

SEAWEED FARMING

Eucheuma spp.

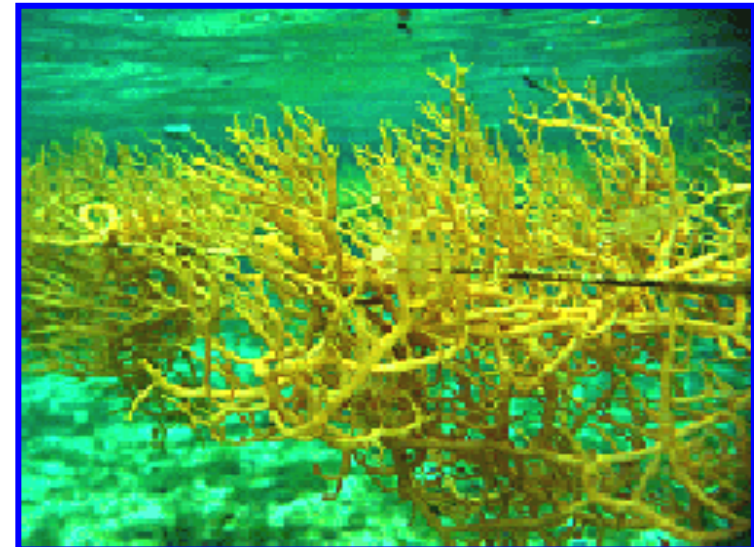


Photo by Shemberg 1996

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Introduction

The Philippines is considered the world's leading supplier of Eucheuma, comprising about 80% of the total world supply (SIAP, 1996). In 1990, the country's total seaweed farm production reached a high of about 400,000 metric tons of fresh Eucheuma seaweeds planted by about 80,000 seaweed farmers/ families. Today, seaweed production and processing have become a high value and profitable livelihood activity in many marginal seafarming communities as well as profitable enterprises in urban centers of the country.

It is of great demand in the global market due to its diversified uses of carrageenan, which is used as stabilizer, gelling agent, thickener, binder and additive for various dairy products, cosmetics, pet food, meat processing and beer bottling industries. Seaweed farming also requires less capital than any other aquaculture species, not labor-intensive and does not need inputs that are potentially harmful to the environment.

EUCHEUMA SPECIES

Eucheuma denticulatum



Trono 1993

Eucheuma spinosum



4. MCPI Incorporated

Tugbogan, Consolacion, Cebu City Phil., ; suite 301-32 Casa Mendoza Bldg. A. cortez, Ave. Mandaue City

Tel NO. : +63(32) 346-3566, (0912) 501-0890, 501-5346, 501-5737

Fax No. : +63(32) 346-0138, 346-0588

Contact Person : Maximo A. Ricohermoso, President

Product Line : Carrageenan

Year Established : 1983

5. Marcel Trading Corporation

926 Araneta Avenue, Quezon City; Metromanila, Phi.

Tel No. : +63(2) 712-2631, 712-2640, 712-2841

Fax No. : +63(2) 712-1989, 712-5879

Contact Person : Wee Lee Hiong, President

Product Line : Carrageenan

Year Established : 1969

6. Genu Philippines, Inc.

6/F, Metro Bank Plaza, Osmeña Bldg. 6000 Cebu City

Tel. No. : +63(32) 253-3122, 253-3053

Fax No. : +63(32) 253-0773

Contact Person : Anastacio Camboanga, President/Gen. Manager

Product Line : Dried Seaweeds, alkali treated cottonii

Year Established : 1967

7. Folk Arts Ximport

516 San Jose de la Montana, Mabolo 6000 Cebu City

Tel No. : 63(32) 231-1623, 231-1699, 231-1845

Fax No. : 63(32) 231-1846

Contact Person : David L. Po, Pres./Gen. Manager

Product Line : Dried Eucheuma cottoni, spinosum

Year established : 1989

Potential Markets for Eucheuma

1. Shemberg Corporation

Osmeña Boulevard, Cebu city

Tel No. : +63(32) 70-044, 346-0866, 346-0425, 254-0772

Fax No. : +63(32) 346-0197

Contact Person : Benson U. Dacay
CEO

Product Line : Carageenan

Year Established : 1967

2. Biocon Philippines/Deltagen, Inc.

Mactan Export Processing Zone G/F SFB Pt. 1,

Lapu-lapu City, Cebu, Philippines

Tabok, Mandaue City, Cebu, Philippines

Tel No. : +63(32) 340-0322, 340-0319, 340-0764

Fax No. : +63 (32) 340-0328, 340-0324

Contact Person : Ernestina Elizalde

Product Line : Carrageenan

Year Established : 1985

3. FMC Corporation

Ouano compound, Looc, Mandaue City

6014 Cebu, Philippines

Tel. No. : +(63) (32) 8-50-97, 346-088, 8-12-611 to 15
+63 (32) 345-0193 to 95

Fax No. : +63(32) 5-40-98, 346-1182, 346-1187

Contact : Tita Tomayao, General Manager/VP

Product Line : Seaweed Flour

CULTURE METHODS

Bottom Monoline Method

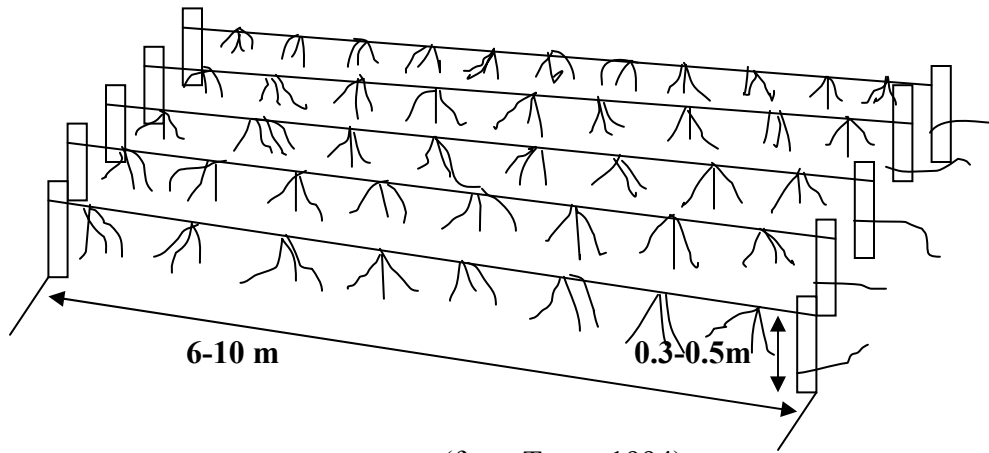
The fixed, off-bottom monoline method or bottom line method of cultivation is commonly used in commercial farms. This method has many advantages over other methods such as the net method used in the past. The farm is cheaper to maintain and easier to install.

Site Selection Criteria for Bottom Monoline Method:

- 1) moderate water current
- 2) sandy to corally bottom
- 3) far from river mouths
- 4) protected against destructive waves
- 5) clear water with temperature of 27° C- 30° C
- 6) not less than 0.5 m water depth during low tide

Construct the Monolines

1. Clear the chosen site of undesirable organisms.
2. Stake wooden anchors into the substratum (like mangrove branches), about 6-10 meters apart. Tie in the nylon lines. (See illustration)
3. Distance of rows of stakes is 1 m. apart. The nylon lines is 0.3-0.5 m away from the bottom depending on the water depth during low tide.
4. Tie Eucheuma cuttings of approximately 25-30 grams to the monolines at 25-30 cm intervals using soft plastic straw also referred to as "tie-tie".



(from Trono 1994)



Pumpboat	10 years	1,500.00
Farmhouse	5 years	6,000.00
Total Depreciation		12,740.00

III. HARVEST

Total Harvest *	40,000 kgs
Less :	
a. Seedlings for planting (next cropping)	8,000 kgs
b. Biological loss at 10%	800 kgs
Net Weight from harvest	31,200 kgs
Dry harvest**	5,200 kgs

IV. NET RETURNS

	Volume	Unit Cost	Total Cost
Total Sales	5,200 kgs	P8.00/kg	P41,600.00
Less :			
Transport Cost		.25/kg	1,300.00
Net Sales per Harvest per Year	7 harvest per year		40,300.00
TOTAL ANNUAL SALES			P 282,100.00
Less :			
Operating Cost (P106,800.00)			
Depreciation Cost (12,740.00)			
Annual Production Cost			119,540.00
ANNUAL NET INCOME			P 162,560.00
BCR = 2.4			

*About 6 kg fresh seaweed is needed to produce 1.0 kg of dried seaweed with dry weight at 30-40% moisture content (MC).

**Initial 40,000 pcs. seedlings at 200 grams each will grow to 1,000 grams each after 45 days.

COST AND RETURNS OF ONE-HECTARE FARM

(Initial Year of Operation)

I. INITIAL INVESTMENT

Items	Volume	Unit Cost	Total Cost
Nylon Monofilament 300lbs test	20 kgs	P170	P3,400.00
Polyrope No. 26	2 rolls	1,300/roll	2,600.00
Polyrope No. 30	2 rolls	1,500/roll	3,000.00
Buoys (mother line floats)	16 pcs.	56/pc	896.00
Dug-out Banca	1	2,500/unit	2,500.00
Farmhouse (storage & drying platform)	1	15,000	15,000.00
Pumpboat	1	30,000	30,000.00
Total Fixed Cost			67,796.00
II. PRODUCTION COST			
Operating Cost			
Seedlings (40,000 tie-ties x 200 gms)	8,000 kgs	P5 /kg	40,000.00
Plastic straw (soft tie)	20 rolls	80/kg	1,600.00
Stainless knives	5 pcs.	50/pc	250.00
Diving goggles	5 pcs.	100/pc	500.00
Sandbags	100 bags	5 each	500.00
Styrofoam sheets 4"x4"x8" (floats)	5 pcs.	750/sheet	3,750.00
Laborers (2 persons at 2,000/mo.			48,000.00
Gasoline & Oil	P600/mo		7,200.00
Items	Volume	Unit Cost	Total Cost
Miscellaneous			5,000.00
Total Operating Cost			106,800.00
Depreciation			
	Economic Life		
Nylon & polyrope lines	2 years	4,500.00	
Buoys	5 years	240.00	
Dug-out banca	5 years	500.00	

Seedlings and Farm Maintenance

Replace poor-growing and lost seedlings. Remove grazers such as sea urchins and starfishes, and epiphytes growing on seaweeds as these compete for nutrients, light and space.

Harvesting

Harvest after 2-3 months. Take the whole plants but leave enough for the replanting of new cuttings.

Floating Monoline Method

The floating monoline method has the following advantages over the fixed, bottom monoline method: a) grazing by bottom-associated animals is minimized or eliminated because the plants are raised out of reach of benthic grazers b) plants near the surface of the water column are exposed to more moderate water movement caused by waves.

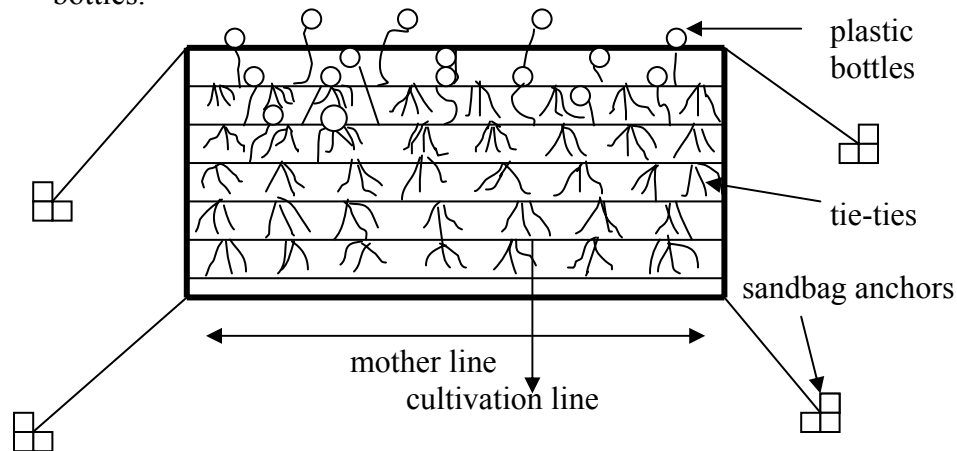
Site Selection

- Select a farm area with moderate water current
- Water temperature should be between 27°C to 30°C
- Salinity range from 30 to 35 ppt
- Water depth of five fathom or more at the lowest tide
- Site should be protected from large waves and strong winds
- Water should be clear, not muddy or turbid
- Conduct test planting in the proposed area prior to establishment

Installation of plot modules :

{ 1 plot module = 1,000 sq.m. (50 x 20m)

- Install mother lines using polyrope # 26 making a 50 x 20 m rectangular plot. The 20-m mother lines should be parallel to the water current.
- Anchor five sandbags each at the four corners and four big plastic bouys as markers.
- Prepare 50 pcs. cultivation lines [1 cultivation line @ 20 m long nylon #200]. Tie cultivation lines to the 50-m long mother lines. Distance between each cultivation line is 1 meter.
- Prepare 4" x 4" x 8" styrofoam floats or empty plastic bottles and tie them to the cultivation line with polyrope [2.5mm].
- One cultivation line should have six styrofoam floats or empty plastic bottles.



Gel Extraction

8. Chop the cleaned seaweed finely. To do this, add 208 ml water.
9. Weigh approximately 50 grams of finely chopped seaweeds. Boil the finely chopped seaweeds in water until only 5% seaweed solids or residue remain in the boiling mixture. While heating, occasionally stir in the mixture in one direction. Put out fire when about 90% of agar is extracted.
10. Pour the hot mixture over a wide silkscreen cloth placed over a wide container where gel is to be collected. Use of silkscreen is recommended than cheesecloth because of faster straining and squeezing out of gel from seaweed residue.
11. Cool the gel by allowing the container to drift in a basin filled with tap water. Store the gel in the refrigerator.

Seaweed Candy

Ingredients:

- 2 1/2 cups gel
- 1 1/2 cups evaporated milk
- 1 can condensed milk

Procedure:

Mix gel, evaporated milk and condensed milk in a casserole. Heat the mixture over medium to low flame for 2-3 minutes. Constantly stir the mixture from the moment it is heated. Stirring the mixture prevents burning and sticking of the product. If the product is already pasty, put out the fire. Allow the product to cool.

POST HARVEST TECHNOLOGY

DRYING

Spread the harvested seaweeds evenly on a bamboo platform. Remove other species of algae, “tie-tie” or other extraneous materials like rocks, sands and others. Never dry the seaweed directly on sand to avoid contamination. In the absence of a drying platform, use coconut palms as flooring.

During sunny days, turn over the seaweeds regularly within two to three days and four to five days when cloudy. When properly dried, Eucheuma has a rubbery touch [30% moisture].

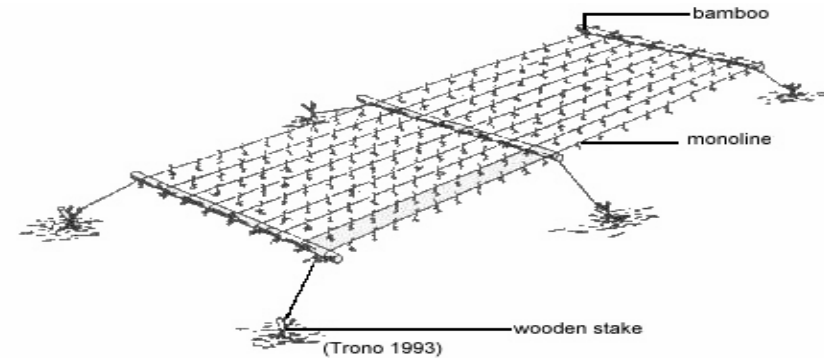
Pack dried materials in plastic sacks and store in a dry and well-ventilated place.

PROCESSING OF SEaweEDS FOR DOMESTIC CONSUMPTION

Cleaning

1. Wash the seaweeds several times with tap water then, drain.
2. Remove stones, twigs or strips of wood from the seaweeds
3. Dry seaweeds under the sun
4. Soak the seaweed for 16 hours in a solution of 5 grams lime and 1000 ml water
5. Wash seaweeds several times in 0.5% lime solution and drain
6. Resoak seaweeds several times in tap water
7. Drain seaweed for 15 minutes

Other modification of the floating monoline or floating longline is by using bamboo poles as floats.



Planting

Seed Selection

Choose luxuriant and strong branches for planting. Always use a clean sharp stainless steel knife to cut the branches (thalli) to leave a smooth surface. The size of propagules should be 100 grams.

Tying of Seedlings

Cut eight-inch long soft plastic straw for tying propagules, Tie the seedlings at its strongest point. The weight should be balanced on both sides of the “tie-te” for free movement. Give allowance of 1.5 centimeter for growth. Tie propagules/seedlings firmly to the cultivation lines at 20 cm interval.

Maintenance of Planted Seaweeds

Remove silt and prevent epiphytes from lodging on the seaweeds by shaking cultivation lines, daily. Missing plants should be replaced at once.

Disease/Calamities Management

During disease outbreak, prune affected thallus with sharp stainless knife giving one centimeter allowance from the affected area. Transfer unaffected plants to other sites. Shake monolines daily to dislodge epiphytes and silt.

To avoid loss during typhoons, lower floats along cultivation lines by adding anchors or lengthening the lines of the floats. Maintain 100 to 300 centimeter from the sea bottom to allow the plants to suspend during the period.

Nursery and Farm Management

Establish a nursery farm in a well-protected area to ensure continuous supply of high quality seedstocks.

Maintain a thirty-day culture period in the nursery to have young and healthy plants for propagation. Plants should not be overgrown for matured plants won't make good plant materials.

Seedling Bed

Construct a 5m x 10m x 2 m cage-type seedling bed. Place seedstocks on it before planting. Immerse it in seawater to prevent from undue stress. Seedstock should be planted after a week of stocking.



Harvesting

Harvest the plants after 45 days culture period either by pruning or total harvest. Select healthy and young plants as seedstock for the next cropping season.