**Plant Tissue Culture and their techniques**

Plant tissue culture is a technique of growing plant cells, tissues, organs, seeds or other plant parts in a sterile environment on a nutrient medium.



**Fundamental principles:**

PTC depends upon

1. Totipotency:- It is the ability of plant cells to regenerate into a whole plant

2. Plasticity: - It is the ability of plants to alter their metabolism; growth and development to best suit their environment

**Explant**

Plant tissue cultures are generally initiated from multicellular tissue fragments, called explants, obtained from living plants. Explants may originate from a wide range of plant tissues, such as leaf, stem, root, petiole, hypocotyl, cotyledon, embryo, or meristem

**Sterilization**

Sterilization Methods Used in Tissue Culture Laboratory - All the materials, e.g., vessels, instruments, medium, plant material, etc., used in culture work must be free from microbes.

**STERILIZATION TECHNIQUES**

Sterilization is achieved by one of the following approaches:

(i) dry heat treatment

(ii) flame sterilization

(iii) Autoclaving

(iv) Filter sterilization

(v) Wiping with 70% ethanol

(vi) Surface sterilization.

**Culture media**

Explants are then usually placed on the surface of a solid culture medium, but are sometimes placed directly into a liquid medium, when cell suspension cultures are desired. Culture mediaare generally composed of inorganic salts plus a few organic nutrients, vitamins and plant hormones.



**MAJOR TYPES OF MEDIA**

**White’s medium** - is one of the earliest plant tissue culture media

**- MS medium** - formulated by Murashige and Skoog (MS) is most widely used for many types of culture systems

**- B5 medium** - developed by Gamborg for cell suspension and callus cultures and at present it’s modified form used for protoplast culture

**- N6 medium** - formulated by Chu and used for cereal anther culture

**Steps in plant tissue culture**

* Stage 0 – Selection & preparation of the mother plant
  + sterilization of the plant tissue takes place
* Stage I  - Initiation of culture
  + explant placed into growth media
* Stage II - Multiplication
  + explant transferred to shoot media; shoots can be constantly divided
* Stage III - Rooting
  + explant transferred to root media
* Stage IV - Transfer to soil explant returned to soil; hardened off



**Plant Tissue Culture Applications**

* The commercial production of plants used as potting, landscape, and florist subjects
* To conserve rare or endangered plant species.
* To screen cells rather than plants for advantageous characters, e.g. herbicide resistance/tolerance.
* To cross distantly related species by protoplast fusion and regeneration of the novel hybrid.
* To produce clean plant material from stock infected by viruses or other pathogens.
* Production of identical sterile hybrid species can be obtained

**Factors Affecting Tissue Culture Efficiency**

Plant regeneration from tissue culture varies with the following parameters:

 plant species

 genotype within the species

 source of the cultured tissue

 age and health of the donor plant,

 nutrient medium, other factor