Seaweed

Name of species/group

Eucheuma, cottoni (*Kappaphycus alvarezii*), lumi wawa, ogonori (*Gracilaria* spp.), lumi cevata (*Hypnea* spp.), tosakanori (*Meristotheca procumbens*), nama, seagrapes (*Caulerpa racemosa*), limu tanga'u, mozuku (*Cladosiphon* sp.).

Primary potential

Aquaculture.

Attributes for aquaculture/stock enhancement

- Primary producer (lowest possible trophic level, so does not require feeding).
- Vegetative propagation (asexually from cuttings) so hatcheries are not necessary.
- Low technology, simple cultivation methods.
- Comparatively low inputs required for aquaculture, simple equipment.
- Seaweed for industrial raw material markets can be dried in the sun, so no need for post-harvest refrigeration.

Culture methods

- Seedstock is obtained from cuttings retained after each harvest.
- Grow-out can be on rope lines and stakes ('off-bottom' method) or IN nets in shallow back-reef areas or on floating rafts (e.g. bamboo) in lagoons.
- Technology is low cost and requires only simple equipment and methods.
- This type of aquaculture is well suited for small-scale operations, by 'grassroots' people running a seaweed business at a household level.
- All of the seaweeds on the above list occur naturally in the Pacific Islands region, except kappaphycus, which is an introduced species. No scientifically rigorous study of the environmental impacts of kappaphycus introductions has yet been made. However, experience so far suggests that impacts, if they exist, are fairly benign (provided that quarantine procedures are adequate).
- Seaweed farms of whatever species have at least two beneficial impacts: they can increase local fish populations by providing shelter and food for herbivorous fishes (especially siganids), and they act as 'nutrient sinks' that take up inorganic nutrients (ammonia, nitrate, phosphate) from the water column.
- Seaweed fisheries are traditionally the domain of women in many Pacific Islands countries, so it is a natural progression for women to be involved in seaweed farming.

Current production status

- Kappaphycus farming is well established in Kiribati, with production routinely around 1000 dry tonnes per annum. It is now re-established in Fiji Islands after a stop-start history of development.
- Seaweed Both Tonga and Vanuatu are poised for development of their own kappaphycus industries.
- Seaweed Kappaphycus production problems include epiphytic filamentous algae (EFA), ice-ice disease, and herbivore damage (mainly by siganid fishes). Growth is highly site-specific, so test-plot surveys are necessary to find the best grow-out locations. Transportation from outlying islands to a major port for containerisation is also a disadvantage.
- Seaweed *Cladosiphon* sp. aquaculture is at an advanced stage in Tonga, which had already developed a lucrative but seasonal fishery for this seaweed. Aquaculture will allow increased production and a prolonged growing season.
- Seaweed Aquaculture of *Meristotheca*, *Gracilaria*, *Hypnea* and *Caulerpa* species is at an experimental stage. Some culture trials having been completed but development has been halted owing to either technical constraints or lack of a ready market.

Marketing

- Seaweed Markets for kappaphycus seaweed are virtually guaranteed.
- Seaweed The farming technology is well known, so kappaphycus is the top candidate for seaweed aquaculture development in the Pacific region.
- Seaweed Once production reaches a certain level, there is a big opportunity to add value locally by construction of a processing factory here in the region.
- Seaweed Gracilaria and hypnea are sources of industrial phycocolloid, but no buyers are immediately apparent. They have value in domestic markets as food species, and traditional fisheries exist for these two seaweeds in Fiji Islands and in other places. It is worth noting that both gracilaria and hypnea are suitable food species for use in trochus and green snail aquaculture, so this alone could justify some limited aquaculture production of these two seaweeds.
- Seaweed Meristotheca and caulerpa are edible species in high demand in Japan, but the former is scarce and difficult to cultivate while the latter is perishable and difficult to transport over long distance. Cladosiphon is also in high demand in Japan as a food species, and is already being successfully marketed there by Tonga.
- Seaweed All seaweed aquaculture products are suited for eco-labelling, as they are essentially organically grown with nothing (food, chemicals) added into the water column apart from the seaweed plants themselves.

Comparative advantages/disadvantages (risks) of producing the species in the Pacific

Advantages

- Most seaweed farming is low technology and suited to the lifestyles of rural villagers who may have few other income generating opportunities.
- The activity is suited for both men and women.
- There are huge areas of sheltered and unpolluted waters suitable for seaweed farming in many Pacific Islands countries. Impacts of seaweed farming appear benign or even beneficial.
- The products can be sold fresh or dried, and are suited for eco-labelling.

Disadvantages

- One drawback is long distances for transportation, firstly from outer islands to the main port and secondly from the main port to European, North American or Japanese export markets.
- The main drawback for kappaphycus aquaculture is that the farm-gate price must be sufficient, and payments be made on a sufficiently regular basis, to maintain grower interest compared with returns from other rural income sources like fishing or copra.