

Tissue Culture Laboratory at the Asola Bhatti Wildlife Sanctuary

Source: HT

Why in News?

Recently, the Delhi forest department has initiated the establishment of a tissue culture laboratory at the Asola Bhatti Wildlife Sanctuary to conserve rare native trees.

 The primary goal of the laboratory is to grow endangered native Delhi trees in a controlled environment and regenerate saplings of species facing regeneration challenges due to invasive species.

What are key Facts about the Tissue Culture Laboratory?

Tissue Culture Laboratory:

- The lab will be able to extract plant tissue from an in-vitro fully grown plant, generating **multiple trees** from the same tree.
- The forest department will take assistance from botanists and scientists from the Indian Council of Forestry Research and Education (ICFRE) and the Forest Research Institute (FRI).

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Other Similar Laboratories:

- The <u>National Facility for Plant Tissue Culture Repository (NFPTCR)</u> was established in Delhi at the <u>National Bureau of Plant Genetic Resources (NBPGR)</u> in 1986.
 - They carry out tissue culture experiments and research on **five plant types** -tubers, bulbs, spices, plantation crops, horticultural crops, and medicinal and aromatic plants.

Application:

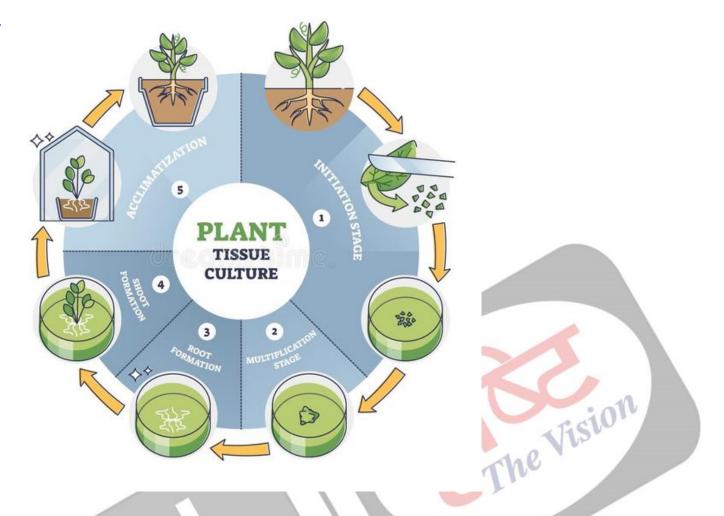
• The Aravalli Plan:

- The regeneration of ridge species like Kulu (ghost tree), palash, doodhi, and dhau is hindered by invasive species, resulting in **poor survival rates**, with large-scale multiplication achievable only through tissue culture, **particularly shoot culture**.
- The lab will also be useful in culturing endangered medicinal plants.

Success Stories:

- Tissue culture has proven highly effective in agriculture, particularly with crops such as bananas, apples, pomegranates, and jatropha, offering higher yields compared to traditional farming methods.
- Issues:
 - Biodiversity experts have contended that cloning should be limited to "extremely rare trees" to avoid genetic homogeneity and vulnerability to specific diseases.
 - Cloning can result in **restricted** <u>genetic diversity</u>, with the trees being clones of a single tree or plant.
 - To avoid this, one should not restrict oneself to a single seed variety; instead, **use different parent seeds** or seed varieties to prevent having multiple cloned trees.
 - Experts believe that commonly found species like khair, dhak and desi babool in the Aravallis could waste public funds, despite **potential benefits for endangered or**

nearly extinct species.



What is Tissue Culture?

- Tissue culture, also known as <u>micro-propagation</u>, allows multiple plants to be produced from a parent plant using <u>in-vitro tissue</u>, which is incubated under a controlled environment.
- Types of Plant Tissue culture:
 - Callus Culture: Involves cultivating undifferentiated masses of cells (callus) from explants.
 - **Cell Suspension Culture:** Cultures **individual cells** or small aggregates of cells in a liquid medium.
 - Anther/Microspore Culture: Used for producing haploid plants from pollen grains or anthers.
 - Protoplast Culture: Cultures isolated plant cells without cell walls.
- Applications of Plant Tissue Culture:
 - **Micropropagation**: Rapid **clonal propagation** of plants by culturing small pieces of plant tissue.
 - Soma-clonal Variation: Studying genetic variation among plant cells in culture.
 - **Transgenic Plants**: Introducing and expressing foreign genes (transgenes) in plant cells.
 - **Induction and Selection of Mutations:** Using mutagens to induce mutations for specific traits.

Animal Tissue Culture:

- Animal tissue culture is the in vitro maintenance and propagation of isolated cells, tissues, or organs from animals in an appropriate artificial environment.
- Cells used in animal tissue culture are usually obtained from multicellular eukaryotes and their established cell lines.

- This technique allows the study of **cell functions**, **mechanisms**, and applications.
- Animal cell culture has revolutionised research and biotechnology, providing insights into cell behaviour and applications across various fields.

Asola Wildlife Sanctuary

- <u>Asola-Bhatti Wildlife Sanctuary</u> is located at the end of an important wildlife corridor that starts from <u>Sariska National Park</u> in Alwar and passes through Mewat, Faridabad and Gurugram districts of Haryana.
- The region has a **semiarid climate** with notable diurnal temperature variations.
- The vegetation in the Wildlife Sanctuary is predominantly an open canopied thorny scrub. The native plants exhibit xerophytic adaptations such as thorny appendages, and wax-coated, succulent, and tomentose leaves.
- Major wildlife species include Peafowl, Common Woodshrike, Sirkeer Malkoha, Nilgai, Golden Jackals, Spotted deer, etc.

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UPSC Civil Services Examination, Previous Year Questions (PYQ)

Prelims

Q. With reference to the current trends in the cultivation of sugarcane in India, consider the following statements: (2020)

1. A substantial saving in seed material is made when 'bud chip settlings' are raised in a nurse, and transplanted in the main field.

2. When direct planting of setts is done, the germination percentage is better with single-budded setts as compared to setts with many buds.

3. If bad weather conditions prevail when setts are directly planted, single-budded setts have better survival as compared to large setts.

4. Sugarcane can be cultivated using settlings prepared from tissue culture.

Which of the statements given above is/are correct?

- (a) 1 and 2 only
- (b) 3 only
- (c) 1 and 4 only
- (d) 2, 3 and 4 only
- Ans: (c)

Q. Consider the following statements: (2009)

1. Sweet orange plant is propagated by grafting technique.

2. Jasmine plant is propagated by layering technique.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans: (c)

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The Vision,