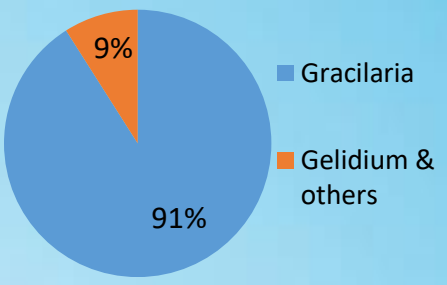
CSIR-CSMCRI

Bhavnagar, Gujarat – 364 002

Gracilaria debilis cultivation for Agar and Sap

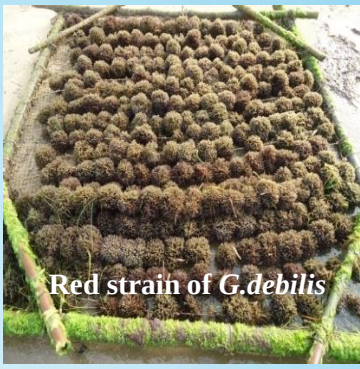
- Restriction for natural harvest (14000 tons to 6000 tons /annum) and export of *Gelidium* biomass (1200 tons/annum) from Morocco and Spain since 2015, resulted lesser agar production in the world and led agar crisis (source : Nature, vol 528:171-172).
- The total annual production of agar in India ranges between 100 - 132 tons, The Indian agar industries annual raw material demand is about 2000 tons dry weight



Global production of agarophytes

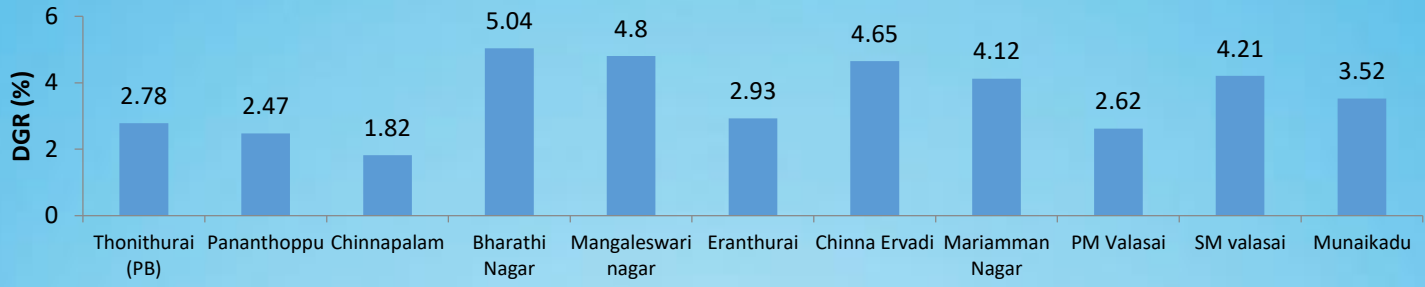
Growth details of *G.debilis*

- Initial seed material/raft: 3-4.5 Kg.
- Harvest biomass / raft : 25 Kg fr.wt or 3.5 kg dry wt
- Avg. growth rate: 2.475-3.264 %/day.
- Cultivation period:45 days
- No of cycle implemented/year: 7cycles
- Favourable growth period: October-April



Glimpses of *Gracilaria debilis* farming

- **Imparted training to 1300 coastal fisher-folks from 13 coastal villages on agarophytes *Gracilaria debilis* cultivation under CSIR-societal activities (CSIR-800; capacity building, Harit programmes).**
- **Imparted training to 1900 coastal fisher-folks from four costal districts of Tamilnadu during 2018-2020 under NFDB, Hyderabad funded projects**
- **Imparted training to 40 people for Trainers of Trainee (ToT) under NFDB, Hyderabad funded projects**



Growth rate of *G.debilis* recorded in coastal villages of Ramanathapuram district, Tamilnadu

Agar yield (%)	Gel strength (g cm^{-2})	Gelling temperature (°C)	Melting temperature (°C)	Sulphate content (%)	References
14.00-32.55	300-866	37.8-42.5	77-90.5	0.76-5.12	Veeragurunathan et al. (2016, 2019)

Agar properties of *G.debilis*

Components	G. debilis sap
Sap yield (%)	17.7-37
Na^+(ppm)	116.95-128.95
K^+(ppm)	29.65-40.31
Ca^{2+}(ppm)	79.65-110.85
Mg^{2+}(ppm)	72.30-87.85

Sap properties of *G.debilis*

Expenditure details (₹)	Gracilaria debilis
Infrastructure cost to farmer (lakhs)*	5.60
Biomass produced year^{-1} ha^{-1} (tonn dry wt)	42
Value realized for produce (lakhs)	18.90
Net profit/person/month	11,083

Economics of *G.debilis* farming

Highlights

- **Technology readiness level (TRL):6**
- Year around cultivation is possible
- Next to *Kappaphycus*, fast growing species with high biomass yield in India
- Pharmaceutical grade agar yielding seaweed
- Suitable alga for commercial farming in India

➢ *Total infrastructure coast in all cases is ₹ 11,20,000 but the farmer is entitled to avail 50 % subsidy

➢ 2000 (2 x 2) raft in ha farm; raft production (d wt) @ 3 kg *G. debilis*

➢ 10 beneficiaries per ha farm

1. Journal Appl ied Phycology (2016) 28: 3479–3489
2. Journal Appl ied Phycology (2019) 31:2609–2621

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