

Plant Tissue Culture

Plant Tissue Culture Micropropagation

Presented by

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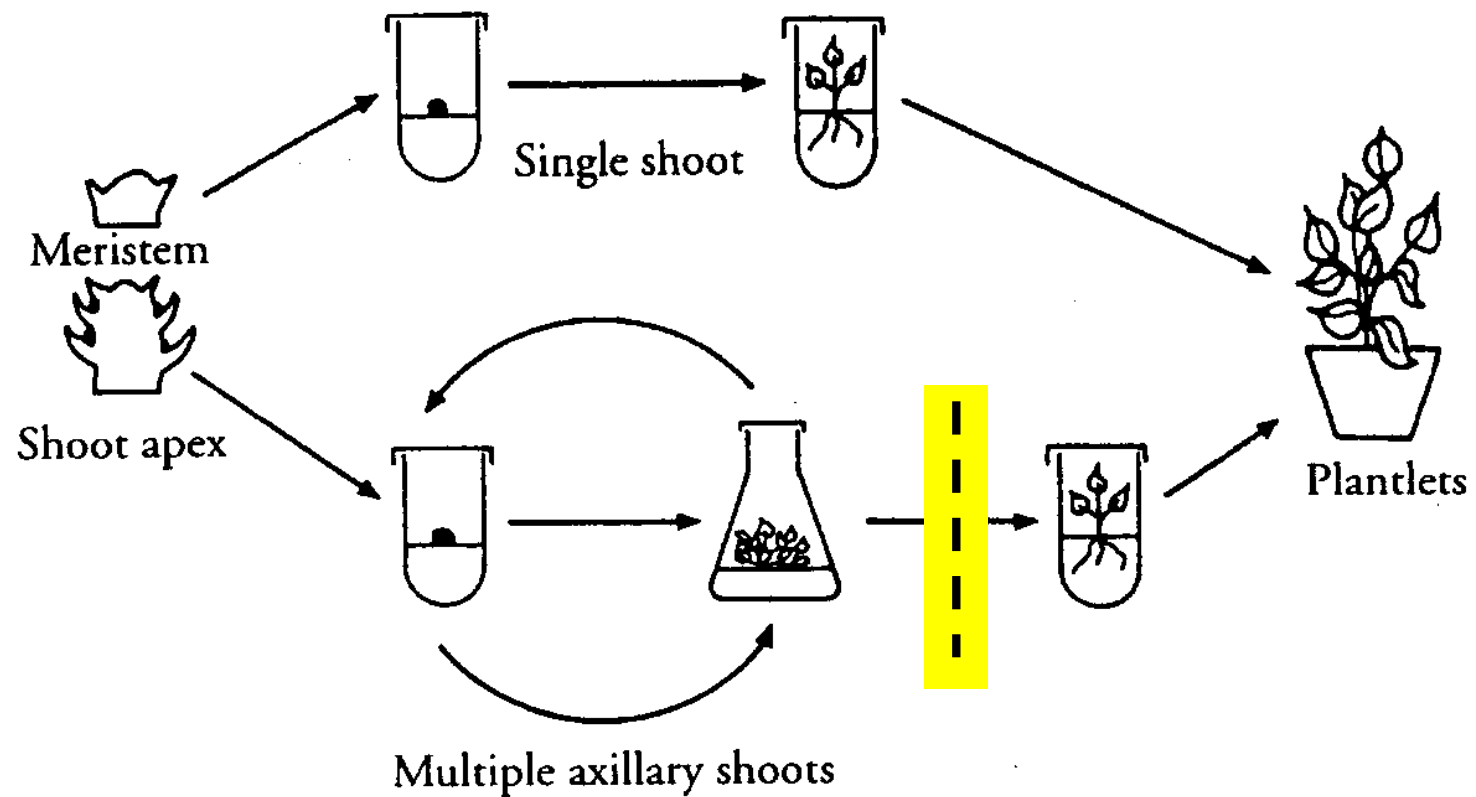
What is Micropropagation?

“... the asexual or vegetative propagation (multiplication) of plants in vitro “

Implies

- regeneration
- multiplication
- uniformity ??

Basic *in vitro* propagation ...



STAGES

1. Selection of plant material
2. Establish aseptic culture
3. Multiplication
4. Shoot elongation
5. Root induction / formation
6. Acclimatization

Benefits for propagation ...

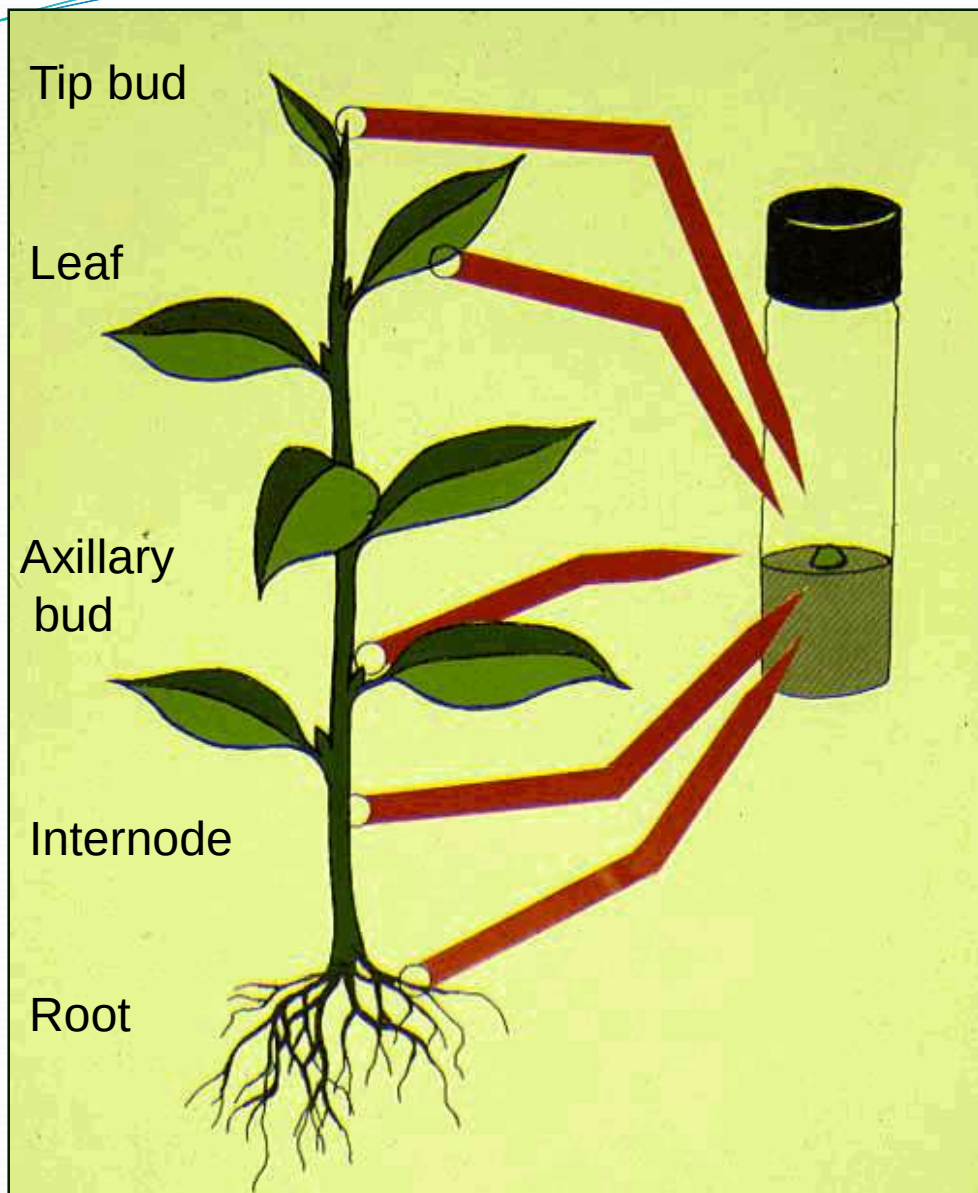
- ♣ Rapid multiplication of clones
- ♣ Difficult species ?
- ♣ Genetic uniformity ?
- ♣ Aseptic conditions
- ♣ Micro- stock plants
- ♣ Controlled environment

Other applications ...

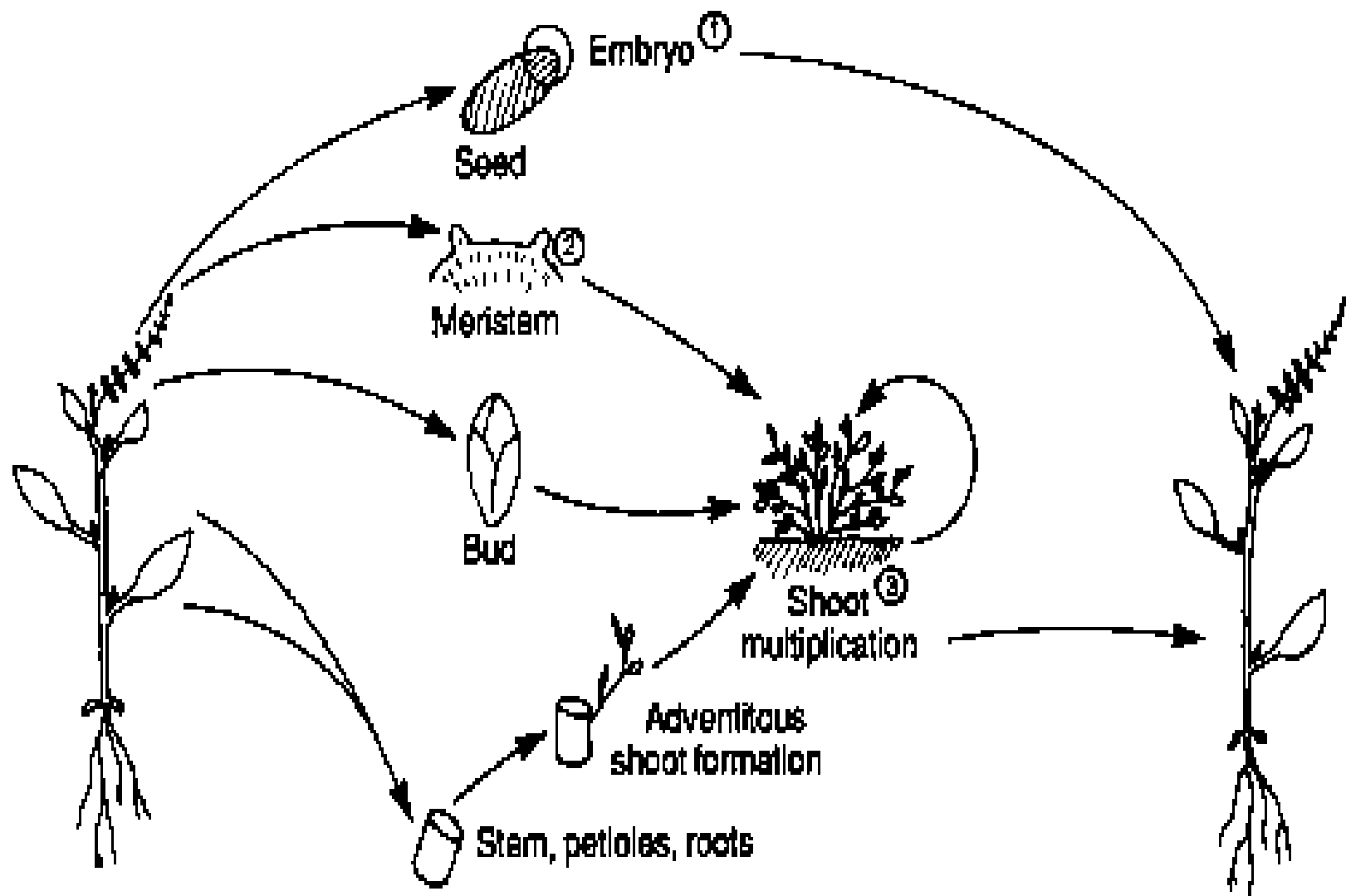
- ♣ *in vitro* micro-grafting
- ♣ Genetic conservation
- ♣ Plant improvement
- ♣ Experimental system

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**Starting material for
micropropagation**



Selection of plant material ...

- ♣ Part of plant
- ♣ Genotype
- ♣ Physiological condition
- ♣ Season
- ♣ Position on plant
- ♣ Size of explant

Physiological state - of stock plant

- ♣ Vegetative / Floral
- ♣ Juvenile / Mature
- ♣ Dormant / Active
- ♣ Carbohydrates
- ♣ Nutrients
- ♣ Hormones

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Disinfestation

- ♣ Stock plant preparation
- ♣ Washing in water
- ♣ Disinfecting solution
- ♣ Internal contaminants
- ♣ Screening

The medium

- ♣ Minerals
- ♣ Sugar
- ♣ Organic 'growth factors'
- ♣ Growth regulators
- ♣ Gelling agent
- ♣ Other additives

Physical Environment

- ♣ Temperature
- ♣ Moisture
- ♣ Light

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Origins of new shoots ...

- ♣ Terminal extension
- ♣ Lateral / Axillary buds
- ♣ Adventitious (*de novo*, re-differentiation)
- ♣ Callus differentiation

Role of growth regulators ...

- ♣ Cell division
- ♣ Differentiation
- ♣ Cell expansion
- ♣ Apical dominance

auxins

cytokinins

gibberellic acid

ethylene

abscisic acid

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Shoot elongation ...

- ♣ Basal 'hormone free' medium
- ♣ Gibberellins
- ♣ Carry-over of hormones

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Root initiation ...

- ♣ Auxins
- ♣ Co-factors
- ♣ C : N ratio
- ♣ Light / darkness
- ♣ Initiation vs growth
- ♣ Juvenility / rejuvenation
- ♣ Genotype

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Acclimatization (hardening)

- *survival of the new plant when removed from the in vitro environment*