

CULTURE OF CLADOCERANS

Introduction

Cladocerans are commonly called as "water fleas". Moina and Daphnia are the commonest representatives of this group of crustaceans and are quite popular as live food in aquahatcheries. This is because of their easy availability in nature and easy adaptability to captive conditions. Owing to these traits these cladocerans come in handy as relatively inexpensive live food in aquahatcheries. Moina and Daphnia belong to the Family Daphnidae of the Order Cladocera under Sub-class Branchiopoda of the Class Crustacea and Phylum Arthropoda of the animal kingdom. Moina and Daphnia inhabit fresh and low saline waters and also in some sewage lagoons.

Morphology

Body is laterally compressed and enclosed in a bivalved shell or a large fold of carapace (except head) in both Moina and Daphnia. Daphnia is distinguished from Moina by the presence of prominent caudal spine. Moina has a pair of prominent caudal setae whereas Daphnia has small setae. In both the cases, head is round and bears a pair of large biramous antennae, a pair of small antennules and a compound sessile eye. Large biramous antennae are the chief organs of locomotion. Thorax bears 5 pairs of appendages (Fig.). Moina measures about 0.5 to 1.0 mm in length and 0.2 to 0.6 mm in width whereas Daphnia measures 0.5 to 2.5 mm in length and 0.3 to 1.0 mm in width.

Food and feeding

Food and feeding habits of Moina and Daphnia are same. They feed on algae, bacteria, fungi, protozoans and organic debris.

Reproduction

Generally Moina and Daphnia reproduce parthenogenetically. The eggs are laid in large brood pouch situated between abdomen and posterior part of carapace. The eggs undergo complete development in brood chamber before being released as a first instar, which is similar in morphology as that of adult female. A batch of eggs in brood chamber is termed as 'brood'. The young ones are released in small batches known as 'Clutches'. In the total life span of a parthenogenetic female, a sexual phase occurs by generating sexual males. These males after mating with parthenogenetic females turn to sexual female, which result in production of resting eggs known as 'ephippia'. These ephippia can be stored for initiating the fresh culture as and when desired. They remain in viable condition for about 2 to 3 months.

Culture of Moina

Stock culture

For pure culture of Moina stock culture need to be developed. In order to start stock culture, collection of Moina is done from freshwater ponds and tanks with the help of a scoop net having 250-500 micron mesh. After collection, the content of the net is placed in a plastic bucket and brought to the laboratory. The sample is then diluted by adding fresh clear water and examined under a microscope to pick up Moina with the help of a fine dropper whenever observed. Each Moina so picked up are inoculated in 20 ml glass tube containing 10 ml of filtered water. Feeding of Moina is done with yeast at the rate of 200 ppm or Chlorella at a cell density of 10×10^6 cells per million. Each gravid Moina produces about 8 to 10 off springs in about 24 hours. Dilution of the test tube cultures is done daily through several 100 ml beakers. The volume is increased to 1 to 2 litre beakers or jars. Feeding is continued in similar manner as in the test tube culture. After 4 to 5 days, these jar cultured Moina are used as inoculum in mass culture tanks.

Mass culture

The mass culture technique for Moina is almost similar to that of Brachionus. Different authors have developed various techniques by feeding pure algal cultures i.e. *Chlorella*, *Chlamydomonas*, *Scenedesmus* etc. or by using phased manuring techniques with various inorganic fertilizers and organic manures.

First Method

In this method, the culture tanks are treated with groundnut oilcake, single super phosphate and urea at the rate of 75 ppm, 20 ppm and 8 ppm respectively. After fertilization, the tank is inoculated with Chlorella or mixed phytoplankton. Algal blooms develop within 3-4 days. Moina is inoculated at the rate 40-50 individuals per litre depending on the availability of the stock culture. Moina multiplies rapidly, feeding on phytoplankton blooms, bacteria and small particles of groundnut oilcake. It attains a peak density of 20,000-25,000 individuals per litre in 5 to 7 days after inoculation. After attaining peak density it is regularly harvested to feed the larval stages. As a result of Moina multiplication and reduction of nutritional status of water, Chlorella concentration declines. In order to maintain optimum Chlorella concentration, partial water exchange from tank bottom and refertilisation with 75 ppm groundnut oilcake is done at an interval of 4 to 5 days after commencement of first harvesting of Moina.

Culture of Daphnia

Stock culture and mass culture techniques of Daphnia are similar to that of Moina culture.

Maintenance of culture

Regular uninterrupted supply of Moina and Daphnia to the aquahatcheries needs judicious management. This involves risk of bacterial contamination. In order to avoid bacterial contamination, a new approach has been evolved as a prophylactic treatment. In this method, probiotics are introduced in Moina and Daphnia culture systems and also in the larval rearing tanks. This helps in providing a microbiologically balanced system by suppressing pathogenic bacteria.