Callus Culture

Callus:- The undifferentiated proliferative mass of large thin walled cells developed as a result of injury in higher plant organ is known as Callus.

The Culture of tissue from isolated plant cell when grown aseptically on artificial nutrient medium, in culture vessels under controlled conditions is known as Callus Culture.

History:- In vitro culture of Callus tissue was attempted in France by different workers like Gautheret, Nobecourt etc. in 1937 by using simple nutrient medium supplemented with Vitamins & Auxins, the growth of the callus tissue was promoted in woody plants.

⇒ Caplin & Steward (1948), Skoog (1954), Skoog and Miller (1957) are the main workers in this field and by their effort it was possible to produce Callus Cultures from a large number of plant species.

Principles of Callus Culture :-

⇒ For successful initiation of Callus Culture, three important Criteria should be accomplished.

i) Aseptic preparation of plant material.

ii) Selection of suitable nutrient medium supplemented with appropriate ratio of auxins and cytokinins or only appropriate auxin and

iii) Incubation of culture under controlled physical condition.

⇒ Different plant parts carry a no. of surface borne micro-organisms - like bacteria, fungus etc.

→ So, before attempting to initiate a Callus culture, it is necessary to surface sterilize the plant parts which are to be cultured.

⇒ Typical plant parts may be segments of root or stem, pieces of leaf lamina, flower petals etc.

→ The excised plant parts called explants are at first washed with liquid detergent (generally 5% v/v Teepol).

⇒ Then the explants are Surface Sterilized by the most commonly used chemicals such as 0.1% w/v mercuric chloride ($HgCl_2$) or Sodium hypochlorite for a limited time.

⇒ After Surface sterilization, the explants are repeatedly rinsed with autoclaved distilled water.

⇒ The Surface sterilized plant material is cut aseptically into small segments

⇒ Size of explants is a critical factor for the induction of Callus tissue.

⇒ The explants are finally transferred aseptically on a suitable nutrient medium solidified with agar.

⇒ Agar solidified or semi-solid nutrient medium after its preparation and sterilization by autoclave at 15 lbs. pressure for 15 minutes is used for the induction of Callus tissue.

⇒ In most cases Succesful Callus ~~tissue~~ culture depends upon the inclusion of plant growth hormones in the nutrient medium and for healthy Callus growth usually both an auxin and a Cytokinin

are required.

⇒ Incubation of culture under controlled physical conditions such as temperature, light, and humidity is indispensible for the proper initiation of Callus tissue.

⇒ The suitable temperature for in vitro Callus initiation & growth is usually 25 ± 2°C.

⇒ In some plant materials initiation and growth of the Callus tissue take place in totally dark condition.

⇒ However, in case of other plant materials, a particular photoperiod (16 hrs. light and 8 hrs. dark) is necessary for the initiation and growth of Callus tissue.

⇒ Approximately 2,000 to 3,000 lux artificial light intensity is needed.

⇒ Cool, white fluorescent lamp are generally used for providing light.

⇒ Generally 55% to 60% relative humidity is maintained in the culture room.

⇒ Once the growth of the Callus tissue is well established, portions of the Callus tissue can be removed and transferred directly onto fresh nutrient medium to continue growth.

⇒ In this manner, Callus cultures can be continuously maintained by serial subcultures.

Importance of Callus Culture:-

→ Callus culture is used for other experimental purposes.

⇒ Propagation of rare plant types may be achieved by this type of culture.

⇒ The morphogenic regeneration of applying this phenomenon through some manipulation of culture medium may be done.

→ The Callus culture may be good source of genetic variability.

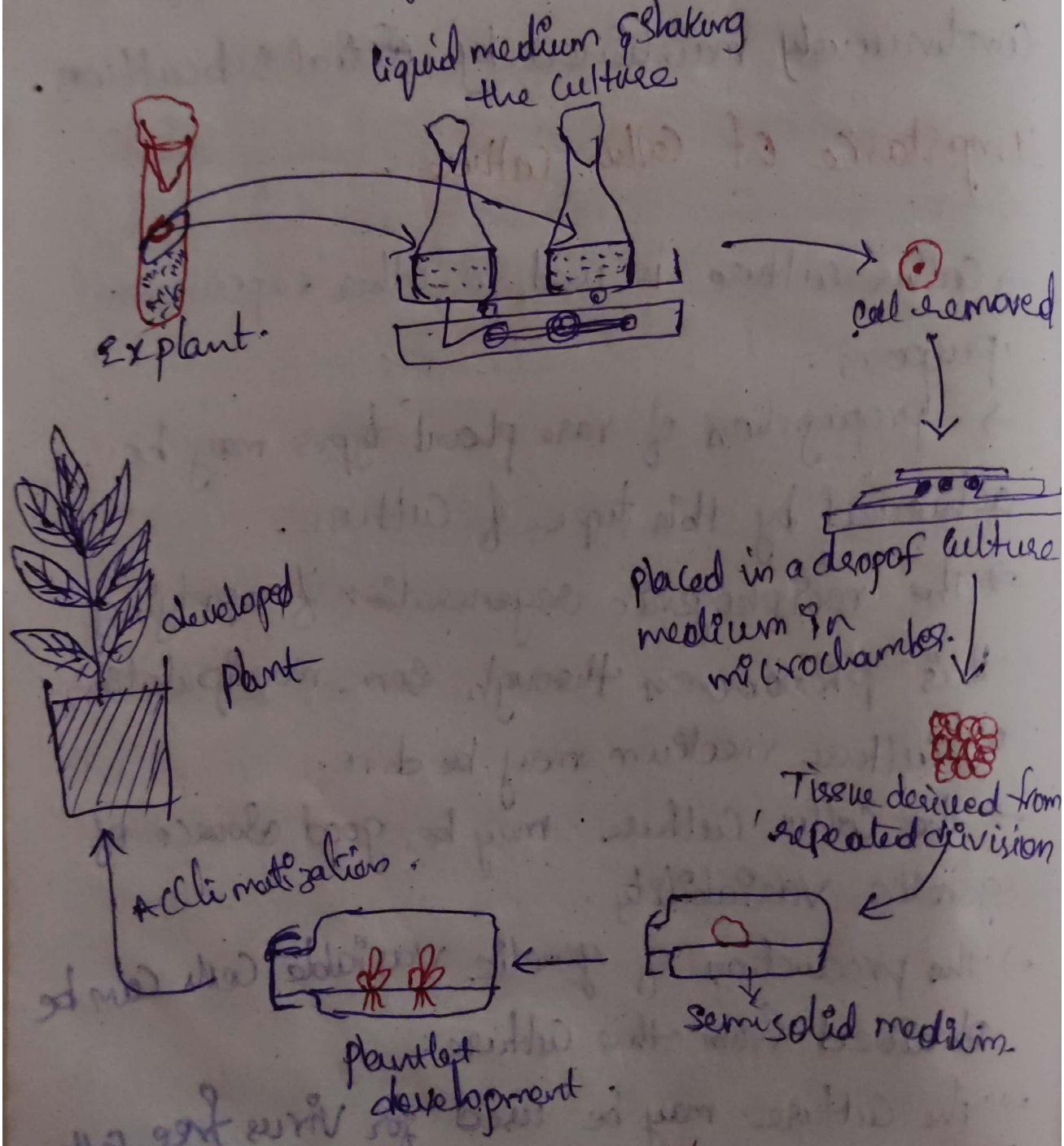
⇒ The production of genetic variable cells can be obtained from this culture.

⇒ The culture may be used for virus free cells.

→ The production of secondary metabolites which are used commercially may be done

through this culture.

→ The haploid culture may be achieved from the cells of the callus tissue if it is derived from microscope culture.



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