PLANT TISSUE CULTURE

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DEPARTMENT OF BOTANY

CERTIFICATE

Examination Seat No: S1827665 **Class:** BSc Vth SEM

This is to Certify that, Mr/Mrs. JYOTI . Y. HIREMATH

Has satisfactorily completed Project work on" PLANT TISSUE CULTURE SCOPE AND SIGNIFICANCE . BASIC ASPECTS AND CELLULAR TOTIPOTENCY **"Under my supervision in M.G.V.C Arts, Commerce and Science College Muddebihal year 2020-2021**

Staff Member in charge

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Examiner's Date:
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Plant tissue culture

Plant tissue culture is in-vitro cultivation of plant cell or tissue under aseptic and controlled environment conditions in liquid or an semisolid well defined nutrient medium for the production of primary and secondary metabolites or to regenerate plant.

Scope of tissue culture.

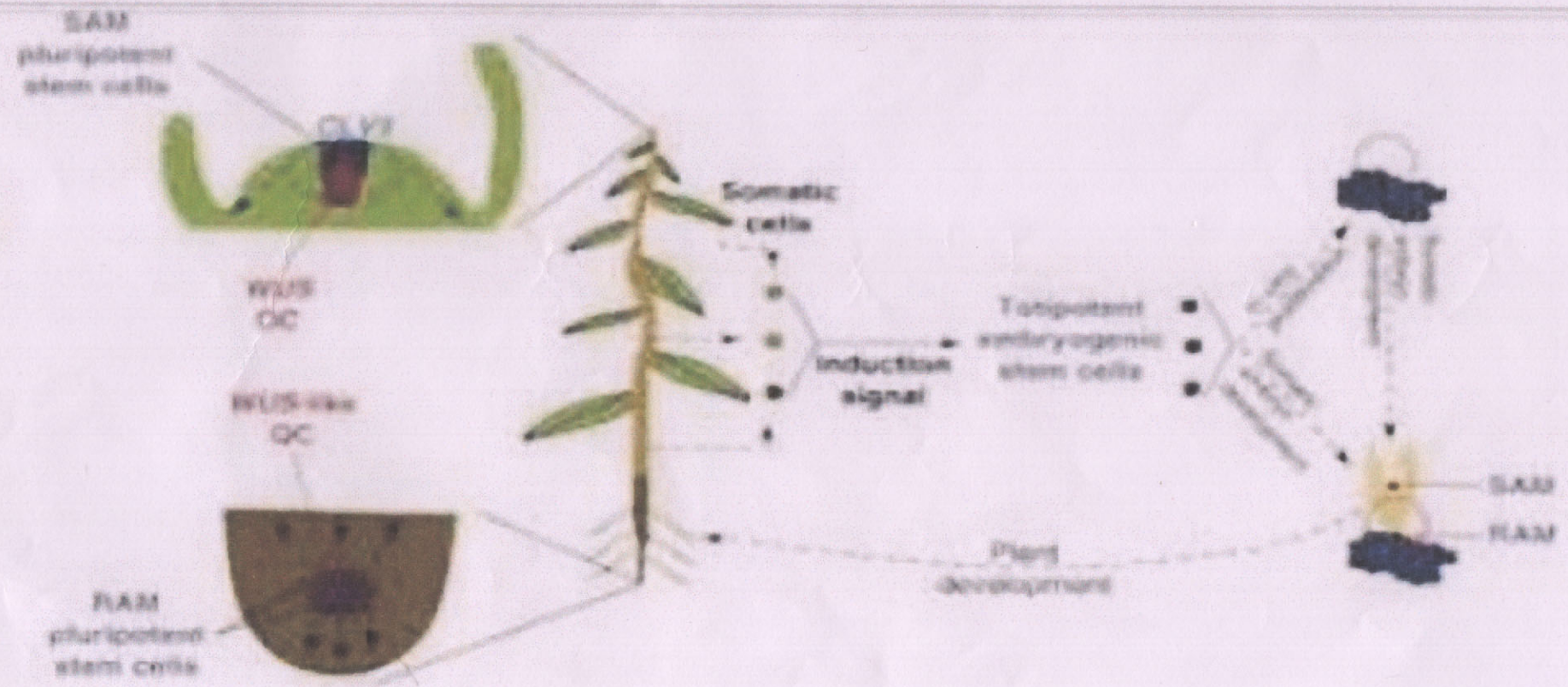
- The production of extra copies of plants that produce good flower, fruits or have other desirable traits.
- To quickly produce mature plants.
- The production of multiple of plants in the absence of seed or necessary pollinators to produce seeds.
- The regeneration of whole plant from plant cell that have been genetically modified.
- Production of plant 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 infection and quickly multiply these plants as cleaned stock for horticulture and agriculture.

Cellular Totipotency.

- Totipotency is the ability of a single cell to divideand produce all of the differentiated cells in an organisms.
- In other words, totipotency is the genetic potential of a plant cell to produce the entire plant.
- Isolated cells from differentiated tissue are generally non dividing and quiescent to express totipotency they undergo differentiation and than redifferentiation.
- In Latin,totus means'entirely 'and potens means 'havingpower'.
- The possibility of regenerating an entire plant from a single or few non-zygotic cells was proposed by Gottlieb Haberlandt(1854-1945)in 1902.
- Haberlandt is now popularly called the Father of Tissue culture.
- As cell dividemitotically,they do so equationary to produce daughter cells.
- Therefore every cell within a plant has a potential to regenerate into a whole plant.
- Spores and zygotes are examples of totipotnent cells.

CALLUS CULTURE

Cellular totipotency in Plant tissue culture



Basic aspects

Explant: plant tissue culture are generally pritiated from multicellular tissue fragments is called explants, obtained from living plants,explants may originate from a wide range of plant tissue such as leaf ,root, petiole embryo.

Selection of explant: The explant is selected it is either haploid or diploid explant.

The growth can be achieved it two ways

1. Shoot directly by approxiate media.
2. By somatic embryogenesis.

Sterilization :sterilization method used in tissue culture laboratory all the materials.

Ex:vessels,instruments,medium,plant material etc. used in culture work must free from microbes.

Culture maedia: Into a liquid medium when cell suspension culture are desired explants are then usually placed on the surface of a solid culture medium, but are some times placed directly culture media are generally composed of inorganic salt plus a few organic nutrients, vitamins and plant hormones.

- Plant tissue culture broadly refers to the invitro cultivation of plants(organs,embryoes,tisssue,single cells, protoplasts)
- Plant tissue culture is one of the most rapidlly growing areas of its high potential to develop improved crops and ornamental plants.
- To achieve the target of creating a new plant or a plant with desired characteristics.
- The technique of plant tissue culture have largely helped in the green revaluation by improving the crop yield and quality.
- The know obtained from plant tissue culture has contributed to our understanding of metabolism, growth, differentiation and morphogenesis of plant cell.
- Further developments in tissue culture have to produce several pathogen -free plant, besides the synthesis of many biologically important compounds including pharmaceuticals, because of hide range of application, plant tissue culture attracts the attention of molecular biologists, plant breeders and industrialists.

Significance of tissue culture

- The commercial production of plants used as plotting, land scope and florist subjects which uses meristem and shoot culture to produce large number of identical individuals.
- To conserve rare and endangered plant species.
- A plant breeder may use tissue culture to screen all rather than plants for advantageous characters.
  Ex:Herbicide resstancel tolerance.
- Production of identical,sterilehybrid species can be obtained.
- Large scale production of artificial seeds through somatic embryogenesis.
- Large scale growth of plant cell in liquid culture in bioreactors for production of valuable compound like plant derived secondary metabolites and recombinant proteins used as biopharmaceuticals.

Culture systems

- Callus culture

1. Callus is an unspecilized,unorgnizedgrowing and deviding mass of cells.
2. Can be maintained infinitely.
3. No photosynthesis and grow in dark.
4. Can be used to isolate single totipotent cells.
5. Many culture lose their potential for differentiation during continued subculture due to epigenetic changes.
6. Difficult to follow many cellular events during it's growth and development phases.
7. A callus cell culture is usually sustained on gel medium.
8. Plant growth regulators, such as auxins,gibberllins and cytokynins are supplemented into the medium intiate callus formation of somatic embryogenesis.