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FACULTY OF ENGINEERING & TECHNOLOGY

Course: B. Tech Biotechnology
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LECTURE 10

Dr. NIHARIKA SINGH
Assistant Professor
Dept. of Biotechnology

EMBRYO CULTURE

- The term embryo culture means excision of embryos regardless of age, size and developmental stage from their natural environment and growing them under artificial environmental conditions.

- Embryo culture is a sterile isolation and growth of an immature or mature embryo in vitro, with the goal of obtaining a viable plant.

- Embryo abortion in wide crosses often occurs during embryogeny (e.g. endosperm degradation) and it is sometimes possible to culture these embryo and recover hybrid plants.

- Embryo culture may include the culture of embryos within an ovule or ovary. In these instances test-tube fertilization may overcome stigmatal or stylar, and pollen incompatibility barriers

- Types of Embryo culture

    1) Mature Embryo culture
    2) Immature embryo culture

1) Mature embryo culture

- ✓ It is culture of mature embryo derived from ripe seeds. It requires simple medium.
- ✓ This is done when embryos
  - i) Do not survive in vitro
  - ii) Become dormant for longer periods of time
  - iii) To eliminate the inhibition of seed germination

- ✓ Some species produce sterile seeds which may be due to incomplete embryo development. Such embryos can be cultured and viable seedlings can be produced. Eg: Iris, orchids

2. Immature embryo culture (or) embryo rescue technique

- ✓ Culture of immature embryos to rescue the embryos of wild crosses is use d to avoid embryo abortion and produce viable plants.

- ✓ It requires complex media which includes special amino acids, hormones, endosperm extract like coconut milk etc.

Purpose of embryo culture /rescue

- To overcome seed dormancy & immaturity
- To enhance breeding
- To rescue genotypes (preservation).
- To avoid abortion
- Crop improvement
- Cryopreservation(Cryo conservation).

Advantages of Embryo Culture:

- Recovery of distant hybrids.
- Recovery of haploid plants from Interspecific crosses.
- Propagation of orchids.
- Shortening of breeding cycle
- Overcoming dormancy.
- In addition ovule and ovary can also be cultured

ENDOSPERM CULTURE

- The early attempt to grow endosperm tissue in culture was made by Lampe and Mills (1933).
- The first extensive work on growth and differentiation of corn endosperm was given by La Duel (1949).
- Endosperm is a unique tissue in majority of the flowering plants. Endosperm is formed in most cases by fusion of two polar nuclei and one of the male gametes resulting in a tissue with triploid number of chromosomes.
- The most common method for triploid production is to cross tetraploid with diploid. Such a cross may not always be successful due to strong crossability barriers and repeated production of triploid seed would be difficult.

The **technique of endosperm culture** involves the following:

- ✓ The immature seeds are dissected under aseptic condition. Endosperms along with embryos, are excised.
- ✓ The excised endosperms are cultured on a suitable medium and embryos are removed after initial growth.
- ✓ The initial callus phase is developed.
- ✓ The shoots and roots may develop and complete triploid plants are formed for further use.

Applications:

- ✓ Production of triploid plants (from triploid endosperm) e.g. in Citrus, banana, apple, tea, mulberry).
- ✓ Inducing the seed lessness e.g:- Apple, Banana, Mulberry, Sugarbeet, Peach, etc.
- ✓ Endosperm culture can also be used as a nurse tissue for raising hybrid embryos.

QUIZ