1. General Introduction

Prawn culture is a fast emerging and high profit industry in the Southeast Asia. It has tremendous potential for development in India also. Careful aquaculture generates much more income than any agricultural commodity. Aquaculture has the added advantage of regional self-sufficiency through the generation of more employment opportunities (Jhingran, 1991). In recent years aquaculture has gained considerable attention the world over, with prawn farming receiving more momentum in the tropics, especially on culture of penaeid prawns. The culture of freshwater prawn, which has made rapid progress in South East Asian countries has not caught up in India except for some sporadic capture in the states like West Bengal, Tamil Nadu and Andhra Pradesh. However, in recent years there has been much awareness evolved towards the culture of freshwater prawn.

Freshwater prawn farming is undergoing a phenomenal worldwide expansion in response to our ever increasing need for protein resources. They are one of the most valuable edible crustacean resources
of the world and are equally important to fishes both as abundant and important source of animal protein.

The freshwater prawns belonging to the genus *Macrobrachium* of the crustacean family Palaemonidae, include about 150 species of which 37 belongs to India. However, only half a dozen species of the genus *Macrobrachium* is of major economic value in India viz. *M. rosenbergii*, *M. malcolmsonii*, *M. choprai*, *M. birmanicum*, *M. rudae* and *M. villosimanus*. (Shree Prakash, 1989). However, the commercial capture fisheries exist only for some of them and the production does not meet the ever increasing demand even at home country. By way of farming in confined waters, very little commercial production is derived at present. Thus, there exists a wide scope for their aqua-production through semi-intensive farming.

*M. malcolmsonii* is one of the best candidate species for aquaculture in South India, since it is indigenous, compatible for polyculture, omnivorous and hardy. It exerts maximum growth performance among the cultivable prawns, without encountering any serious problem of diseases and has good consumer preference and demand in the local as well as overseas markets. *Macrobrachium rosenbergii* was globally well attempted for culture but there is no much work on the equally
sized and fast growing Indian river prawn *Macrobrachium malcolmsonii*. Since supply of wild seed is unreliable and insufficient, hatchery production of freshwater prawn is desirable to be undertaken as an organised system of farming. The commercial culture production has been in the low level phase only so far due to lack of sufficient seeds. At present the major bottleneck in freshwater prawn culture in the country is non availability of sufficient quantity of seeds. Therefore, establishment of hatcheries to cater to the needs of ever increasing demand is necessary. To cope up with this, reproductive informations are very much needed on this commercial prawn *Macrobrachium malcolmsonii*. Hence, in this present work attempts were made to understand the biometric characters and fecundity, effect of photoperiod on the growth of juvenile prawns, biochemical analysis of the ovary during maturation of female prawns and electron microscopic studies of the reproductive organs of male prawn.

**Objectives and Work Plan**

a) The thesis is spread over seven chapters. Chapter one starts with a general introduction with details of research aim and approach.

b) In the second chapter, an extensive literature review was made on the topics of relevance to this thesis. The lacunae were underscored to take up such events in the present study to fill up the gap.
An accurate information on the length-weight relationship is pivotal to assess the health of prawn, which is clearly important for the proper management of these prawns in culture. Further, the fecundity study would help to assess the carrying capacity and viability at different stages of *Macrobrachium malcolmsonii*, are dealt in chapter three and four.

Light is a cardinal factor found to modulate the body growth in a wide range of animals. Thus, it can be used as a tool to promote growth leading to maturity. Therefore, in the present work under chapter five an attempt was made to study the effect of different photoperiodic conditions on the moulting frequency and growth of juvenile *Macrobrachium malcolmsonii*.

Chapter six: Lipid accumulation in the oocytes is a metabolically essential process during the ovarian maturation of decapod crustaceans. Lipids are important sources of energy reserve for cellular constituents during embryonic and early larval development. The decapods are incapable of synthesizing sterols and poly-unsaturated fatty acids, much of the lipids required for oocyte maturation are derived only from diet. Studies on the changes in lipid profile during different phases of ovarian maturation in wild-caught *Macrobrachium malcolmsonii* would provide information on the lipid ingredients necessary for the formulation of juvenile and maturation diets for raising and maintaining brood stock.

Semenology has great applied value in prawn aquaculture in as much as it can help us to evolve alternate strategies for effective fertilization and larval production, when mature males become scarce.
in cultures due to selective harvesting. Semenological studies are also vital in the improvement of genetic stocks through artificial insemination. Ultra structural details of sperm morphology and aspects of spermatogenesis have been fairly worked out in different groups of crustaceans. However very little information is available on *Macrobrachium* sp., particularly no information on *M. malcolmsonii*. Hence, light and electron microscopic studies were carried out to analyse the ultrastructure of male reproductive organs of *M. malcolmsonii* under chapter seven.