

Basic Stage

(Fiscal Year 2005-2007)

Saga Ariake Sea Coastal Area

Establishment of Environmental-Friendly Nori Culture System and Creation of Zero Emission System in Nori Industry at Ariake Sea

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Project Promotion

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Science and Technology Coordinator... Seiji Yasuda

Core Research Organizations

Saga University,
Saga Prefectural Ariake Fisheries Research and Development Center,
Industrial Technology Center of Saga

Major Participating Research Organizations

Industry... NISHIHATSU INDUSTRY CO.,LTD, Togami Electric Mfg. Co., Ltd.
TENZAN SAKE BREWER CO.,LTD, Miyajima Shoyu Co. Ltd.
ORIENTAL YEAST CO.,LTD, DAIICHI SEIMO CO.,LTD,
Showa Sangyo Co., Ltd.
Academia... Saga University, Kyushu University, Nishikyushu University,
Konan University
Government... Saga Prefectural Ariake Fisheries Research and Development Center,
Industrial Technology Center of Saga, Saga Prefectural Livestock Experiment Station,
Saga Prefectural Regional Industry Support Center

Aim of research and development

Ariake Sea coastal area is known to have highest productivity of nori (Rhodophyta algae, Porphyra spp.) in Japan, so the nori production in its cultivation is developed as one of the specialty in Saga Prefecture. However, the harvest amount of nori in the cultivation in this area has been unstable in recent year, possibly due to the sudden change for worse in the fishery environment. Therefore, the recovery of the fishery environment has become the urgent problem to be settled in Ariake Sea and its coastal area.

The aim of this research is to overcome the problem mentioned above by using the network composed of industries, universities and research institutes of local government which are engaged in the nori production and also its related researches in this area. Combination of the technology and knowledge in nori and its cultivation, which has been accumulated individually in each component of the network, has to contribute to settling the problem and developing the nori industry.

The attempt of the establishment for the novel nori industry system containing of the development for functional food materials and feeds, the main aim of this project, will lead the creation of "zero emission type" industries in Ariake Sea coastal area. Thus, the advancement of nori industry with the collaboration among each unit of the network constructed in this project has to be the beginning of the way for the environment regeneration in Ariake Sea.

Contents of research

1. Researches on stable production of nori and environmental conservation of Ariake Sea

According to the possible change of hydrographic condition at Ariake Sea, the current nori industry is often suffered from various infectious diseases of nori such as Red rot disease, Chytrid disease and Suminori disease. Although the acid treatment agent containing phosphorous compound was developed for the disease control, its using was claimed to be the negative factor for the sea environment. Since removal of nori body residue that adhered to the nori net takes a long time after cultivation, this is another pollution source for surroundings as the occurrence of small insects (fly etc.) as well as the foul order etc. In this research, it is based on the result that had been achieved by a joint research with the industry-academia-government cooperation or public achievement to establish the cultivation technology for the stable production of nori without any stress for the marine environment. The application and development of the results in many fields make clear the influence of the cause of the disease and the nori cultivation itself affected on the surroundings. It divides into groups of the following three topics. The research and development is executed in each group, and the team works on construction of the environmental harmonic nori cultivation system specifically.

- Control and prevention of disease for stable production
- Establishment of novel, environmental harmonic nori cultivation
- Research and application of useful bacteria for the nori decomposition

2. Research on development of functional materials derived from nori for industrial utilization

In Saga Prefecture, nori is produced about 20 percent of the whole production in Japan (about 18 billion yen), and the nori sheet is commercialized as a brand of 'Saga Nori' produced from Ariake Sea around Saga Prefecture. In recent years, the decrease in the quality by the disease and the discolorment of the thalli of nori had become serious problem, therefore, it led uneasy elements in the income for the aquicultural labor of nori.

In this research, it is aimed to develop the nori-related materials to various fields as functional food materials, based on the results that had been achieved through a independent research of the prefecture and the joint research project among industry-academia-government. Concretely, it divides into groups of the following three topics, and the research and development is executed in each group to construct the zero emission system in nori industry.

- Development of food materials with health claims about porphyran (POR) and related materials
- Development of functional food materials that make the most of characteristics of water-soluble low molecular extract
- Development of functional feed for enhancement of laying hen immunity and for functional egg production

The main study results

1. Researches on stable production of nori and environmental conservation of Ariake Sea

[Control and prevention of disease for stable production]
The primer planning and the zoospore collection method were developed to establish the PCR polymerase chain reaction(PCR) for detecting the pathogen of nori diseases at an early stage. The investigation was conducted at the actual fishery area to detect the zoospores.

[Development of a new environmental harmonic nori culture]
A new acid treatment agent was developed for the cultivation of nori.

[Search for useful bacteria concerning decomposition of raw and dried nori]
The nori degrading bacteria were isolated and identified.

2. Research on development of functional materials derived from nori for industrial utilization

[Development of food materials with health claims about porphyran and related materials]
We established the optimized method for extraction and purification of POR, the simple determination method for POR, and analytical method for the mean molecular weight of POR by the use of HPLC. Also, enzyme(s) that degrade POR was isolated from marine microorganism.

[Development of functional food materials that make the most of characteristics of water-soluble low molecular weight extract]
The physiological activity in the water-soluble low molecular weight extract was clarified.

[Development of functional feed for enhancement of laying hen's immunity and for functional egg production]
Usefulness of the water-insoluble fraction and the discolored nori was clarified.

