

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A),
(Re- Accredited by NAAC with B Grade)
Jagannaickpur, Kakinada-533002, East Godavari, AP

DEPARTMENT OF ZOOLOGY & AQUACULTURE
TECHNOLOGY

2020-2021



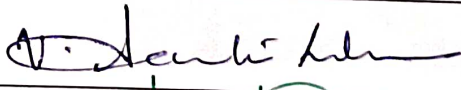
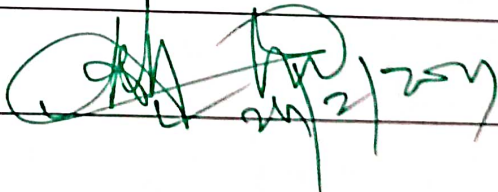
Orientation Programme

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Activity Register 2020-2021

Date	24/02/2021 - 6/03/2021
Conducted through (DRC/JKC/NCC/NSS/Department)	Aquaculture Technology
Nature of Activity (Seminar/Workshop/Extn. Lecturer ect.)	Orientation programme
Title of the Activity	Principles of aquaculture
Name of the Department/Committee	Aquaculture Technology
Details of Resource Persons (Name. Designation ect.)	N. VEERA CHANTI Guest lecturer in aquaculture technology
No. of Students Participated	19
Brief Report on the Activity	Students certainly benefit by themselves when they are participated in. They can know how to gather information relevant to the topic.
Name of the Lecturers who Planned & Conducted the Activity	U. Satyanarayana G/F in Zoology N. Veera Chanti G/F in Aquaculture In Technology B. Sonia G/F in Zoology
Signature of the in Charge	
Signature of the Principal	
Remarks	

Department of Aquaculture Technology



1st year students Participated in Orientation Programm.



Principles of Aquaculture

1 The Science of Aquaculture, 2 The Science of Aquaculture, 3 The Science of Aquaculture.

4 1.1 Definition

The term 'Aquaculture' means culture of all aquatic forms like fish, prawns, molluscs and sea weeds in fresh, brackish as well as marine waters.

The 'Aquaculture' includes:-

- The type of culture systems utilized, e.g., pond culture, cage culture, pen culture, etc.
- The type of organisms cultured, e.g., fish, oyster, shrimp or prawns.

The origin of aquaculture dates back to at least three thousand years ago, but unlike agriculture, which has been the most important way of obtaining food on land, aquaculture has until recently contributed very less to mankind due to age old methods in use coupled with lack of proper knowledge. But now the picture is changing rapidly as aquaculture is gaining more importance in the today's' modern world, due to increase in population and shortage of food.

1.2 Objectives of Aquaculture The main objectives of aquaculture are:

- (1) To boost economy of the nation by way of increasing per capita production.
- (2) To generate employment opportunities for the unemployed persons.
- (3) To utilize fully the natural water resources available to the maximum.
- (4) To uplift the socio-economic status of the people of Indian sub-continent.
- (5) To earn foreign exchange revenue by transport of fish to foreign countries.
- (6) To culture ornamental fishes for beautifying aquariums.
- (7) To culture larvicidal fishes for control of mosquito larvae.
- (8) To increase production of food, in the form of fish, and decreasing the pressure on other food items.

1.3 The History of Aquaculture Earth's surface is covered with water which gives medium to living organisms, which include a varied forms of life from protozoa to chordata. The fishes are one of them, thriving in water bodies of the universe.

(a) **The First Fish Ponds** About 4000 years ago, rivers the middle east and the belt of the Tigris and Euphrates were much better and more fertile. It is the period in which the first fish pond was built by the Sumerians in their temples. The Assyrians and other races followed them.

(b) **Fish Culture in Egypt** The engraving on a tomb in Egypt showing Tilapia being fished out of an artificial tank in about 2500 B.C. provides evidence that the people of Egypt were the first in the world to culture Tilapia. The Egyptians even mummified some of their important species, so that, accuracy of the drawings can be checked. Besides Tilapia, Nile Perch and Mormyrus were also cultured by them.

(c) **The Romans and Fish** The Roman, Marcus Terentius Varro (116-27 B.C.) wrote about two kinds of fish ponds kept by the peasants for food and profit and salt water ponds which were owned by wealthy aristocrats who used them to entertain guests. 'Red Mullet' were favorite fish as the colour

changes of the dying fish were admired by guests before the fish was cooked and eaten. Large Moray Eels' were also kept apart from Red mullets. The involvement of Romans with fish was not only for show, but, also for they explored 'Fish Culture' methods and were known to have transported fertilized fish eggs. The Roman's have externally fertilized the fish eggs utilizing the stripping method. The Science of Aquaculture 5

(d) The Chinese Fish Culture Around 500 B.C. 'Classic of Fish culture' was written by 'FanLei' in which he cited that his ponds were the source of his wealth. In 1243 A.D. Chow Mit of the Sung Dynasty and Heu in 1639 A.D. described the collection of carp fry from rivers and methods of rearing them in ponds. The earliest form of fish culture was that of Common Carp, *Cyprinus carpio* a native of China. From there, this species has been introduced into several countries of Asia, far East and Europe. From the 6th Century A.D. the culture of common carp declined in China. The common name of the carp in Chinese is 'Lee' and this name is associated with the name of the Tang Dynasty Emperor 'Lee'. Since the name of the emperor is considered sacred hence, the culture of the fish for food was not acceptable to the general society. So a search for another species for culture was undertaken which ended with the Chinese Carps, like Grass Carp (*Ctenopharyngodon idella*), Silver Carp (*Hypophthalmichthys molitrix*), Bighead (*Aristichthys nobilis*) and Mud carp (*Cirrhina molitorella*). The rearing of these fish species has given rise to polyculture practice.

(e) Fish Culture in Indo-China Fish culture was practised in Indo-China for many centuries and the systems called 'Pen' and 'Cage culture' of catfishes originated in Cambodia. Flow through culture was developed and the variations of the same were practiced in Indonesia for carps and in Thailand for *Pangasius* sp.

(f) Aquaculture in India The evidence about fish culture practised in India years ago, came from the 'Kautilya's 'Arthshastra' in which he mentioned about the secret means of keeping fish in reservoirs. 'King Someshwara' of Chanakya Dynasty described the methods of fattening the fish in ponds. There is a long period regarding fish culture in India until, collection and transportation of carp spawn, from rivers and stocking the ponds, was developed traditionally in Bengal, Bihar and Orissa by the end of 19th century. This technique spread in other states also and a notable advance in fish culture in Bengal was the construction of 'Bundhs' for carp breeding. Warm water fish culture got a boost in 1911 when under the guidance of 'H.C. Wilson the first big fish farm with facilities of carp breeding, came into existence in Tamil Nadu (TN).

The Indian Council of Agriculture Research (ICAR) recommended sponsoring fisheries research schemes by State Governments and Universities on different aspects of fish culture. For extending fish culture activities to all parts of the country Govt. of India established the Central Inland Fisheries Research Institute (CIFRI) at Barrackpore (West Bengal). The pond culture substation of CIFRI was started at Cuttack (Orissa) in 1949 for finding solutions to problems of fish culture in ponds and thereafter a considerable thrust has been laid on research programmes in inland fisheries.

Development after 1970 have led to the use of 'Second generation Techniques' including mammalian hormones, steroids, prostaglandin, and its analogues to make the cultivated species spawn for seed production. The Central Institute of Fisheries Education (CIFE) Versova, Mumbai, Aquaculture Research and Training Centre, Kakinada, Central Marine Fisheries Research Institute (CMFRI), Cochin; Central Institute of Freshwater Aquaculture (CIFA), Kausalyaganga, Orissa, Central Institute of Brackishwater Aquaculture, Chennai, have been established for the development of aquaculture in India.

(g) **Trout Propagation: History** The trout originated in France and the monk Don Pinchot of 14th century discovered the artificial propagation of trout eggs. Being a sport fish the, trout culture spread to almost all continents thereafter. Commercial trout culture developed in countries like France, Denmark, Japan and recently in Norway and Italy. With the development of 'Cage Farming' of Trout in Norwegian 'fiords' salmonoid culture achieved a remarkable place in production and public attention. The fish culture in North America was centered earlier towards propagation of salmon and trout. In 18th century trout hatcheries were established. Gradually the trout propagation spread to the temperate and semi temperate areas of central and south America. The British introduced trout in Asia and Africa, mainly to develop sport fisheries. The first attempt to transplant trout in India was made at Nilgiris in Western Ghats of Tamil Nadu.

(h) **Exotic Fish Culture in India and Other Countries** Besides trouts there are other species which from their place of origin have been introduced in other countries for culture purpose, e.g., *Cyprinus carpio* is the most extensively cultivated species worldwide. In India, the common carp (*Cyprinus carpio*) is cultured in combination with Indian major carps. The Silver Carp (*Hypophthalmichthys molitrix*), has been introduced in many countries and cultured in China, Taiwan, Thailand, Malaysia, Japan, Sri Lanka, India, Pakistan, Nepal, Philippines, Russia, Myanmar, Hong Kong, Singapore and Israel. In India for the first time fingerlings of silver carp were brought from Japan in 1959. Likewise, the Grass Carp (from China) and *Tilapia mossambica* (from Africa) have been transplanted throughout the world for cultural practices. There was resistance to its introduction in many countries as it was considered a pest by some countries. The larvivorous fishes were also introduced in different parts of the world. The catfish family Clariidae enjoys the widest range of geographical distribution and species *Clarias gariepinus* (Nile Catfish) from Africa was introduced in South Vietnam in 1974. From Vietnam it reached Cambodia, Laos and Thailand and it gets entry in India, in 1993. The Science of Aquaculture 6

(i) **Coastal Aquaculture** The oldest form of 'Coastal Aquaculture' is the 'Oyster Farming' practiced by the early Romans, Greeks and Japanese. In Japan around 2000 years ago coastal aquaculture was practiced. Aristotle mentioned the cultivation of Oysters in Greece. The culture of mussels and clams developed at a quite later stage. The terms 'Mariculture' and 'Sea Farming' are frequently used for raising organisms in the marine environment until recently, and from the worldwide interest, that the sea farming has received in recent years, it appears that sea will be cultivated on a large-scale. The animals now cultured include shrimps, lobsters, oysters and clams.

(j) **Sea Weed Culture** Sea weed culture is relatively of recent origin. The earliest reference about 'sea weed' culture appears to have published in Japan in 1952. It was after II World War the culture of edible sea weeds expanded and intensified considerably and practised in Korea, Taiwan and China. In Philippines and Hawaii several sp. of algae are regularly eaten. Several sp. of sea weeds contain 'Gelatin', used for the preparation of Jelly and Jams. Dried sea weeds are regularly used in domestic cookery for making soups, pudding, etc. The active ingredient in the sea weeds is 'Agar' (Sodium Alginate) which is used as a gelling substance. A few years ago, India used to export sea weeds and the products such as Agar and Alginates used to be imported. Now India is self-sufficient in its production. 1.4 **Aquaculture in India** India is the second largest producer with about 9% share of the world's total aquaculture. The top producer is China (57%). — **Freshwater Aquaculture in India** Inland aquaculture emerged today, as a major fish producing system in India (Fig 1.1) with production around 1.7 million ton/yr. Carp accounts for over 80% of cultured fish. Major Carps cultured are Rohu (*Labeo rohita*), Catla (*Catla catla*), Mrigal (*Cirrhinus mrigala*), Grass carp (*Cenopharyngodon idellus*), Common Carp (*Cyprinus carpio*), Silver Carp (*Hypophthalmichthys molitrix*), Magur

(*Clarias batrachus*), Singhi (*Heteropneustes fossilis*), Rainbow trout (*Salmo gairdneri*) and giant prawn (*Macrobrachium rosenbergii*). West Bengal is the largest producer of fish in India. The state is also the largest supplier of fish seed and supplies nearly 80% of the carp seed demand of the country. The Central Institute of Freshwater Aquaculture (CIFA) Kausalyaganga (Orissa) established in 1986 is the top level institute in the country with the motto of conducting research on different aspects of freshwater aquaculture and undertaking transfer of technology to the field. The institute serves as the lead Centre on Carp

Farming. — Brackishwater Aquaculture in India The area of brackishwater available in India for aquaculture is 1.19 million ha. Traditional shrimp farming practices are popular in Kerala, West Bengal and Goa. The yields vary from 300 to 1000 kg/ha year. Because of its high commercial value,

Giant tiger prawn (*Penaeus monodon*) is the dominant species in commercial production, although, Indian white prawn (*Penaeus indicus*) is also farmed in several places. Shrimp production by farming reached a record value in 1994-95. subsequently production suffered a set back due to a ban imposed by the Supreme Court of India in response to petition filed by environmentalists pleading that shrimp farming had created severe environmental damages. Subsequently many shrimp farms in coastal areas were closed. Intensive shrimp farming is banned and only modified improved farming is permitted with a productivity of around 2 to 2.5 ton/ha/yr. West Bengal is the highest producer of shrimps in India. Its estuarine area in the Sunderbans is ideally suited for the extensive culture of prawns and shrimps. The Central Institute of Brackishwater Aquaculture (Chennai) is today, conducting research on different aspects of brackishwater aquaculture as a national level institute transferring the technology to the field. — Mariculture (Sea Farming) in India Indian 'Sea farming' progress has been very slow. Of the 1.2 million ha. of potential land identified for shrimp farming only about 100,000 ha. is utilized. The slow progress in this area is due to the collapse of the Shrimp farming industry because of environmental concerns and disease problems. Although the present attention is towards diversification of fish species other than shrimp the commercial ventures are constrained due to unreliable seed supply and lack of technology for commercial marine finfish hatchery seed production. The culture of Sea bass (*Lates sp.*), milkfish (*Chanos sp.*) grey mullets (*Mugil sp.*), pearl spot (*Etroplus sp.*) etc. has been practiced in India since 1960's. Most of the culture systems are operated on smallscale level. The Science of Aquaculture 7 Potential mariculture sites especially for open seacage fish farming have been identified at Andaman Sea, northeastern arm of the Indian Ocean, bounded on the west by the Andaman and Nicobar Islands with the coral lagoons and protected deep-water bays. It provides environmental conditions for finfish farming using 'sea-cages'. *Lates calcarifer* (Sea Bass) (Fig 1.3) is a potential species for farming in India because of its fast growth rate, wider tolerance to environmental conditions and demand in export markets. It is distributed along the East and South west coast of India and is farmed traditionally in North east India using seed collected from wild. *Epinephelus* spp. (The Grouper) has abundant nursery grounds in Gulf of Mannar, Coral Lagoons of Lakshadweep and Andaman and Nicobar Islands. In India farming of groupers as an alternative species will be a productive venture. The culture of Mullet's is also restricted due to non-availability of hatchery seed. The 'Pearl spot' (*Etroplus sp.*) is monocultured using wild seeds in traditional ponds of Kerala. Experimental cultures of this species show its potential for polyculture. Sustainable marine fish farming will be achieved in India through integrated

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Orientation Programmers 2020 - 2021

S. No	Roll No	Name of the Student	Signature
1.	11413	S. Hema Durga Devi	S. Hema durga devi
2	11422	D. Pujitha	D. Pujitha
3	11423	P. Anitha	P. Anitha
4	11447	G. Krishavani	G. Keishnavani
5	11448	G. Swathi	G. Swathi
6	11463	V. Vijaya Durga	V. Vijayadurga
7	11464	K. Gnana Nagarawari	K. Gnana Nagarawari
8	11471	K. Kuruma	K. Kuruma
9	11517	S. Pavani	S. Pavani
10	11558	M. Suvarna Latha	M. Suvarna Latha
11	11600	M. Priya	M. Priya
12	11609	M. Kavya Sri	M. Kavya Sri
13	11630	P. Sandhya Sani	P. Sandhya Sani
14	11656	K. Laxmi Kumari	K. Laxmi Kumari
15	11679	G. Satya Veni	G. Satya Veni
16	11693	D. Sony	D. Sony
17	11723	P. Chumalika	P. Chumalika
18	11724	D. Neelima	D. Neelima
19	11727	P. Sai Laxmi	P. Sai Laxmi