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Popular Article

Seaweeds: An untapped treasure in India

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Introduction

Seaweeds, often referred to as macroscopic algae, thrive in marine environments such as rocky shores and shallow coastal waters. These versatile marine plants are celebrated for their myriad applications across agriculture, industry, biomedicine, and even personal care. Dubbed the "Medical Food of the 21st Century" by experts like Mohamed (2016), seaweeds are particularly valued for their role in producing agar, agarose, and carrageenan—compounds widely used in industries ranging from food processing to pharmaceuticals.

Globally, approximately 844 species of seaweeds have been identified along Indian coasts, of which 221 hold commercial significance. India harbors an estimated 434 species of red algae, 194 species of brown algae, and 216 species of green algae (DoF, 2020). Red seaweeds dominate the coastal flora, followed by green and brown variants. Despite its underwhelming 0.13% contribution to global seaweed production, India has the potential to expand its share to 2.5% with concerted efforts. Seaweed cultivation not only generates sustainable livelihoods for coastal communities but also mitigates coastal pollution by reducing carbon dioxide levels.

In 2022, global seaweed production reached 35.1 million tons (wet weight), valued at $16.5 billion. However, India's contribution was limited to about 47,000 tons harvested from natural beds, underscoring untapped potential for growth.

Prominent Cultivable Seaweed Species in India

India's seaweed cultivation thrives along the coasts of Tamil Nadu, Gujarat, Lakshadweep, and the Andaman & Nicobar Islands. Notable species cultivated for industrial purposes include:

- **Red Algae:**
  - *Gelidiella acerosa, Gracilaria edulis,* and *G. dura* for agar production.
  - *Kappaphycus alvarezii* for carrageenan extraction.
- **Brown Algae:**
  - *Sargassum wightii* and *Turbinaria conoides* for alginate production.

These species are typically cultivated using bamboo rafts or tube nets in open waters, a cost-effective method requiring minimal maintenance. For instance, Tamil Nadu's fisherfolk

produce 400–500 tons (dry weight) annually from *Kappaphycus alvarezii*, involving over 2,000 families in this eco-friendly practice.

Seaweed Farming Practices

1. Site Selection

Ideal farming sites must feature:

- Seawater salinity of at least 30 ppt.
- Sandy or rocky substrates with clear water.
- Temperatures ranging between 26–30°C and pH levels of 8.2–8.7.
- Mild water currents (30–60 cm/sec) and a minimum depth of 1 meter during low tide.

2. Raft Preparation and Stocking

Seaweed rafts are constructed using bamboo poles measuring 3×3 meters and are either fixed or free-floating. For *Kappaphycus alvarezii*, each raft requires 50–60 kg of seed material, yielding up to 250 kg of seaweed per cycle. With six cultivation cycles annually, a single raft can produce up to 12,000 kg, fetching Rs. 20–30 per kg for wet seaweed and Rs. 110–120 per kg for dried varieties.

3. Harvesting and Post-Harvest Care

Seaweeds are harvested every 45–60 days, typically growing fivefold during this period. After harvest, they are washed to remove sand and debris, then sun-dried to reduce moisture content. Properly dried seaweed fetches higher market prices and can be stored in well-ventilated areas.

Cultivation Methods

1. **Open Water Farming:** Utilizes natural marine areas like bays, lagoons, and coral reefs with stable substrates. Techniques include Single Rope Floating Raft (SRFR), tube nets, and monoline systems.
2. **Pond Farming:** Ponds are stocked with chopped seaweed material, maintaining water depths of 30–80 cm. Regular water exchange and fertilizer use enhance growth.
3. **Integrated Multi-Trophic Aquaculture (IMTA):** Combines seaweed farming with shrimp, fish, or mussel aquaculture. For example, *Kappaphycus alvarezii* grown alongside green mussels in Kerala increased seaweed yields by 20-fold within 80 days.

Global Competitiveness and Market Dynamics

Globally, seaweed exports totaled 210 million tons in 2023, worth $434 million. While China leads with a 27% market share, India lags behind at 0.3%, ranking 29th globally. Industrial seaweeds fetch higher prices, emphasizing the need to expand India's export capabilities.

Applications and Innovations

1. Commercial Products:

Seaweed is a resource for biofuels, fertilizers, nutraceuticals, cosmetics, and bioplastics. Examples include:

- **Bio-stimulants:** 'Sagarika,' an organic fertilizer developed by CSIR.
- **Nutraceuticals:** 'Cadalmin,' an arthritis relief product by ICAR-CMFRI.
- **Value-Added Goods:** Seaweed-based tea cups and bioplastic films by Tamil Nadu research institutes.

2. Environmental Benefits:

Seaweeds act as nutrient scrubbers, reduce carbon footprints, and serve as nurseries for marine life, enhancing ecosystem health.

Challenges and Opportunities

Despite its potential, seaweed farming in India faces hurdles such as rising sea temperatures, water pollution, and reliance on wild seeds. Solutions include:

- Development of laboratory-grown seeds.
- Awareness campaigns to boost domestic demand.
- Infrastructure for processing and marketing through initiatives like the proposed Seaweed Park in Tamil Nadu.

Conclusion

Seaweed farming represents an untapped opportunity for India to enhance coastal livelihoods and promote sustainable industrial practices. By addressing current challenges and leveraging governmental support, India can emerge as a global leader in seaweed production, unlocking its immense ecological and economic potential.

References:

Department of Fisheries (2020). Government of India. https://dof.gov.in/sites/default/files/2020-07/Seaweed_Cultivation.pdf

Department of Fisheries (2021). Package of aquaculture practices. Government of Kerala. https://fisheries.kerala.gov.in/sites/default/files/202102/Aquaculture%20Practices_compressed.pdf

DAHD, 2023. Department of Animal Husbandry and Dairying. Ministry of Fisheries, Animal Husbandry & Dairying. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1954383 .

Department of Fisheries (2024). Ministry of Fisheries, Animal Husbandry and Dairying Government of India. https://pmmsy.dof.gov.in/

Johnson, B., Ranjith, L., Divu, D., Mojjada, S.K., Koya, M., Tamilmani, G., Ignatius, B., Suresh, V.V.R. and Gopalakrishnan, A., 2023. Seaweed farming technologies. Course Manual. ICAR- Central Marine Fisheries Research Institute, Kochi, pp. 210-216.

Mohamed, G., 2016. Current trends and Prospects of Seaweed Farming in India. Winter School on Technological Advances in Mariculture for Production Enhancement and Sustainability. *Course Manual*, Central Marine Fisheries Research Institute, Kochi, pages 78-84.

National Fisheries Developmental Board (2022). https://nfdb.gov.in/PDF/NFDB-Projects/4.Seaweed%20Cultivation%20%20Alternate%20Livelihood%20for%20Coastal%20Fisher%20Population.pdf

Reddy, P.B., Goud, P.M.K. and Das, A., 2023. Seaweed cultivation: Untapped potential of India. *Indian Farming*, 73(9), pp.03-06.