

I.e. it involves culturing and sub-culturing of plants and animal cells (similar to microbial cultures) for industrial production of various biological products.

**a. Plant Tissue Culture:**

Plant tissue culture is an essential component of plant biotechnology. It provides the means to multiply and regenerate novel plants from genetically engineered cells. The promising plant thus produced may be readily cloned in cultures under aseptic conditions. Tissue culture is widely used in –

- Obtaining disease free plant.
- Rapid propagation of plants those are difficult to propagate.
- Somatic hybridization.
- Genetics improvement of commercial plants.
- Obtaining androgenic and gynogenic haploid plants for breeding programs.

Tissue culture is becoming as an alternative means of vegetative propagation of plants. In vitro growing plants are usually free from bacterial and fungal diseases. Virus eradication and maintenance of plants in virus free stage can also be rapidly achieved in culture.

**b. Types of Tissue Culture:**

1. **Cell culture:** is the process by which cells are grown under controlled conditions, generally outside their natural environment.
2. **Organ Culture:** is the maintenance or growth of tissues or the parts or whole of an organ in vitro in such a way that may allow differentiation and preservation of the architecture and/or function.
3. **Explant culture:** is a techniques in which whole tissues and organs are removed or explanted. In other words, it is the culture of small pieces of tissue surgically removed from animal tissue or organ.

**c. Importance of Tissue Culture:**

- In a relatively short time and space, a large number of plantlets can be produced starting from the single explant.
- Taking an explant does not usually destroy the mother plant. So rare and endangered plants can be cloned safely.
- The production of exact copies of plants that produce particularly good flowers, fruits, or have other desirable traits.
- The time required is much shortened, no need to wait for the whole life cycle of seed development. I.e. to quickly produce mature plants.
- The regeneration of whole plants from plant cells that have been genetically modified.

- The production of plants in sterile containers that allows them to be moved with greatly reduced chances of transmitting diseases, pests, and pathogens.

### **Transgenic Plants:**

- Are plants into which one or more genes another species have been introduced into the genome, using genetic engineering processes.
- Plants that have had their genomes modified through genetic engineering techniques either by the addition of a foreign gene or removal of a certain detrimental gen.

### **Advantages of transgenics:**

1. Increased productivity without dependence on damaging agrochemicals (Pesticides, Herbicides etc.)
2. Decreased use of agrochemicals leading to better quality of life.
3. Decreased demand on cultivated area.
4. Decreased loss of crops from various diseases.
5. Increased nutritive value of plant products.