SEAWEED FARMING IN INDIA: INDUSTRY PERSPECTIVE



AQUAGRI – An Introduction

Aquagri emerged from a CSR initiative of Pepsi Co. to promote livelihoods in coastal areas in 2008.

We have pioneered seaweed cultivation in India and our the first manufacturers of carrageenan and organic bio-stimulants from indigenous cultivated and collected seaweeds.

Aquagri is the first company to establish seaweed extract concentration and spray drying facility to create a world class bio-stimulant for the farmers.

It has led to yield increase of 15-35 % in different crops along with reduction in fertiliser application by 25 %. Sagarika (28 % w/w) is manufactured as per patented technology (US Patent No. 6,893,479; Indian Patent No. 224,938) of Central Salt and Marine Chemical Research Institute (**CSMCRI**), a constituent laboratory of Council of Scientific and Industrial Research (**CSIR**), Government of India.



"Scientific intervention and technologies hold the key to improving productivity in Indian agriculture... We now need to focus on a Blue Revolution... fisheries... ornamental fishes and seaweeds... We need greater research and promotion of coastal seaweeds... Coastal seaweeds have great potential for human health care and agriculture... We should work on scientific methods of seaweed agriculture. Seaweeds are important raw materials... and can play a significant role in improving crop productivity..."

Shri Narendra Modi, Honourable Prime Minister of India, July 29, 2014 at the 86th Foundation Day of the Indian Council of Agricultural Research (ICAR), New Delhi.



"Seaweed cultivation neither requires land nor irrigation water nor any fertilizer; instead it yields fertilizers, which will be used in land-based crops."

Dr. APJ Abdul Kalam, Former President of India



The red algae (Kappaphycus Alvarezii) is cultivated by coastal communities in India, mainly comprising of <u>women</u>. It is an innovative model which provides a <u>sustainable livelihood</u> to them.

VISUAL OVERVIEW OF THE SEAWEED FARMING OPERATIONS



Livelihood creation - 1000+Natural Carbon SinkReverses Ocean AcidificationProtects the coral reefsSeaweed is pesticide and fertilizer free - 100% Organic

Beneficial Environmental Impact of AquAgri initiative and Sea Plant Cultivation

- + A great livelihood creation opportunity for the coastal communities
- + Our patented process compared to the conventional process and allows for the coproduction of bio-stimulants for agriculture application and carrageenan from the same biomass using 70% less process water
- + Our recycling systems ensure no effluent discharge
- + Bio-stimulants help reduces chemical load in agriculture and offers organic nutrients for animal use
- + Kappaphycus sequesters carbon opportunity for carbon credits
- + Kappaphycus cultivation creates a new habitat/shelter for marine organisms
- + This algae can be a rich source of food grade potassium chloride-salt for patients having high blood pressure



Seaweed Opportunity

- Recognition of Seaweed under Ministry of Fisheries and financial support allocated for development of this sector under PMMSY.
- India can become a leading player in the global market given the 7500km + coastline and a large coastal population looking for livelihood opportunities.
- Can provide sustainable livelihood to 100,000 people with majority of women.
- Can support the Prime Ministers visionary plan to reduce chemical fertiliser usage by 25% to maintain soil health.
- Can play a major role in bridging the productivity gap of organic production.

Government of India has prepared an ambitious plan backed by sufficient allocation of funds to accelerate the growth of this sector.

Commercially Source: FAO(2016).



We need to import new strains like Eucheuma Spinosium and Gracilaria Heteroclada

FROM: Seaweed production: overview of the global state of exploitation, farming and emerging research activity. H. Buschmann, Carolina Camus, Javier Infante, Amir Neori, Álvaro Israel, María C. Hernández-González, Sandra V. Pereda, Juan Luis Gomez-Pinchetti, Alexander Golberg, Niva Tadmor-Shalev & Alan T. Critchley, European Journal of Phycology, 52:4, 391-406, 2017. DOI: 10.1080/09670262.2017.1365175

Seaweed farmers & Dry-weed Production - 2001 – 2020



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Challenges that we need to address to put India on the global seaweed map.

- Globally seaweed cultivation is dependent on 6 species, out of which 3 are suitable to Indian tropical waters and we only have one option for our growers which is Kappaphycus.
- + Even our Kappaphycus seaweed which is a progeny of a 5cm piece brought by CSMCRI Scientists in the 1970's has lost its vigour and growth potential due to climate change and unfavourable sea conditions.
- We need to urgently bring in fresh Kappaphycus seaweed to get our productivity levels to 5x in 45 days as earlier.
- For import we need to replicate the law created by Department of Fisheries for Vannamei Prawn for seaweeds, as currently no defined procedure exists.

Challenges that we need to address to put India on the global seaweed map.

- + We need high quality planting material of Kappaphycus which should be imported from Indonesia or Philippines and then multiplied in the lab by micro propagation/tissue culture technique, which has been proven at R&D Scale.
- Active participation and scientific research is required from ICAR institutes to support development of seed in the lab on mission mode to make cultivation sustainable and viable for the growers.
- 15MT of fresh seaweed needs to be imported if we want to meet year 1 target set by the Fisheries Department under PMMSY scheme.

Roadmap for making Seaweed Cultivation successful in India

- Rejuvenation of the planting material and development of seed banks and micro propogation/tissue culture labs under public private partnership.
- Introduction of new cultivars like Spinosium, Gracilaria etc. to increase growing options for cultivators.
- Establish a defined process for import of fresh germ plasm both for existing species and for new potential species much like the system being followed for fish culture.
- Introduction of exotic species is an accepted development strategy and has defined the success of green revolution in India and the successes in prawn and fish culture.
- Latest study by MoEF&CC along with National Centre for Sustainable Coastal Management (NCSCM) has confirmed the finding of CSMCRI and CMFRI of not finding any adverse impact on the corals in the Palk Bay Region where cultivation is being practiced for the last 15 years.
- Kappaphycus as advised by Policy Paper No. 22 of National Academy of Agriculture Sciences (NAAS) as early as 2003 should now be treated at par with native species and its cultivation permitted in the Gulf Areas.

Roadmap for making Seaweed Cultivation successful in India

- Recognise that cultivation can only take place in gulf areas, sites with reef protection and coasts where the tidal amplitude is low. Open sea areas with high tidal amplitude not viable for the coastal communties as due to operational risk and vulnerability of the infrastructure.
- Clear policy should be articulated on the collection and harvesting of seaweeds in every State of the country. State Government should partner in identification of potential sites where collection opportunities exist.
- Central support should be provided to State Governments for carrying out GIS based survey for suitable site mapping both for collection and cultivation.
- Institutional and private sector partnerships should empower the local population to start collection and cultivation activity. To facilitate this announcing the prices at which the material would be bought by the companies should be clearly communicated to the beneficiaries.

Roadmap for making Seaweed Cultivation successful in India

- Focus should be on providing predictable and viable income to the collectors and cultivators rather than just prices.
- Introduction of insurance from government for seaweed growers to protect against natural calamities.
- Funding may be provided to Institutions and Universities for the development of more resistant seaweed strains through selection, breeding and tissue culture. As also for finding and developing better processes and new applications.
- Currently no State has planting material of any species to even commence seaweed cultivation.
- Need to make some allocation of deep sea area and demarcate it for seaweed farmers where boats/trawlers don't cause disruption. We need to go to deeper sea to prevent ice ice disease and lower sea water temperature suitable for cultivation. Govt. should support creation of this infrastructure.

Seaweed Cultivation – Global Geography



Seaweed Cultivation Targets

- Projected annual Mari-culture production potential based on suitable areas available in the Indian region ranges from 4 to 8 million tons (CMFRI).
- Fisheries target of 10.6 Lakh Tons of Seaweed has been fixed for 2024-25

S. No.	States/UT	Production target (Lakh Ton) 2024-25
1	Gujarat	2.00
2	Maharashtra	1.00
3	Goa	0.20
4	Kerala	0.50
5	Tamil Nadu	3.00
6	Andhra Pradesh	1.50
7	Odhisa	1.00
8	West Bengal	1.00
9	Puducherry	0.20
10	Lakshadweep	0.10
11	Andaman & Nicobar Islands	0.10
	Total	10.60

The entire targetted output can be utilised for the bio-stimulant application if we achieve 10% penetration of arable land in India. Market for hydrocolloids as well as nutritional products for animals & humans offer opportunity for higher biomass utilisation

Seaweed Based Product Opportunities





Food Additives Hydrocolloids





Organic A Agri- Inputs Bio- stimulant (Sagarika)





Animal Nutrition





Organic Chemicals





Nutraceuticals





Edible

Organic Bio-Stimulant Product Range – IFFCO India



Bio-Stimulant Relevance

- Escalating chemical fertiliser prices that have more than doubled in the last two years.
- Rising climate event requiring products to enhance crop resistance
- Government thrust on natural agriculture
- Low cost input for increasing productivity of rain-fed crops
- Can play an important role in increasing grass land productivity.
- New bio-stimulant regulation to increase market access

CSIR Award for S&T Innovation for Rural Development Aquagri & CSIR – CSMCRI – Joint Award given on 26th September 2016 "Cultivation of red seaweed Kappaphycus alvarezii and co-production of bio-nutrients & carrageenan from fresh seaweed."



Product Launch with President of India Technology Day 11th May 2016

