

Mass Cultivation of Micro Algae 1

Algal culture → A culture is a genetically homogeneous clone propagated from one individual cell or filament in an artificial environment.

Culture Technique → Basic principles of microbial cultivation in general are applicable to microalgae. The unique ability of microalgae to utilize light energy, however sets them apart from most microorganisms.

I. Isolation of Algae

Isolation of algae involve the following steps

1. Selection of source of Algae
 - a. Algae can be collected from the various aquatic form such as ponds, lakes, water treatment sites.
 - b. Algae can attach to other algae, vascular plants, animals and rocks, where they can be collected by scraping.

2. Enrichment of a culture

Enrichment is the process of providing a suitable environment for the growth and reproduction of a special group of micro-algae while being inhibitory or lethal for non-target organisms.

a. Obtaining Unialgal cultures

- a. Unialgal cultures contain only one kind of alga usually a clonal population (but which may contain bacteria, fungi or protozoa).
- b. To obtain an unialgal culture, one species must be isolated from all the rest.
- c. Three major techniques are taken from microbiology to obtain unialgal isolates.
 1. streaking and successive plating on agar media.
 2. Single-cell isolations using capillary pipettes.
 3. Serial dilution technique.

Sterilization

1. Producing Axenic cultures.
2. Axenic culture is obtaining of unialgal specimen without bacteria, fungi, protozoa.
3. Biological contamination of algal culture by other eukaryotes and prokaryotic organisms in most cases is very difficult and may lead to the extinction of the desirable algal species in culture.
4. It is very difficult to obtain bacteria-free culture and measures should be taken to minimize bacterial number.

- Some of the basic purification techniques of algal cultures are

I. Isolation cell washing -

1. Under a dissecting microscope an individual algal cell is picked up using a micropipette and placed in a sterile liquid medium in a spot plate.
2. The organisms are then transferred through a series of sterile media.

Associated microorganisms adhering to the algal cells are separated through the action of pipetting and washing off during transfer.

II. UV Radiation -

1. Most algal specimens are slightly more resistant to ultraviolet light than bacterial cells. Thus after UV radiation, washing and diluting a sample and then spraying or streaking it on selective agar medium may produce pure algal culture free of bacteria.

III. Filtration -

1. Filamentous algae can be separated from bacteria using membrane filters. Sonication is often employed to break up the algae into small length filament (3-5 cells). The diluted sample is then vacuum filtered.

IV. Axenic

Axenic culture can be obtained by growing isolated algae with one or more antibiotics to discourage growth of contaminating eubacteria and other bacteria.

Maintenance and preservation of Microbial Strains

1. Algal strains can be maintained in liquid or solid agar media.
2. To maintain an algal strain, the culture can be kept at low irradiation, at room temperature (15-20°C) and transferred every few months.
3. For preservation most algal cultures have to be kept at room temperature. Some species of algae can be kept in liquid nitrogen for long-term storage.

Media choice and preparation

1. After obtaining axenic and sterilized microalgal strain, the algal strain is placed in the nutrient media to obtain further stock of algal culture for mass cultivation.
2. While choosing a culture medium the natural habitat of the species always should be considered in order to determine its environmental requirement.

3. Culture media are the combination of chemical substances which provide nutrition to the algal strain.

4. Some example of culture media are: =

- a. BG₁₁ Medium
- b. DY₁₁₁ Medium
- c. Aronson Medium
- d. Beijerinck Medium
- e. Bold Basal Medium

5. After placing of sterilized algal strain in the culture media the culture is placed in a culture chamber provided with artificial light and aeration of air for proper growth.

6. Mother stock of algal culture is prepared for the mass cultivation from this process.

7. The mass cultivation of algae takes place after preparation of mother stock of unialgal strain.