General Introduction

With global population expansion, the demand for high quality protein, especially from aquatic sources, is rising dramatically. Increased aquaculture production is clearly needed to meet this demand in the third millennium, because capture fisheries are at capacity or showing precipitous decline due to overfishing, habitat destruction and pollution. Increased demands for aquaculture production mean increasing pressure for development of more efficient production systems. Major improvements have already been achieved through enhanced management, nutrition, disease diagnostics and therapeutics and water quality maintenance. A common theme through all these is genetics, which, actively and passively, has been used to meet many production challenges, such as disease resistance, tolerance of handling, enhanced feed conversion and spawning manipulation, i.e. all those areas to which wild animals must adapt for productive “domestication”.

Aquaculture genetics began with the advent of aquaculture in China more than 2,000 years ago, at about the same time as the Romans began to hold fish in ponds and learned how to breed them. Without realizing it, the first fish culturists who completed the life cycles of species such as the common carp, *Cyprinus carpio*, began changing gene frequencies and altering the performance of the fish they were domesticated. When the farmers noticed mutations in colour, body conformation and finnage, those with attractive traits were chosen as broodstock, and selective breeding was born.

India is endowed with a vast area of open inland waters in the form of ponds, rivers, canals, estuaries, natural and man-made lakes, backwater impoundments and
mangrove wetlands. Potentially, the inland fish resources of India are the richest in the world of 21,723 fish species known to science, over 40% of which live in freshwaters and majority of them live in tropics between latitude 23° 5’N and 23° 5’S. No where in the world is a zoogeographic region so blessed as the Indian sub- continent in respect of the diversity of fish wild life that dwells in inland waters. In terms of fish production too, India ranks second in the world, only China being ahead of her. The country now stands on the threshold of an aquaplosion aiming with a target of 8.2 million tonnes from fisheries sector by 2020 AD, from the present level of 4.8 million tonnes to meet the domestic per capita consumption of 11 kg and an export of 1 million tonnes, when India’s population will be 1300 million.

Though India is the richest biodiversity country in wildlife fisheries, a rough biodiversity utilization index given by Kutty (1999) showed that, India’s biodiversity index utilization is only 0.13. The same index of Korea and Taiwan is found to be 0.51, though they rank far below in aquaculture production. This clearly insists for the unexplored opportunities in aquaculture diversification and production. As natural fisheries become exhausted, production of this worldwide food resource will depend more on aquaculture through altering fish genetically for more and rapid production. Implementation of the genetic manipulation techniques will improve production of high quality protein for human diet. The need will be especially acute in developing countries like India, where the rate of human population growth will be the highest. Aquaculture and aquatic biotechnology including the use of genetically manipulated organisms have to be promoted as means to meet the extra need.
The genetic manipulation in selected catfishes such as *Heteropneustes fossilis*, *Clarias batrachus* and *Clarias gariepinus* were studied in the present study with the following objectives

1. To standardize the requirements of optimum dosage of Ovaprim hormone for ovulation, invitro fertilization protocol and larval rearing techniques for the catfishes such as *Heteropneustes fossilis*, *Clarias batrachus* and *Clarias gariepinus*.

2. To standardize triploidy induction in Indian catfish, *Clarias batrachus* using heat shock treatment and to compare the survival and growth between diploid and triploid individuals.

3. To optimize the protocol for induction of meiotic gynogenesis in *C. batrachus* by using heterologous sperm of *C. gariepinus*.

4. To study the performance of intergeneric and interspecific hybrid between the selected catfishes and compare the performance of hybrid with that of parents.