



CULTIVATION AND COLLECTION AND PROCESSING OF HERBAL DRUGS

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Abstract:

Drugs of natural origin, derived from plants, animals, and minerals, play a vital role in traditional and modern healthcare systems. The quality, safety, and therapeutic efficacy of these natural drugs largely depend on scientific cultivation, systematic collection, appropriate processing, and proper storage methods. Cultivation practices such as selection of suitable soil, climate, propagation techniques, irrigation, fertilization and pest control help ensure high yield and optimum phytochemical content. Collection at the correct season and maturity stage minimizes loss of active constituents. Subsequent processing techniques including cleaning, drying, size reduction, and preservation are essential to maintain purity and prevent degradation. Proper storage under controlled temperature, humidity, and protection from microorganisms, insects, and light further ensures stability and prolonged shelf life. Therefore, adopting standardized procedures throughout the cultivation-to-storage cycle is crucial for producing high- quality herbal raw materials suitable for pharmaceutical use.

Keyword:

Cultivation practices,

Collection methods,

Processing techniques.

Introduction

Cultivation of medicinal plants requires intensive care and management as various factors such as Environment, soil, irrigation pests, etc, play a vital role. These factors vary from one plant to another. Scientific documented methods should be followed, if no data available traditional methods should be Adopted and a systematic method should be developed through research Good agricultural practices. Cultivation is the process of growing plants under controlled conditions for the production of crude drugs. Medicinal plant materials should be collected during the appropriate season or time periods to Ensure the best possible quality of both source materials and finished products. It is well Known that the quantitative concentration of biologically active constituents varies with the Stage of plant growth and development. The best time for collection should be determined according to the quality and quantity of biologically active constituents rather than the total vegetative yield of the targeted medicinal plant parts. In General, the collected raw medicinal plant materials should not come into direct contact with The soil. If underground parts are used, any adhering soil should be Removed from the plants as soon as they are collected. Collected material should be placed in Clean baskets, mesh bags, other well aerated containers.

After collection, the raw medicinal plant materials may be subjected to appropriate Preliminary processing, including elimination of undesirable materials and contaminants.

Definition

Cultivation of Crude Drugs: Cultivation of medicinal plants requires intensive care and management. The conditions and duration of cultivation required vary depending on the quality of medicinal plant materials required.

Cultivation of Medicinal plants

The cultivation of medicinal plants is the process of growing and managing plants with therapeutic properties under controlled and favourable conditions to produce consistent, high-quality raw materials for medicines .Proper management of water, soil, and organic fertilizers maximizes active healing compounds Medicinal plants are plants that possess therapeutic properties or exert beneficial pharmacological effects on the human or animal body. Since ancient times, plants with healing properties have been a big part of how people heal and treat illnesses. Our country is rich with a diversity of medicinal plants. Among the herbal raw drugs, 90% are used in the manufacture of Ayurveda, Siddha, Unani, and Homoeopathic systems of medicine, largely from the wild. This wild resource is gradually decreasing day by day. In this context, conservation and sustainable use of medicinal plants are very much needed.

Methods of Cultivation of medicinal plants.

Medicinal plants can be cultivated by two usefull methods as applicable to medicinal plants or crops.

1. **Sexual propagation method.**
2. **Asexual propagation method.**

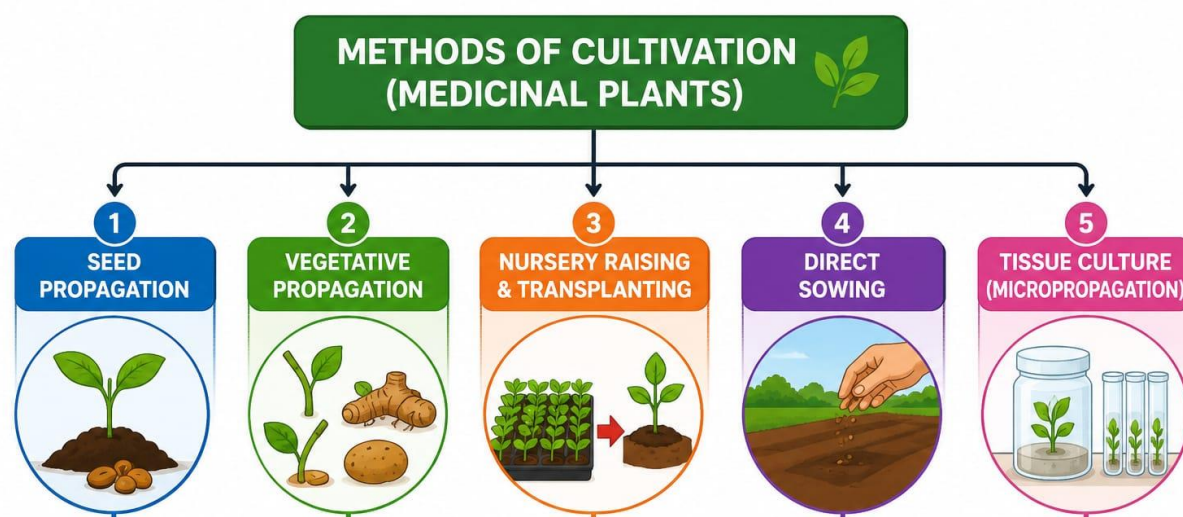


Fig no;01:Methods of cultivation

1.Sexual method.

Seed Production

Seed propagation is how many plants naturally reproduce. Additionally, growers can take advantage of seed propagation by obtaining seeds from plants they wish to propagate or grow. Many gardeners will often save and grow ornamental plants and crops from seeds, especially if the plant has many desirable characteristics. This is because seeds carry the genetic information of the parent plant, and will therefore retain many of the same characteristics of the parent plant. In seed propagation, seeds can be germinated and planted in individual containers or starter plugs until they form seedlings. Once germinated, these seedlings can then be transferred to larger containers, or planted in beds or fields.

Nursery Raising and Transplanting

Seedlings are first raised in a nursery and then transplanted to the main field. This ensures healthy growth and a better survival rate.

Direct Sowing

Seeds are sown directly into the field without raising a nursery. It is a simple and time-saving cultivation method.

Tissue Culture (Micro propagation)

Plants are produced from plant tissues under laboratory conditions. This method is used to produce disease-free, uniform, and rare medicinal plants.

2.Asexual method. (Vegetative propagation)

Vegetative Propagation

Vegetative propagation is the formation of new plants from vegetative parts of the plant such as roots, stems and leaves. It is an asexual method of reproduction which involves a single parent and does not require the formation and fusion of gametes. Hence the offspring produced are morphologically and genetically identical to the parent.

plant. This process is very unique to plants and helps in reproduction of plants without the formation of flowers or seeds

Cuttings: Severing a vegetative part from the parent to regenerate roots and shoots.

Stem Cuttings: Used for Peppermint (*Mentha piperita*) and Rosemary to rapidly scale field populations.

Root Cuttings: Utilized for Brahmi (*Bacopa monnieri*) and Sarpagandha (*Rauvolfia serpentina*) by using taproot segments to sprout new shoots.

Layering: Inducing root growth on a stem while it remains physically attached to and nourished by the parent plant. Once roots mature, the segment is severed.

Application: Effective for woody medicinal shrubs like Jasmine.

Division: Splitting the mature root crown or underlying cluster of a perennial herb into multiple fully functional individual plants.

Grafting & Budding: Joining a high-yield therapeutic shoot or bud (scion) onto a robust, disease-resistant root system (stock) so they fuse into a single plant.

Collection of Herbal Drugs

The collection of medicinal plants is a careful process of gathering specific parts such as roots, leaves, bark, or flowers at the exact time they hold the highest concentration of active healing compounds. Traditional healers and modern pharmacologists alike emphasize that harvesting must be done sustainably and ethically from clean environments, often in the early morning before the sun degrades volatile oils. Proper identification, timing, and drying methods are crucial to ensure the potency, safety, and quality of the plant-based remedies.

Factors effecting collection

The quality and yield of herbal drugs depend on proper collection. The main factors affecting collection are:

Season of Collection :

Plants should be collected in the appropriate season when the active constituents are at their maximum level.

Time of Collection

Different plant parts are collected at specific times of the day. For example, leaves are usually collected in the morning after dew has dried.

Stage of Growth (Age of Plant)

Plants should be collected at the correct stage of maturity to obtain maximum medicinal value.

Plant Part Collected

Leaves, roots, bark, flowers, fruits, and seeds should be collected at their proper stage of development.

2. Washing:

Garbling the herbal raw material should be cleaned well to remove the traces remaining soil, dirt and other impurities from the surface. The roots, rhizomes and tubers are washed with clean water.

3. Parboiling (Blanching):

After washing, certain herbal raw materials need to undergo a parboiling process in which they are put in boiling water for a short period. This may help in improving the storage of the raw material and prevent insect/mould contamination. It may also facilitate in further processing such as removal of stubborn impurities as well as outer coats/ covering of raw materials.

4. Leaching:

Some impurities can be removed by subjecting the plant material under running water known as leaching. However the duration of leaching should be controlled to prevent loss of chemical constituents present in the drug.

5. Drying:

In some cases, the plant material should be thoroughly dried after washing in order to prevent the deterioration and degradation of active constituents. They must be dried as soon as possible to remove moisture and reduce the damage due to microbial or mould infestation. Drying also prevents the activation of certain enzymes which may otherwise degrade the active ingredients and also facilitate grinding and milling of the raw material depending on the drug and nature of ingredients, different drying methods can be used which are as follows:

- Natural drying
- Sun drying

B) SECONDARY PROCESSING

It refers to the steps applied to herbs in addition to primary processing.

The secondary processing differs from one herb to another depending on the nature of active Ingredients as well as therapeutic properties. Secondary processing includes techniques such as removal of foreign substances, prevention of Microbial/ infestation, enhancing the efficacy of drugs, reducing the toxicity, extraction using suitable Solvents, concentration and drying of extracts. These are further standardized by different methods. The following processes are carried out in the secondary processing of herbal raw materials. Cutting, Sectioning and Comminution. After thoroughly drying, the herbal materials are processed by cutting and sectioning into smaller Sizes which are convenient for storage as well as extraction. Various sizes can be obtained depending on the part of herb and extraction methods used. It may be small particles, coarse powder or fine powder.

Aging/ Sweating:

Aging refers to storing the raw material for a specified time after harvesting. It is generally done under Sun or in shade for up to a year. During the process of aging excessive water is evaporated and enzymatic reactions may occur to alter the chemical composition of herbal material.

Example: Cascara bark should be aged for at least one year prior to use in medicinal preparations to Reduce its irritant effects. Sweating is done by subjecting the herbal materials at a temperature between 45 to 65°C with high Humidity for a period ranging from one week to few months. The herbal materials are stacked between woollen

blankets or other kind of cloth. The sweating Process is considered a hydrolytic and oxidative process in which some of the chemical ingredients of the herbs are hydrolysed or oxidised.

Baking/ Roasting:

It is a process of drug heating where the herbal material is heated in ovens. The temperature of heating and duration of baking/ roasting vary from one herbal material to another Until the drug develops a specific colour.

Example: Nutmeg is roasted till they turn to a yellowish brown colour.

Boiling Steaming:

In the boiling process the drug is cooked in water or any other liquid solvent such vinegar, wine, milk or animal urine.

Example: Acoruscalamus rhizome is boiled in cows urine to enhance its anticonvulsant effects. In the steaming process the herbal material is kept in contact with steam using a steamer resulting in Development of moist texture.

Example: Roots of Polygonum multiforum are steamed in the presence of black bean decoction to Enhance its tonic effects Stir frying. It is a process in which the herbal materials are put in a pot of frying pan and continuously stirred or Tossed for a specific period under heat until the external colour changes, charred or even carbonized. To facilitate uniform heating the drug material can be admixed with sand, talc or clay.

Fumigation:

Sometimes the harvested raw materials are subjected to fumes. Fumigation with sulphur dioxide is commonly employed for some medicinal herbs for the purpose of Preserving colour, improved appearance, bleaching and preventing the growth of insects and moulds.

Extraction of herbal materials

Extraction is a process of separation in which the chemical constituents present in plants and tissues Are removed by using selective solvents which are called as menstruum.

Herbal extracts include infusions, decoctions, fluid extracts, tinctures and powdered extracts. The Herbal preparation so obtained may be ready for use as a medicinal agent or it may be further Processed to finished products as tablets, capsules and pills.

Infusion

It is a liquid preparation obtained by extracting herbal materials with either cold or hot water without boiling. Other solvents may also be used.

Packaging and Storage of Herbal Drugs:

1. Climate Control and Ventilation:

Implementing HVAC systems and dehumidifiers helps maintain optimal temperature and humidity levels, preventing moisture buildup and mold growth. Adequate ventilation ensures airflow, facilitating natural drying of herbs and reducing the risk of contamination.

2. Pest Control Measures:

Effective pest control is essential to safeguard herbs from insect infestations and rodent damage. Installing screens on windows, sealing cracks, and using natural repellents or traps are some measures to consider.

3. Hygienic Practices:

Strict hygiene standards, including regular cleaning and sanitization of storage areas and containers, minimize the risk of contamination and ensure the purity of herbs.

4. Light Protection:

Shielding herbs from direct sunlight and artificial light sources helps preserve their potency. Opaque containers or dark storage areas are recommended to minimize light exposure.

5. Segregation and Organization:

Organizing herbs based on their properties and storage requirements facilitates easy access and prevents mixing. Using separate containers or compartments ensures proper segregation.

6. Sustainable Packaging:

Opting for eco-friendly packaging materials reduces environmental impact. Recyclable or biodegradable packaging options should be prioritized to align with sustainability goals.

7. Quality Control Measures:

Implementing robust quality control protocols involves regular inspection of herbs for signs of degradation or spoilage. Any herbs failing to meet quality standards should be discarded or returned.

8. Collaboration with Farmers: Building strong partnerships with farmers and suppliers promotes sustainable agricultural practices and ethical sourcing of herbs. Supporting

Conclusion

The cultivation, collection, processing, and storage of drugs of natural origin are critical steps in ensuring the Quality, safety, and efficacy of herbal and plant-based medicines. Proper cultivation practices maintain the Genetic and phytochemical integrity of the plants, while careful collection ensures sustainable harvesting Without damaging the natural resources. Standardized processing techniques preserve the active constituents, and appropriate storage conditions Prevent degradation and contamination. Together, these practices form the foundation for producing reliable and effective natural drugs, supporting both traditional medicine and modern pharmaceutical applications. Emphasizing quality control and adherence to good practices is essential for maximizing therapeutic benefits and promoting sustainable use of medicinal plant resources.

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