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Technical Collaboration



Joint Venture

IFFCO BAZAR



“**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. ARJ Abdul Kalam, Former President of India

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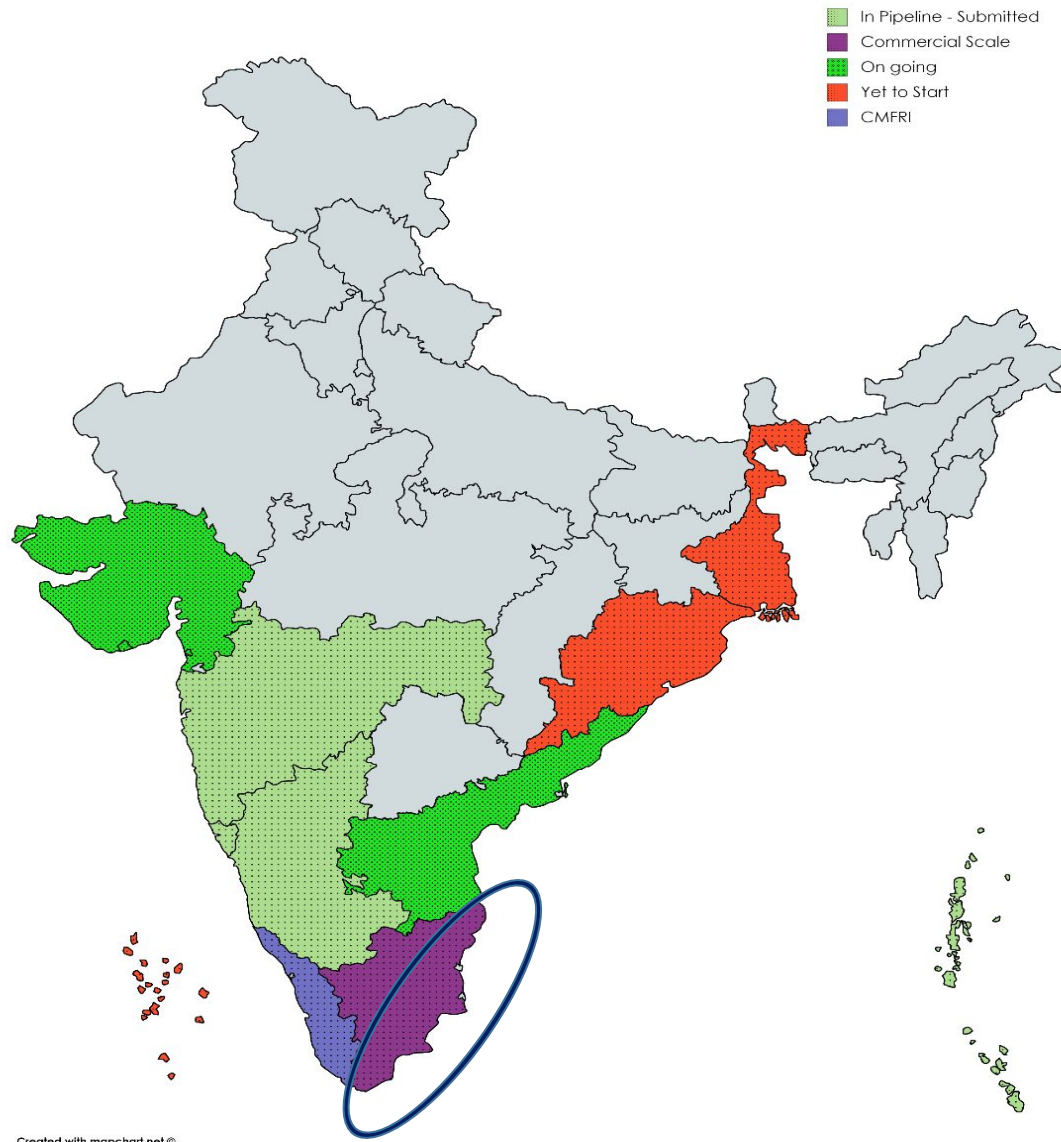
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*The red algae (*Kappaphycus Alvarezii*) is cultivated by coastal communities in India, mainly comprising of women. It is an innovative model which provides a sustainable livelihood vocation to them.*

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Steps involved in seaweed cultivation



Raft infrastructure



Raft frame making



Tie-tie preparation



Seedlings preparation



Planting bits



Ready for Planting



Anchoring



Farm maintenance



Harvest

Different Seaweed Cultivation Techniques



Floating Bamboo raft



Off-bottom mono-line



Iffco sagarika



A BLEND OF RED & BROWN SEAWEED EXTRACTS



Red seaweed
extract

Brown seaweed
extract



TECHNOLOGY LICENSED BY CSMCRI

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Iffco sagarika – an introduction



- **SAGARIKA** is a natural extract of the sea plant *Kappaphycus alvarezii* and Sargassum species. It has no chemical additives other than bio-degradable food-grade preservatives at very low levels.
- **SAGARIKA** is a rich source of micro and macro-nutrients. A natural source of Plant Growth Regulators (PGR) such as *Auxins*, *Cytokinins* and *Gibberellins* are in rich which provide a major boost to crop yields by accelerating the plant's metabolic function. In addition presence on thermo-stable glycine betaine and choline is found in **SAGARIKA** which provides stress tolerant ability to plants.
- This seaweed extract also releases its nutrients gradually into the soil. It is an excellent part of a **balanced soil-building program**.

Seaweed extraction facilities



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Ceramic, nano and ro filtration of seaweed extract



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Seaweed extract – Filtration, concentration & spray drying facility



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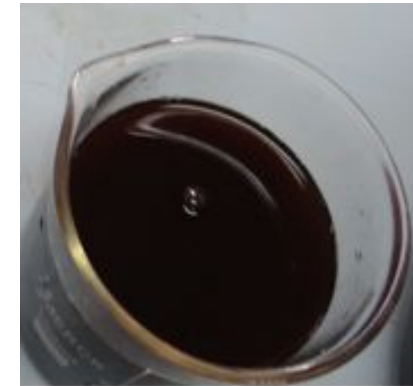


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concentration facility



TS: 2.5 – 3.0%



TS = 28%

Highest TS in the Market

Triple Effect Evaporator

Sagarika – filling & packing facility



Technical analysis of Sagarika



| MICRO/MACRO NUTRIENTS | UNIT | RESULTS |
|-----------------------|---------------|------------------|
| Nitrogen (N) | g/100g | 0.25-0.30 |
| Phosphorous (P) | g/100g | 0.03-0.04 |
| Potassium (K) | g/100g | 14.0-18.0 |
| Sodium (Na) | g/100g | 1-1.5 |
| Calcium (Ca) | g/100g | 0.15-0.20 |
| Silica (Si) | g/100g | 0.2-0.25 |
| Magnesium (Mg) | g/100g | 0.35-0.45 |
| Iron (Fe) | g/100g | 0.02-0.03 |
| Sulphur (S) | g/100g | 0.1-0.15 |
| Copper (Cu) | mg/Kg | 50-70 |
| Manganese (Mn) | mg/Kg | 15-20 |
| Cobalt (Co) | mg/Kg | 5-10 |
| Zinc (Zn) | mg/Kg | 5-12 |

| Physicochemical Parameters | UNIT | RESULTS |
|----------------------------|---------|-----------|
| Total organic matter | g/100g | 7.0-7.5 |
| Electrical conductivity | mS | 3.53 |
| pH | - | 7.8-8.3 |
| Moisture content | ml/100g | 70.0-72.0 |
| Total Ash | g/100g | 17.5-20 |
| Specific Gravity | g/cc | 1.1-1.2 |

| PLANT GROWTH REGULATORS | UNIT | RESULTS |
|-------------------------|------|---------|
| Auxin | ppm | 400-600 |
| Cytokinin | ppm | 200-400 |
| Giberrellins | ppm | 500-800 |

MAJOR BENEFITS OF IFFCO SAGARIKA



Increases Crop Yield

Increases Germination Rate

Early Flowering And Fruit Set

Promotes Shoot and Root Development



Resistance to Various Abiotic & Biotic Stress

Increases Nutrient Uptake

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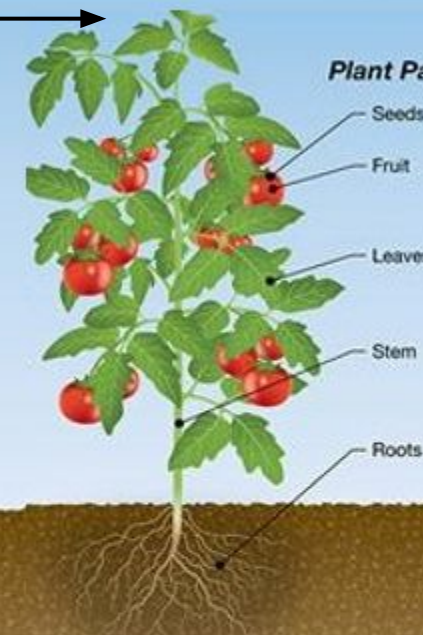
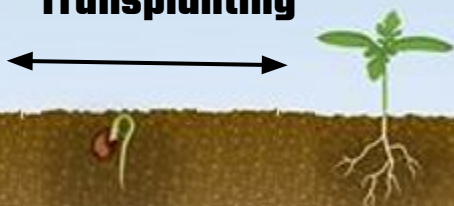
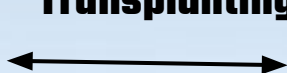
Application Protocol



Post-Flowering Stage

Pre-Flowering Stage

Sowing / Transplanting



Plant Parts

- Seeds
- Fruit
- Leaves
- Stem
- Roots

**Sagarika Granules
as basal application**

**Dosage:
8 - 10 KG / Acre**

Sagarika Liquid as foliar spray

**Dosage:
250 - 500 mL/Acre
At the rate of 0.25 - 0.5%**

A multi-institutional multi-crop trial



A multi-institutional multi-crop project coordinated by CSIR-CSMCRI wherein the efficacy of Kappaphycus sap is being tested and validated at 43 different agricultural Institutions/centers across 20 states of India



| Centre No. | Centre Name |
|------------|---|
| 1. | BCKV, Nadia, WB |
| 2. | CRRI, Cuttack centre, Odisha |
| 3. | CRRI, Jorhat centre, Assam |
| 4. | CRRI, Hazaribagh centre, Jharkhand |
| 5. | PSB, Shantiniketan, W.B. |
| 6. | RAU, Samastipur, Bihar |
| 7. | AAU, Jorhat |
| 8. | ICAR Research Complex, for NEH, Meghalaya |
| 9. | OUA & T, Bhubaneswar, Odisha |
| 10. | MPUA & T, Udaipur, Rajasthan |
| 11. | SDAU, Sardar krushi nagar, Gujarat |
| 12. | PAU, Ludhiana, Punjab |
| 13. | NAU, Navsari, Gujarat |
| 15. | PDKV, Akola, Maharashtra |
| 16. | CSMCRI trials (Guj, MH, MP) |
| 17. | Dir. Soyabean Res, Indore, MP |
| 18. | JNKVV, Jabalpur, MP |
| 19. | GBPUA&T, Pantnagar, Uttaranchal |
| 20. | IISR, Lucknow (ICAR), UP |
| 21. | CCS HAU, Hissar, Haryana |
| 22. | CSAUA & T, kanpur, UP |
| 23. | GKVK, Bangalore, Karnataka |
| 24. | ANGRAU, Hyderabad, Andhra Pradesh |
| 25. | UAS, Dharwad, Karnataka |
| 26. | TNAU, Coimbatore, Tamil Nadu |
| 27. | SKRAU, Bikaner, Rajasthan |
| 28. | BAU, Ranchi, Jharkhand |
| 29. | DBSKKV, Dapoli, Maharashtra |
| 30. | CAU, Manipur, Imphal |
| 31. | AAU, Anand, Gujarat |
| 32. | SVRUAT, Meerut, UP |
| 33. | CSKHPKV, Palampur, HP |
| 34. | IGKV, Raipur, Chattisgarh |
| 35. | CPRI, Shimla centre, HP |
| 36. | CPRI, Shillong Centre, Meghalaya |
| 37. | CPRI, Ooty Centre, Tamil Nadu |
| 38. | CPRI, Meerut Centre, Modipuram |
| 39. | CPRI, Jalandhar, Punjab |
| 40. | CPRI, Patna centre, Bihar |
| 41. | CPRI, Gwalior, MP |
| 42. | SBI, Coimbatore, TN |
| 43. | VSI, Pune, Maharashtra |

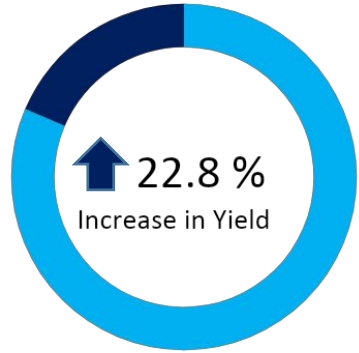
The product has been tested for over 12 years with scientists, ICAR institutes, private sector, public sector and consistently delivered average increase in yield of 24%.

Recent University trial results

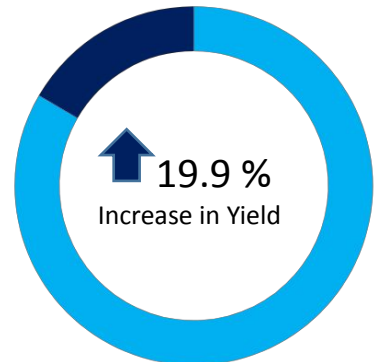


| S No. | IFFCO Chair | Experiment title | Crop | Period | Treatment Done | Results |
|-------|--------------------------------|--|---|---------------------|---|--|
| 1 | TNAU, Coimbatore, Tamil Nadu | Effect of seaweed extract on growth, profitability of greengram (Vigna radiata) | Greengram (CO8) (Irrigated conditions) | July 2018- Oct 2018 | Application of 100% RDF (100 Kg NPK/ha) + seed soaking (0.1%) SWE+ seed treatment with Rhizobium followed by 2 foliar application of seaweed extract (0.25%) at 25 and 35 days of the sowing. | 26% increase in yield |
| 2 | UAS, Dharwad, Karnataka | Efficacy of sagarika (liquid) for enhancing the productivity of greengram | Greengram | 2018-19 | Application of RDF (75 Kg NP/ha) + Sagarika @ 0.1 % seed soaking + seed treatment (Rhizobium+ PSB) + Foliar spray of Sagarika @ 0.25 % at pre flowering stage | 16.2% increase in yield |
| 3 | BCKVV, Nadia West Bengal | Effect of Sagarika on Performance of Green gram crop (SAMRAT (PDM-9) | Greengram Samrat (PDM 139) | March- June 2019 | Sagarika liquid applied as seed soaking (0.1 %) & 2 foliar sprays (@ 0.25 %) at 21 & 42 days after sowing along with RDF (@ 120 Kg NPK/ha) | 35% increase in yield |
| 4 | CSAUAT, Kanpur, Uttar Pradesh | Nutrient optimization through organic and inorganic resources in rice- wheat cropping system. | Rice(NDR-359) – Wheat (PBW -343) Cropping System | 2017-18 | Application of 75% NPK alongwith basal application of 25 kg/ha Sagarika granules + 2 sprays of 0.25% of Sagarika & 2% of WSF (18:18:18) | Increase in average yield of grain (48.33 q/ha) |
| 5 | SVBPUAT, Meerut, Uttar Pradesh | Nutrient management in Wheat for improving fertilizer use efficiency, soil biodiversity and productivity in Indo Gangetic plains of U.P. | Wheat | 2017-18 & 2018-19 | RDF + FYM @ 5 MT/ha + NPK – BF + Foliar spray of NPK (18-18-18) +Sagarika Liquid (0.25 %) at 55 -70 DAS | 31.8% increase in grain yield (2017-18) 27.9% increase in grain yield (2018-19) |
| | | Effect of Nutrient Management practices on growth and yield of summer moong bean (Vigna radiate L.) | Moong bean | Spring 2018 | Foliar spray of NPK (18-18-18) +Sagarika Liquid (0.25 %) | 22.5% recorded grain yield |
| 6 | CCSHAU, Haryana | Nutrient optimization through organic & inorganic resources in wheat | Wheat (WH-1105) | Rabi 2018-19 | 75% NPK + two spray of 0.25% of Sagarika + 25kg/ha Sagarika Granules + two spray of 2% of WSF (18:18:18) | 7% higher grain yield |

Sagarika success stories



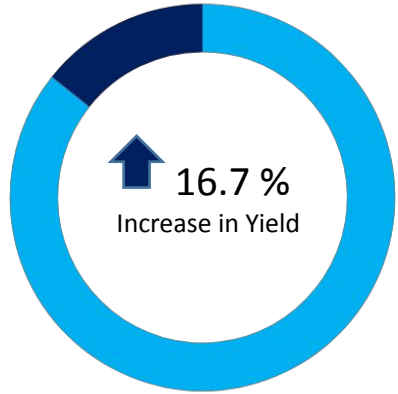
| | |
|-------------------------|---|
| CROP | : GRAPES |
| VARITEY | : DILKUSH & BANGALORE BLUE |
| LOCATION | : KOLAVANAHALLY, CHIKKABALLAPURA |
| STATE | : KARNATAKA |
| YIELD (CONTROL) | : 39.42 MT/Ha |
| YIELD (TREATED) | : 48.41 MT/Ha |
| ECONOMIC BENEFIT | : 2.15 LAKHS |



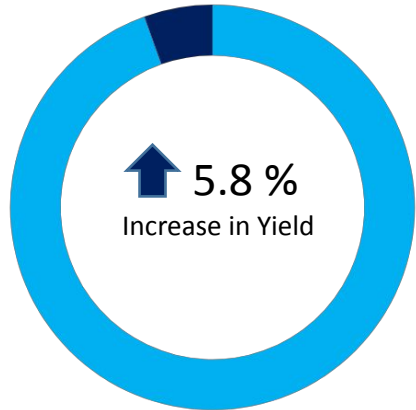
| | |
|-----------------------------|--|
| CROP | : SUGARCANE |
| VARITEY | : CO 86032 |
| LOCATION | : YAKKERI, SAVADATTI, BELGAUM |
| STATE | : KARNATAKA |
| CANE YIELD (CONTROL) | : 104.308 MT/Ha |
| CANE YIELD (TREATED) | : 125.089 MT/Ha |
| NAME OF THE FARMER | : Mr. PUJAR YALLAHOOVAPPA |



Sagarika success stories



| | |
|---------------------------|---------------------------------|
| CROP | : POTATO |
| VARITEY | : JYOTI |
| LOCATION | : KANTAPUR VILLAGE, BURDWAN |
| STATE | : WEST BENGAL |
| YIELD (CONTROL) | : 30 MT/Ha |
| YIELD (TREATED) | : 35 MT/Ha |
| NAME OF THE FARMER | : Mr. AJIT KUMAR MITRA & OTHERS |



| | |
|---------------------------|--------------------------------|
| CROP | : Bt COTTON |
| LOCATION | : KHIRASARA, UPLETA, RAJKOT |
| STATE | : GUJARAT |
| YIELD (CONTROL) | : 2.42 MT/Ha |
| YIELD (TREATED) | : 2.56 MT/Ha |
| NAME OF THE FARMER | : Mr. JAISUKHBHAI MANAVADARIYA |



Seaweed based bio-stimulant – Comparison Study



IFFCO Sagarika



BIOVIT

A



Kappaphycus alvarezii



Ascophyllum nodosum



The Source



| Pack Size | MRP (in INR) |
|-----------|--------------|
| 100 ML | 70.00 |
| 250 ML | 135.00 |
| 500 ML | 260.00 |
| 1 L | 500.00 |
| 5 L | 2300.00 |



| Pack Size | MRP (in INR) |
|-----------|--------------|
| 100 ML | 130.00 |
| 250 ML | 270.00 |
| 500 ML | 405.00 |
| 1 L | 950.00 |
| 5 L | 3160.00 |



Price



28 %



~20 %

TS

Seaweed Composition




Technology sourced from Central Salt & Marine
Chemicals Research Institute (CSMCRI), Bhavnagar
(Constituent Laboratory under Council of Scientific &
Industrial Research (CSIR), New Delhi)
Patents : IN 224938; US 6893479 EP 152



**Technical
Collaboration**





Trial Results





पूर्णतः सहकारी स्वामित्व
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Marketed By

IFFCO BAZAR

IFFCO

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AQUAGRI

SAGARIKA



Product

MRP (In INR)

| | |
|----------------------------------|------|
| Sagarika 10 KG Bag (Granules) | 415 |
| Sagarika 10 KG Bucket (Granules) | 515 |
| Sagarika 25 Kg Bag (Granules) | 960 |
| Sagarika Liquid - 100 ml | 70 |
| Sagarika Liquid - 250 ml | 135 |
| Sagarika Liquid - 500 ml | 260 |
| Sagarika Liquid - 1 LTR | 500 |
| Sagarika Liquid - 5 LTR | 2300 |

Available at all IFFCO Outlets

- IFFCO Societies
- IFFCO E-Bazar
- IFFDC Center
- IKSL Stores
- IFFCO E-Bazar Franchisees
- IFFCO Private Retailers

