

Korea's edible seaweed trade

Although, in aggregate, the edible seaweed trade is large and important — both economically and nutritionally — it is not a global industry, but one restricted primarily to several Asian countries. One such country committed to furthering its yields of edible seaweeds which command a better price than industrial seaweeds, namely seaweed colloids, is the Republic of Korea.

by D G McHugh and B V Lanier

The use of seaweeds, both for food and medicinal purposes, was recorded in China thousands of years ago. Today, seaweed and seaweed products remain widely used food items in certain Asian countries. In fact, the primary consuming countries for edible seaweeds are Japan, the Republic of Korea and China. Thus, the bulk of international trade in edible seaweeds is between these nations. There is some minor trade with other countries where nationals of the former ones have settled (eg the Japanese community in the United States). The trade is mostly in dried brown seaweeds, some salted, wet brown seaweeds, and the red seaweed, *Porphyra*. With the exception of the Republic of Korea, there is little potential for developing Asian seaweed producing nations to enter this market because their marine environments are too warm to allow the growth of the seaweeds in demand. The Republic of Korea, however, does have suitable marine environment and is already heavily involved in the mariculture of edible seaweeds, namely *Hizikia*, a brown seaweed.

Seaweeds for direct human consumption

The principal red, brown and green seaweeds which are utilised as subsidiary foods are listed below:

Food for direct human consumption		
Red seaweed	Genera <i>Porphyra</i>	
Brown seaweeds	<i>Hizikia</i>	<i>Undaria</i>
	<i>Laminaria</i>	
Green seaweeds	<i>Caulerpa</i>	<i>Ulva</i>
	<i>Enteromorpha</i>	

Brown seaweeds

The total production of brown seaweeds in 1980 was reported at 226 000 tons (wet material), or about 50 000 tons dry weight. This represents a near recovery to the 1977 production level after the decline of 1978 and 1979. It is estimated that only 1 200 tons of this output was used for colloid manufacture; the remaining material was utilised mainly as edible seaweed for either domestic consumption or for export. In 1980, 27 400 tons of dried brown seaweed were exported, of which *Undaria pinnatifida* (*wakame*) accounted for 90%. Most of this (96%) went to Japan. After the export of seaweed meal — 800 tons mainly to Japan — about 22 000 tons remained for domestic use. The Republic of Korea is the third largest

producer of brown seaweeds in the world after China and Japan. Production for 1982 totalled about 260 000 tons.

Red seaweeds

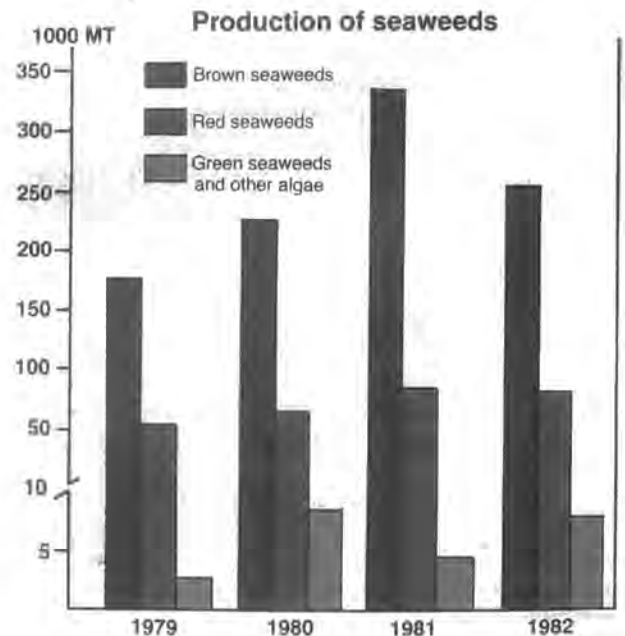
Production of red seaweeds in 1980 was 66 000 tons wet, or about 15 000 tons dried. Official statistics show that less than 200 tons of this was exported — two-thirds as *laver* and one-third as "Irish moss". The export of "Irish moss" (probably *Chondrus ocellatus* and/or *Gigartina tenella* for use in carrageenan extraction) fell from 438 tons in 1978 to 43 tons in 1981, and current government regulations prohibit its export.

About 11 500 tons of red seaweeds are used in the manufacture of seaweed colloids, mainly *Gelidium amansii* for agar. Most of the *Gelidium* is collected by divers. Mariculture has been introduced, but a production level of only 60 tons per year has been reached to date.

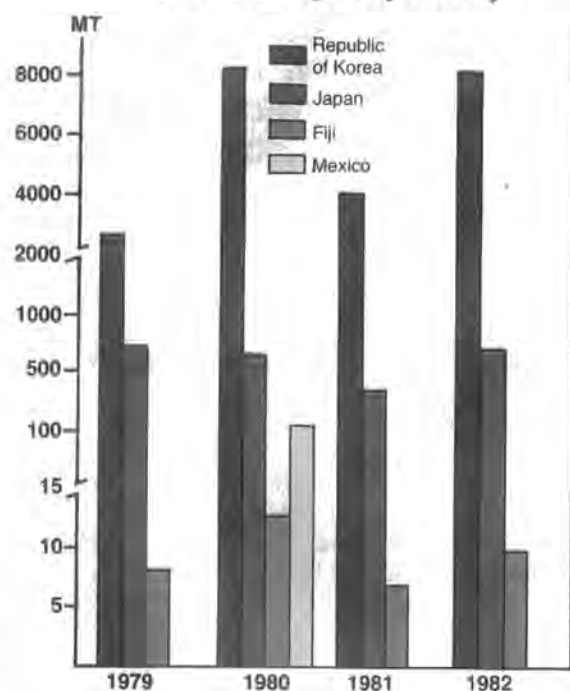
Latest production figures show that some 90 000 tons of red seaweeds were produced in 1982.

Green seaweeds

The Republic of Korea is the largest known producer of green seaweeds: 8 300 tons of wet material in 1980



Production of green seaweeds and other algae, by country



FAO/Dacia C.L. Chang

compared to less than 600 tons from the second largest producer, Japan. Much of this production is of "green laver" (*Enteromorpha* spp), some of which is exported to China and Japan.

Principal seaweed food products

These seaweeds are chiefly utilised in various dried forms, but smaller amounts are also utilised as salted products. Japan, China and the Republic of Korea are the main consuming countries, where nearly 400 000 tons, in aggregate, are utilised annually. Coastal inhabitants of other Asian countries, such as the Philippines, Malaysia and Indonesia, also consume seaweeds — usually red or green types — fresh as a salad food or cooked like fresh vegetables. In Japan, the Republic of Korea and China, the principal seaweed food products are *kombu*, *wakame* and *laver*.

Kombu is a dried brown seaweed. Several species of *Laminaria* are utilised and are sometimes referred to by the general term *kelp*. It is boiled as a vegetable, used as a soup stock, as a seasoning for rice dishes, and — in dried strips — eaten as a snack food.

Wakame is a dried brown seaweed, derived from *Undaria pinnatifida*. When reconstituted, it is among the softest of the brown seaweeds, and is used in Japanese *miso-soup*. In recent years, about 50% of the market for the dried product has been replaced by a salted, wet form.

Laver is principally derived from the red seaweed, *Porphyra* (purple laver). This thin, wafer-like seaweed is chopped into small pieces and dried as flat sheets which are used in a wide variety of dishes, such as *sushi*. *Laver* has a much higher protein content (25-35%) than the brown seaweed (8-15%) and, nutritionally, is the

superior of the three foods. It is, therefore, the most expensive.

Trade

Total exports, value and average price of some of these and other seaweed items for 1982 can be perceived from the table below. Together, they accounted for about 8.1% of the total Korean export value of marine products.

Trade and artificial culture of all three types of seaweed have flourished, as demand, especially in Japan, has risen. This has led to exports to Japan, principally by China and the Republic of Korea.

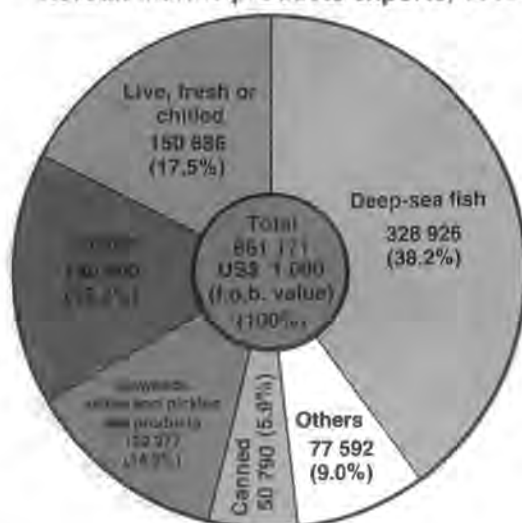
The Republic of Korea has long enjoyed the monopoly of supplying salted mustard (*Undaria*) to the Japanese markets. Her 1982 shipment of salted mustard to this market totalled some 23 000 tons, representing a value of about US\$ 30 million. This monopoly is, however, now being encroached upon by Chinese products. In 1982, China first marketed 520 tons of salted mustard to the Japanese markets. The target for 1983 was 1 000 tons (some 350 tons were exported during the first four months; later statistics are not yet available). Spurred by the successful shipment, China plans to export 3 000 tons this year and 5 000 tons in 1985. If the export of salted mustard from China increases beyond 5 000 tons, Korea will face a serious setback in bargaining conditions and quantity.

The Republic of Korea also supplied Japan with 2 344 tons (value US\$ 12.95 million) of *Hizikia fusiforme*, a tender edible brown seaweed. In the case of *laver*, the country's export of various types of *laver* to Japan in 1981 was only 47 tons, indicating that the country consumes much of its own product and that Japan has a vigorous artificial culture industry which meets most of its own domestic needs.

The export prices of edible seaweeds are high compared with other types. For example, red lavers sell for

Seaweed exports (1982)			
	Volume (MT)	Value (1000 US\$)	Price (US\$/MT)
Smoked laver	75.9	1.0	12.6
Rock laver	51.8	474.0	9 186.9
Other laver	532.8	6 689.5	12 555.5
Fusiforme	2 359.4	12 993.6	5 507.2
Green laver	43.4	260.6	6 004.9
Undaria	23 522.6	30 079.9	1 278.8
Kelp	1 730.8	8 074.5	4 665.2
Other edible seaweeds	371.6	637.6	1 715.7
Agar-agar, strip form	636.2	6 358.3	9 994.3
Agar-agar, powdered	40.0	470.6	11 765.9
Other agar-agar	9.2	77.4	8 417.7
Other seaweeds for agar-agar manufacturing	216.5	356.4	1 646.1
Moulded tenax	3.7	18.5	5 007.8
Furcata	40.2	85.5	2 127.9
Typicus	421.9	325.6	771.8
Kelp meal	217.0	70.9	326.9
Other seaweeds	1 386.8	2 323.8	1 675.6
Laver (parched or seasoned)	11.4	20.6	1 805.7
Other edible seaweeds (parched or seasoned)	62.9	80.0	1 271.3
Total	31 734.1	69 398.3	

Percentage seaweed contribution in Korean marine products exports, 1982



Official Korean Marine Products Export Statistics

between US\$ 8 000–US\$10 000 per ton, green laver and kelp tangles at about US\$ 6 000 per ton. *Undaria* (*wakame*), the lowest priced of any of the edible seaweeds, fetches about US\$ 1 300 per ton.

Industrial uses — seaweed colloids*

Agar

Annual production is estimated at about 1 300 tons spread among 14 manufacturers, the majority of which use the traditional freeze-thaw process. Ninety percent of production is in the form of agar strip, with the remaining 10% in powdered form. In 1981, the country exported 594 tons of agar strip (average price US\$ 13.80 per kg) and 50 tons of powdered agar (US\$ 12.80 per kg). This accounts for about half of the total production. The bulk of exports went to Singapore (225 tons), Japan (180 tons) and Hong Kong (100 tons).

In 1982, some 640 tons of agar strip was exported while the figure for the powdered form dropped to 40 tons.

Carrageenan

At present, there is only one carrageenan producer (100 tons per annum), but a new joint venture with a Japanese company, at Jyuten, is being planned (to manufacture 200 tons per annum). Production is based on *Chondrus ocellatus* and *Gigartina tenella* as raw material. The product is exported to industrialised countries.

The Republic of Korea is the only developing country producing significant quantities of carrageenan. Exports of "Irish moss" (presumably *Chondrus ocellatus*) have fallen because of the impact of *Euchema* farming in the Philippines. The Korean carrageenan industry, thus, appears to have sufficient raw material to allow for further expansion from the present production of 100 tons per year. This should be facilitated by the fact that

the Korean product has already established itself in some markets.

Alginates

It is estimated that some 105 tons of alginates per year have been exported to Japan from 1971-73, but it is doubtful that production has continued. In 1979, imports of alginates were 153 tons, followed by 235 tons in 1980. Exports in 1980 totalled only three tons. The country has suitable seaweeds for alginates but, instead, imports appreciable quantities of alginates. This stems from the industry and Government's policy of garnering the more substantial returns from selling the seaweeds for food purposes.

Marketing

The marketing of seaweeds, both edible and industrial, is channelled through local cooperatives which have branches in the South coast region where most of the collection and cultivation is done. The local cooperatives decide on grades and prices after consultation with the National Federation of Cooperatives in Seoul. Some are sold by direct sale and some by auction. Some of the buyers process and package the seaweed for both domestic and export markets. There are yet, other exporters who simply buy from these primary processors and re-sell for export.

Potential for development

The Republic of Korea can meet current levels of demand for its brown seaweeds, both domestic and overseas. Prime interest, however, is in edible seaweeds which are in high demand within the country, produce considerable export income and yield much higher returns to the producer than industrial seaweeds for colloid manufacture.

An area of potential growth appears to be the mariculture of *Gelidium amansii* for agar production. This species gives an agar of excellent gel strength, and surplus production could be exported. Agar production could, therefore, be expanded if the mariculture of *Gelidium* succeeds. There is a good demand for agar strip both domestically as well as in surrounding Asian countries. Demand may also increase if prices decline.

Production of carrageenan is likely to increase too, as a result of the joint venture with a Japanese company. The large quantities of seaweed formerly exported should provide a good basis for expansion of the industry, and the joint-venture arrangement may ensure a market for the product. Given the current world demand and supply situation for carrageenan, any further expansion in the Republic of Korea should be preceded by careful market appraisal. ■

This article represents up-dated excerpts of a study, "The World Seaweed Industry and Trade: Developing Asian Producers and Prospects for Greater Participation", which was conducted by Mr D G McHugh and Mr B V Lanier on assignment from INFOFISH and the Asian Development Bank. The full report is available on sale from INFOFISH.

* More information on this in IMD 4/83.