

# Cultivation and beverage development of red alga, *Sarcodia suieae*



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## 1. Introduction

In Taiwan, the seaweed imports are much higher than those produced locally, indicating people's need for fresh and nutritious seaweed. However, food safety issues, such as seaweed products soaked in industrial-graded chemicals and imported seaweed products, which contain heavy metals, arise in the market; for which this laboratory studies the aquaculture technique for fresh seaweed without fertilizer.

*Sarcodia suieae* of the division Rhodophyta is a common edible seaweed for Liuqiu residents. With high dietary fiber and low calorie, it meets the health demands of modern people and has high potential for commercial application.

Many researches has discovered the advantages of eating seaweed, which contains anti-cancer, anti-aging, and cholesterol lowering contents of medical values; also, its dietary fiber, proteins, amino acids, fatty acids and mineral are good for health.

Researchers studied the effect of feeding aqueous extracts from *Sarcodia suieae* on hyperglycemia mice. The results showed that feeding high to medium amount of the aqueous extracts (50, 10 and 5 mg/kg), of which the total carbohydrate content was 595 mg/g, total phenol content was 3.16 mg/g, and molecular weight was 500 kDa, for 10 weeks to the mice decreased and regulated their blood glucose levels. Another study supported its effect on enhancement of immune regulation as well as antineoplastic activity, and inhibition of lipid synthesis for mice: the mice were fed aqueous extracts from *S. ceylonensis*, of which the monosaccharide consist of galactose, glucose, xylose and mannose. The polysaccharide of *S. ceylonensis* could regulate blood sugar, regulate immune ability and inhibit lipid synthesis, and it had potential to become an antineoplastic drug. Therefore, *Sarcodia* drink is a health product which regulates blood sugar, regulates immune ability and inhibits lipid synthesis for modern people.

## 2. Design Concept

Our laboratory wants to develop inland aquaculture technique of *Sarcodia* sp. that can be produced stably at all seasons and meet the "sanitary standards of algal food" published by Food and Drug Administration. Currently, formula of *Sarcodia* drink has been completed and is at pilot production. Through this research, we hope to increase *Sarcodia* production and to refine *Sarcodia* drink product for higher market competitiveness.

The developed artificial aquaculture technique can produce *Sarcodia* stably at four seasons; also, the produced seaweed meet the "sanitary standards of algal food" published by Food and Drug Administration. After properly cooked, it becomes delicious dishes. *Sarcodia* is a special food source at Liuqiu; through artificial propagation, much more people can enjoy the seaweed originated from southern Taiwan. It is now for sale at local consumer cooperative and will be produced commercially at food manufacturer after technology transfer.



### 3. Technical Development

This technique can be divided into two parts: *Sarcodia* aquaculture and *Sarcodia* formula drink manufacturing.

#### i. Mass production of *Sarcodia*

*Sarcodia* is originated from the sea region of Pingtung. The thalli, 5-15 cm in length, appear dark-red and coriaceous with irregular-forked branches. After selection and cleaning, *Sarcodia* is placed at an outdoor seaweed culture FRP tank (200\*100\*100 cm). The temperature is set at  $25\pm 3^{\circ}\text{C}$  with a thermostatic control. Aeration is strong enough for thalli to move constantly in water. The salinity is maintained at  $32\pm 3$  ppt. Water exchange takes place every 3 days with addition of micro elemental culture media. Throughout culture process, density is kept at certain level to maintain seaweed growth.



#### ii. *Sarcodia* formula drink mixing

Ingredients of *Sarcodia* formula drink consist of *Sarcodia* water, white gourd tea, and freshly squeezed kumquat juice. The mixing begins with alginin extract of *Sarcodia* with boiled water; then, using white gourd tea as the base, *Sarcodia* water is added. While grinding and mixing with a blender, kumquat juice is added until the degree of sweetness reaches 10 via a refractometer.



### 4. Technological Competitiveness

Now the market price of *Sarcodia* is about 250 NTD/kg. *Sarcodia* used in this research is cultured inside the academy; its production amount depends on the weather. In the future, the culture cost is estimated to be 25 percent of the selling price. The Net profit of *Sarcodia* formula drink at first stage is estimated to be 30 percent of the selling price. After improvements in aquaculture techniques and product formulas through this research, technology transfer with food manufacturer is expected; later on, the manufacturer will continue to produce, spread and sell the products.





## 5. R&D Result

Sarcodia aquaculture system is this laboratory's own design, which produces fresh and pesticide-free Sarcodia thalli with quality control. The seaweed itself contains many beneficial elements for human bodies; due to the fact that people's attention towards safety of raw materials has increased nowadays, development of new seaweed drink can meet the demands of people for food safety and increase the effectiveness of Sarcodia aquaculture.

In this research, Sarcodia propagated by inland-aquaculture technique is made into convenient Sarcodia drink with abundant nutrients, which fits the busy tempo of modern society. It allows consumers to acquire nutrients fast and effectively; also, it supplies dietary fibers, that most people lack, and is low in calorie, that fits the need of modern people's food and health.

The products developed by this laboratory have well-secured food safety. During the manufacturing process of drinks, no more additives were added, and the fresh Sarcodia thalli are propagated by inland-aquaculture technique with water quality control. In its growth process, excess heavy metals are not accumulating beyond the safety value, and no other pollutants are involved. Development of Sarcodia formula drink can increase the market demand for Sarcodia as well as the eating habit for seaweed, and can promote the seaweed aquaculture industry. Statistics shows that the annual seaweed production by aquaculture has increased by 7.8%; the annual production value of Taiwan is 220 million NTD, while the import value is 1.7 billion NTD, which is higher than the former and indicates the development potential of seaweed aquaculture. Furthermore, local-propagated seaweed is a green food source with lower carbon footprint. The seaweed formula drink developed by this research, in conclusion, is beneficial for human health, seaweed aquaculture industry, and economic growth of Taiwan.

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