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Seaweed Cultivation

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INTRODUCTION

Seaweeds are simple plants of the sea. They are primitive plants without root and shoot system and widely distributed in the oceans from the tidal level to considerable depths, floating freely or attached to substrate with hold fast. Seaweeds are wonder plants of the sea since they are efficient converters of solar energy through constant nourishment of the surrounding seawater and some of them grow faster than anything on earth. In the presence of sunlight, on the surface waters of the sea they can grow 3 to 5 times more of their original weight during a 45 days growth period. Seaweeds are also termed as the 'Medical Food of the 21st Century' as they are being used as laxatives, for making pharmaceutical capsules, in treatment of thyroid, cancer, bone-replacement therapy and in cardiovascular surgeries.

Seaweeds are mainly eaten in the Oriental countries like Japan, China, Korea and more recently, in USA and Europe. The Republic of Korea has the highest per capita consumption of seaweeds in the world. Seaweeds are popularly called 'Sea vegetables' and rich in minerals and vitamins. Therefore, seaweeds are considered as medical food of the 21st century. They also provide a strong base for growth promoters of several plants and expected to be the major source of bio fertilizers to start organic agricultural revolution in the country. Seaweeds are found to be one of the major sources of bioactive compounds and have yielded molecules for anti- HIV drugs and other dreadful disease. Seaweed products such as agar, alginate and carrageenan have numerous applications in the food, beverages, pharmaceutical, chemical, cosmetic and textile industries. After human food consumption, the next most valuable commercial use of seaweeds is as raw material for extraction of agar, alginate and carrageenan.

Nutrition composition of seaweed-

Seaweeds are excellent source of vitamins A, Bl, B12, C, D & E, riboflavin, niacin, Pantothenic acid and folic acid3,4 as well as minerals such as Ca, P, Na, K. Their amino acid content is well balanced and contains all or most of the essential amino acids needed for life and health.

Table 1. Nutrition composition of some seaweed species

Seaweed *spp.*	Protein%	Lipid%	Carbohydrate%	Ash%
Ulva	26.1	2.1	42.0	7.8
Enteromorpha	19.5	0.3	64.9	15.2
Mosostroma	20.0	1.2	63.9	14.9
Laminaria	16.1	2.4	39.3	19.6
Alaria	17.1	3.6	39.8	14.9
Saragssum	19.0	2.9	33.0	16.2
Padina	18.81	1.7	31.6	10.3
Prophyra	28.4	4.5	45.1	6.9
Rhodymenia	21.5	1.7	44.6	5.3
Gracilaria	24.3	1.8	61.7	11.3

Seaweed resource in India-Seaweed is abundant along the Tamil Nadu and Gujarat coasts and around Lakshadweep and Andaman & Nicobar Islands. Rich seaweed beds occur around Mumbai, Ratnagiri, Goa, Karwar, Varkala, Vizhinjam and Pulicat in Tamil Nadu, Andhra Pradesh and Chilika in Odisha.

Status and Potential –

Around 844 species of seaweeds have been reported from Indian seas, their standing stock is estimated to be

about 58,715 tonnes (wet weight). Out of the 844 seaweed species, India possesses around 434 species of Red Algae, 194 species of Brown Algae, and 216 species of Green Algae.

Project Location and Implementation-

A. Beneficiaries: Coastal fisher-families, especially fisher-women, their societies/ SHGs, and farmers/ entrepreneurs. The project is to be implemented in a cluster model with each cluster consisting of a minimum of three beneficiaries. Project will be implemented by the beneficiary with technical support from Department of Fisheries of the State Govt.

B. Selection of Site for Seaweed Cultivation: Seaweed cultivation would be undertaken in shallow coastal waters of maritime States, wherein Bamboo-Rafts or Tube-Nets would be held in clusters. Suitable sites for seaweed cultivation will be selected based on the following criteria:

- Stable seawater with not less than 30 ppt salinity
- Sandy/ rocky bottom with transparent water
- Ideal temperature 26-30^{0}C.
- The area should have minimum 1.0 m water depth during low tide.
- Area with mild water currents is preferred.

The benefits of seaweed farming-

- **For Nutrition: -** Seaweed is a source of vitamins, minerals, and fibre, and can be tasty.
- **For Medicinal Purpose: -** Many seaweeds contain anti-inflammatory and anti-microbial agents. Their known medicinal effects have been legion for thousands of years. Certain seaweeds possess **powerful cancer-fighting agents** that researchers hope will eventually prove effective in the treatment of malignant tumours and leukaemia in people.
- **For Economic Growth: -**Seaweed has also contributed to economic growth. Among their many uses in

manufacturing, they are effective binding agents (emulsifiers) in such commercial goods as toothpaste and fruit jelly, and popular softeners (emollients) in organic cosmetics and skin-care products.

- **Bioindicator:** -When waste from agriculture, industries, aquaculture and households are let into the ocean, it causes nutrient imbalance leading to **algal blooming,** the sign of marine chemical damage. Seaweeds absorb the excess nutrients and balance out the ecosystem.
- **Iron Sequestrator:** -These aquatic organisms heavily rely on iron for photosynthesis. When the quantity of this mineral exceeds healthy levels and becomes dangerous to marine life, seaweeds trap it and prevent damage. Similarly, most heavy metals found in marine ecosystems are trapped and removed by seaweeds.
- **Oxygen and Nutrient Supplier: -**On their part, the seaweeds derive nutrition through photosynthesis of sunlight and nutrients present in seawater. They release oxygen through every part of their bodies. They also supply organic nutrients to other marine life forms.

Problems in seaweed farming-

The major problems in the seaweed industry include overexploitation leading to a scarcity of raw material, poor quality raw material, labour shortages during the paddy harvesting and transplanting season, lack of technology to improve processed product quality, and a lack of information on new and alternative sources of raw materials. Attention should also be given towards developing hybrid species with superior growth and nutritional characteristics. The problem of eutrophication of culture ponds due to overfeeding and excreta released by fish can be tackled by culturing seaweeds in such ponds.

CONCLUSION

Seaweed cultivation not only brings in economic gains but also generates considerable benefits for the environment and the better use of valuable land resources**.** In the 21st century 'food security' is one of the major concerns among agriculture scientist communities. After realizing the significance of seaweed both as a food and as an economic asset, scientists are now acknowledging seaweed as an alternative way to combat food security in future. Accordingly, the improvement of seaweed aquaculture industry needs to focus on generating more economic returns and environmental benefits and advancing the cultivation technology. It is worth looking forward to improving the coastal water quality and saving valuable land resources by cultivating seaweed in coastal regions.