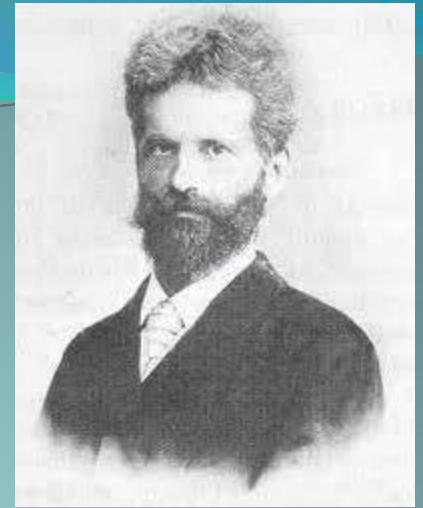


TEKNIK-TEKNIK DALAM KULTUR JARINGAN

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FMIPA UNY

2012



- Kemampuan untuk menghasilkan atau mempertahankan organ-organ tumbuhan (embrio, tunas, akar, bunga) dan jaringan tumbuhan (sel, kalus, dan protoplas) dalam kondisi aseptik serta menghasilkan tumbuhan baru adalah hasil dari penelitian di laboratorium di bidang botani, patologi tumbuhan dan genetika.

- Prosedur yang digunakan disebut dengan :
 - Tissue culture
 - Organ culture
 - In vitro culture
 - Micropropagation
 - Biotechnology

Teknik yang digunakan :

- Berdasar struktur yang akan terbentuk :
 - Bibit
 - Plantlet
 - Kalus
 - Embrio somatik

1. Pembentukan Bibit

- Seed culture
- Embryo culture



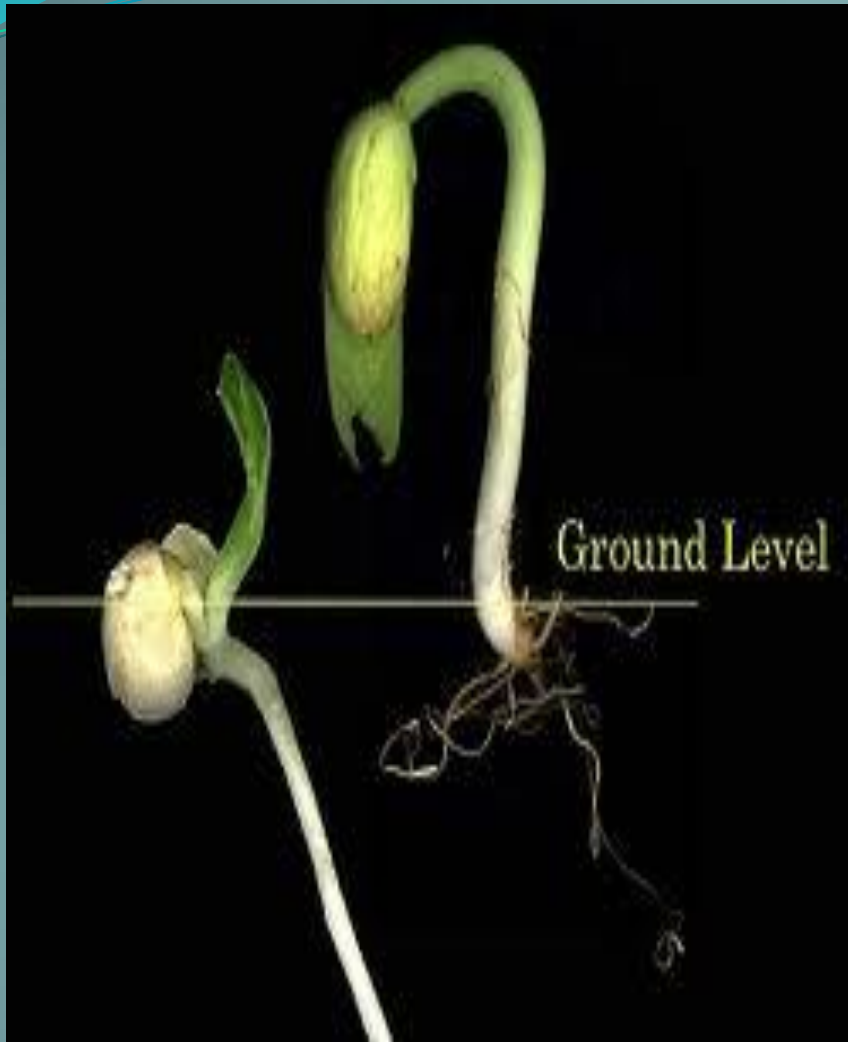
Seed culture

Biasanya digunakan dalam kultur anggrek karena biji anggrek tidak bisa tumbuh sendiri (tidak mempunyai endosperm).

EKSPLAN BIJI

Metode regenerasi : KULTUR BIJI

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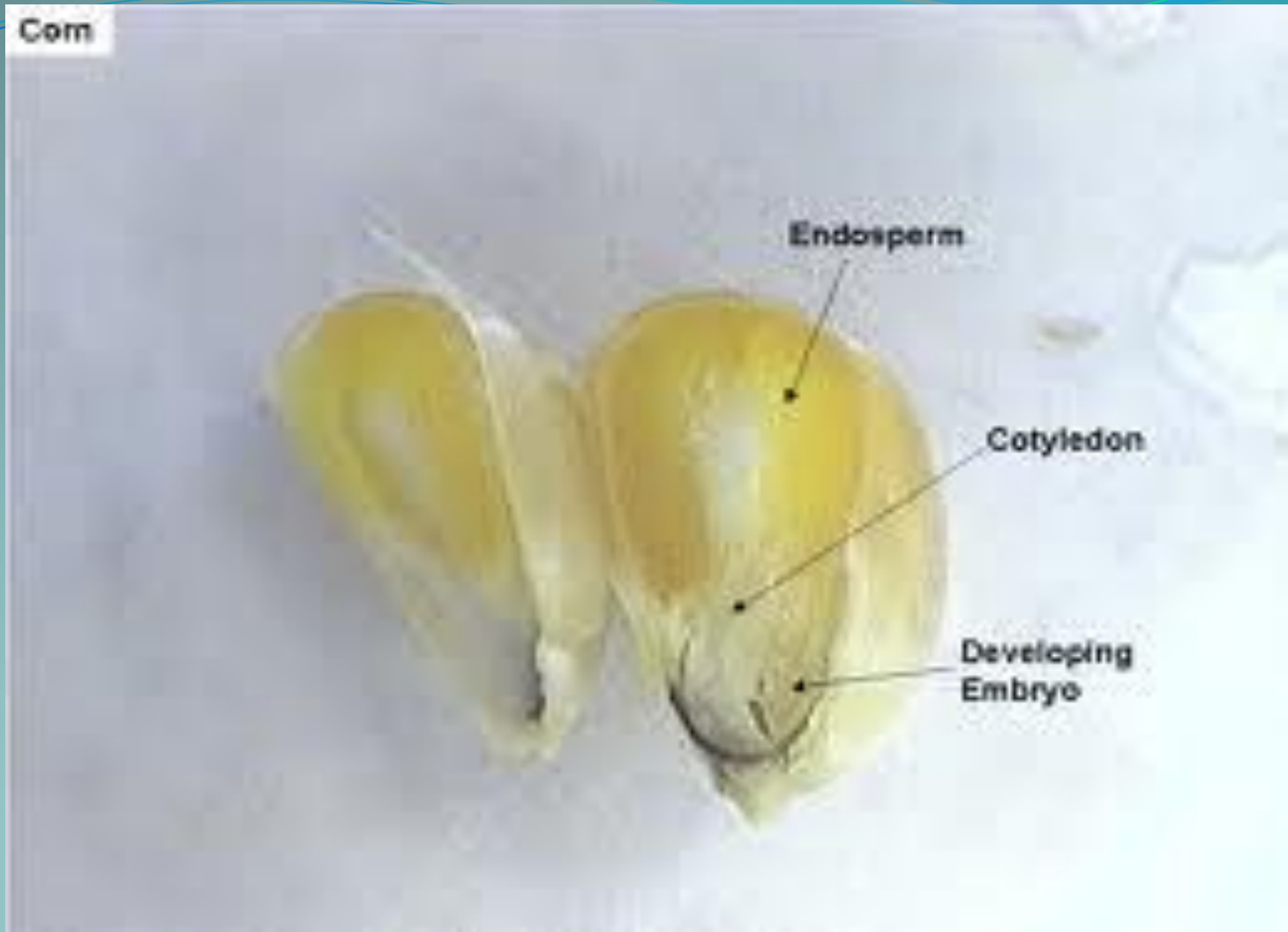
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Embryo Culture

1. Embrio masak akan berkecambah dengan mudah di kondisi in - vitro untuk membentuk bibit. Biasanya digunakan untuk penelitian, stok micrografting, dan propagasi
2. Embrio belum masak diisolasi setelah melakukan persilangan interspesifik. Persilangan tersebut biasanya menghasilkan embrio tetapi tidak dapat berkembang.

Metode regenerasi : Embryo rescue, Ovule culture, Ovary culture

Com



2. Pembentukan Planlet

a. Axillary shoot formation :

- Meristem culture
- Shoot culture

c. Micrografting

b. Adventitious shoot formation :

- Diploid plant regeneration (full complement of chromosome)
- Haploid plant regeneration (half the original chromosome number)

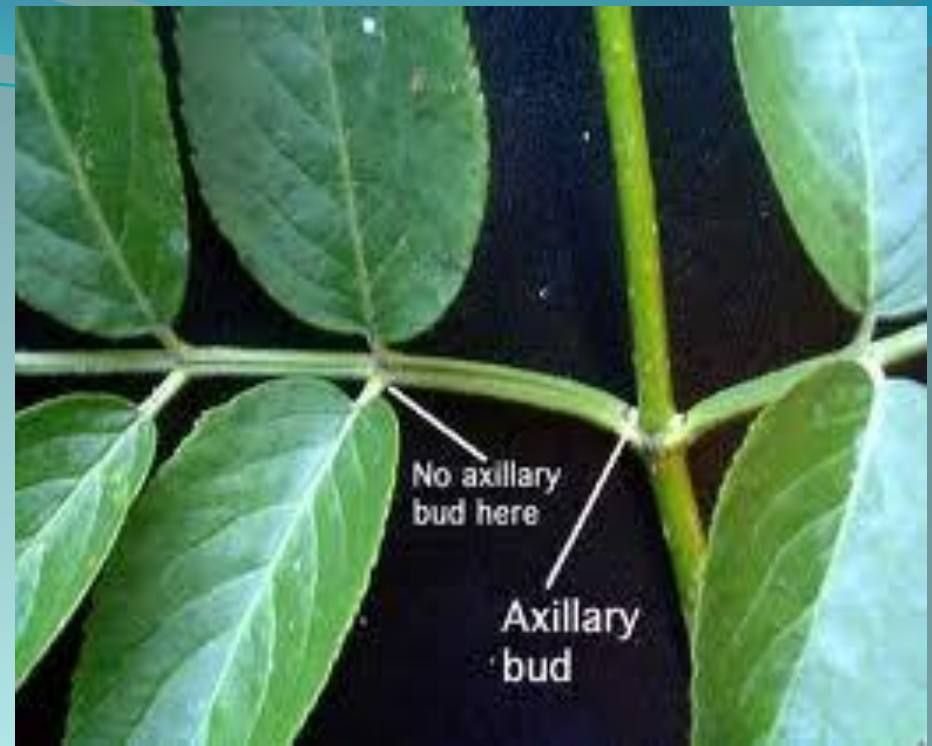
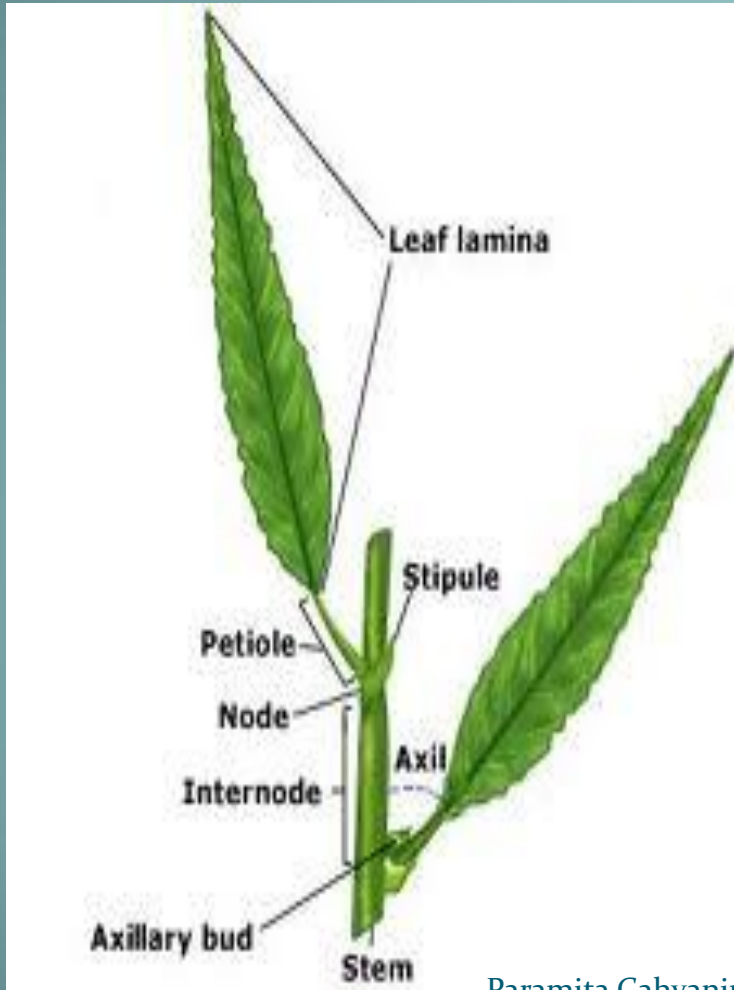


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Adventitious



Axillary



Axillary Buds



Axillary shoot
formation

Meristem Culture

Initially developed as a micropropagation system but now mostly used for virus elimination

**EKSPLAN
SHOOT TIP
less than 1mm
in size**

Shoot Culture

- Shoot cultures are the most often used micropropagation systems
- Bisa berupa : axillary branching, nodal cultures, stool shoots, pseudocorms, minitubers

EKSPLAN

**Stem with 1 to 4
nodes. May
include leaves
and shoot tip**



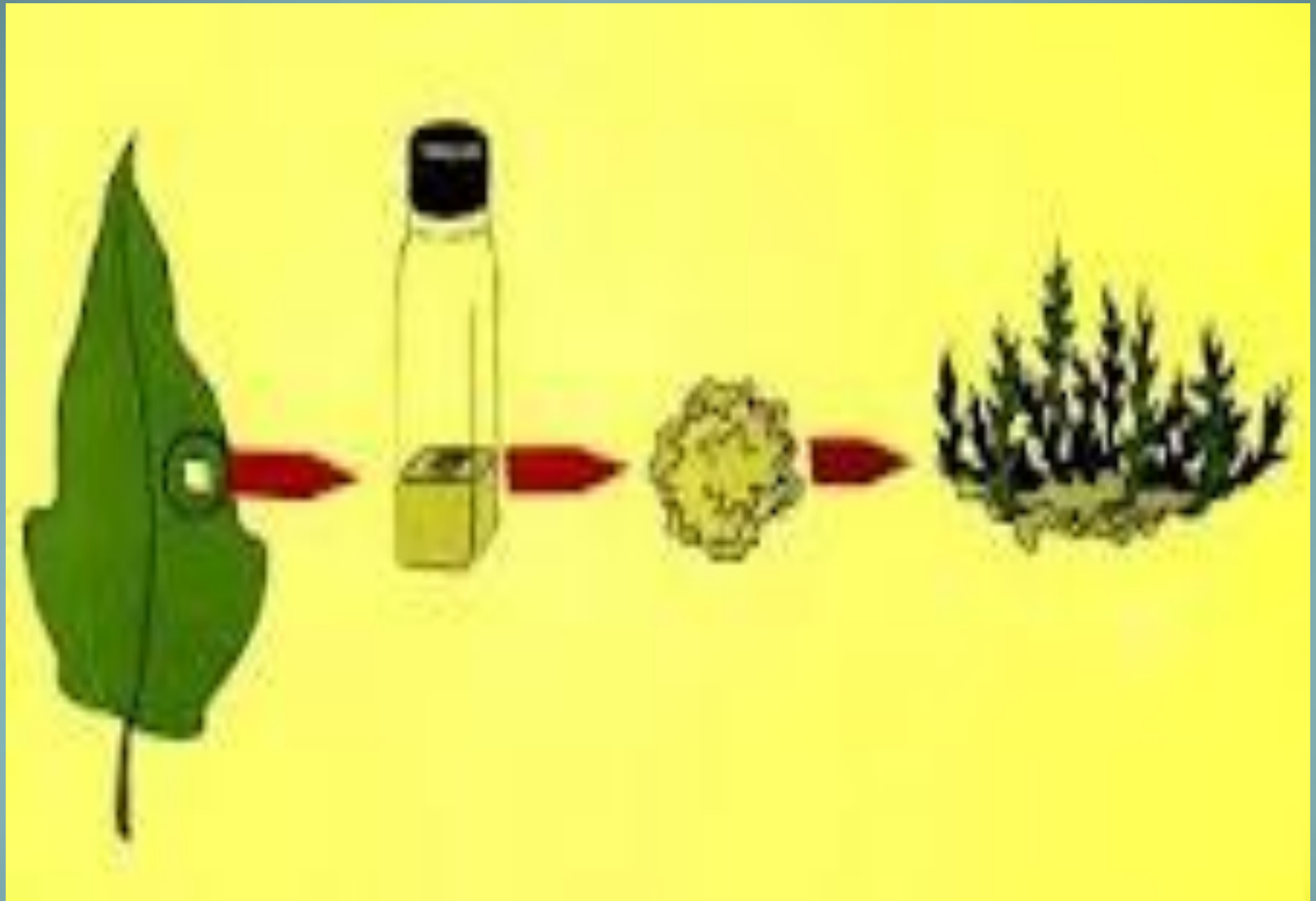
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Diploid Plant Regeneration

- Often used for micropropagation, especially in monocots.
- Adventitious shoot regeneration is one of the key steps in obtaining plants that have been genetically transformed

EKSPLAN

**Leaf pieces, petioles,
bulb scales,
stem internodes, roots
and callus**

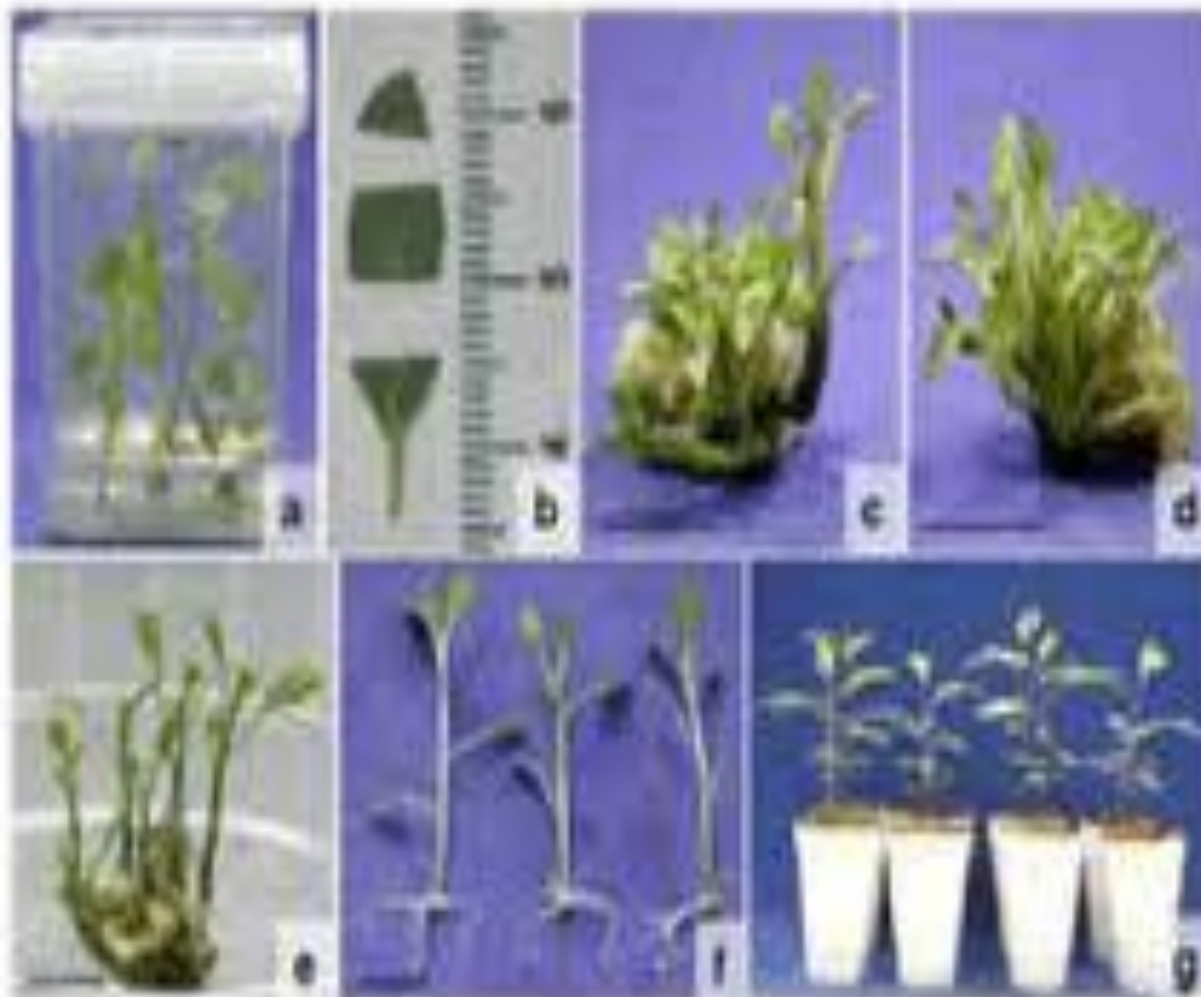


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Haploid Plant Regeneration

- Used in breeding to obtain haploids.
- Shoots or somatic embryos may be obtained

EKSPLAN

Anther

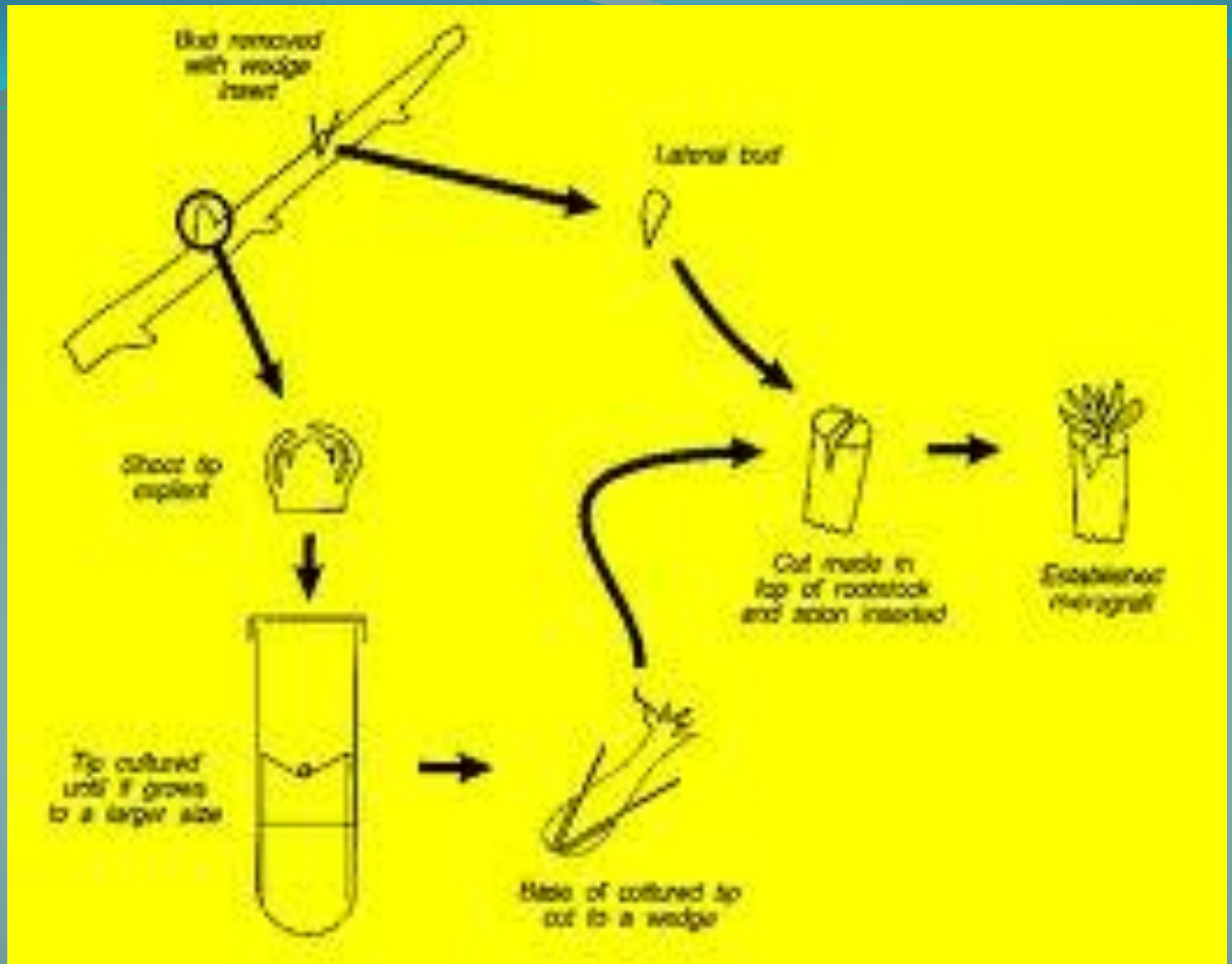
**(pollen mother
cells)**

Micrografting

- Useful for virus elimination.
- Can also be used in special situations (like grape) as an alternative to conventional grafting

EKSPLAN

**Small scion shoot
tip usually grafted
to a seedling
rootstock**







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3. Pembentukan Kalus

- Ada 3 metode regenerasi :
 1. Callus cultures (stationary)
 2. Callus suspension cultures
 3. Protoplast cultures

Callus cultures (stationary)

Callus cultures are used for research, breeding, and genetic transformation studies. Callus cells can be used to produce enzymes, medicines, natural flavours, and colours.

EKSPLAN

**Any vegetative
tissue**

Jemalong

2HA

Day 0



Day 14



Callus suspension cultures

Suspension callus are shaken constantly to perpetuate callus formation. Uses are the same as stationary callus cultures

EKSPLAN

**Callus
subcultured
from stationary
cultures**

Protoplast Cultures

- Protoplast are used in plant research to study basic cell function.
- Protoplasts can also be used in breeding.
- Under the right conditions, 2 protoplasts can fuse to form a single cell.
- The nuclei in these cells merge, combining genetic information, even in species that are not sexually compatible.
- New cell walls form and the resultant callus can be induced to form adventitious shoots.

Eksplan kultur protoplast

- Protoplast are isolated single cells without a cell wall.
- The cell wall has been digested by fungal enzymes

4. Somatic (vegetative) embryo formation

Adventitious somatic embryogenesis

1. Type 1
2. Type 2 (polyembryogenesis)
3. Type 3

Induces somatic embryogenesis

Type 1

Adventitious
somatic
embryogenesis

Used to regenerate
clonal copies of the
mother plant

EKSPLAN
Nucellus or ovule

Type 2

Adventitious
somatic
embryogenesis

For breeding and genetic
transformation

EKSPLAN
Embryogenic suspensor
mass

Type 3

Adventitious
somatic
embryogenesis

For breeding and genetic
transformation

EKSPLAN
Developing
embryos or
seedling parts

Induced Somatic Embryogenesis

For breeding and genetic transformation.

Most systems proposed for synthetic seeds use this procedure

EKSPLAN

**Callus cell
suspension
cultures**



Eksplan dengan busuk (a) → Kalsi dan embrio
 yang tumbuh dari sebuah jaringan busuk (b)
 → Kalsi embrionik (c, d) yang berkembang menjadi
 embrio (e) → Pflanz yang berkembang dari embrio (f) →
 adaptasi

NEXT WEEK

Embryo culture
Embryo rescue

