RESEARCH OF THE PROPERTIES OF ALGAE BY PRODUCTS FROM SHRIMP FARMING TO UTILIZATION WITH THE BCG CONCEPT

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ABSTRACT

Research of the properties of algae by products from shrimp farming to utilization with the BCG concept The objective is to study the properties of algae by-products from shrimp farming and to evaluate the feasibility of utilization with the BCG Economy concept by using qualitative and quantitative research methods and conducting research, including collecting data from documents, books, textbooks, and related research. Spatial studies from interviews Observation in Phraek Nam Daeng Subdistrict, Amphawa District, Samut Songkhram Province Data analysis, focusing on features, and evaluating the feasibility of utilization found that:

Shrimp farms in Phraek Nam Daeng Subdistrict, Amphawa District, and Samut Songkhram Province There are 3 types of algae, which are named after the locality: Pomnhang algae, Wunsen algae, and Mama algae. The most Pomnhang algae is found in 80% of the total algae. It usually grows in brackish water. The amount of algae affects the quality of water in shrimp ponds, i.e., when algae are abundant, sunlight will not reach the bottom of the pond. This causes some algae to die and rot. Because the algae are characterized by sticky and small fibers, when the shrimp get stuck, they cannot get out and die. It also affects the yield.

The feasibility assessment found that algae were a by product of shrimp farming. It is possible to use it for processing into alternative materials such as paper and textiles. Agricultural materials and alternative materials such as plywood, etc.

From the conclusion of the research, it was found that the use of algae by-products from shrimp farming to be processed into alternative materials is considered to be a combination of natural resource capital combined with creativity as a way to create value for the community economy. With the concept of BCG Economy (Bio-Circular-Green Economy), which is one of the ways to help create advantages in both economic and social aspects of society and the environment for the country

Keywords: Features, Algae, BCG Economy

INTRODUCTION

Algae in shrimp farms are natural weeds with different names, such as Pomnhang, Gai, Tao, or Thao, and are included in the group of green algae, which is the largest group, found in fresh, salt, and brackish water. There is cellulose on the cell wall, and it has ecological benefits, namely oxygenating the water from the process of food synthesis itself. Being the first producer in the food chain is therefore very important to the ecosystem. (Yuvadee Peerapornphisarn, 2013) The amount of algae will affect the quality of the water, but in case the shrimp pond has too much algae, it should be raked from the pond because if left for too long, the algae will die, causing too much ammonia in the water and causing sewage problems as a result. (Narong Sangin, 2023)

With the concept of BCG economy (bio-circular-Green economy), which is one of the ways to help create advantages in both economic and environmental aspects, BCG is a holistic economic development with all three dimensions: Bioeconomy: Focus on the use of biological resources to create added value. Linked to the Circular Economy: Taking into account the reuse of various materials as much as possible. Under the Green Economy, economic development is not only focused on income. However, it must be developed in tandem with social aspects and environmental protection in a balanced manner. Taking advantage of biodiversity and culture. In addition, it supports the development of innovations related to the circular economy, namely being able to design products and production processes to minimize waste (eco-design and zero-waste), promote reuse, refurbishment, sharing, and focus on waste management from production and consumption. By using raw materials that have been produced and consumed in the process of transformation for reuse (recycle, upcycle) (Office of National Higher Education Science Research and Innovation Policy Council, 2024) Based on the above information, the researcher had the idea to explore algae in shrimp farms. To be collected as an example to be studied and developed into materials applied in various aspects of design. It is a way to create value to promote the community economy along with conservation, as well as design that takes into account the environment by using resources cost-effectively and for maximum benefit.

OJECTIVES

1 . To study the properties of algae by-products of shrimp farming. In Phraek Nam Daeng Subdistrict, Amphawa District, Samut Songkhram Province

2. To evaluate the feasibility of utilization with the concept of BCG economy

RESEARCH SCOPES

A. Content Scope

1. Study the area, properties, features, and benefits of algae. By-products of shrimp farming from research and related documents

2. Study the data from the survey site. Use in-depth interviews and observations to obtain information on quantity, space, disposal, utilization, etc.

B. Area Scope

Phraek Nam Daeng Subdistrict, Amphawa District, Samut Songkhram Province

METHODOLOGY

This research is qualitative and quantitative, with the following steps:

1. Collection of information from documents, books, textbooks, and related research.
2. Spatial studies from interviews watched
3. Data analysis, focusing on features
4. Evaluate utilization possibilities.

Tools for collecting information

Questionnaire to assess satisfaction which has a 5-level estimation scales;

5 means the most appropriate
4 means very appropriate
3 means moderately appropriate
2 means less appropriate
1 means the least appropriate

Data Analysis

The satisfaction questionnaire used the mean and the standard deviation of the satisfaction level that can be divided as follows;

4.50-5.00	means	most appropriate
3.50-4.49	means	very appropriate
2.50-3.49	means	moderately appropriate
1.50-2.49	means	less appropriate
1.00-1.49	means	least appropriate

Statistics used for data analysis

The data were analyzed by the researcher using a software package to analyze statistical data and present the analysis results as follows;

1. Percentage
2. Mean

RESULT

From studying the data and going to the survey area with interviews and observations in Phraek Nam Daeng Subdistrict, Amphawa District, and Samut Songkhram Province about the species and characteristics of algae, it was found that:

In shrimp farms, the survey area found 3 types of algae, which are named after the locality, namely Pomnhang algae, Wunsen algae, and Mama algae., each of which has different characteristics and quantities as shown in Table 1.

Table 1: Types, quantities, and characteristics of algae found in shrimp farms

Algae species	Volume (Percentage per total algae)	Characteristics of algae
Pomnhang	80	The fibers are small, resembling hair. Long fibers bond together to form a sheet. There are several shades of green mixed together. The fibers hold water well.
Wunsen	10	The fibers are flat, long fibers bonded together in lumps resembling succulents.
Mama	10	The fibers are large internodes that form stems that do not stick together. It looks like a succulent, clear fiber with a greenish-brown color.

Table 1 shows that there are 3 types of algae found in shrimp farms: Pomnhang algae, which is the most common, with 80% of the total algae found; Wunsen algae; and Mama algae. It is rare to find 10% of the total algae found in each species, with all 3 types of algae having different characteristics, as shown in Figures 1–3.

Figure 1: Pomnhang algae
Source: Noppadon Sangwalpetch

Figure 2: Wunsen algae
Source: Noppadon Sangwalpetch

Figure 3: Mama algae
Source: Noppadon Sangwalpetch

From the interview with Shrimp Farm owner Narong Sangin (2023) The most common algae were found to be Pomnhang algae, which tends to grow in brackish water. The amount of algae affects the quality of water in shrimp farms, i.e., when algae are abundant, sunlight will not reach the bottom of the farms. This causes some algae to die and rot. Because the algae are characterized by sticky and small fibers, when the shrimp get stuck, they cannot get out and die. It also affects the yield. As shown in Figures 4–5

Figure 4: The area where the algae are found.
Source: Noppadon Sangwalpetch

Figure 5: spoiled algae
Source: Noppadon Sangwalpetch

Table 2: Basic properties of 3 types of algae found in shrimp farms

Algae species	Properties of algae
Pomnhang	Can be coagulated into sheets. When dried in the sun, it dries. Some of them are dry and crispy, but they still cling together in sheets.
Wunsen	Can clump together. When dried in the sun, it shrinks and dries crispy.
Mama	can't get together. When dried in the sun, it shrinks and dries crispy.

Table 3: The results for identifying the Pomnhang algae

Habitat :	Running and standing water
Colour :	Natural colour : Green Cell colour : Green
Habit :	Attached algae
Microscopic features :	Filamentousunbranched, uniseriated, cells cylindrical, cell wall thick and stratified, Cross wall H-shaped, chloroplast parietal and net-like appearance In Thailand, the common name is "Sarai Kai".
Classification :	Division Chlorophyta Family Microsporaceae
Species :	17
Remark :	Used as food in the northern region around Mekong and Nan Rivers called "Kai Yee", "Kai Pan" etc.

Source: Mongkol Ingkutanon , Patcha U-Tiswannakul. (2023). The Menswear Branding Innovation from Algae Fibers Innovation for Reuse Revolutionaries Target Group by Using Zero Waste Concept. The 2023 International Academic Multidisciplines Research Conference in Vienna

Table 4: Feasibility of utilizing algae by-products from shrimp farming

Utilization Guidelines	Mean	Standard Deviation (S.D.)	Satisfaction Level
Processed into alternative paper-type materials	4.94	.238	The most
Processed into alternative textile materials	4.94	.238	The most
Processed into alternative plywood	4.75	.479	The most
Processing into agricultural materials	4.80	.402	The most
other	4.56	.686	The most

Table 4 shows that from the analysis of algae properties. It is possible to use it for processing into alternative materials such as paper and textiles. Agricultural materials and alternative materials such as plywood, respectively. There are also suggestions for other areas of processing, including gelatinous foods. feed Medical materials, industrial materials, etc.

CONCLUSIONS AND DISCUSSIONS

Based on the results of the study, field survey, and feasibility assessment for the utilization of algae by-products from shrimp farming, The findings can be summarized as follows:

Shrimp farms in Phraek Nam Daeng Subdistrict, Amphawa District, and Samut Songkhram Province There are 3 types of algae, which are named after the locality, namely Pomnhang algae, Wunsen algae, and Mama algae, which are the most common Pomnhang algae, with 80% of the total algae found. The amount of algae affects the quality of water in shrimp farms, i.e., when algae are abundant, sunlight will not reach the bottom of the farms. This causes some algae to die and rot. Because the algae are characterized by sticky and small fibers, when the shrimp get stuck, they cannot get out and die. It also affects the yield.

Based on the study and testing of the preliminary properties of algae, it was found that all three types of algae have the possibility of utilization, but Pomnhang algae is suitable for

processing into alternative materials and community products. It has the distinctive feature that it can coagulate together into sheets. When dried in the sun, it dries. Some of them are dry and crispy, but they still cling together in sheets. The scientific name is Microspora sp. The cells are cylindrical, the thick shell walls are layered, and the longitudinal walls are H-shaped. There is a chloroplast next to the cell, shaped like a mesh. (Mongkol Ingkutanon , Patcha U-Tiswannakul, 2023)

The feasibility assessment found that algae were a by-product of shrimp farming. It is possible to use it for processing into alternative materials such as paper and textiles. Agricultural materials and alternative materials such as plywood, etc.

According to the conclusion of the research, it was found that the use of seaweed by-products from shrimp farming to be processed into alternative materials is considered to combine natural resource capital with creativity as a way to create value for the economy. This is consistent with the research titled The study of rattanakosin art towards ornament design from local materials, which uses natural materials to create jewelry works that create value and can meet the needs of consumers appropriately. It is a guideline to promote the creative economy. (Chanoknart Mayusoh, Supawadee Juysukha, Siracha Samleetong, 2023) In addition, the use of natural materials in the creation is an environmentally conscious approach by using resources in a cost-effective and maximum-benefit manner. With the concept of BCG economy (bio-circular-Green economy), which is one of the ways to help create advantages in both economic and environmental aspects, society and environment for the country.

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