

Plant Tissue Culture



What is plant tissue culture?



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



WHY?



- The production of clones of plants that produce particularly good flowers, fruits, or have other desirable traits.
- To quickly produce mature plants.
- The production of multiples of plants in the absence of seeds or necessary pollinators to produce seeds.
- The regeneration of whole plants from plant cells that have been genetically modified.



WHY?



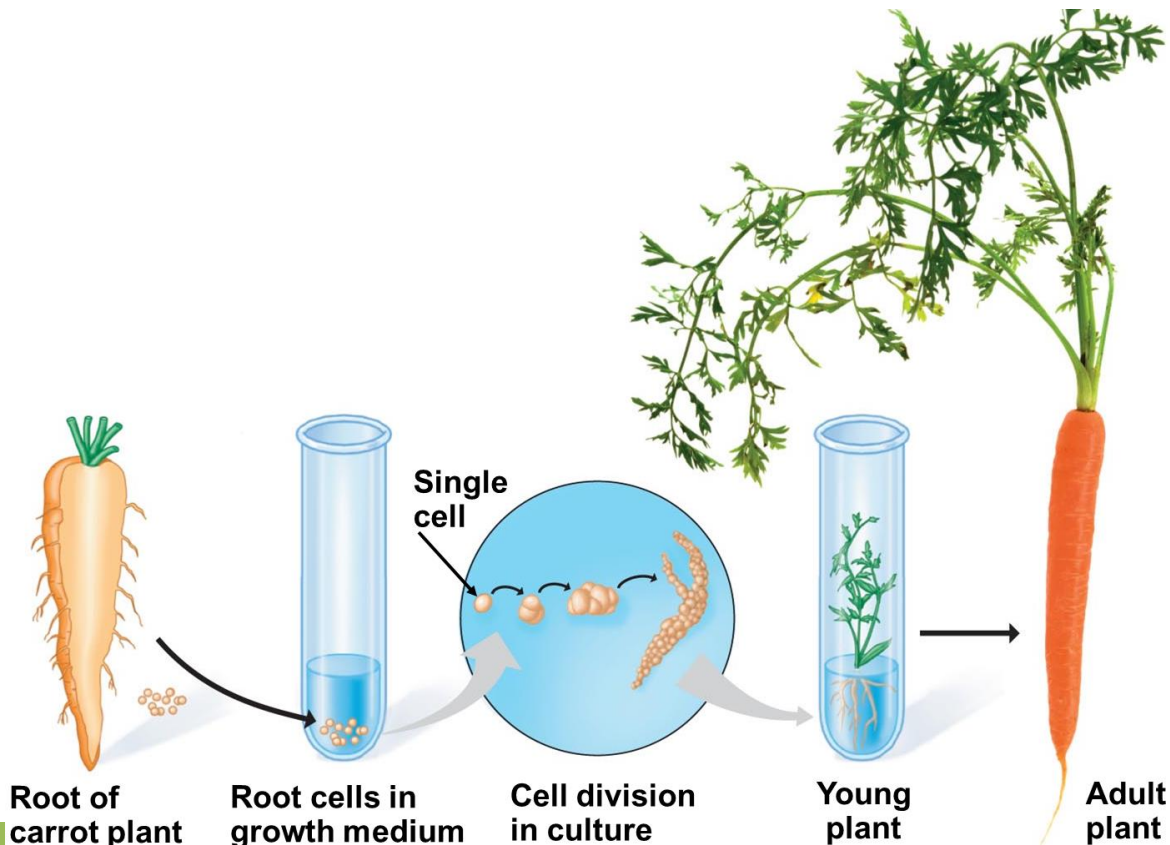
- The production of plants in sterile containers reduces disease transmission
- Allows production of plants from seeds that otherwise have very low chances of germinating and growing, i.e.: orchids and *Nepenthes*.
- To clean particular plants of viral and other infections and to quickly multiply these plants as 'cleaned stock' for horticulture and agriculture.



How?



Adult plant cells are **totipotent**, meaning they have the ability to give rise to a fully differentiated plant. Because of this, it is possible to collect cells from a mature plant and use those cells to produce clones of that plant.



Plant tissue Culture Basics



- Modern plant tissue culture is performed under **aseptic conditions**
- Living plant materials from the environment are naturally contaminated on their surfaces (and sometimes interiors) with microorganisms, so surface sterilization of starting material (**explants**) in chemical solutions (usually alcohol and sodium or calcium hypochlorite is required).

Plant tissue Culture Basics



- 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 media** are generally composed of inorganic salts plus a few organic nutrients, vitamins and plant hormones.

Plant tissue Culture Basics



- As cultures grow, pieces are typically sliced off and transferred to new media (subcultured) to allow for growth or to alter the morphology of the culture.



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.
- Large-scale growth of plant cells in liquid culture in bioreactors for production of valuable compounds, like plant-derived secondary metabolites and recombinant proteins used as biopharmaceuticals.

Plant Tissue Culture Applications



- 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

Plant tissue culture web links



Tissue Culture Techniques