

KADALEKUM KANIVUKAL

(Bounties of the Sea)

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MIXED FARMING OR POLYCULTURE

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In Kerala, nearly 75-80% of the population consume fish and their annual per capita consumption rate is about 13 kg. The rate of fish consumption is likely to go up due to increased awareness about fish as a source of cheap and highly nutritious but harmless food item. Hence there is every need to augment fish production not only to meet our food requirements but also to increase foreign exchange earnings. The current level of fish production is inadequate to fulfil all these needs. An analysis of the trend of fish production during the past few years indicates that there may not be any significant improvement in it in the coming years. In this context, measures to increase fish production are to be thought of. Aquaculture is the only way to achieve this. In Kerala at present aquaculture is restricted to backwaters and inland waterbodies. In order to enhance fish production, farming of fish and other species of aquatic organisms is to be extended to inshore coastal waters for which suitable farming methods are to be adopted.

Different species of fish, shrimps, lobsters, crabs and molluscs are cultured in backwaters, ponds, reservoirs and other inland water bodies. Shrimps, crabs and lobsters are farmed in well prepared ponds. However, in this method of farming the complete water column is not effectively utilized for maximum production of useful organisms. The new method of farming called mixed farming or polyculture helps in full utilization of water column.

Culture of diversified candidate species together in the same place at the same time is called mixed farming or polyculture. The candidate species selected should not compete among themselves for space, food and reproduction.

For this type of culture it is therefore important to select species which occupy different depth zones in the water column. Both inshore and backwaters are more suitable for this type of farming than freshwater systems. This is because our coastal waters and backwaters are rich in species diversity. The seed requirement for mixed farming can be met from these areas. By adopting simple and easy collection methods large quantities of seed can be collected. Seed can also be obtained from commercial hatcheries operating in public and private sectors.

Calm and shallow areas of the coastal sea which are less than 10 m in depth and backwaters which remain brackish throughout the year are ideal sites for mixed farming. Shallow inshore places flushed by tidal flow in which 20-30% of the water is periodically exchanged also are suitable for mixed farming. The bottom of the farm area should be clayey, sandy or rocky. Other aspects which are to be considered are optimum conditions of temperature, salinity, pH and dissolved oxygen. Abundant sunlight and enough seasonal rains enhance the primary production of these areas which in turn reflects in increased production and faster growth of the stocked species. Inshore areas which are prone to heavy waves, strong currents and cyclone are not suitable.

The species selected for culture can be grouped into locomotory and sedentary types. Whereas finfish, lobsters, crabs and shrimps are locomotory, organisms such as sea cucumbers, seaweeds, mussels, edible oysters, pear oysters and clams are sedentary. Clams, sea cucumbers, shrimps, crabs and lobsters, which are mostly benthic are cultured in the bottom layer. The mussels, pearl oysters and edible oysters are farmed in the middle layer in ropes or cages suspended from specially erected rafts. In the surface layer of one or two metres depth, seaweeds are cultivated on specially fabricated coir nets. Sluggish fish like groupers, sea bass, crabs and lobsters are cultured in cages fixed close to the bottom.

Cages of different sizes and shapes can be fabricated with bamboo reapers, split branches of 'Oda maram' (*Acacia planifron*), mid ribs of palmyrah leaves, ropes and nets. As it is rather difficult to erect pens in the inshore coastal waters and to prevent escape and entry of species from and into the

protected areas, it is desirable that the species selected should be with restricted movement and fast growth. Nowadays there is growing demand for live ornamental fish for export and it will be more profitable to grow them in the polyculture systems from where they can be easily caught unharmed and marketed alive.

In brackish water and fresh water areas such as ponds, canals and reservoirs, it is possible to culture different types of fishes both small and large. In shallow regions of backwaters having 1-2 m depth, pens can also be constructed using mats prepared out of bamboo, palmyrah or arecanut tree trunks. In these pens, shrimps, pearlspot, mullet, milkfish, crabs, etc. can be grown. Simultaneously, depending on the salinity level, clam, edible oyster and mussel can also be reared along with these organisms.

It has been established that in brackish water ponds and canal systems in coconut groves, different species of fishes and shrimps can be profitably cultured without much investment. Mullet, pearlspot, milkfish and shrimps such as *Penaeus monodon* and *P. indicus* are selected for culture in these areas and production in the range of 2000 to 3000 kg in six months to one year period is generally obtained. Production in the order of 1000 to 2000 kg was achieved in one year by culturing milkfish, mullet and pearlspot. Since it is possible to raise three crops of shrimps and one crop of fish, mixed farming is an expensive but profitable venture.

In mixed farming, the food requirement of the cultured organisms is met from the surrounding water itself. The molluscan forms consume micro-plankton, whereas the shrimps, crabs and lobsters subsist on the benthic organisms and bottom detritus. Ornamental fish feed on macro-plankton and hence no artificial feed is required. But caged fish which are deprived of free movement should be fed with suitable food from outside. However, species which are cultured in confined areas and ponds should be fed with artificial diets.

The major features of mixed farming are that different species can be reared together in the same period and the production could be enhanced by the complete utilization of the different layers of the water column. In this system the use of feed is also minimum. The expenditure for fabrication of

cages, pens and rafts can be considerably reduced by using locally available materials. The current demand for live fish in foreign markets is also an encouraging factor for promoting this type of venture. The mixed farming system can help to generate more employment opportunities to the traditional fishermen and their families. Above all, polyculture in a confined area helps to enrich the total productivity of that area which in turn attracts many other edible fishes to this area for feeding. Exploitation of these fishes also will provide additional income to the fishermen.