

CELL AND TISSUE CULTURE IN PLANTS

MICROPROPAGATION

Dr Sugandha Tiwari

Associate Professor

Dept. of Botany

D.G.P.G. College, Kanpur

Email: sugandhatiwari7@gmail.com

PLANT CELL AND TISSUE CULTURE

Plant tissue culture is a technique of growing plant cells, tissues or organs on a nutrient culture medium under sterile (aseptic) and controlled environmental conditions.

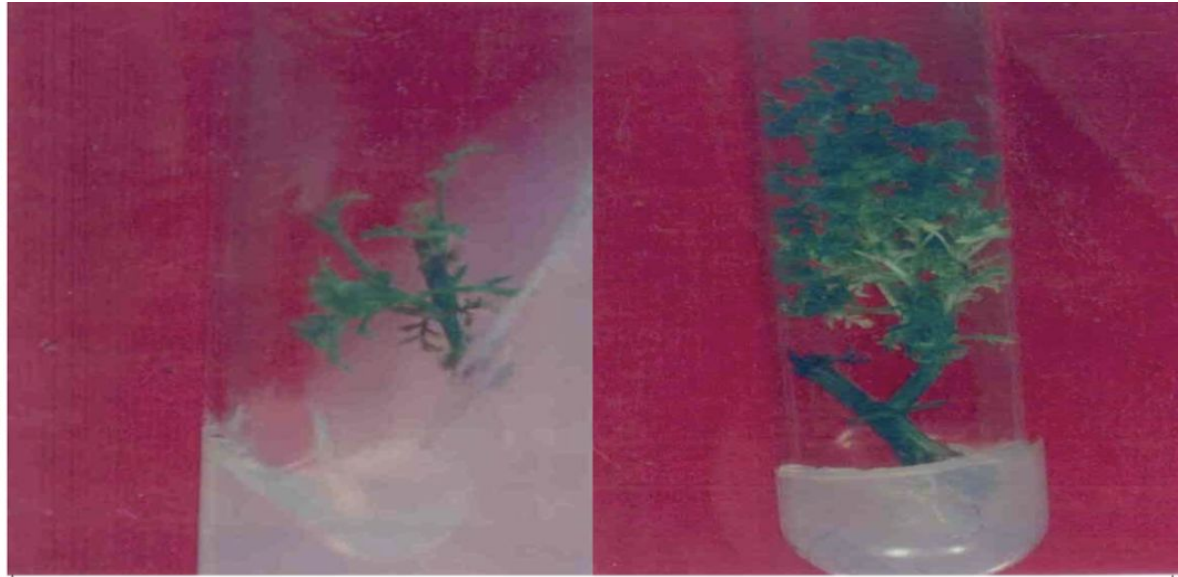
MICROPROPAGATION

- Multiplication of genetically identical copies of a plant by asexual reproduction is called clonal propagation.
- **Clonal propagation through tissue culture is called micropropagation.**

Micro propagation mostly involves in vitro clonal propagation by two approaches:

1. Multiplication by axillary buds-

2. Meristem and Shoot Tip Cultures:



Micropropagation of *Artemisia annua* from nodal explants containing axillary buds (Dr. Sugandha Tiwari)

General Micropropagation Technique

Murashige (1974) identified major stages in the in vitro propagation process.

Micropropagation comprises of five steps, each with its specific requirements and problems :

Stage 0: It is the preparatory stage to provide quality explants;

Stage 1: Initiation of aseptic cultures;

Stage 2: Multiplication;

Stage 3: Rooting of in vitro formed shoots; and

Stage 4: Transfer of plants to greenhouse or field conditions (transplantation).

Factors Affecting Micro propagation:

1. Genotype of the plant:

Plants with **vigorous germination and branching capacity** are more suitable for micropropagation.

2. Physiological status of the explants:

Explants (plant materials) from **young parts** of plants are more effective than those from older regions.

3. Culture media:

Addition of growth regulators (auxins and cytokinins) and **alterations** in mineral composition are required for different plant species and type of explant.

4. Culture environment:

Light:

An illumination of **16 hours day and 8 hours night** is satisfactory for shoot proliferation.

Temperature:

Majority of the culture for micropropagation requires an optimal temperature around **25°C**.

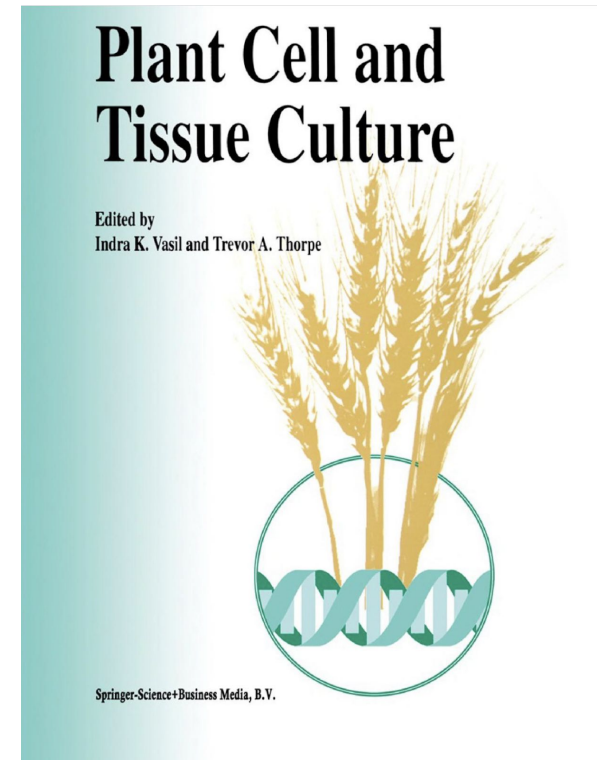
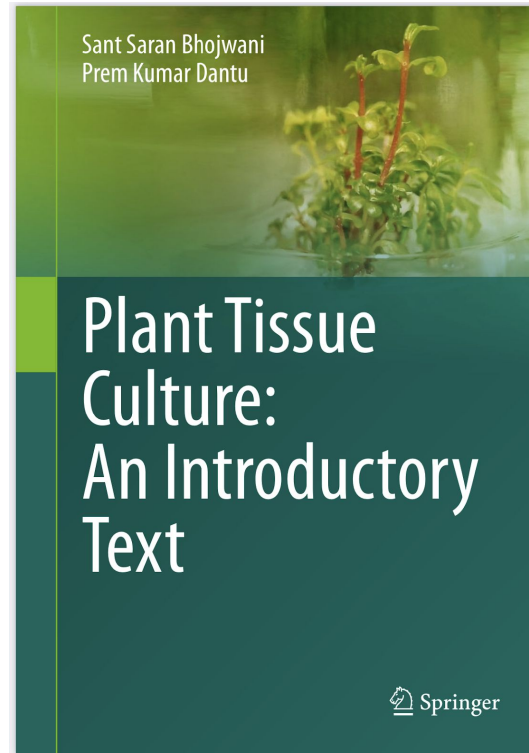
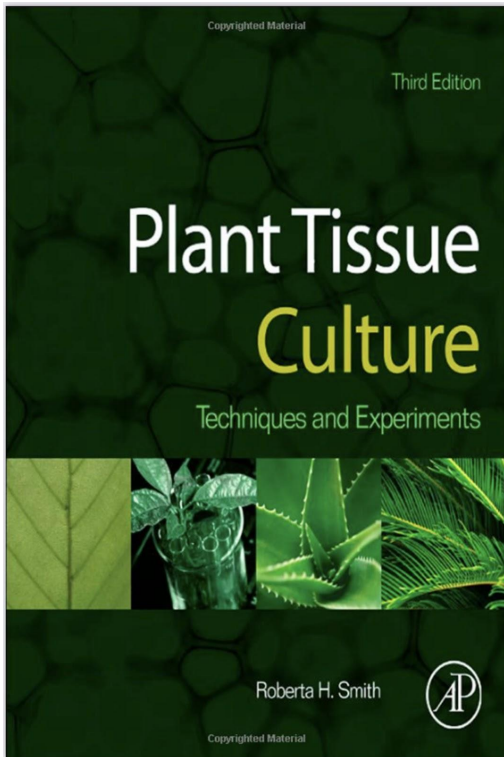
Applications of Micropropagation

1. The major benefit is **clonal propagation**, resulting in genetically identical copies of a cultivar.
2. **Germplasm conservation** of threatened or endangered plants.
3. More **rapid propagation**,
4. Meristem tip cultures to develop **pathogen-free plants** .
5. **Enhanced axillary branching** of in vitro-derived plants (resulting in fuller foliage),
6. Production of a **uniform crop**,
7. **Year-round production**,
8. **Hastening of a new crop introduction**, and

Applications of Micro propagation:

9. Cloning of only the desirable female plants (date palm) or male plants (asparagus).
10. **Minimum growing space** (millions of plant species can be maintained inside culture vials in a small room in a nursery).
11. The small sized propagules obtained in micro propagation can be easily **stored** for many years (germplasm storage), and **transported across international boundaries**.
12. Automated micro propagation using **bioreactors for large scale multiplication** of shoots and bulbs

References



Thank you all

Any questions ??

sugandhatiwari7@gmail.com