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Science, Technology, Research and Innovation for Development (STRIDE)

Production of *Halymenia durvillei* Biomass in a Land-Based Culture Facility Using Vegetative Propagules and Spores

GRANTEE: University of the Philippines Diliman (UPD)

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INDUSTRY PARTNER: Plentex Philippines, Inc.

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GRANT AMOUNT: Php 2,810,008.97 (approximately USD59,800)

Seaweeds as high-value natural products

Seaweeds are one of the most important marine exports of the Philippines. In 2013 alone, production of *Halymenia durvillei Bory de Saint Vincent* (*H. durvillei*), a red seaweed species characterized by dark red coloration and large and bushy leaves, was 1.56 million metric tons, amounting to PhP9.9 million (Bureau of Agricultural Statistics-Philippine Statistical Association CountryStat, 2014). Scaling up the production of *H. durvillei* through culture technology using vegetative propagules and spores may further increase current production capacity; thereby, providing a sustainable source of high-value natural products. Current production of this seaweed relies heavily on harvest from natural stocks in the absence of data on natural populations. Harvesting of natural stocks usually results in overexploitation, adversely affecting new stocks and possibly leading to depletion. Thus, finding proper technologies for cultivation is crucial.

A member of the research team weighs *H. durvillei* grown from carpospores and outplanted at sea

To improve existing and ongoing approaches in the production and propagation of *H. durvillei*, UPD introduced the implementation of a technology for mass production; thereby, reducing harvesting pressures and promoting conservation and protection. The project, implemented with support from USAID STRIDE and built on previous work and findings, aims to translate laboratory-scale cultivation into pilot-scale production of *H. durvillei* and to establish profitable mass-scale production.

Milestones

Implemented in Bolinao, Pangasinan, through the Bolinao Marine Laboratory seaweed culture and hatchery, the milestones are as follows:

- The investigation of the research team on the potential of *H. durvillei* as a significant source of lambda-like carrageenan and the phycobilin pigments r-phycoerythrin and h-phycocyanin, is the first initiative of its kind in the Philippines;
- Economic analysis of the use of *H. durvillei* as food (i.e., salad or component of local dishes) and by following a value chain approach to identify and establish possible markets to aid in commercialization;
- Development of various products such as a) raw/preserved seaweed, b) lambda-like carrageenan, and c) phycobilin pigments r-phycoerythrin and r-phycocyanin, used as food components by various industries. The value chain will be more or less similar to that of the seaweed-carrageenan industry, since one of the target products is the lambda-like carrageenan; and
- In the course of the experiments, it was found out that light plays a major role in the growth and production of *H. durvillei* because seaweeds are basically photosynthetic organisms.

However, phycobiliproteins decrease when irradiance increases (Algarra and Niell, 1990) Phycobiliproteins function in light harvesting that increases the plant's efficiency for capturing light under low light levels. *H. durvillei* grows in the subtidal zone, which is dominated by a low light regimen. Carrageenan's phycobiliprotein content and improved pigmentation is expected to increase with growth which can be achieved with the installation of screens or fish nets that reduce sun exposure; thereby, inhibiting the growth of epiphytes (small plants that co-exist with seaweeds).

An outdoor hatchery being maintained by the research team

These findings led to the conclusion that pilot-scale cultivation is technically feasible through the optimization of parameters such as light to increase yield and the establishment of an open sea support system for grow-out of carpospores cultures.