method, the floating raft method, and the basket method. Remarkably, the billion-dollar carrageenan seaplant industry has remained artisanal despite explosive growth.

CARIBBEAN SEAPLANT MARKET

Approximately 21 species of local seaplants are consumed in 15 Caribbean countries as traditional beverages dating to the first half of the 19th century. Over the past 20 years, small-scale beverage -processing facilities have been established in Jamaica, Barbados, Grenada, Antigua and Barbuda, Trinidad and Tobago, St Vincent and the Grenadines, St Lucia, and Dominica.

The cultivation of Caribbean seaplants, as a biomass for the carrageenan extractive industry, began in the 1970s whereby seaplant seed from St Martin was introduced to experimental farms developed in Guadeloupe and Martinique. The economic return was too low to be competitive with Asian sources to produce carrageenan, which sells for less than $1 per pound.

There is a potential major market for regenerative and healthy seaplants harvested from pristine Caribbean Ocean waters and branded as "superfood" for the global $168 billion dietary and supplement industry. Seaplants have 92 of the 102 essential minerals required for strengthening human immune systems for combating COVID-19 and other inflammatory diseases. A superfood brand would also be appealing to the emerging market of eco-conscious and humane consumers seeking alternatives to unsustainable protein produced in polluting animal factories.

Therefore, the initial target market for the Caribbean should be high-value exports of sustainable seaplant products for human consumption where it has a branding advantage with proximity to the North American and European markets. Furthermore, the continued rapid expansion of the seaplant industry will be driven by a growing global demand for edible seaplants that are certified contaminant-free. This competitive advantage presents a major problem for established complex Asian seaplant distribution systems coupled with the region's questionable near-shore water quality. Transparent and traceable seaplant supply chains will soon become mandatory for assuring informed customers that they are not consuming products grown in polluted waters loaded with pathogens, heavy metals, and microplastics.

The Caribbean has the potential to introduce a farming and distribution system whereby the seaplant is traceable to where it was grown and the day it was harvested for transparently meeting health and sustainable certification standards. Consumers are increasingly willing to pay more for products that are sustainable, eco-friendly, carbon neutral, and promoting social justice. Demand by Western markets for contaminant free and highly traceable seaplant products is expected to increase significantly, with growing interest in sustainable alternatives that can meet future food and health demands.

Another opportunity that is widely underdeveloped, and promises to become transformative for the seaplant industry, is genetics for developing seaplants with desirable traits such as higher biomass yield and increased tolerance to climatic changes. Unlike most of today's terrestrial crops, which have gone through thousands of years of selection, breeding, and domestication to produce superior varieties, there has been minimal research for advanced seaplant breeding. With modern bioengineering, the Caribbean could produce rapid results for proprietary seaplant genetic improvement.

TECHNOLOGY FIRST MOVER ADVANTAGE

As a late entrant into the commercial scale seaplant industry, the Caribbean is poised to take advantage of emerging new technologies and innovations for improving the efficiency and productivity of farming systems that are more eco-sustainable and appropriate for the emerging blue economy.

Submersible seaplant structures employing cage culture would produce higher crop yields and provide protection from predators such as rabbitfish, turtles, and long-spine sea urchins as well as storm damage from typhoons in tropical regions. Furthermore, the technology would provide traceability data on when and where the seaplant crops were harvested for meeting rigorous health and sustainability standards.

There is also a major opportunity to develop seaplant strains with advanced selective breeding techniques that are more sunlight and thermally tolerant and epiphyte disease resistant. This research would include identifying solutions for optimal stocking densities and photon fluence levels. Abiotic factors such as light, temperature, salinity, and nutrient seawater concentration greatly influence the composition of seaplants. Recent research shows the correlation between seaplant compound variation from UV radiation and salinity, which can be optimised by water depth selection to obtain a higher pigment yield.

The massive ocean area in the Caribbean is currently not a limiting factor for expanding offshore seaplant mariculture, but climate change, with the consequential changes in water temperature and water chemistry, could lead to a future reduction of suitable near-shore cultivation areas. As a result, large-scale seaplant farming operations may be required to move further offshore, which will require innovations for enduring the challenges of the harsh open-ocean environment.

A new multidisciplinary movement is emerging in the global seaplant mariculture industry with an emphasis on biological sciences and engineering that the Caribbean region could exploit to launch a new sustainable industry to diversify its tourism economy for post-pandemic recovery.

Phil Cruver is president of KZO Sea Farms based in San Pedro, California. Send feedback to peruver@kzoseafarms.com.