

Cultivation, Collection, Processing and Storage of Drugs of Natural Origin

Methods of Plant Cultivation

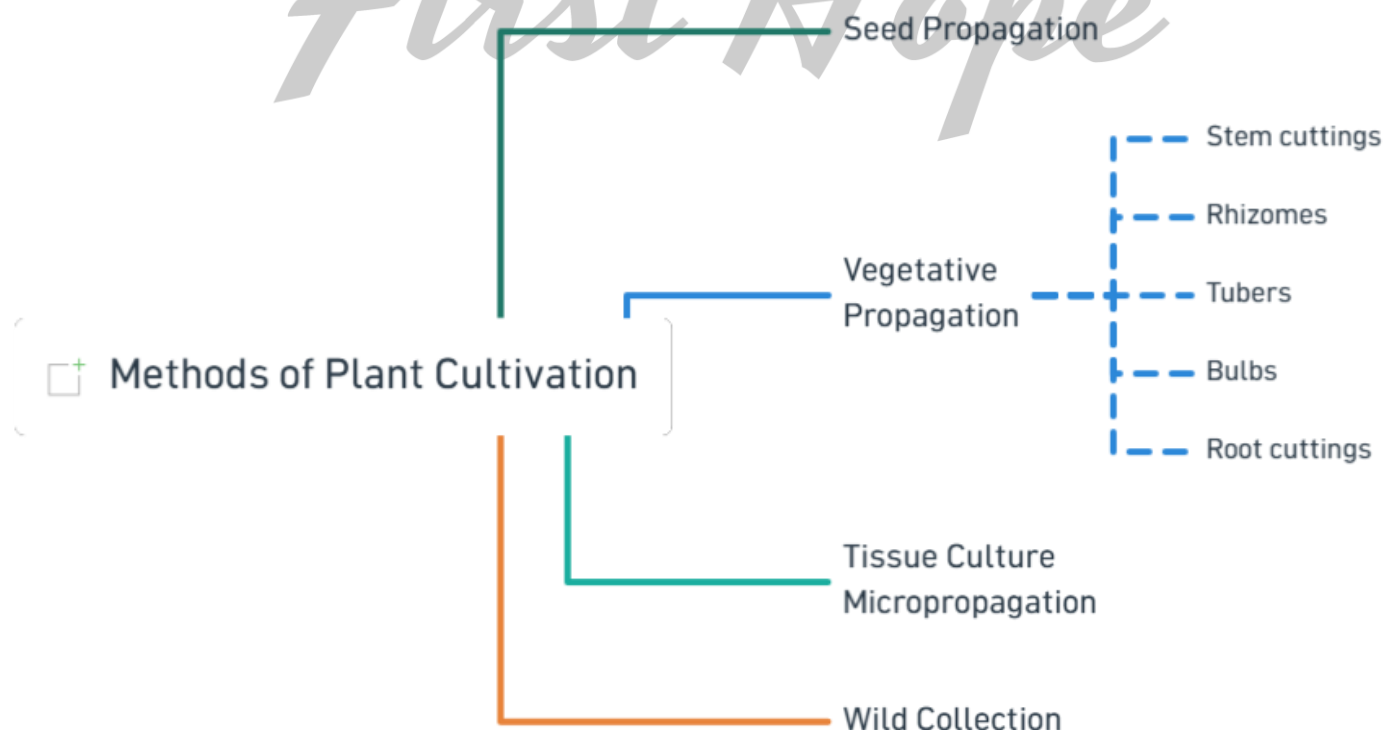
Basic Idea

- Plant cultivation is the scientific process of growing medicinal plants under suitable environmental and agricultural conditions to obtain high-quality crude drugs.
- Proper cultivation ensures that medicinal plants produce the maximum amount of active chemical constituents and remain free from contaminants.

Objectives of Cultivation

- To produce medicinal plants of high quality.
- To obtain uniform plant material with consistent medicinal properties.
- To increase the yield of medicinal plants.
- To reduce dependence on wild plant collection.
- To protect endangered medicinal plant species.

Methods of Plant Cultivation



1. Seed Propagation

- Seed propagation is the method of growing medicinal plants from seeds.
- Healthy, disease-free, and mature seeds are selected before sowing.
- Seeds are planted in suitable soil under proper moisture and temperature conditions.

- This method is simple, economical, and commonly used for many medicinal plants.

Advantages

- Seed propagation is inexpensive.
- Seeds are easy to transport and store.
- Large numbers of plants can be produced.

Disadvantages

- Plants may show genetic variation.
- Some seeds require a long time to germinate.
- Seed viability may decrease during storage.

Examples

- Senna
- Isabgol
- Coriander

2. Vegetative Propagation

- Vegetative propagation is the method of growing new plants from vegetative parts instead of seeds.
- New plants develop from stems, roots, leaves, rhizomes, tubers, bulbs, or cuttings.
- This method produces plants that are genetically identical to the parent plant.

Types of Vegetative Propagation

1. Stem Cuttings

- A healthy stem is cut from the parent plant and planted in suitable soil.
- New roots and shoots develop from the cutting.

2. Rhizomes

- Underground stems called rhizomes are divided into pieces.
- Each piece grows into a new plant.

3. Tubers

- Underground storage organs containing buds are planted.
- Each bud develops into a new plant.

4. Bulbs

- Bulbs are planted directly into the soil.
- New plants develop from the bulb.

5. Root Cuttings

- Portions of healthy roots are planted to produce new plants.

Advantages

- Plants grow faster than seed-grown plants.
- Medicinal quality remains uniform.
- Desired plant characteristics are maintained.

Disadvantages

- Disease can spread from the parent plant.
- Fewer plants are produced compared to seeds.

Examples

- Ginger
- Turmeric
- Aloe vera
- Garlic

3. Tissue Culture (Micropropagation)

- Tissue culture is a laboratory technique used to grow plants from small pieces of plant tissue under sterile conditions.
- Plant cells are grown on special nutrient media to produce complete plants.

Advantages

- Large numbers of plants are produced quickly.
- Plants remain genetically uniform.
- Disease-free planting material can be produced.
- Rare and endangered medicinal plants can be conserved.

Disadvantages

- Tissue culture requires specialized laboratories.
- The technique is expensive.
- Skilled personnel are required.

Examples

- Vanilla
- Orchids
- Ashwagandha

4. Wild Collection

- Some medicinal plants are collected directly from forests and natural habitats instead of being cultivated.

- Wild collection is mainly used when cultivation is difficult or not economically feasible.

Advantages

- No cultivation cost is required.
- Naturally growing plants may contain high levels of active constituents.

Disadvantages

- Overharvesting may lead to extinction of plant species.
- Quality varies depending on environmental conditions.
- Supply is not always reliable.

Importance of Proper Cultivation

- Proper cultivation increases drug quality.
- Proper cultivation improves yield.
- Proper cultivation reduces contamination.
- Proper cultivation helps conserve medicinal plant resources.

Good Agricultural and Collection Practices (GACP) Guidelines (WHO/GAP/GCP) for Medicinal Plants

- Good Agricultural and Collection Practices (GACP) are internationally accepted guidelines developed by the World Health Organization (WHO) to ensure that medicinal plants are cultivated and collected safely and consistently.
- These guidelines help maintain the quality, purity, safety, and effectiveness of medicinal plant materials.

Objectives of GACP

- To produce medicinal plants of consistent quality.
- To reduce contamination with pesticides, microbes, heavy metals, and foreign materials.
- To ensure traceability from cultivation to final use.
- To protect the environment.
- To promote sustainable harvesting of medicinal plants.

Major Guidelines of GACP

A. Selection of Plant Species

- Only correctly identified medicinal plant species should be cultivated or collected.
- Authentic planting material should be obtained from reliable sources.

B. Site Selection

- The cultivation area should be free from industrial pollution.
- The soil should be fertile and suitable for plant growth.
- The area should have good drainage and adequate sunlight.

C. Soil Management

- Soil fertility should be maintained through appropriate agricultural practices.
- Soil contamination should be avoided.
- Soil testing should be performed regularly.

D. Water Quality

- Clean and safe water should be used for irrigation.
- Contaminated water should never be used because it may introduce harmful microorganisms or chemicals.

E. Use of Fertilizers

- Fertilizers should be used according to recommended guidelines.
- Organic fertilizers are preferred whenever possible.
- Excessive fertilizer use should be avoided.

F. Pest and Disease Control

- Integrated pest management should be practiced.
- Safe pesticides should be used only when necessary.
- Recommended doses should always be followed.

G. Harvesting

- Plants should be harvested at the correct stage of growth.
- Harvesting should be carried out during suitable weather conditions.
- Clean equipment should be used during harvesting.

H. Cleaning

- Plant materials should be cleaned immediately after harvesting.
- Soil, stones, insects, and foreign matter should be removed carefully.

I. Drying

- Drying should be started as soon as possible after harvesting.
- Proper temperature and ventilation should be maintained.
- Excessive heat should be avoided to prevent loss of active constituents.

J. Packaging

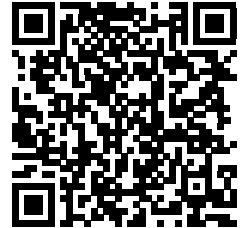


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