ESTIMATION OF STANDING CROP

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The standing crop/biomass of zooplankton is estimated by three methods:

Volumetric method

1. **Settling volume**
2. **Displacement volume**

Gravimetric method

1. **Wet weight method**
2. **Dry weight method**

Chemical method

VOLUMETRIC METHOD

Settlement volume

In this method the plankton is allowed to settle over a period of time in a volumetric container and the volume is read directly.

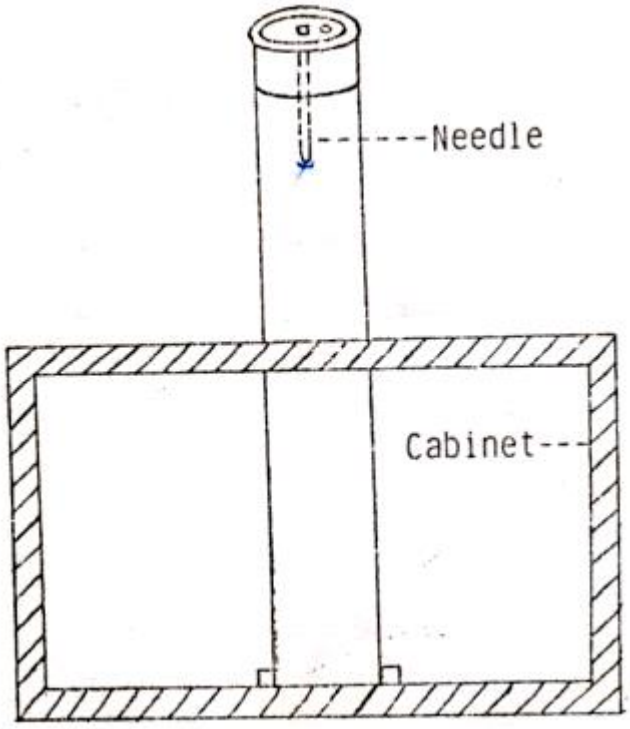
Procedure:

- Transfer the preserved plankton with enough water into a conical plankton container or a measuring cylinder.
- Allow at least 24 hours for the settlement of plankton.
- After 24 hours note the volume occupied by plankton in the bottom of the container.

VOLUMETRIC METHOD

Displacement volume

When the plankton sample is small, the volume measured by displacement will be more accurate. A displacement apparatus is used for this purpose.



Displacement Apparatus:

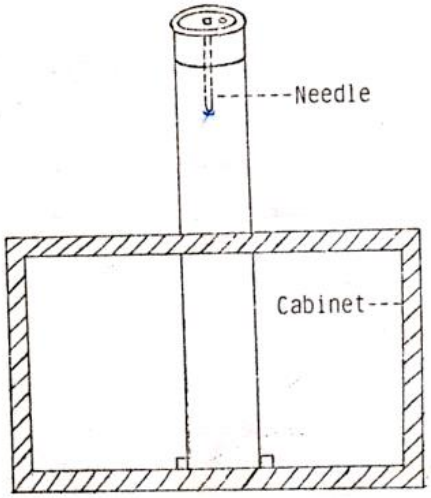
The displacement apparatus consists of a plastic cylindrical chamber of 50 ml capacity with a sieve at the bottom and lid with a pointed needle projecting downwards. An opening in the lid admits water in the chamber from a burette. The chamber is mounted in a plastic cabinet and could be removed easily.

VOLUMETRIC METHOD

Displacement volume

Procedure:

- Set up the chamber in the plastic cabinet and place the lid in proper position.
- Fill a 50 ml burette with water and note the initial reading (a).
- Slowly run the water from the burette into chanber through the opening in the lid till the water level reaches the tip of the needly. Note the burette reading (b).
- Calculate the volume of empty chamber ‘c’ = (b - a).
- Remove the lid and transfer the plankton into the chamber.
- Run water into the cylinder from a burette (after taking initial reading) through the opening in the lid without disturbing the plankton till the level reaches the tip of the needle.
- Note the amount of water added into the chamber ‘d’.
- Calculate the volume of plankton from the data obtained.
- Volume of plankton = c-d ml.



GRAVIMETRIC METHOD

Wet weight method

Procedure:

- Filter the plankton through a fine mesh bolting cloth.
- Place the bolting cloth with plankton above a filter paper to remove water.
- Transfer the plankton into a watch glass or aluminium foil of known weight.
- Weigh the container with plankton.
- Calculate the biomass:
- Biomass = Weight of container with plankton – Weight of container

GRAVIMETRIC METHOD

Dry weight method

Procedure:

- Concentrate the plankton in a bolting cloth and wash it quickly with distilled water to remove salts.
- Transfer the plankton into a weighing bottle or aluminium foil of known weight.
- Dry the plankton in an oven maintained at 60^{o}C for 24 hours.
- Weigh the container with dried plankton and calculate the weight of dried plankton alone.
- Dry weight = Weight of plankton with container – Weight of container

CHEMICAL METHOD

- In this method, the live plankton samples are dry frozen.
- Before analysis, the samples are rinsed with distilled water.
- Measurement of constituent elements such as carbon, nitrogen, phosphorus and biochemical elements viz. protein, lipid and carbohydrates are made.
- Sometimes the biochemical values of a particular taxon and species are undertaken to evaluate food energy transfer at higher trophic levels.
- The calorific content of the plankton can be used as an index of zooplankton biomass.

ESTIMATION OF PLANKTON DENSITY

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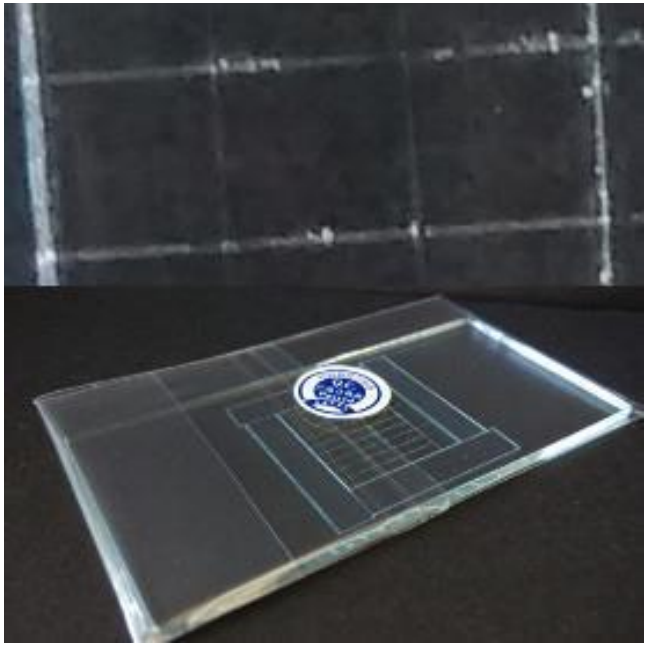
- The estimation of plankton density is done by using counting chambers like Sedgwick-Rafter cell.
- The counting cell is filled with the plankton sample and placed on the mechanical stage of the microscope.
- Then the counting of plankton is left for about half-an-hour for proper sedimentation.
- The organisms are then counted from one corner of the counting cell to the other.
- The Sedgwick Rafter is moved horizontally along the first row of squares and the organisms in each square of the row are thus counted.
- The rafter is moved to the second row and organisms in each square here are counted.



ESTIMATION OF PLANKTON DENSITY

- Few transects may also be counted instead of all the squares.
- The total number of plankton is then computed by multiplying the number of individuals counted in transects with the ratio of the whole chamber area to the area of the counted transects.
- Replication of counts of one ml samples is recommended for the statistical treatments.
- After counting, the sample is to be returned to the jar containing the whole sample.
- The average values are taken into account for calculation.

ESTIMATION OF PLANKTON DENSITY

- The total number of plankton present in a litre of water sample can be calculated using the following formula:

$$N = \frac{n \times v \times 1000}{V}$$

- Where, N: total number of plankton cells/org. per litre of water filtered;
- n: average number of plankton in 1 ml of plankton sample.
- v: volume of plankton concentrate (ml)
- V: volume of total water filtered (l).

ESTIMATION OF PLANKTON DENSITY

Determination of the volume of water passing through plankton net (V):

Different types of flow meters are available and for any calculation the manufacturer's instructions have to be followed.

The following calculation is given for the hydro-bios digital flow meter.

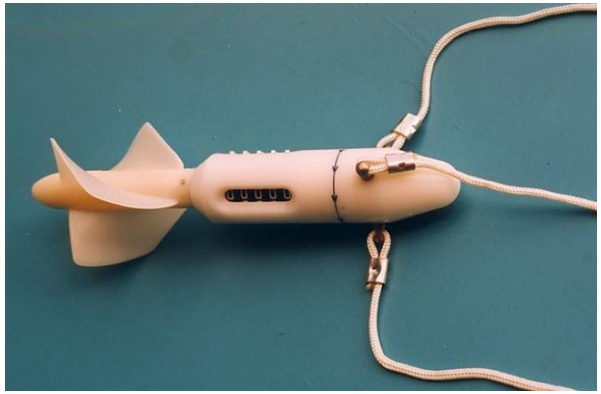
This flow meter has a three blade impeller which is coupled directly to a five digit counter.

The pitch of the impeller is 0.3 meter per each revolution.

Therefore the number of revolutions multiplied by 0.3 gives the towing distance in meters. (e.g.)

Calculation of towing distance:

- Initial reading of the flow meter I = 00061
- Final reading of the flow meter F = 00181
- No of revolutions (F-I) = 00181-00061 = 120
- Towing distance = 0.3 X 120 = 36.0 ms.



ESTIMATION OF PLANKTON DENSITY

Calculation of water volume passing through plankton net:

- Volume of water passed through net = No of revolutions X 0.3 X V X 1000.
- V = net opening area in M^2.
- Let the diameter of the net (mouth region) be 40cm (0.4M).
- Then opening area (IIR2) = 0.125 M^2
- Initial reading of the flow meter I = 100.
- Final reading of the flow meter F = 366
- No of revolutions = 266
- Volume of water passed through the net = 266 X 0.3 X 0.125 X 1000 = 9.975 litres.