QUALITATIVE AND QUANTITATIVE ANALYSIS OF PLANKTON

Collection and Preservation of Plankton

Collection

Bottle method:-
Bottle method is ideal for small collections. It is mainly used for the collection of water samples from any desired depth of shallow ecosystems from a stationary vessel - near shore waters, estuaries and mangroves. Surface water can be obtained by gently scooping water into a container of a suitable size from the leeward side of the ship.

Net method:-
Plankton of >50 µm size can be collected by ordinary net sampling. This method could preferably used for qualitative plankton collections, as large quantity of water is filtered. A net is towed vertically, horizontally or obliquely.

Fixation
Fixation is the application of a chemical (fixative) to kill an organism but to retain its morphological characteristics as for as possible. Commonly used fixative is formalin (5%). Add formalin in the ratio of 5-10 to 90 parts (v/v). Invert the sample bottle after adding fixative for even dispersing. The pH of both solutions should be maintained around 7.6 – 8.3.

Preservation
Preservation is the maintenance of the fixed condition for extended periods of time. Specimens after one week fixation are used for preservation after thorough washing with distilled water. Formalin (2.5 – 5.0%) is used in the ratio of 1:9 (sample to preservative). pH should be maintained at 7.0. To preserve the natural color of the plankton, fish and crustaceans may preserve in phenolic antioxidant such as 40% emulsifiable concentrate of butylated hydroxytoluene (BHT) or butylated hydroxyamisole (BHA).

The direct Concentration of the collected plankton by sedimentation (and occasionally by centrifugation) is a pre-requisite for accurate qualitative and quantitative analysis.

Qualitative estimation
Preparation of the sample: -

1. Take one litre of water sample in a glass bottle.
2. Add 10ml of Lugol's Iodine and allow it to stand for at least 24 hrs to ensure complete sedimentation (centrifuge if necessary).
3. Remove the supernatant liquid with the help of a pipette.
4. Further concentrate the remaining sample upto 10-100ml depending on the number of plankton.

Plankton enumeration

I. Drop Count Method: -

1. Shake the concentrated sample and put quickly one drop on a clean micro slide with the help of a standard dropper holding it vertically.
2. Carefully cover the whole drop with a cover slip of suitable size so that the sample does not run out.
3. Put the slide under microscope and focus one edge of the cover slip.
4. Count the phytoplankton / zooplankton species-wise.
5. Shift the slide to the next field.
6. In this way observe the whole coverglass and work put planktonic estimation at least for 5-10 drops depending on the density of plankton.

Tabulation:-

Sl. No.	Name of the species	Number of organisms / drop					Average number of organisms / drop
		1	2	3	4	5	
1							
2							
3							
4							
5							
Total							

Calculation:-

Total number of organisms / L = A x 1/L x n/v

Where, A = Number of organisms / drop,
V = Volume of one drop,
N = Total volume of the concentrated sample,
L = Volume of original sample (L)

II. Sedgwick-Rafter Cell: -

It has been named after the inventor of the cell. The rectangular cavity in the slide (50X20X1 mm) contains exactly 1 ml of water sample. This method is better suited for the enumeration of larger organisms (zooplankton).

1. Transfer one ml of well mixed plankton sample using graduated pipette into the sedge wick rafter cell.
2. Spread evenly in the form of thin layers.
3. Focus one edge of the cavity and move the slide horizontally, simultaneously counting the organisms till the other edge.
4. Examine this way 3-6 such strips or transects.

Calculation:

$$N = n \times v/V$$

Where, N = Total number of plankton cells / L,
n = Average number of plankton cells in 1 ml of sample
v = Volume of plankton concentrate,
V = Total volume of water filtered (L)

Quantitative Estimation

Settling volume method

The plankton is allowed to settle by gravity and the space occupied by the settled material is taken as settled volume. Concentrate the sample using a net. A known volume of sample is transferred into graduated cylinder or sedimentation tube. Mix well and allow the sample to settle for 1-7 days. The settled volume is recorded (cc). The volume of the sample is then calculated in m^3.

Wet weight method

It is the raw weight of the planktonic organisms with their natural body fluids.

1. Plankton sample is screened through filters (Plankton nets)
2. Adhering water is blotted off with filter paper.
3. Collect and transfer the plankton matter into pre-weighed aluminum foil by scraping with the help of blade.
4. Keep it in the oven at 60^0 C for overnight.
5. Take the weight of the plankton sample.

Dry weight method

It is the dry weight of the planktonic organisms without water content.

1. The plankton concentrate for which the wet weight is already known is placed in a pre-weighed aluminum foil.
2. Dry on an electric oven at 60^0C until all the water is evaporated.
3. The weight of the aluminum foil and contents are then weighed.
   The difference between the final weight and dish weight gives the dry weight.