Tissue Culture: GCSE Biology

CONTENTS:

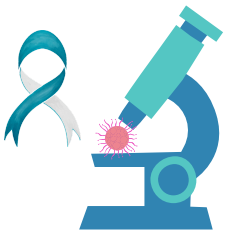
1. Introduction

- **Tissue Culture** has brought a revolution in **medical science**, **agriculture,** and **biological research**.
- It involves **growing cells**, **tissues**, and **organs** in **laboratories**.
- With this technique, a large amount of tissue can be produced from just a single individual organism.
- This can be further used for a **variety of purposes**.

Real -life uses:

Production of vaccines

Testing new medicines



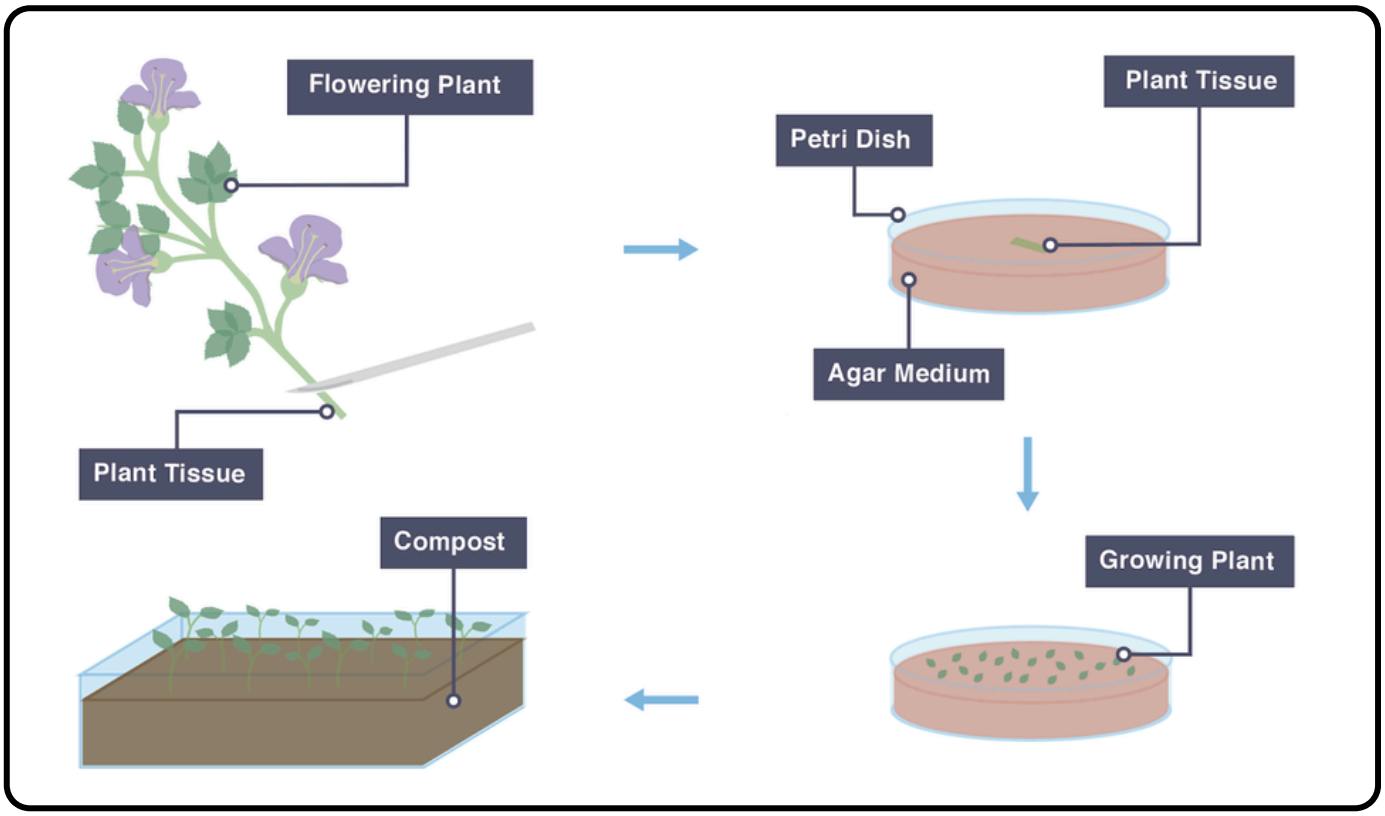
Cancer research

Conservation of rare species

Tissue Culture: GCSE Biology

2. Tissue Culture

- **Cells** or **tissues** (known as explants) are **taken** from their **parent** (plant or animal).
- These are, then, **transferred** to a **nutrient medium** (a liquid or a solid with nutrients).
- In this medium, the explants **divide** and **grow** into an **individual**.
- This process is known as **tissue culture**.



- Using the tissue culture technique, identical cells can be grown.
- These form undifferentiated cells (callus) and can be made specialized.

3. Uses of Tissue Culture

- **Conservation** of **vulnerable plant** species.
- Development of plants that are difficult to grow from seeds.
- **Cloning** of **genetically modified plants.**
- **Study of viruses** is done using cell cultures**.**

Tissue Culture: GCSE Biology

- **Cancer cells** can be **studied** using cultures of cancer cells.
- **Testing of new medicines** without any harm to animals or humans can be done using tissue culture.

4. Process of Tissue Culture

A plant with **desirable traits** is **chosen**.
From the parent plant, **explants** are **taken**.
Explants are made **sterile** and then transferred to **a petri dish** containing **nutrient agar** under **aseptic conditions**.
Growth hormones like auxins are **added** for the growth of explants.
The **explants grow into plantlets**, shifted to potting trays covered with compost.
Here, they develop into plants.

5. What is Biological Control?

- The process of **controlling pests** and **weeds using living organisms** is called **biological control.**
- For example, the introduction of **ladybirds** to **eat** plant-destroying **aphid pests.**
- This method of getting rid of pests and weeds **replaces chemical pesticides and herbicides.**

Tissue Culture: GCSE Biology

6. Advantages & Disadvantages of Biological Control

Advantages	Disadvantages
It is **environmentally friendly** as it causes less pollution.	It is **difficult to control,** as the population of the control organisms can increase rapidly.
It is **pest-specific** and does not affect other organisms.	It may **affect** other **non-target species** (organisms may feed on other species).
It has a **long-lasting effect**.	It is a **slow process**.
It leaves **no chemical residues**, making crops safer for humans to eat.	This method is **hard to reverse**.
Pesticide resistance is **reduced**.	Biological control can have **unpredictable outcomes**.

Tissue Culture: GCSE Biology

7. FAQs

1. **What is tissue culture?**
Tissue culture is a technique where small pieces of plant tissue or cells are grown in a nutrient medium to produce new plants.

2. **Why is tissue culture used in plants?**
It is used to produce large numbers of genetically identical plants quickly, especially plants with desirable characteristics.

3. **Why must tissue culture be carried out in sterile conditions?**
To prevent microorganisms such as bacteria or fungi from growing and competing with the plant cells.

4. **What is biological control?**
Biological control is the use of living organisms to reduce the population of pests.

5. **How does biological control work?**
Natural predators, parasites, or pathogens are introduced to control pest numbers.

6. **Why is biological control preferred over chemical pesticides?**
It reduces chemical pollution, targets specific pests, and does not leave harmful residues in the environment.

7. **Is biological control always effective?**
No, it can take time to work and may not completely eliminate the pest population.