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Assignment

- Cell biology, Genetics and Evolution
- BS Zoology
(4th Semester)
- Submitted by :
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- Submitted to :
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Germplasm Conservation

➔ Define :-

"Germplasm conservation is the most successful method to conserve the genetic traits of endangered and commercially valuable species." The sum total of all the genes present in a crop and its related species constitutes its germplasm.

➔ Methods of germplasm Conservation

A global organization **International Board of Plant Genetic Resources (IBPGR)** has been established for germplasm conservation and provides necessary support for collection, conservation and utilization of plant genetic resources throughout the world.

(a) In-situ conservation:

The germplasm is conserved in natural environment

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by establishing biosphere reserves such as national parks, sanctuaries. This is used in the preservation of land plants in a near natural habitat along with several wild types.

(b) Ex-Situ conservation:

This method is used for the preservation of germplasm obtained from cultivated and wild plant materials. The genetic materials in the form of seeds or in vitro cultures are preserved. It is stored as gene banks for long term use.

→ In vitro conservation of germplasm

The methods involved in the in vitro conservation of germplasm are:

(a) Cryopreservation:

In this case the cells are preserved in the frozen state. The germplasm is stored at a very low temperature using

- Solid CO_2 at (-79.0°C)
- Using low temperature deep freezers at (-80.0°C)
- Using vapour nitrogen at (-150.0°C)
- Liquid nitrogen at (-196.0°C)

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(b) cold storage:

Cold storage is a slow growth germplasm conservation method. It conserves the germplasm at a low and non-freezing temperature ($1-9^{\circ}\text{C}$). The growth of the plant material is slowed down in cold storage in contrast to complete stoppage in cryopreservation.

(c) Low pressure and low oxygen storage:

In low pressure storage, the atmospheric pressure surrounding the plant material is reduced. In the low oxygen storage, the oxygen concentration is reduced. Lowered partial pressure reduced the in vitro growth of plants. This method has also helped in increasing the shelf life of many fruits, vegetables and flowers.

(d) slow-growth cultures:

Slow-growth of plantlets in vitro provides an attractive alternative to freeze preservation of germplasm as it is simpler, cheaper and very effective. Slow growth may be achieved by maintaining the plantlets either at a low temperature ($4-9^{\circ}\text{C}$ or ca 15°C) or on a medium having high osmotic concentration or both.

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(e) DNA clones:

Germplasm can also be preserved in form of DNA segments cloned in a suitable vector, e.g. cosmids, phasmids or YACS. The technique is highly sophisticated, technically demanding and expensive.

→ Significance of this Conservation

- (i) The conservation of germplasm involves the preservation of the genetic diversity of a particular plant or genetic stock.
- (ii) It is important to conserve the endangered plants or else some of the valuable genetic traits present in the existing and primitive plants will be lost.
- (iii) Many crops produce recalcitrant or short lived seeds.
- (iv) The roots and tubers lose viability rapidly. Their storage requires large space, low temperature and is expensive.
- (v) Similarly, in case of clonal crops seeds are not the best material to conserve due to their genetic heterogeneity and unknown worth.