

Tissue culture

1. "Tissue culture is the fast and more reliable technology for the production of disease free and disease resistant variety of plant." Justify the statement by describing it with various stages of tissue culture in plants. (4 marks) (2080)

- Through the use of somatic hybridization and meristem tip culture, disease resistant and virus free plants can be produced.

Steps in plant Tissue Culture:

i. Isolation of plant material:

-Firstly, depending on the type of tissue culture to be performed, explant is ~~exer~~ excised from a desired variety of plant.

ii) Preparation of the specified culture medium:

-For the proper growth of the explant, various substances is necessary for growth are mixed to prepare culture medium.

-Includes inorganic nutrients, organic nutrients, growth hormones, agar, etc.

iii) Sterilization:

- It is the destruction of microorganisms from working area, culture media, plant materials and working hand using various sterilizing compounds and methods.

iv. Inoculation:

- Sterilized explant is then inoculated in the sterilized culture tube containing the required culture medium at $25-27^{\circ}\text{C}$.

- Inoculation is done in the laminar air flow cabinet.

v. Shoot multiplication:

- Explant grows using the

nutrient materials present in the culture medium and develops an unorganized mass of tissue on its upper surface: callus.

- Callus is used for production of unlimited number of plants.

- Callus produces the shoot when placed in shooting medium.

vi. Rooting in vitro shoots:

- Above shoots are transferred into rooting medium which contain high concentration of auxin which favour root formation.

- Plantlets are formed.

vii. Transplantation:

- When plantlets have well developed root and shoot, is transplanted to soil, in a green house, under more or less controlled environmental conditions.

- High humidity (90-100%) is maintained for 10-15 days.

2. Application of micropropagation in agriculture. (4 marks)
(2065)

OR

Application of tissue culture.
(2076) (4 marks)

- Micropropagation:

- Practice of rapidly multiplying stock plant material to produce a large number of progeny plants, using modern plant tissue culture methods.

- Examples of micropropagation: tissue culture, callus culture, anther culture, meristem culture, etc.

Application of micropropagation in agriculture:

i. Multiple shoot production:

- A plant tissue culture technique used to regenerate

numerous shoots from a single explant.

ii) Production of disease free plants:

- Produces healthy, disease-free plants using pathogen-free tissues.

iii) Production of Genetically Modified plants:

- Facilitates the large-scale production of genetically modified crops with enhanced traits.

iv) Conservation of Rare and Endangered species:

- Assists in conserving and multiplying rare or endangered plant species.

Ambition