Better Management Practices for Seaweed Farming
Eucheuma and *Kappaphycus*

ASEAN FOUNDATION

NACA

Prepared by the Philippines National Team
Nemencio B. Arevalo, Tiburcio C. Donaire, Maximo A. Ricohermoso
and Ronald Simbajon

INTRODUCTION

Seaweed farming in the Philippines started in the late 1960's. Various experiments were done in seaweed growing reefs of Sulu. The culture techniques was then proven and disseminated to the seaweed farmers in the early seventies.

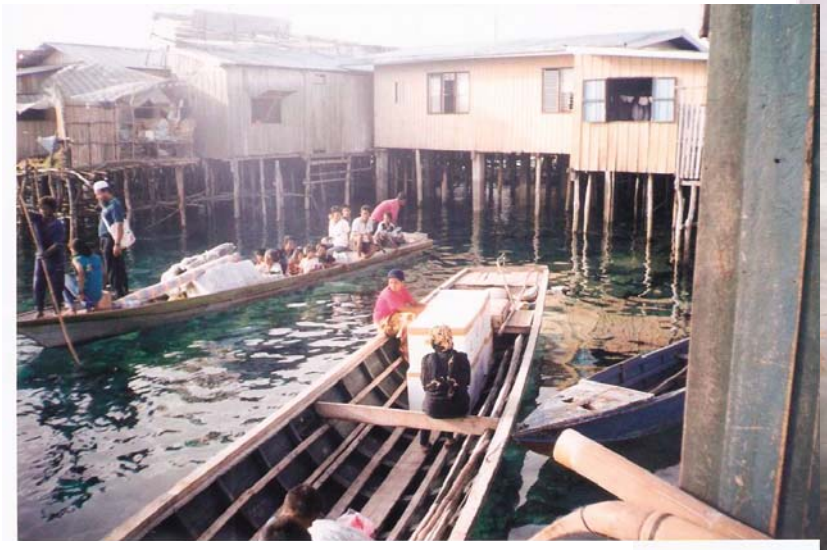


Fig 1. Seedling transfer to Sitangkai, Tawi-Tawi

Fig 2. Researcher monitoring seaweed growth

Fig. 3. Different varieties of seaweeds are prepared for test planting

Today, the Philippines is the world's biggest producer of farmed *Kappaphycus* and *Eucheuma* seaweeds supplying about 60% of the world raw material requirements for carrageenan production.

Seaweed is the number 1 aquaculture commodity in terms of production. In 2006, the Philippines produced about 1.5 million metric tons equivalent to 70% of total aquaculture production.

Major seaweed producing areas include Sulu, Tawi-Tawi, Zamboanga, Palawan and Bohol. Other production areas are Batangas, Masbate, Surigao, Negros, Bantayan, Lanao, Samar and more areas are developed for farming.

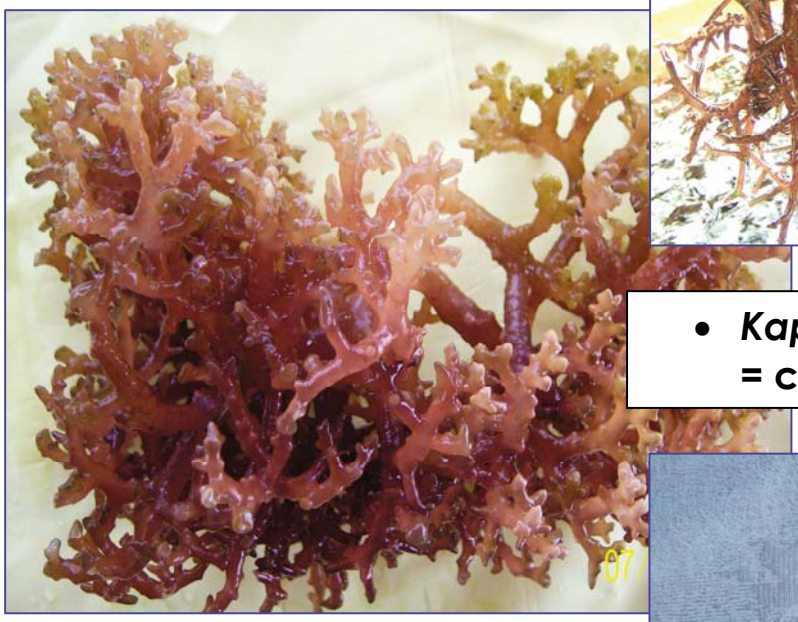
Fig .4. Map of the Seaweed production area in the Philippines

○ Major producing areas, Sulu, Tawi-Tawi , Bohol and Palawan
△ Other production areas

THE SEAWEED TYPES

There are three commercially farmed seaweed species and they grow in different seasons of the year

- ***Kappaphycus alvarezii*** **(previously known as *Eucheuma alvarezii, Eucheuma cottonii)* = cottonii in commerce**



- ***Kappaphycus striatum*** **= cottonii in commerce**

- ***Eucheuma denticulatum*** **(previously known as *Eucheuma spinosum* = spinosum in commerce**

Commonly farmed varieties of *Kappaphycus* and Eucheuma

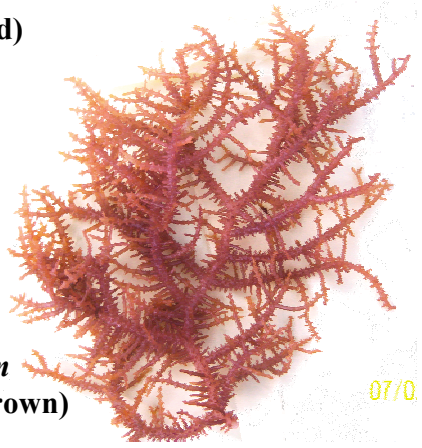
K. alvarezii
(tambalang green)

K. alvarezii
(tambalang brown)

K. alvarezii
(tambalang yellow green)

K. alvarezii
(vanguard)

K. striatum
(sacol green)



E. denticulatum
(spinosum brown)

ECONOMIC IMPORTANCE OF SEAWEEDS

Seaweed is a source of carrageenan an important ingredient in food and other industrial applications

Newly harvested seaweed

Dried seaweed (by solar drying)

Carrageenan (by mechanical process)

USES OF CARRAGEENAN

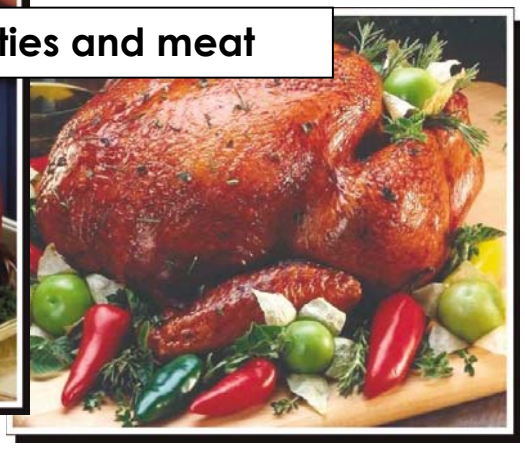
Gelling agent for jellies

Stabilizer for ice cream and toothpaste

Beer clarifier

Thickener for catsup and sauces

Binder for patties and meat



STARTING A SEAWEED FARM

SITE SELECTIONS: **Seaweeds grow in tropical marine environment, however, there are important considerations ideal for a successful seaweed farming**

- **Accessibility to farming inputs and markets, transport facilities, security and safety and available areas for expansion;**

- **With good water movement.**
  = Not very slow to cause silting
  =Not very strong to break the plants and damage the farm structures;

- **Away from sources of fresh water like river mouth.**

- **Protected from strong waves**

- **Water is clean and away from sources of pollutants**

- **Natural growth of seagrasses and other seaweeds are found and abundant**

Once a site has been selected, get a permit from the Local Government Unit which has a jurisdiction over municipal waters where the farms are to be established.

FARMING MATERIALS REQUIREMENTS

It is important to prepare these materials before planting.

Fig 5. Farming Materials
a. mallet
b. plastic straw (hard type
c. wooden stake
d. PE Rope # 18
e. Stainless knife
f. Plastic straw (soft type)
g. Recycled styropor (floating device)
h. banca

FARMING METHODS

There are three farming methods in Cottonii and Spinosum:

1. Floating Method
2. Fixed Off Bottom Method
3. Broadcast Method

Floating Method is suitable in shallow (not less than 0.75 m) to deeper areas with moderate water current.

Innovations in floating method

- Monoline/longline
- Raft
- "Tumbo tumbo"/"Spider web"

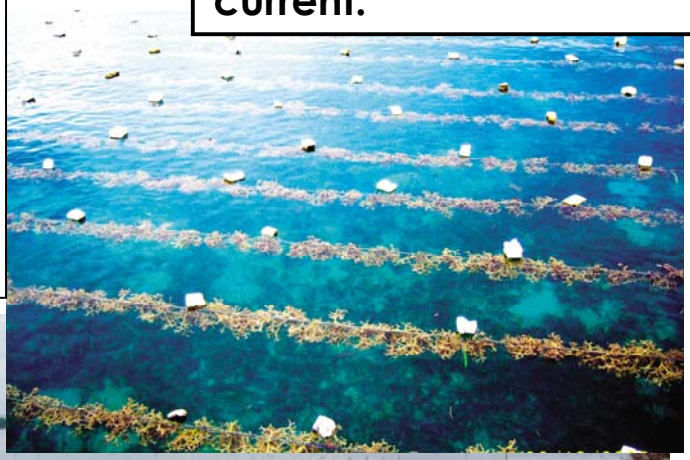


Fig 6. Floating monolines

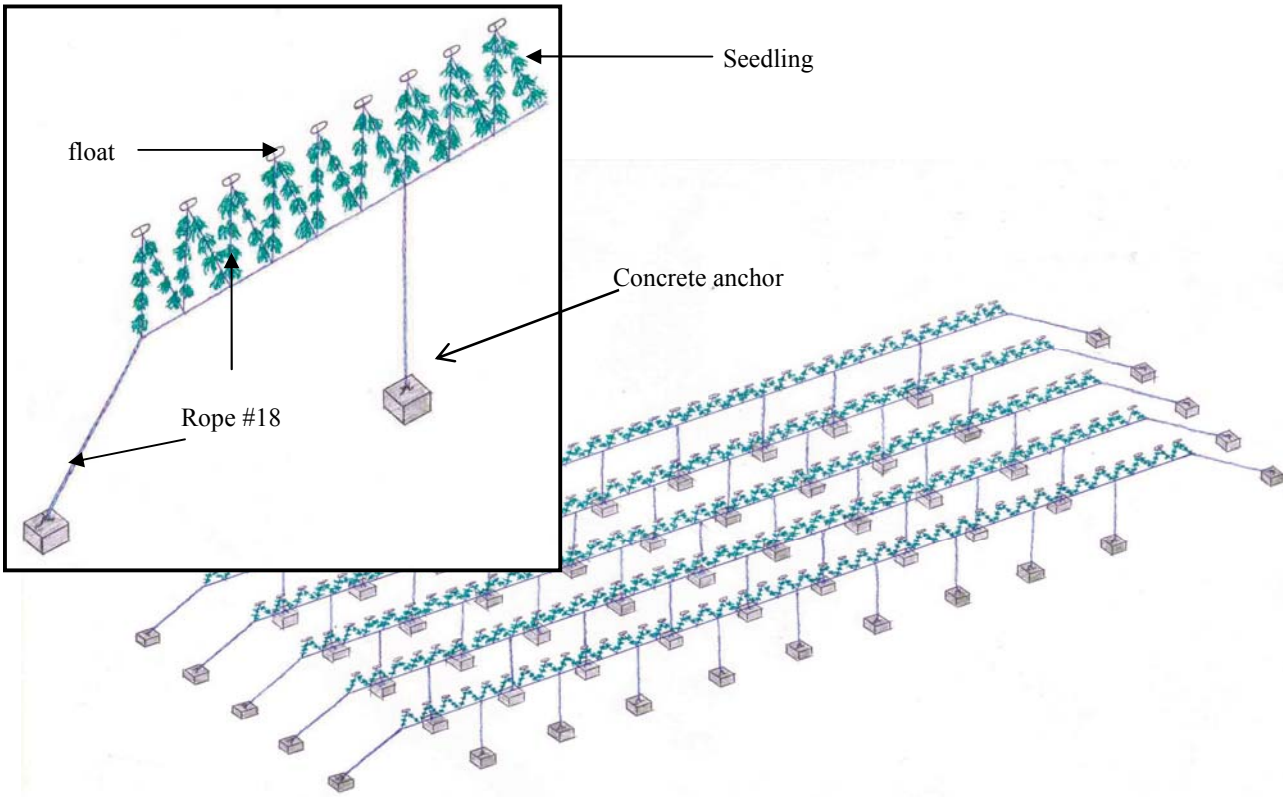


Fig 7. Tumbo-tumbo

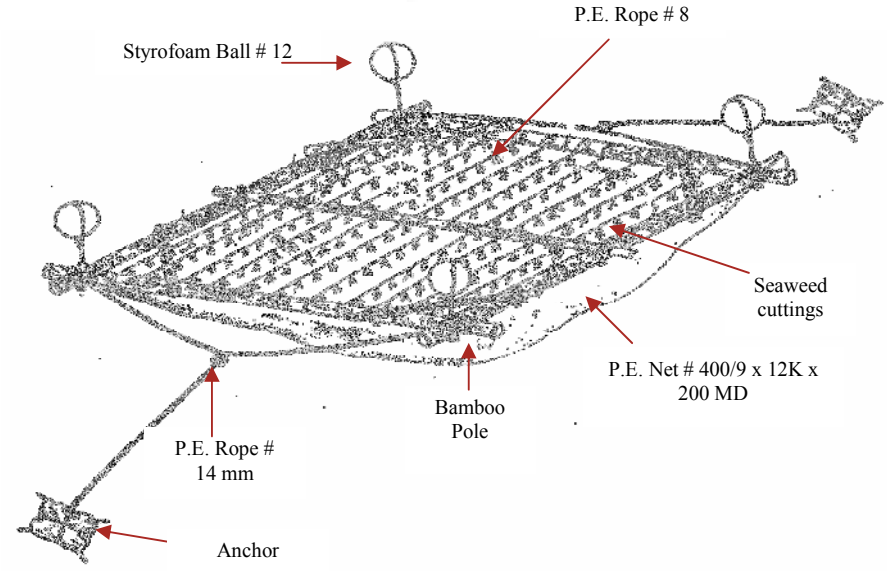
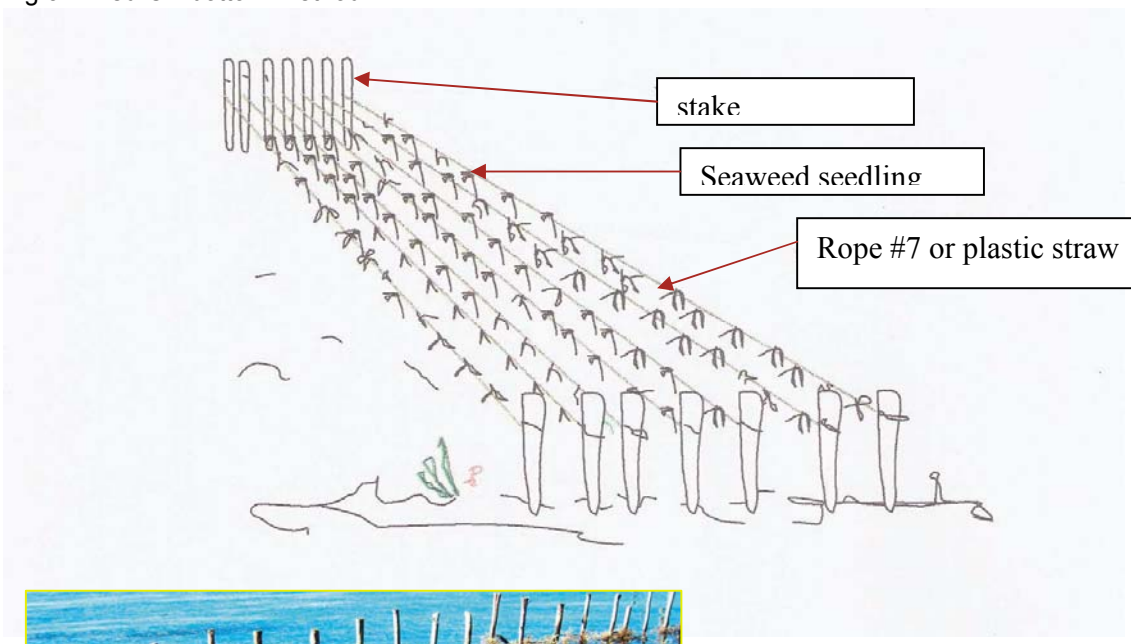


Fig 8. Raft

Fixed Off-Bottom is best used in shallow areas (not less than 0.75 m) during low tides with moderate to strong water current

Fig 9. Fixed Off-bottom method

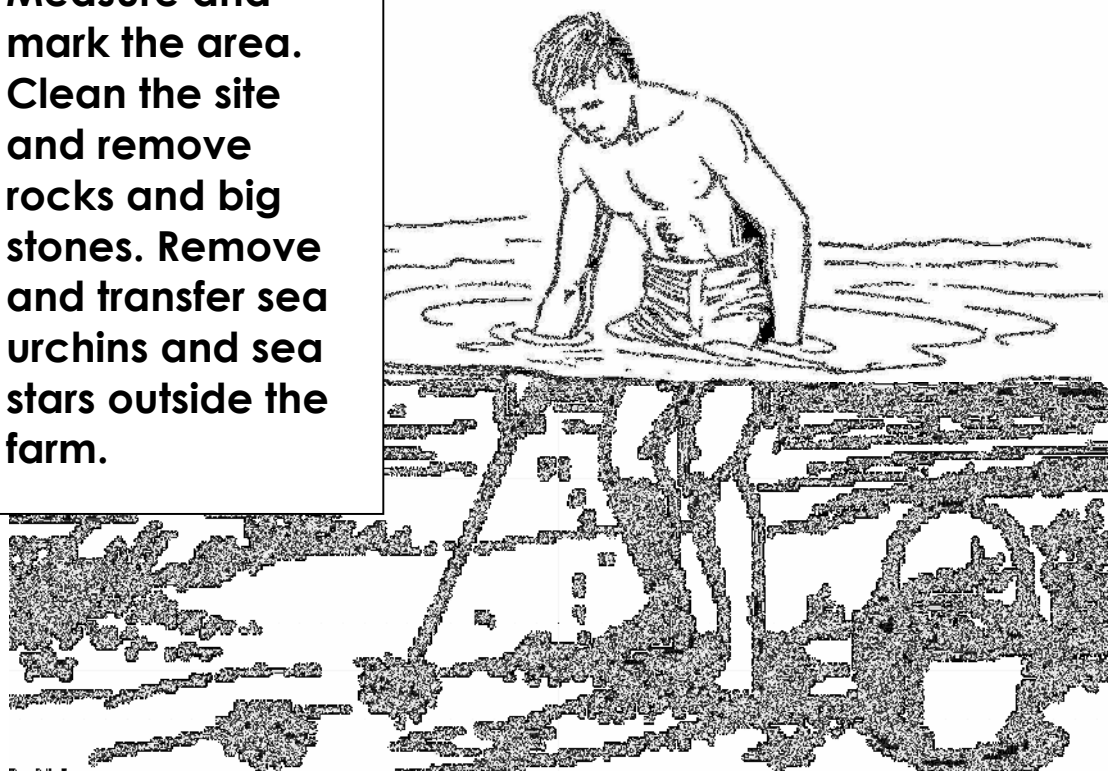


Broadcast method is used in shallow areas with moderate to strong water current, sandy to corraline bottom and mostly used in Spinosum farming.

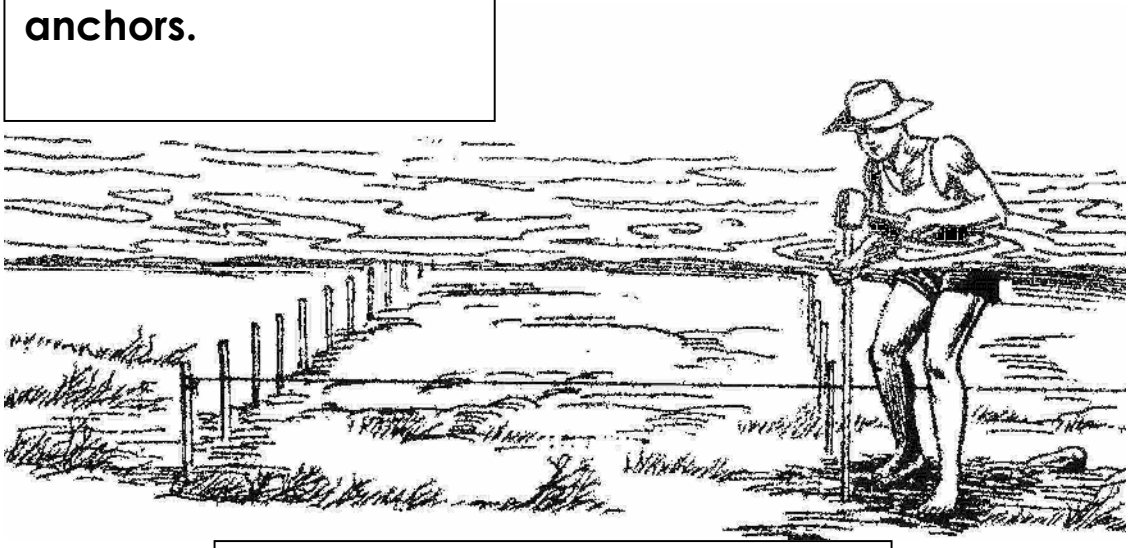
Fig 10. Broadcast Method

PREPARATIONS AND SETTING UP OF FARMS

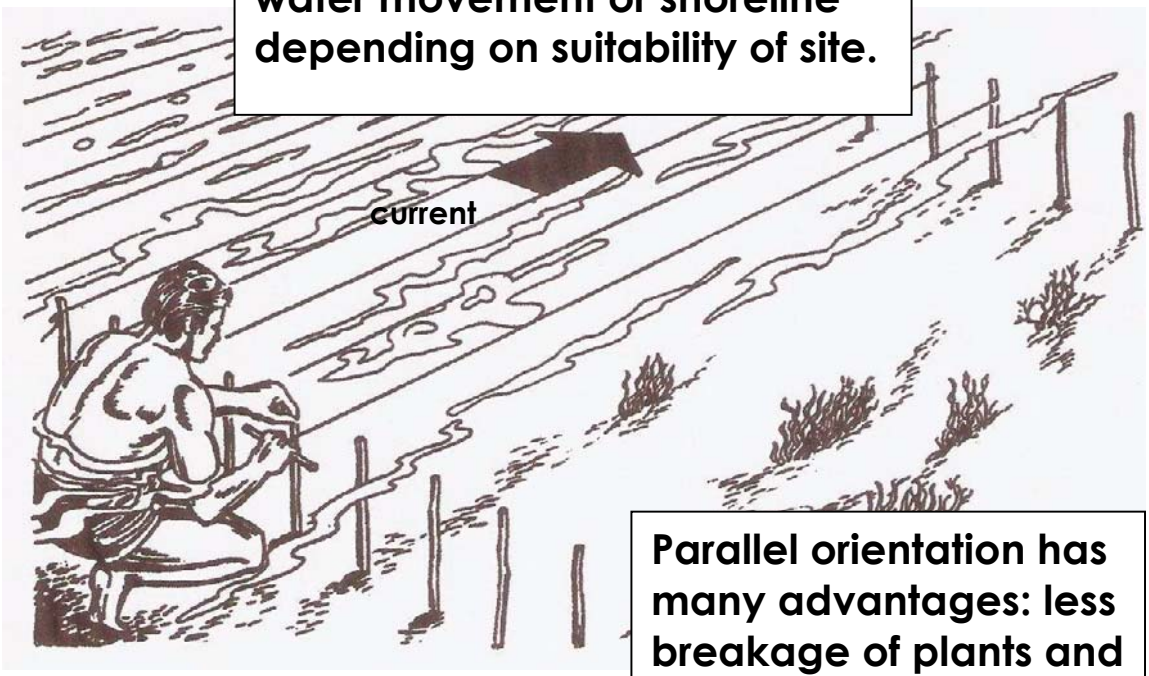
Measure and mark the area. Clean the site and remove rocks and big stones. Remove and transfer sea urchins and sea stars outside the farm.



Lay-out the farm, install stakes and anchors.



Monolines maybe parallel, perpendicular or diagonal to water movement or shoreline depending on suitability of site.



Parallel orientation has many advantages: less breakage of plants and lines, minimal uprooting of stakes and less entangling of floating debris.

SEEDLING PREPARATIONS

Seedlings should be taken from healthy and fast growing variety in the area preferably from the young portion of the plant.

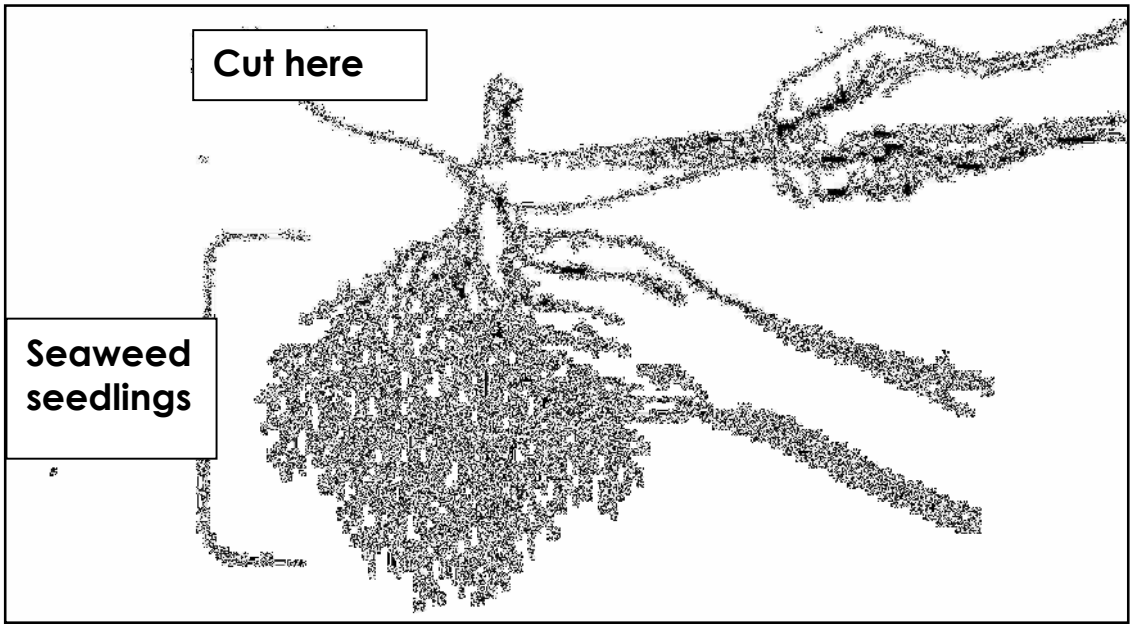


Fig 11. Seedling selections

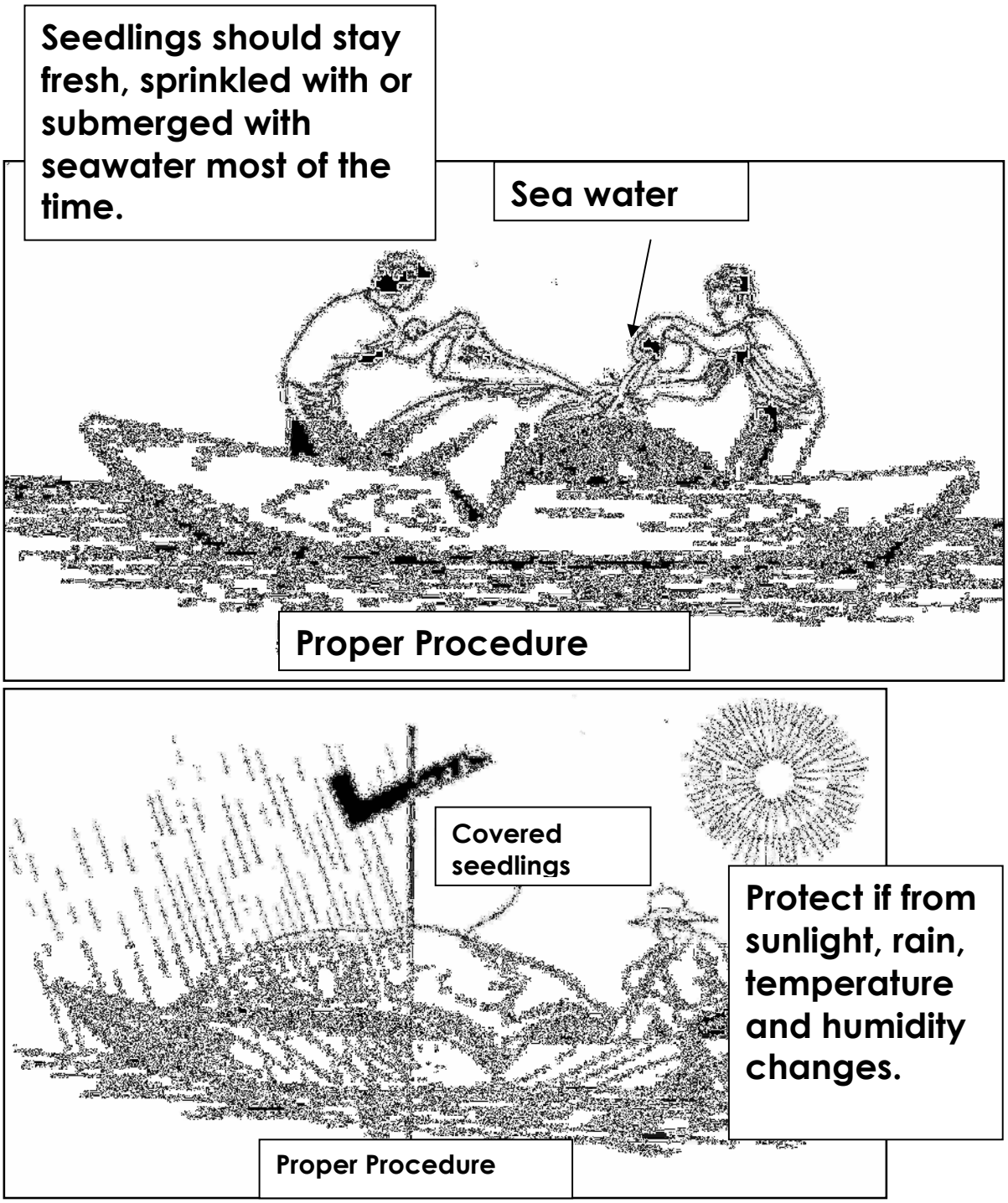


Fig. 13. Proper handling and transport of seaweed seedlings

If seedlings are taken from other areas, water should be drained first before transport. Placed them inside styroboxes, rattan baskets or sacks.

Seedling preparations can be done on the shore or in land. Always work under the shade.

Tie each seedling using soft twine "tie-tie".

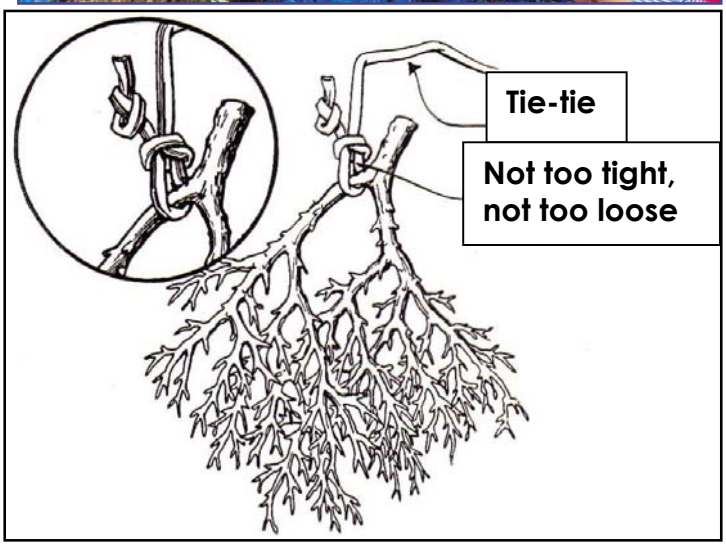


Fig 15. Seedling preparations

CARE AND MAINTENANCE

Seaweeds need a Tender Loving Care, regular visit is necessary to check the possible problems before they worsen.

Replace broken or lost plants.

Remove other weeds. Mud flakes and sediments that cling to the plants and lines.

Remove old and rotten stakes and repair uprooted stakes and anchors.

Tighten and fix sagging and broken monolines.

Drive away fish grazers, removed sea urchins and others.

Pick-up broken and drifted plants.

HARVESTING

Seaweeds are fast growing and they are ready for harvest in 45 to 60 days.

For floating and fixed off bottom farming, harvest the seaweeds by removing the entire monolines together with the plants from the stakes or from the main support lines.

This procedure makes it easy and convenient to select good seedling materials for the succeeding cropping.

In the broadcast method, harvest the seaweeds by pruning the plants and leaving some parts of the seaweeds to re grow.

MANAGEMENT OF DISEASES AND OTHER CALAMITIES

"Ice-ice" disease is a major problem in seaweed farming. Affected plant parts become whitish, soft and eventually disintegrates.

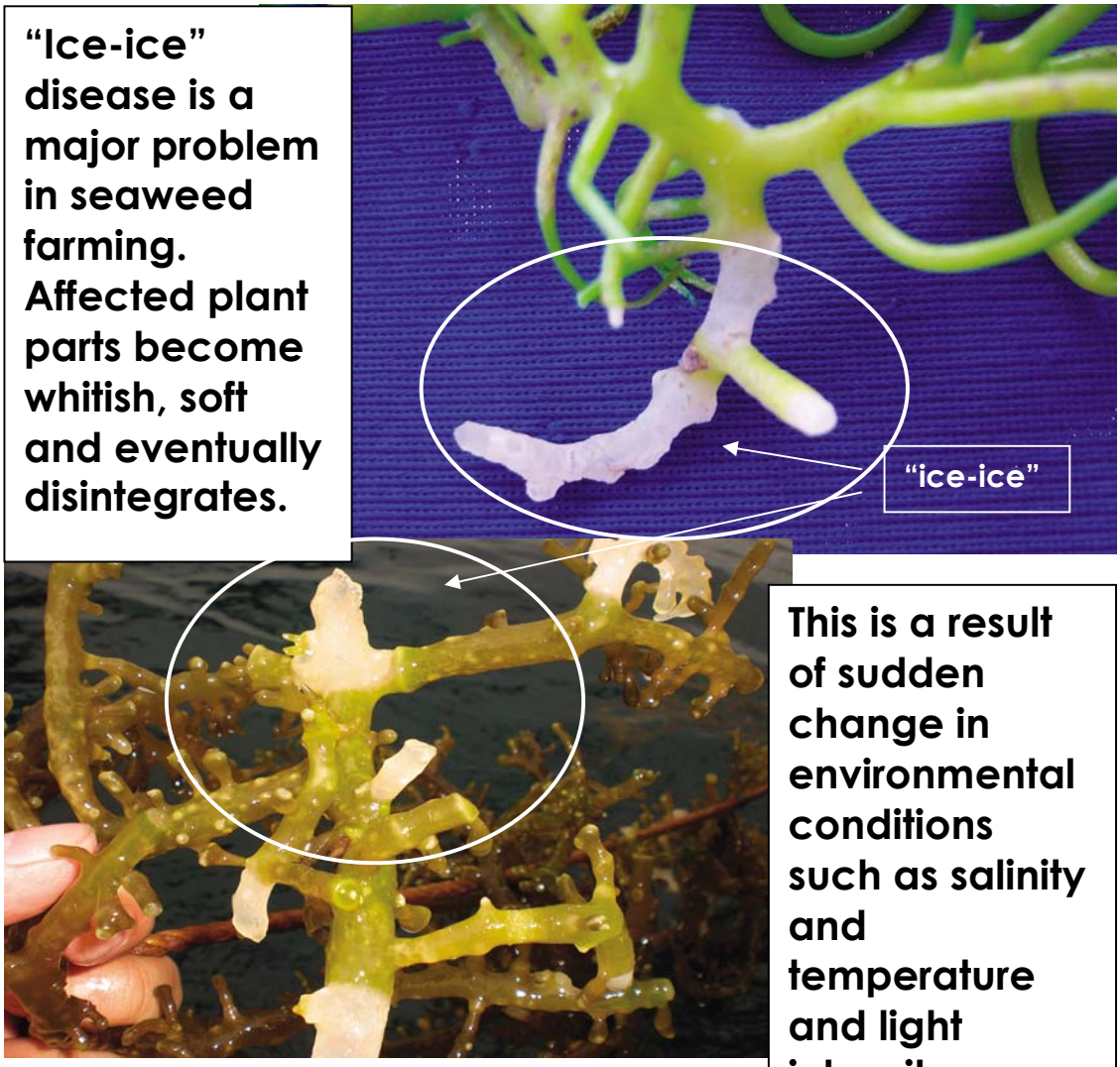


Fig 16. Seaweeds infected with "ice-ice"

This is a result of sudden change in environmental conditions such as salinity and temperature and light intensity.

If ice-ice is observed, totally harvest crops and replace them with new seedlings or transfer your plants to un affected sites.

Other problems include: epiphytes infestations; pitting, tip darkening and silting.

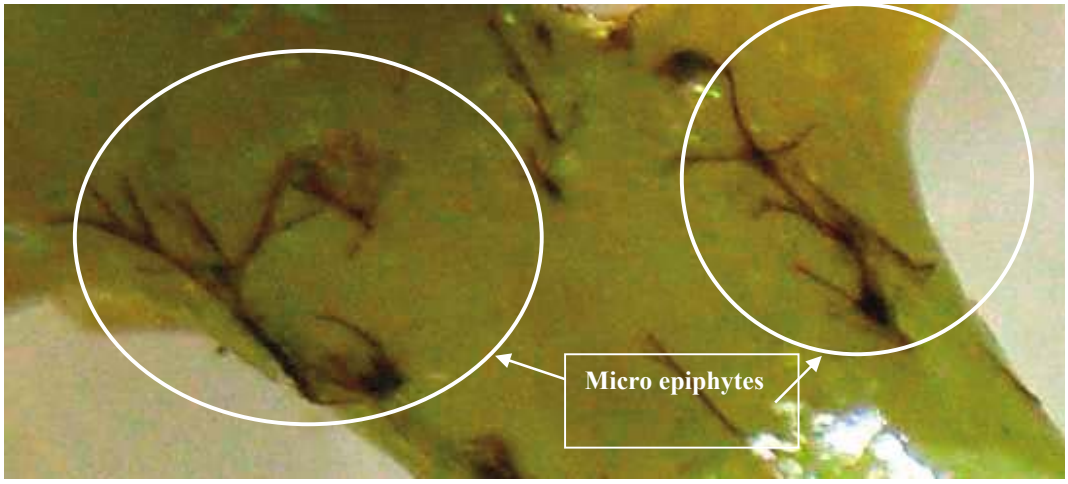


Fig 17 Seaweed infected with micro-epiphytes

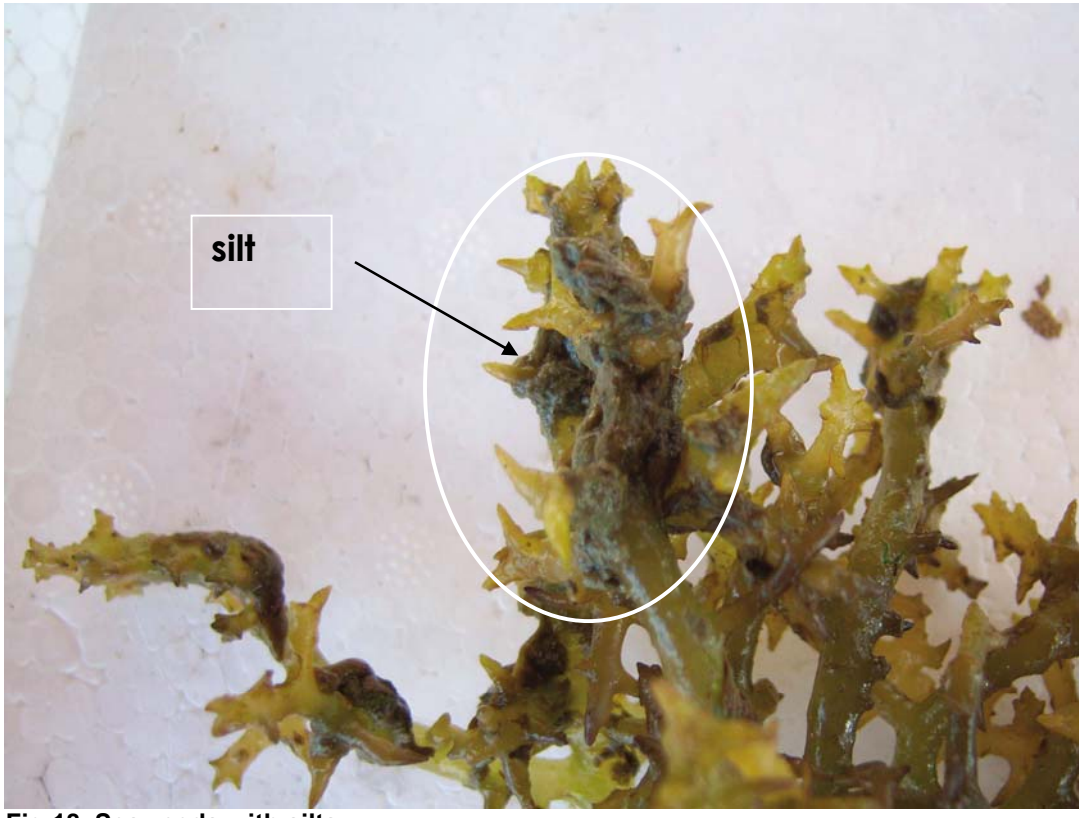


Fig 18. Seaweeds with silts

POST HARVEST HANDLING AND PROCESSING

Seaweeds and its extracts are mainly intended for food, pharmaceutical and personal care applications, hygienic practices should be observed at all times.

Never dry the seaweeds directly on the ground to avoid any contaminations.

Fig 19. Seaweeds being dried hanging on bamboo poles

Fig 20. Hanging method of solar drying in the seaweed farm

Fig 21. Seaweeds being dried in elevated drying platform

While drying, remove the impurities like tie-ties, stones, corals, shells and other foreign matters.

Cover the seaweeds with plastic sheets during night time and when it rains.

Do not allow stray animals like dogs, cats, and chicken in the drying area.

As soon as the seaweeds are dried, pack them in sacks and store in clean dry place.

Fig 23. Proper handling and storage of dried seaweeds.

Dried seaweed is now ready to sell immediately or accumulate them in storage while awaiting for better price (but not too long to avoid spoilage).