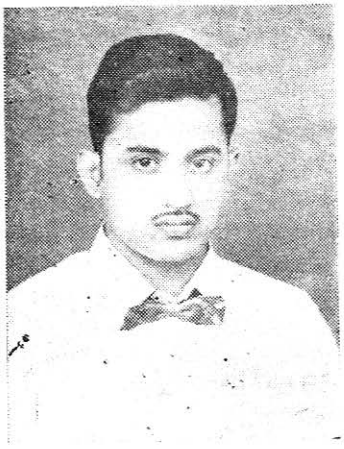
CAN WE CULTURE SHRIMPS TO INCREASE OUR PRODUCTION?



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Canned and frozen prawns, as products for export, form one of the most important foreign exchange earners in India. It was in 1953 that the first consignment of frozen shrimps was exported by an industrialist from Cochin as an experiment. The success of this venture led to a phenomenal increase in this industry within the last 18 years. The foreign exchange earnings as a result of export, established a special significance to this fishery which was denied to other fisheries. Thus, a modern and sophisticated industry of frozen and canned prawns sprang with an export record of over 35 crores of rupees in 1970.

This has raised India to the status of one of the leading prawn exporting countries in the world. The annual production of marine prawns in India is estimated to be about 100,000 tonnes which forms about 10% of the total landings of marine fish. About 80% of the marine prawn catches come from the west coast of India. The narrow coastal belt with the adjoining stretches of low lying areas and backwaters form the main prawn fishing regions. The Cochin Backwater, for example, is the most important area for prawns with an estimated annual production of several thousand tonnes.

Prawns belong to the class Crustacea of the phylum Arthropoda. The economically important prawns, constituting the major portion of the catches, are the penaeids belonging to the genera *Penaeus, Metapenaeus, Parapenaeopsis* and *Solenocera*. In addition to these, non-penaeid prawns belonging to the genera *Palaeomon, Hippolysmata* and *Acetes* are also caught. Among penaeids, *Penaeus indicus, P. monodon, Metapenaeus dobsoni, M. affinis, M. monoceros* and *Parapenaeopsis sculptilis* are the most important species commercially. Of these, *P. monodon* is the largest Indian marine prawn attaining a maximum length of about 30 cm, while among the non-penaeids, the palaeomonid *Macrobrachium rosenbergii* grows to a maximum length of 30 – 32 cm.

Much of the fishing for prawns is still being carried out near the shore

within the 36 metre-line; using mechanised boats and shrimp trawls. However, there are possibilities for extending the fishing range beyond this region. Exploratory fishing has shown the presence of a few species of prawns in deeper water.

The increasing demand for prawns naturally necessitates increased production. This could be achieved by greater exploitation. But this, as it is understood now, when concentrated in a limited area would lead to a depletion of stock; and hence the need for exploitating the offshore prawns grounds will be felt more. This would require larger and better equipped fishing vessels and would need considerable investment. Another line which is likely to augment prawn resources is to device and adopt prawn cultural practices. So far little work has been done on the culture of prawns in our country. India has a coastline of about 4700 km. Connected with this vast coastline are about 8,000[2] of estuarine and other brackish water areas suitable for prawn culture. A kind of seasonal culture practice, however, does exist in some parts of our country. For example, in Kerala, after the paddy harvest, prawn culture known as "Pokkali Culture" is practised in the paddy fields during the months of November to April. Water from the brackish water lakes and backwaters, which contain numerous prawn larvae are allowed to get into the paddy fields after the paddy harvest. These larvae are allowed to grow there for 2 – 3 months. They feed on the abundant organic matter and quickly grow into adult size. Before the commencement of the next paddy crop, they are caught and the paddy fields are flushed with freshwater to remove the salt. Similar culture practices are also undertaken in Indonesia, Malaya and Japan. In this type of culture the basic stocks are the prawn larvae from the sea which are allowed to enter paddy fields now filled with brackish water. In these fields they get plenty of food, and grow fast.

Commercial culture of marine penaeid prawns, on the other hand, from the egg to the adult stage (that is without depending on the supply of prawn larvae from the sea) is a field where no one in India has succeeded so far. From the egg, the adult prawn is formed only after it passes through various larval stages, namely nauplius, protozoea, zoea and mysis, which do not have any resemblence with their parents. Therefore, any attempt to culture prawns requires the prior knowledge of the life history of the concerned species. In early stages it has been found difficult to rear prawn larvae in the laboratory because of their peculiar food habits, and temperature and salinity requirements during the early stages of growth. Once these problems are overcome we can hope to culture prawns on a commercial scale.

In a few countries such as Japan and more recently in Australia, prawns have been cultured on a commercial scale from beginning to the end. In Australia, *Metapenaeus masterii*, a species of prawn which attains a maximum length of 10 cm within 12 to 14 months, is being cultured now. In addition to Australia and Japan, a few other countries also have taken up shrimp culture seriously and have shrimp farms to supplement their catch. S. W. Ling has conducted a series of experiments on the breeding, rearing and culturing of *Macrobrachium rosenbergii* under controlled conditions at the Malaysian Fisheries Research Institute. He has succeeded in developing the techniques for culturing this

species and based on these techniques Malaysia and Indonesia have started thriving shrimp farms in their near coastal waters. There is considerable scope for similar prawn cultural practices along our coasts.

Japanese scientist, Motosaku Fujinaga, first succeeded in culturing a species of prawn, *Penaeus japonicus*. With his newly developed techniques, Fujinaga was able to rear adult prawns from eggs within 6 to 10 months. He resigned his job in a Japanese Fisheries Organisation in 1959 and is now engaged in prawn culture. Although his methods have not achieved maximum profit, he has shown that prawns can be cultured on a large scale under controlled conditions.

In brief, the Japanese method can be summarized as follows:-

Ripe females are first collected from the culture farms or from the sea. They are kept in breeding tanks. Each female contains about 1,200,000 eggs. Usually eggs are laid at midnight. When all the eggs are shed, the mother prawns are removed from the tank. To prevent clumping of the eggs at the bottom of the tanks, the water is stirred by jets of air bubbles. Within 13 – 14 hours nauplii are hatched from the eggs. They are, for sometime, dependent upon the stored food material present in the eggs.

Within another 36 hours after hatching, the nauplii get transformed into the protozoea stage. From this stage onwards they will begin to feed on food provided from outside source. Because of their poor locomotive powers they are unable to make use of the food material if it happens to be slightly away from them. In nature food materials seem to be brought close to the larvae by wave action.

Fujinaga himself prepares the food for this stage of prawn and it consists of a microscopic unicellular diatom (plant). *Skeletonema costatum*. It is grown in special culture media in seperate tanks, The colour of the *Skeletonema* culture is yellowish brown. This culture, containing millions of these microscopic plants, is periodically added to the rearing tanks. Water in the rearing tanks is also constantly agitated by jets of air bubbles and so these plants find their way into the hungry mouths of the prawn larvae. This is how Fujinaga succeeded in rearing the most critical stage of the prawn life history.

As the larvae grow in size, they start ingesting animal foods. In addition to the 'Vegetable Soup' mentioned above, Fujinaga gives them finely chopped brine shrimps, marine molluscs and oyster eggs. This mixture of food enables the larvae to grow very quickly.

After passing through the mysis stage, the larvae metamorphose into the postlarval stages. Now they begin to resemble the adult prawns. If enough food is not supplied, these small prawns begin to show cannibalistic tendencies and thousands of them suddenly disappear. To prevent this, they are transferred into more spacious cement tanks of over half metre depth. The bottom of these tanks is covered by sand and aeration is maintained through the porous sand. This helps in two ways: (1) Small prawns which burrow in the sand during the daytime are forced to come out and they eat more food. (2) The water in the tanks gets well aerated.

The small prawns are allowed to remain in these tanks for about 10 – 20 days. When they reach about 2 cm length, some are caught and sold to

other prawn culturists and the rest are transferred to large fields adjascent to the sea.

Most of the cultured prawns are used for the preparation of a special dish called "Tempura" in Japanese restaurants. Cultured prawns in Japan fetch a price of nearly 8 dollars per Kg. Even then prawn culture, considering the cost of rearing involved, has not been found very profitable; but Fujinaga hopes to make his venture more profitable in the next 2 or 3 years, using a modified mass culture technique.

In India, at the Central Marine Fisheries Research Institute, experiments on the rearing of various species of prawns are being conducted for the last few years and some success has been achieved in this field particularly with species of the genus *Macrobrachium*.

It seems worthwhile to explore if Fujinaga's culture techniques are applicable to Indian conditions. Fujinaga made the following comment in one of his scientific papers: "The best places for shrimp culture should be sought in tropical and subtropical regions. Vast and boundless marshes, swamps or jungles in the tropics or subtropics should be made available for suitable shrimp farms. These areas are at present not utilized for any production purpose and are thought useless, but they are the best places for penaeid prawn culture. This will greatly contribute towards the increased supply of animal protein to the human race". Let us hope Fujinaga's prediction will soon come true. ●