RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

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Course: B. Tech Biotechnology
Sub Code: BBT-515

Semester: 5th
Sub Name: Plant Biotechnology

LECTURE 7

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2. Closed type

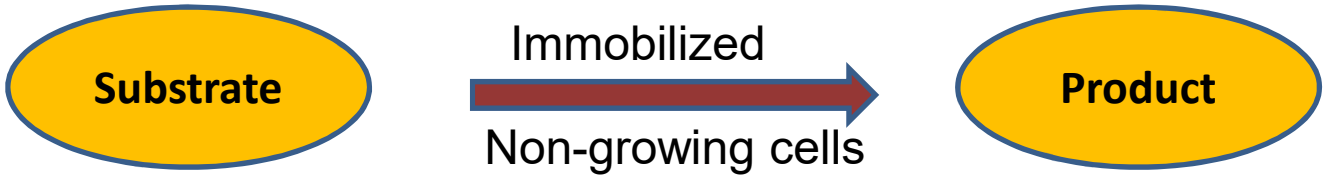
In closed type, the used medium is replaced with the fresh medium, hence, the cells from used medium are mechanically retrieved and added back to the culture and thus, the cell biomass keeps increasing.

IMMOBILIZED CULTURES

Plant cell Immobilization

- It is defined as a technique, which confines to a catalytically active enzyme (or to a cell) with in a reactors system and prevents its entry into the mobile phase, which carries the substrate and product.

- It involves the entrapment of cells within a gel or passive adsorption on solid support materials, thus creating a situation for cell to imitate membership on a tissue of a whole plant.



- It is a controlled process of agglutination, formation and adhesion on a matrix under controlled condition.

- It is a process in which highly reactive and sensitive enzyme is embedded in a matrix so that only substance and product can pass through matrix.

- Cells cease to grow & accumulate metabolites.

- In immobilization technique the plant cells are entrapped in different polymerize matrices. E.g. alginate, agar, agarose etc. and converted into hetrogeneous catalyst.

TYPES OF IMMOBILIZATION

1. Adsorption

Direct intracellular binding due to natural affinity (adhesion or agglutination)

2. Covalent linkage

Covalent coupling on otherwise inert matrices.

3. Cross linking

Intracellular connection via bi or poly functional reagent

4. Embedding

Mixing with suitable materials by changing their consistency with temperature.

5. Entrapment

Physical retention within the frame work of diverse pore size and permeability (Micro encapsulation)

Mechanism/methods of immobilization system

1. Entrapment

- ✓ Gel entrapment by polymerization with polymers like polyacrylamide e.g. vinca
- ✓ Gel entrapment by ionic network formation: Entrapment of cell in calcium alginate
- ✓ Gel entrapment by formation by precipitation of some natural and synthetic polymer by changing one or more parameters such as pH, temperature, salinity etc.
- ✓ Entrapment in performed structures like hollow fibre reactors e.g. Polyurethane foam.

2. Surface immobilization with help of nylon, cellulose etc.

3. Immobilization by embedding in agar, agarose etc.

Applications of plant cell immobilization:

- ✓ Biotransformation
- ✓ Rapid biosynthesis of secondary metabolites
- ✓ Synthesis from precursor
- ✓ The biosynthesis of secondary metabolites with increased yield over extended period of time.

Examples: Immobilization of various plant like Capsicum, Coffee, Vinca, Mentha, Tobacco etc.

ESTIMATION OF GROWTH

QUIZ