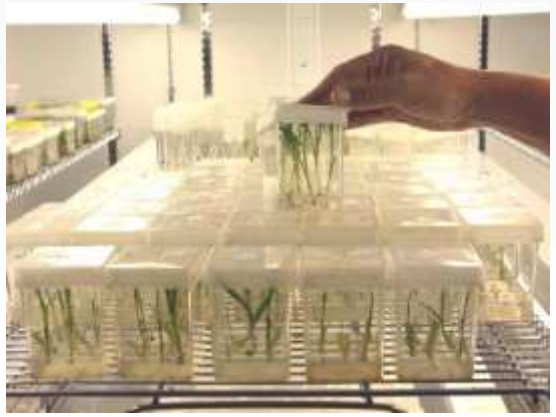
Plant defense response



IN VITRO PROPAGATION OF PLANTS

TISSUE CULTURE

- **TISSUE CULTURE IS THE METHOD OF PROPOGATION OF PLANTS IN LABORATORY CONDITIONS.**
- **IT IS ALSO CALLED AS MICROPROPAGATION.**
- **TISSUE CULTURING TECHNIQUE IS ADAPTED TO KEEP IN PACE WITH DEMAND AND QUALITY.**
- German Botanist **HABERLANDT** who conceived the concept of cell culture in 1902.

DIFFERENTIATION

- The phenomenon of the reversion of mature cells to the meristematic state leading to the formation of callus is called dedifferentiation (regaining the capacity to divide mitotically by differentiated cells). The component cells of callus have the ability to form a whole plant, a phenomenon described as redifferentiation (once differentiated cells return to their original specialized form).

TOTIPOTENCY

THE CAPACITY TO GENERATE A WHOLE PLANT FROM ANY CELL OR AN EXPLANT IS TERMED AS TOTIPOTENCY.

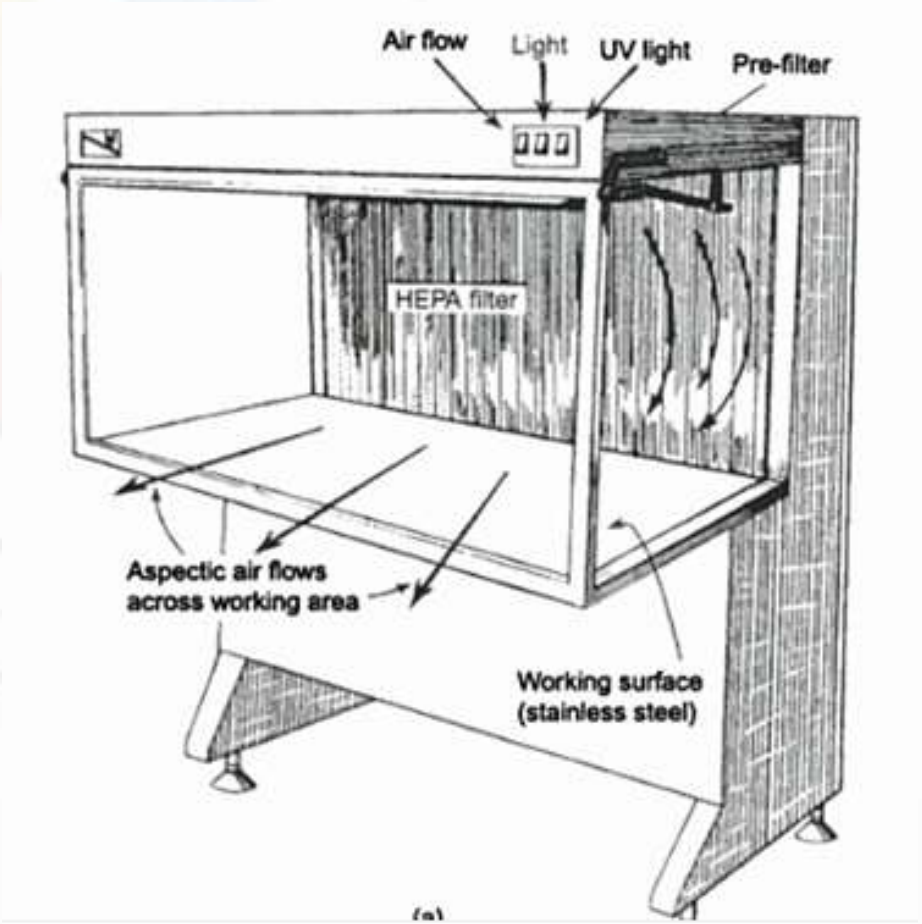
✓Competency : **the endogenous potential of a given cells or tissue to develop in a particular way**

EXPLANTS

- **A SMALL PIECE OF THE DESIRABLE PLANT IS SELECTED.**
- **GENERALLY MERISTEMATIC TISSUE OR INTERNODAL SEGMENTS OF THE PLANT IS SELECTED FOR MICROPROPAGATION.**
- **THE SELECTED PLANT TISSUE IS CALLED AS EXPLANT.**

General plant tissue culture laboratory design

1. Glassware washing and storage area
2. Media preparation and sterilization area
   - Refrigerator/freezer
   - Balances
   - Hot plate/stirrer
   - pH meter
   - Autoclave
3. Growth room
4. Aseptic transfer area
   - Laminar flow hoods

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Sterilization methods:

Why?

1. Micro-organism contamination can over grow the plant culture resulting in culture death
2. Micro-organism contamination exhaust the nutrient media
3. Micro-organism can change in secondary metabolite structure or produce other compounds .

What?

- The explant or culture
- The vessels The media The instruments
- The environment where handling is taking place

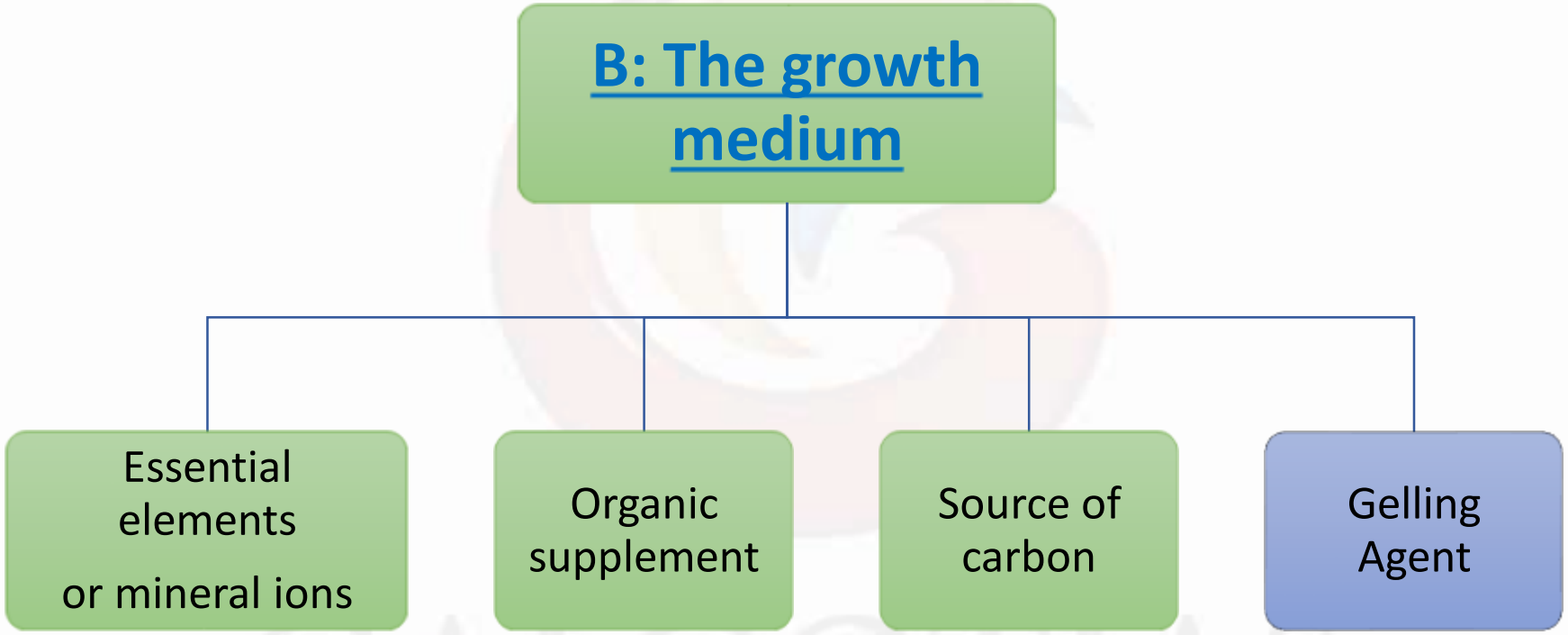
How?

1. Heat sterilization:
   a. Dry heat: 130-180 °C for 2-4 hours

   Used for glassware, metal instruments

   b. Autoclave: 121 °C, 1.06 kg/cm2 (15 Ib) for 15 to 20 minutes

   Used for glassware, media and aqueous solutions and plastic caps
2. Sterilization by filtration: for heat labile aqueous solutions
3. Ethanol: used for handling surface sterilization and also for explant.
4. Chemical sterilization: using sodium or calcium hypochlorite, sliver nitrate, mercuric chloride or some other bactericidal chemicals



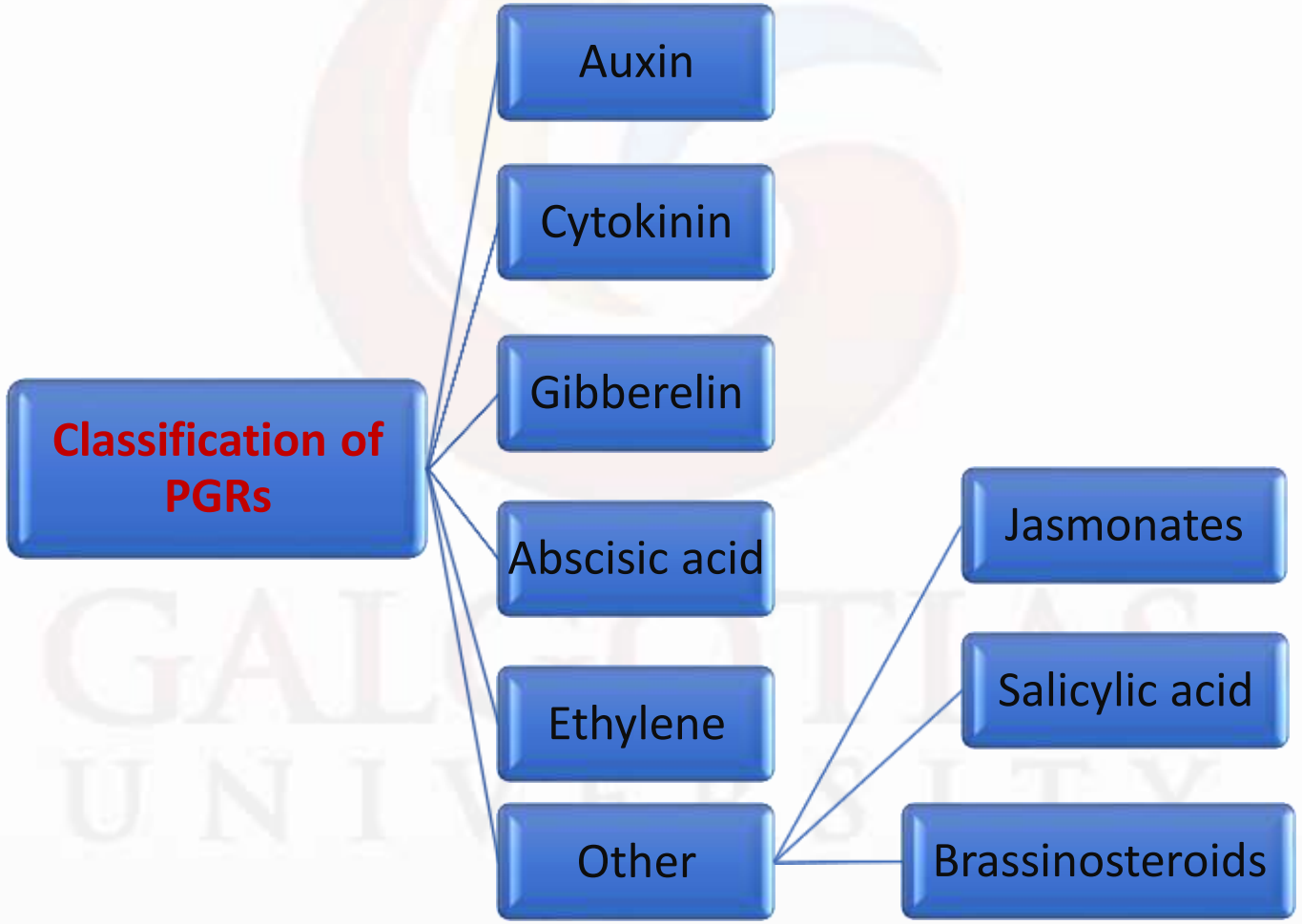
CULTURE MEDIUM

- **THE TISSUE SO COLLECTED IS PLACED IN A CULTURE MEDIUM / NUTRIENT MEDIUM FOR THE MULTIPLICATION OF CELLS.**
- **CONTENTS OF THE CULTURE MEDIUM:-**
- **AGAR GEL.**
- **A CARBON SOURSE – SUCROSE.**
- **INORGANIC SALTS .**
- **PLANT GROWTH REGULATORS – AUXINS & GIBBERLLINS.**

C. Plant growth regulators:

Definition

Characteristics



References

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- ✓ Taiz, L. and Zeiger, E. 2002. Plant Physiology, 3rd ed. Sinauer Associates.