RAMA UNIVERSITY

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

Semester: 5th
Sub Name: Plant Biotechnology

LECTURE 4

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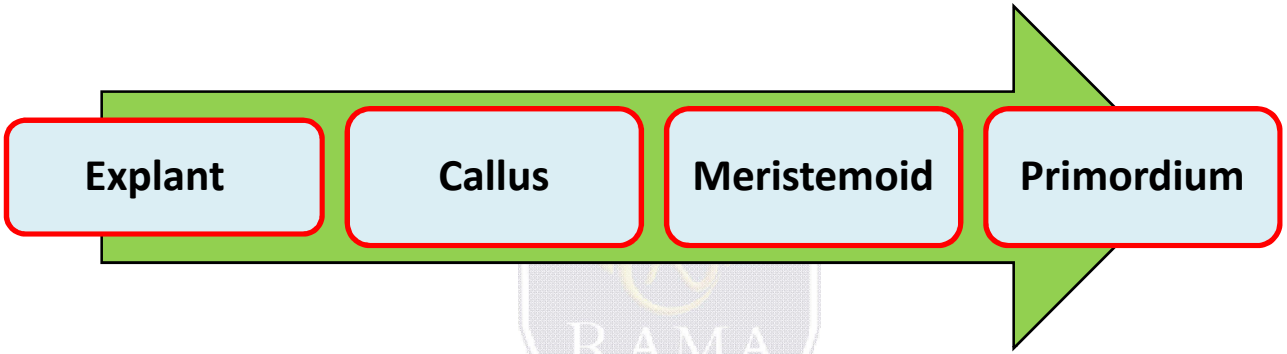
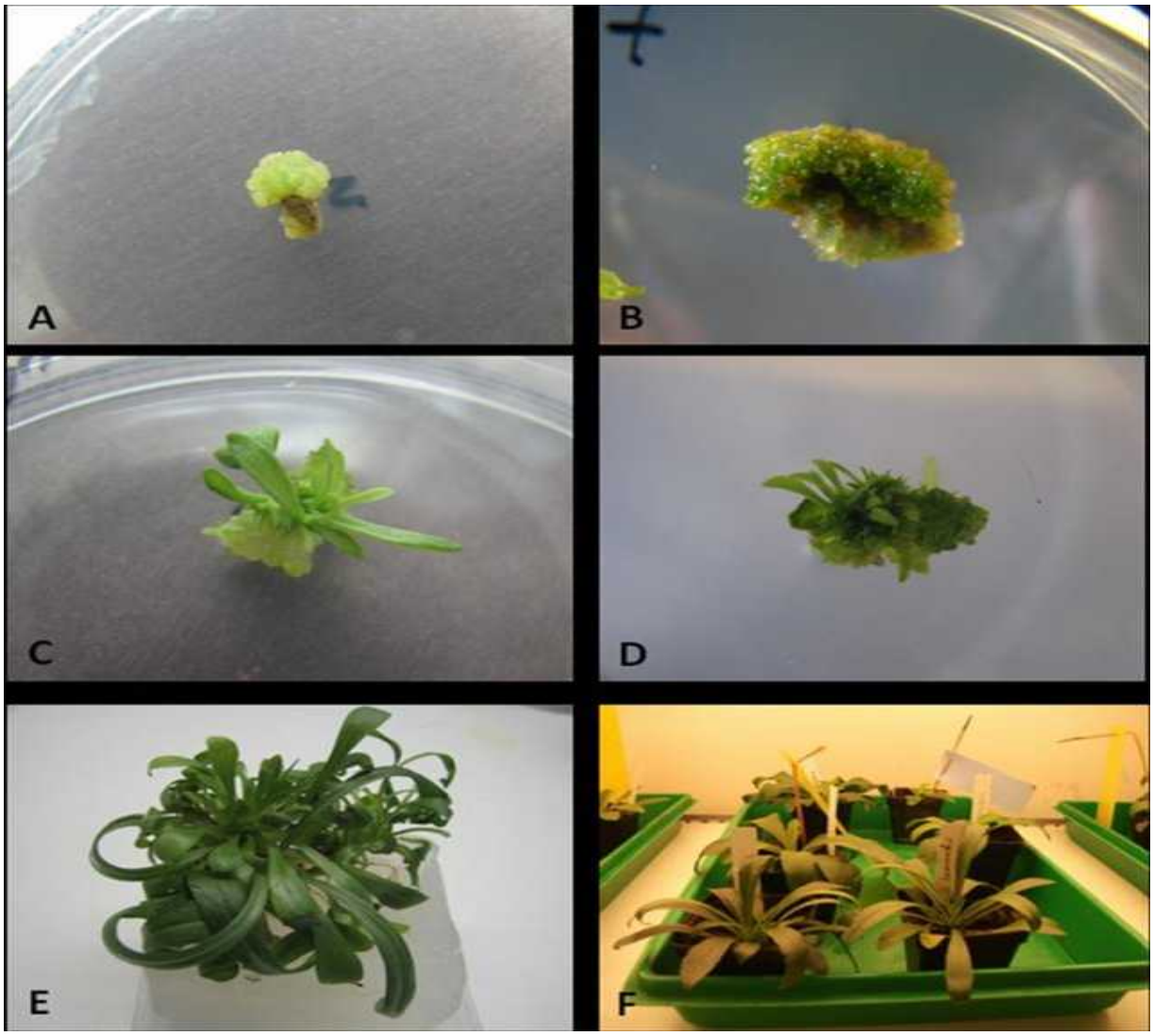
Indirect organogenesis



- ✓ In indirect organogenesis, callus is first produced from the explant.
- ✓ Organs can then be produced from the callus tissue or from a cell suspension produced from that callus.



Steps of indirect organogenesis in *D. lamarckii*.

A. Hypocotyl explants producing organogenic callus on medium containing 5.0 mg/BA and 1.0 mg/L NAA

B. organogenic callus on medium containing 0.5 mg/L BA and GA 3

C and D. Indirect shoot formation after a 6 weeks of cultivation

E. Regenerants after rooting stage

F. Regenerants being hardened off under growth chamber conditions.

https://www.researchgate.net/publication/267802786_IN_VITRO_PROPAGATION_AND_CARDIAC_GLYCOSIDE_PRODUCTION_IN_ENDEMIC_DIGITALIS_L_SPECIES_OF_ANATOLIA

4. Somatic Embryogenesis

- Embryo is defined as the earliest recognisable multicellular stage of an individual that occurs before the development of characteristic organs of the given species.
- Production of embryo like structure from callus is known as embryogenesis. In higher plants such embroys usually arise from zygote formation and are termed as zygotic embryos.
- Various types of cells and tissues can be used as source of embryogenic cells. It may be microspores (1n), zygote (2n), somatic cells (2n) or somatic hybrids (4n).
- Embryogenesis can be initiated in an explant only from the more juvenile or meristematic tissues.
- Immature zygotic embryos, cotyledons and hypocotyl dissected from ungerminated seeds are common explants.
- Isolated somatic cells can develop into embroys.
- Embryo development occurs through an organised sequence of cell division, enlargement and differentiation.
- The final stages of development towards maturation are distinguished by overall enlargement and matured embryo morphology.

Somatic embryogenesis involves three distinct steps which are absent in organogenesis

1.Induction

- It is the initiative phase where cells of callus are induced to divide and differentiate into groups of meristematic cells called embryogenic clumps (ECs).
- These ECs develop into initial stages of somatic embryo i.e. globular stage.

2.Maturation

- In this phase somatic embryos develop into mature embryos by differentiating from globular to heart shaped and the mature embryo here undergoes biochemical changes to acquire hardness.

3.Conversion

- Embryos germinate to produce seedlings.

How Somatic Embryos produced?

- ✓ In somatic embryogenesis, embryo-like structures, which can develop into whole plants in a way analogous to zygotic embryos, are formed from somatic tissues.
- ✓ These somatic embryos (SE) can be produced either directly or indirectly.
- ✓ Two ways of somatic embryogenesis:

    1. Direct embryogenesis
    2. Indirect embryogenesis

QUIZ