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What is Plant Tissue Culture

Tissue culture could be defined as the method of 'in vitro' culture of plant cells, tissue or organ – on nutrient medium under aseptic conditions usually in a glass container. The culture media is provided with water, minerals, vitamins, hormones, carbon sources, and certain antibiotics depending on the plant being cultured.

Plant Tissue Culture Steps/Plant Tissue Culture Procedure

The following is the general process of plant tissue culture. There are specific steps for the regeneration of a complete plant from an explant cultured on the nutrient medium. These steps are:

1. **Selection and Sterilisation of Explant:** A suitable explant is chosen and excised from the donor plant and the explant is sterilised using disinfectants.
2. **Preparation and Sterilisation of the Culture Media:** A suitable culture media is prepared with specific components for the growth of the explant, the culture is then sterilised.
3. **Inoculation:** The sterilised plant is inoculated on the culture medium under aseptic conditions.
4. **Incubation:** The cultures are then incubated in the culture room where appropriate conditions of light, temperature and humidity for successful culturing.
5. **Sub - Culturing:** Cultured cells are transferred to a fresh nutrient medium to obtain the plantlets.
6. **Transfer of Plantlets:** After the hardening process (i.e., acclimatisation of plantlets to the environment), the plantlets are transferred to the greenhouse or in pots.

Application of Plant Tissue Culture

The uses of tissue culture are:

- In-plant biotechnology, the useful product is a plantlet and they are used for many purposes.
- All the cells in callus or suspension plant tissue culture are derived from a single explant by mitotic division.
- Hence, all plantlets regenerated from a callus or suspension culture have the same genotype and constitute a clone. These plantlets are utilised in rapid clonal propagation.
- A genetic variation that is observed amongst plant cells of culture is called somaclonal variation.
- A gene that is transferred into an organism by genetic engineering is known as a transgene and it can be introduced into individual plant cells.
- An organism that contains and expresses a transgene is called a transgenic organism.
- The plantlets can be generated from these cells and give rise to highly valuable transgenic plants.
- Mutagens are added to single-cell liquid cultures for the induction of mutations.

- Tolerance to stress like toxins, salts, drought, pollutants, flooding, etc. can also be obtained by providing them in culture medium by increasing dosage. The surviving healthy cells are taken to a solid medium for raising resistant plants.