RAMA UNIVERSITY

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FACULTY OF ENGINEERING & TECHNOLOGY

Course: B. Tech Biotechnology
Sub Code: BBT-515

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Sub Name: Plant Biotechnology

LECTURE 5

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GAMETOCLONAL VARIATION

- The variation observed among plants regenerated from gametic cell cultures is termed as gametoclonal variation.
- The concept of gametoclonal variation evolved from that of somaclonal variation.
- The term ‘gametoclonal variation' can be described as the variation among derivatives of gametic cells in culture, or sexual progeny of plants regenerated from gametic cells in culture. These variants are obtained from both meiotic and mitotic divisions
- Both somaclonal and gametoclonal variations were detected in cultured cells and regenerated plants for morphological, biochemical characteristics, and chromosome number and structure.

There are four distinct sources of variations when referring to gametoclonal variation:

i. New genetic variations induced by the cell culture procedures.

ii. Variations resulting from segregation and independent assortment.

iii. New variation at the haploid level induced by the chromosome doubling, and

iv. New variation induced at the diploid level, resulting in heterozygosity.

Difference between Somaclonal variation and Gametoclonal variation

Somaclonal variation	Gametoclonal variation
Involves fusion of somatic cells.	Involves fusion of male and female gamete
Production of allotetraploid plants happens.	Production of the diploid plant.
Segregation does not occurs	Leads to occurrence of segregation.
Wide crosses can be made easily.	Wide crosses are associated with sexual problem.

ANDROGENESIS AND GYNOGENESIS

ANDROGENESIS

The process of embryo development from the male gametes (microspores or anthers), with the subsequent regeneration of haploid and doubled haploid plants from these cells

This is an ability of microspores and immature pollen grains to convert their developmental pathway from gametophytic to sporophytic, resulting in cell division at a haploid level followed by formation of calluses or embryos.

Due to its high effectiveness and applicability in numerous plant species, it has outstanding potential for plant breeding and commercial exploitation of double haploids.

GYNOGENESIS

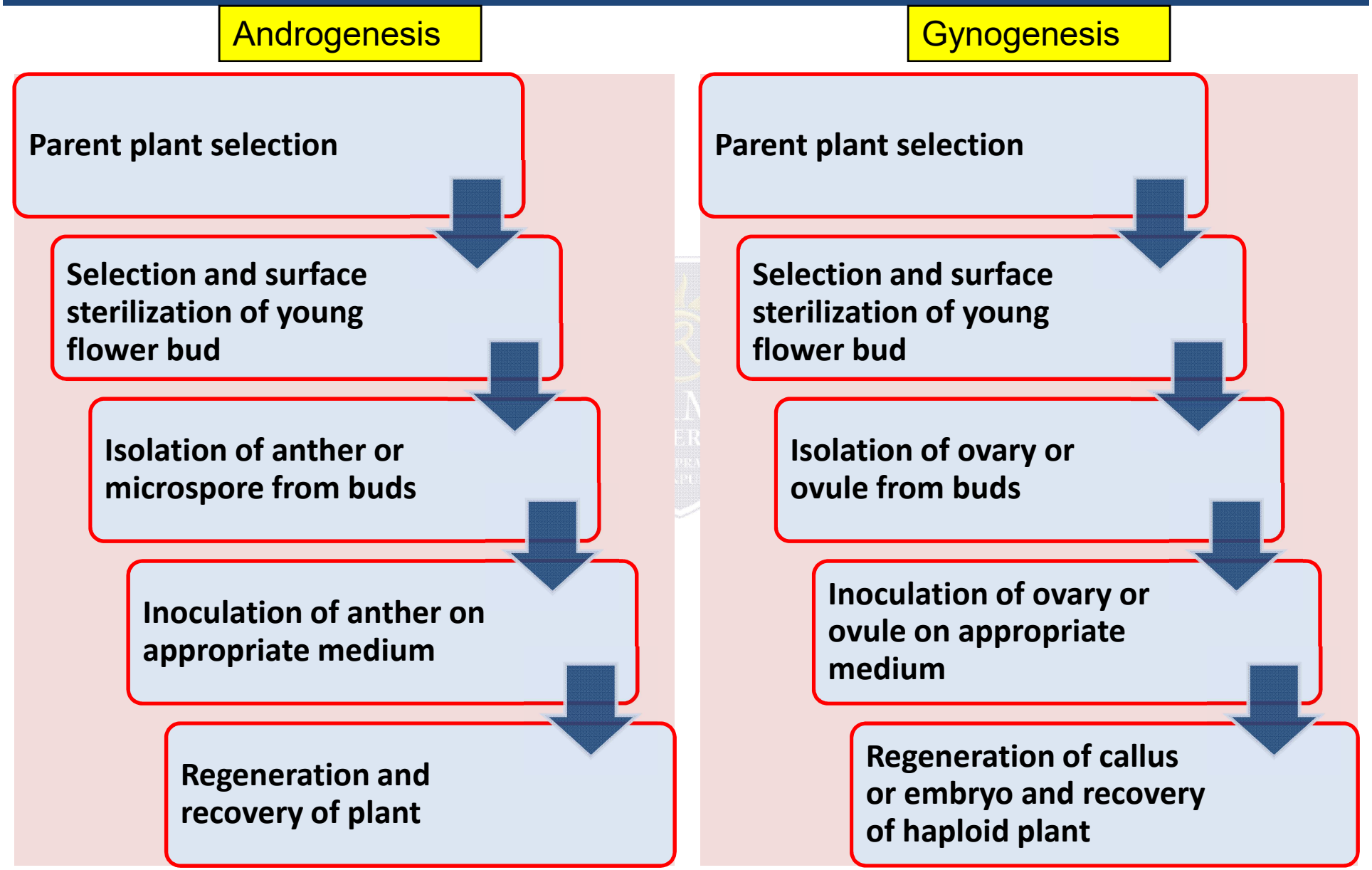
It is the culture of unfertilized female gametophytes

(ovules , ovaries etc.)

It is another pathway to the production of haploid embryos exclusively from a female gametophyte.

This method is used when plants do not respond to androgenic methods or the donor plants are male sterile.

PROCESS


Androgenesis
Parent plant selection
Selection and surface sterilization of young flower bud
Isolation of anther or microspore from buds
Inoculation of anther on appropriate medium
Regeneration and recovery of plant
Gynogenesis
Parent plant selection
Selection and surface sterilization of young flower bud
Isolation of ovary or ovule from buds
Inoculation of ovary or ovule on appropriate medium
Regeneration of callus or embryo and recovery of haploid plant

QUIZ