

Applications of Plant Tissue Culture

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DESCRIPTION

Plant tissue culture encompasses excising plant tissues and growing them on nutrient media. It is used rather largely to include numerous variations, such as meristem culture for breeding of virus-free plants, protoplast culture for mutagenic treatment, cell suspension culture, tissue and organ culture, and anther or pollen culture for fabricating haploid plants [1].

In meristem culture Segregation and progress of the shoot meristem are of value in improving pathogen-free plants. When disease infects vegetatively propagated plants, the pathogen spreads from one vegetative generation to the next. The same disease may infect the whole population of a specific clonal variety. With latent viruses, the signs may be as problematic to detect as reduced yield or inferior plant quality. Such infections can be problematic to abolish. In tissue culture an appropriate sample is selected and prepared for culture, then incubated for development and separation on an adequate nutrient mixture. Essential requirements are the basic laboratory setup, handling of sample tissue, nutrient medium and establishing the culture. Most of the general needs of plant tissue culture are met by a laboratory that can handle plant biochemistry or physiology-type investigations. It is an appreciated tool for research on morphogenesis, cell signaling, physiology, and molecular biology, as well as crop development by biotechnology. The implication of plant tissue culture technology for agricultural biotechnology is huge. Plant tissue is prepared for tissue culture in an aseptic environment with HEPA filtered air delivered by a laminar flow cabinet. Following that, the tissue is cultivated in sterile containers such as Petri plates or flasks in a regulated temperature and light environment [2,3]. Because living plant materials in the environment are naturally contaminated with bacteria on their surfaces (and sometimes inside), their surfaces must be sanitised in chemical solutions (typically alcohol and sodium or calcium hypochlorite) before appropriate samples can be taken. The sterile samples are then generally positioned on the surface of a sterile solid culture medium but are sometimes placed directly into a sterile liquid medium, mostly when cell suspension cultures are preferred. Solid and liquid media are usually composed of mineral salts and a few organic nutrients,

vitamins and plant hormones. Solid media are made by combining liquid media with a gelling ingredient, commonly pure agar. The morphology of the tissues that grow from the initial explant is greatly influenced by the medium's composition, particularly the plant hormones and nitrogen source [4,5].

Applications

- Tissue culture has given a mechanism for propagating and genetically improving commercially valuable plants.
- Tissue culture has been used to study characteristics of the growth, metabolism, reproduction, physiology and nutritional necessities of the plants under controlled circumstances.
- Mutagens are added to single cell liquid cultures for initiation of mutations
- Embryos which normally do not survive inside seeds can be developed in tissue culture to produce new plants. It can be used for interspecific hybridization.
- Large scale fabrication of artificial seeds through somatic embryogenesis
- The plantlets are produced in a very short time with a lesser amount of plant tissue.
- The production of multiples of plants in the lack of seeds or essential pollinators to produce seeds

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