

Seaweed Cultivation- Socio-economic Sustainability

Genesis

- Mars suggests to PepsiCo. India to explore seaweed farming as an opportunity leveraging their contract farming experience.
- PepsiCo. search for technology and planting material leads it to CSMCRI (Central Salt & Marine Chemicals Research Institute)
 - an enduring relationship is established.
- PepsiCo. initiates work to promote seaweed cultivation in coastal Tamil Nadu. Government permission received in December 2005.
- Mars makes available services of a global cultivation expert and assures buy back arrangement.
- By 2008 a viable cultivation model working through self-help groups is established.
- July 2008 PepsiCo. transfers the project to Aquagri – Mars establishes the relationship with Aquagri.



SEAPLANT CULTIVATION....

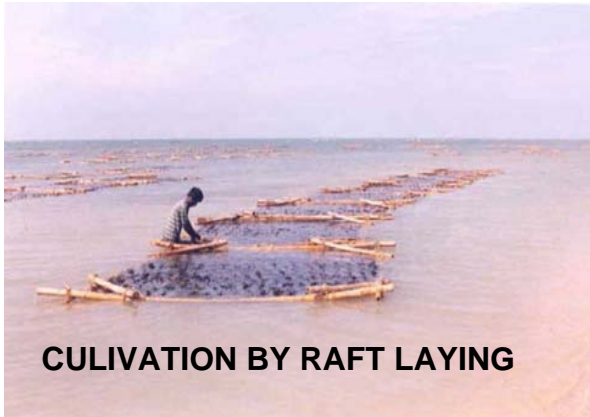
A Visual Introduction



RAFT PREPARATION



SEEDING OF ROPES



CULTIVATION BY RAFT LAYING



RAFT FOR HARVESTING



DRYING ON SHORE



KAPPAPHYCUS CULTIVATION IN TAMIL NADU, INDIA



PREPARATION OF
SEED MATERIAL



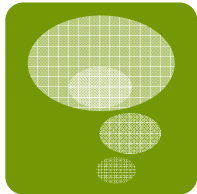
RAFT PREPARATION AND
LAYING



SEAPLANT CULTIVATION....

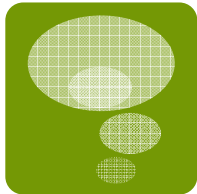
A great livelihood opportunity for fisher-folk and landless coastal poor

- Cultivation undertaken by self-help groups (SHG's) supported by the extension team and assured fixed price buy back by the company.
- Infrastructure like bamboo's and ropes financed by the bank with seed capital support subsidy from the fisheries or rural development departments.
- Allows for flexible working hours enabling greater women participation. Current work force ratio is 70:30 in favor of women.
- Currently income earned by an individual member in excess of Rs 5000 per month. Good growers earn over Rs 10000 per month. Today, over a thousand people are earning their livelihood from this activity and numbers are growing.
- Due to income potential, in many cases the entire family is becoming actively involved in the cultivation.

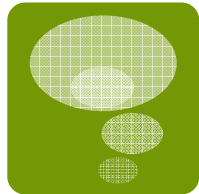


Global Practice: CARRAGEENAN EXTRACTION FROM DRY WEED

- The process of manufacture and extraction of carrageenan from dry weed is both water and energy intensive.
- Given the concerns of water availability in the coastal areas, partnered CSMCRI in developing fresh weed processing technology.
- This process triggered the co-creation of a range of bio-stimulants/nutrients which have application in agriculture and animal nutrition.
- A new process of Carrageenan manufacture with greatly reduced water consumption and zero discharge became a reality.



NEW APPROACH TO PROCESS FRESH KAPPAPHYCUS ALVAREZII



Kappaphycus Alvarezii



Sea plant

AQUASAP
Sea Plant Nutrient

AQUAFEED
Animal Nutrition

CARRAGEENAN
Polysaccharide
Gelling/Stabilizing Agent

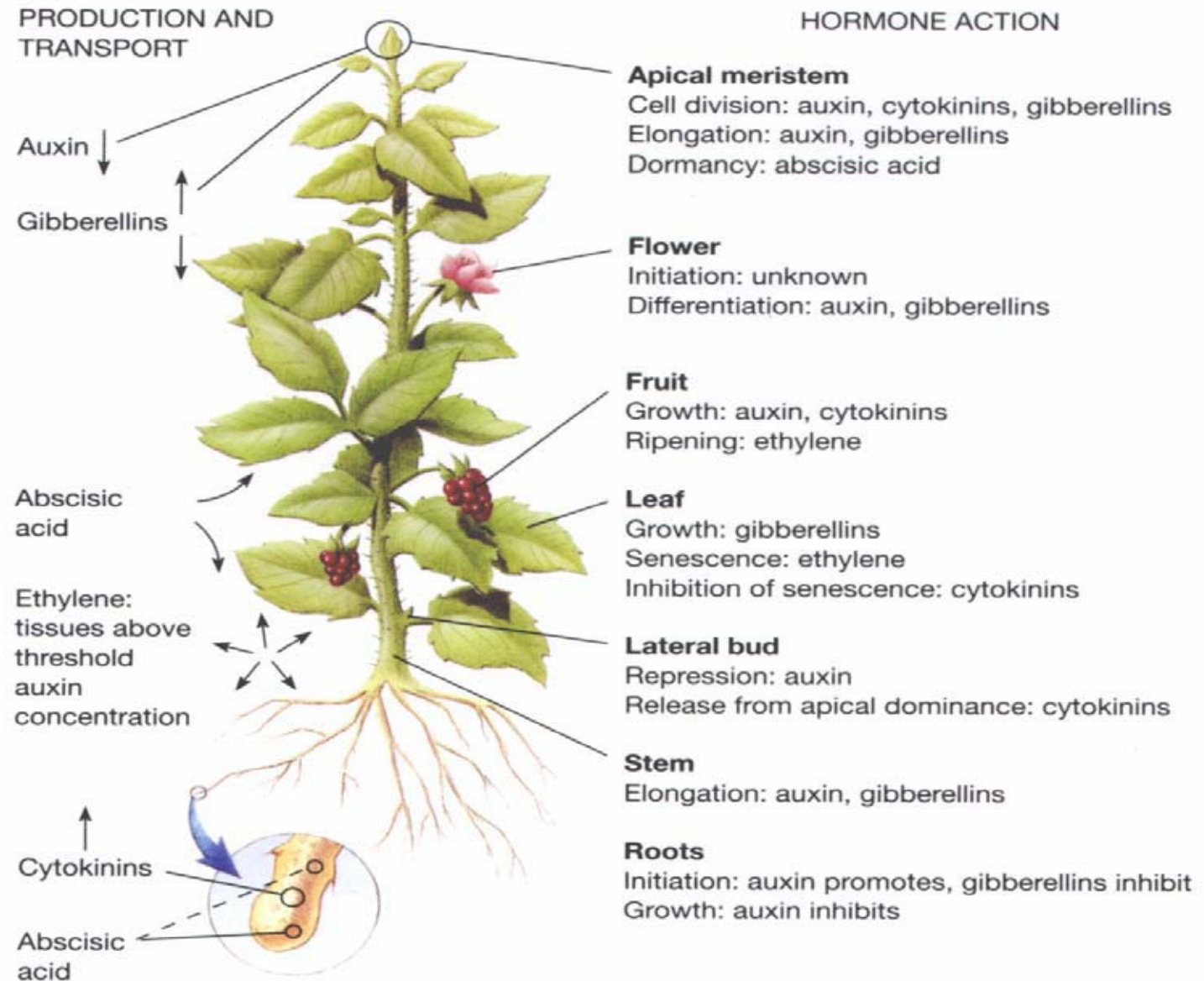
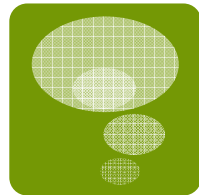
AQUASAP.... An Introduction

- AQUASAP is a natural extract of the sea plant *Kappaphycus Alvarezii*. It has no chemical additives other than bio-degradable food-grade preservatives at very low levels.

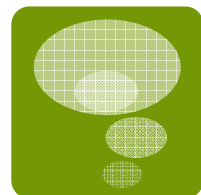


- AQUASAP is a rich source of micro and macro-nutrients. A natural source of Plant Growth Regulators (PGR) such as *Auxins*, *Cytokinins* and *Gibberellins*, that provide a major boost to crop yields by accelerating the plant's metabolic function. Its amino acid profile stimulates nutritional uptake from traditional feed
- This seaweed extract also releases its nutrients gradually into the soil. It is an excellent part of a **balanced soil-building program**.
- Field Trials have been carried out over a range of cultivars in the last five years. Results reveal consistent productivity gains across crops.

PGR IMPACT ON PLANTS ... A visual representation



YIELD IMPROVEMENTS SUMMARY USING AQUASAP



CROP	INCREASE IN YIELD (%)	TRIAL LOCATION
BROAD ACRE CROPS		
CORN	16.1	PEPSI FARMS
PADDY	18.0	MADRAS UNIVERSITY
BARLEY	11.0; 22.0	4 FARMER FIELDS; RAJASTHAN GOVT. FARM
WHEAT	20.2('05-'06); 13.5('06-'07)	PEPSI FARMS; 5 FARMER FIELDS
SUGARCANE	40.1('06); 30.0('07)	RENUKA SUGAR; 1000ac FARMER FIELDS IN K'TKA
MUSTARD	7.2	RAJASTHAN GOVT. FARM
VEGETABLES		
BRINJAL	22.1; 23.0	PEPSI FARMS; FARMER FIELDS
TOMATO	20.0; 18.0	CLEAN FOODS; PEPSI FARMS
POTATO	26.0; 25.0	TECHNO TUBERS; AGRI UNI.,W.B.
CAPSICUM	19.1; 24.0	PEPSI FARMS; FARMER FIELDS
CHILLI	18.0; 9.0	CLEAN FOODS; FARMER FIELDS
LEGUMES		
SOYABEAN	13.6('05); 15.3('06)	SOYA PRODUCERS ASSOCIATION
GRAM	12.5; 16.0	5 FARMER FIELDS; RAJASTHAN GOVT. FARM
PULSES	12.0	FARMER FIELDS, RAJASTHAN
PEANUT	14.5	MADRAS UNIVERSITY

AQUASAP- An affordable nutrient



- All the work on sea plant based nutrients has emerged from Europe and North America and the focus has been on cold water algae such as giant kelp and *Ascophyllum nodosum*.
- Though they have demonstrated success, have really not become main stream because of their pricing (typically above Rs 500 per liter)
- Kappaphycus sap priced at a level of 10% compared to internationally sourced product is a boon for Indian farmers and its application costs per acre – between Rs 250-500 makes it affordable by the poorest of farmers.
- AQUASAP can help in improving productivity of rainfed agriculture as PGR's have a major role in breaking dormancy reviving plants under stress.
- Literature suggests that Poly Amino acids in AQUASAP also build resistance against other sources of stress such as drought, cold and frost.

SEAWEED AS AN ANIMAL FEED SUPPLEMENT....

An Introduction



- Research and trials have proved beyond doubts that animals can obtain natural nutrients from seaweed that are incomparable by land plants or other sources.
- Seaweed contains macro and micro nutrients, trace minerals, alginic acid, vitamins, amino acids, naturally occurring plant growth hormones and antibiotics all chelated making them 100% absorbable
- Seaweed is also a natural source of Iodine which acts as an antibiotic to kill germs, increases growth rate, feed efficiency and helps regulate the metabolic function.
- Its complex constituent profile not only helps in nutritional uptake but also builds immune system and resistance against disease.
- Trials undertaken by Bombay Veterinary College and the Poultry Directorate confirm increased immune modulation response.

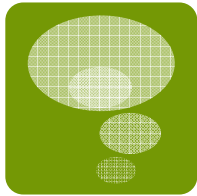
SEAWEED AS AN POULTRY FEED SUPPLEMENT....

Seaweed as a supplement for poultry feed has been used since the 1960's. Its benefits as indicated thru research and trials are as follows:



- Carotenoids (30-60 mg/kg) and rich trace element profile in seaweed improve egg shell strength
- Fucoxanthin A, producing a xanthophyll in the gut (90-250 mg/kg) improves egg yolk colour
- Low energy-high fibre improves intestinal function; combats feather picking and cannibalism.
- Farmer trials have shown a decrease in mortality rate by approximately 5% and an increase in weight of 10% as compared to control when 5% granules were added to the feed.

Carrageenan – An Introduction



- Carrageenans are a family of linear sulphated polysaccharides extracted from seaweeds.
- Carrageenan has the ability to form a variety of different gels which are stable at room temperature. This leads to a wide range of applications as thickening and stabilizing agents in various industries such as food processing, dairy, pet foods, cosmetics and pharmaceuticals.
- Current domestic demand is met from imports.
- Now, Aquagri Processing can offer a range of Carrageenan to meet customer specifications in respect to gel strength, breaking strength and viscosity.
- Aquagri is also in the position to address and create specific food solutions by means of custom making products to address viscosity and gel strength needs of various food products.

