

UNIT-1

Herbs as Raw Materials

Herbs

It is any plant with leaves, seeds or flowers used for flavouring food, medicine or perfume.

Herbal Medicine

Practice of using herbs, herbal materials, herbal preparations and finished herbal products. These all are herbal medicines.

Herbal Medicinal Products

These are medicinal products which contain one or more herbal substances, or herbal preparations, or combination of both.

Herbal Drug Preparation

These preparations are obtained by subjecting the herbal substances to processes like extraction, distillation, expression, purification, or fermentation.

Source of Herbs

Two sources:

A) Wild Source

- Herbs are obtained from wild sources such as forests, plains, river banks, etc.
 - Obtaining herbs from a wild source is easy, economical, less time consuming and has a decreased cost of labour.
- Some disadvantages may be:
- The plants will not be uniform in their growth and yield.
 - Modern methods cannot be applied to increase the yield as well as quality.
 - Continuously obtaining plants may deplete the raw materials from the wild.

B) Cultivated Source

- Nowadays, medicinal plants are cultivated systematically in fields. This ensures following advantages:
- Quality and purity is ensured
 - Better yield and more profit

- ensures regular supply of raw materials
- Modern techniques can be applied

Processing of Herbal Drugs

steps involved:

- selection of herbs
- Identification and authentication
- cultivation of herbs
- Collection of herbs
- Processing of Herbal Raw Material

Selection of Herbs

- The species selected for cultivation should be the same as specified in the official Pharmacopoeia.
- Newly introduced medicinal plants should be identified and documented.

Identification and Authentication

- Botanical Identity

The species, subspecies, genus, variety, etc. of the plant for cultivation should be verified from a qualified botanist and recorded.

- Specimens

In case of new plant with medicinal properties whose identity is not known, a specimen of the plant should be submitted to a national herbarium for identification and documentation.

- Seeds and other propagation materials

The suppliers of seeds and other propagation materials should specify all the necessary information relating to the identity, quality as well as their breeding history. The seeds and propagation material should be free from contamination and disease in order to promote healthy growth of plant.

Collection of Herbs

→ The proper time of collection is important because the nature and quantities of constituents vary greatly in some species according to the season.

→ The two basic factors which should be considered during collection are:

- (i) The plant parts should be collected when the level of active constituents are maximum.
- (ii) The environmental conditions in which the plant grows the maximum active constituents should be considered. The factors to be considered are: - light, humidity, altitude, rainfall, soil type, etc.

Processing of herbal raw material

Primary processing

- Gubling
- Washing
- Boiling
- Leaching
- Drying

Secondary processing

- Cutting/sectioning
- Ageing/sweating
- Banking/Roasting
- Boiling/streaming
- Stir/frying
- Fumigation

Biodynamic Agriculture

- Biodynamic agriculture is a form of organic farming which includes various concepts introduced by Rudolph Steiner in 1924.

- Biodynamics is a system of organic agriculture which recognises the biological and chemical values of soil and treats soil fertility, plant growth and livestock care as ecologically interrelated tasks.

- Biodynamic agriculture is an alternative where the chemical fertilizers are totally replaced by biological nutrients derived from bacteria, algae, fungi and emphasizes the use of manures and composts.

GAP of Medicinal Plants

Various stages of processing in which GAP are needed are as follows:

1) Seeds and Propagation material

→ The seeding materials are to be identified botanically, including plant variety, cultivar and its origin.

→ The material used should be 100% traceable.

2) Cultivation

- Depending on the method of cultivation, conventional and organic growers should be allowed to follow different SOPs for cultivation.
- Appropriate rotation of crops should be done.
- avoid environmental disturbances.

3) Soil and Fertilisation

- Medicinal and aromatic plants should not be grown in soils that are contaminated by sludge.
- Heavy metals, pesticidal residues and other unnatural chemicals should not be in soil.
- Use of chemical fertilizers should be minimum.

4) Irrigation

- Should be as per needs of the plant
- Irrigation water should be free from faeces, heavy metals, pesticides, herbicides and other hazardous substances.

5) Crop maintenance

- Tillage whenever required must be carried out.
- Pesticides and herbicides should be avoided as far as possible.
- Use of pesticides and herbicides has to be documented.

6) Harvesting

- Harvesting should be done when the plants are in their best quality and quantity.
- Harvesting should be done in optimum favourable conditions.

7) Primary Processing

- It includes steps such as washing, drying, freezing, etc.
- Buildings used for processing should be clean and provide protection to the harvested crop from birds, insects, rodents, animals.
- Processing equipment must be cleaned and regularly serviced.
- All the processed material should be inspected and substandard products must be discarded.

8) Packaging

- The product should be kept in clean, dry, new bags.
- The label must be clean, permanently fixed.
- Packaging materials should be clean and should not cause contamination.

9) Storage and transport

- Packaged dried materials and essential oils should be stored in a dry, well airtight building.
- Fresh products should be stored in 1-5°C, while frozen products should be stored below -18°C or below -20°C for long term.
- During transportation, sufficiently airtight vehicles should be used.
- National regulations on transport followed.

10) Staff requirements

- The staff should have a high degree of personal hygiene.
- Staff with infectious diseases should not come in contact with the plant material.

11) Documentation

- All the propagation material and steps in the production process must be documented.

12) Quality Assurance

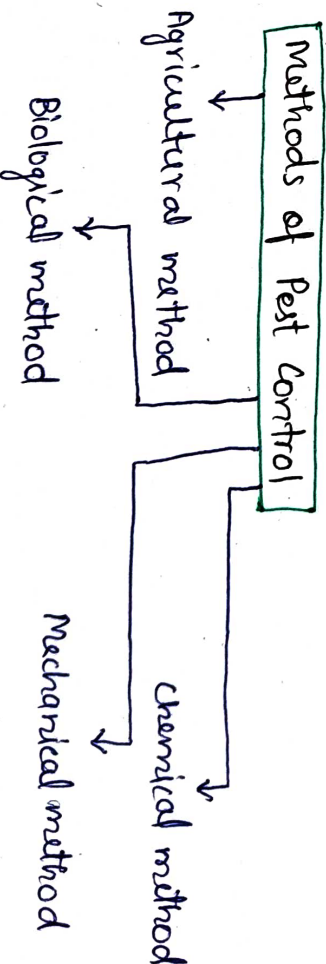
- Consultation and feedback should be taken from buyers of medicinal plants regarding the quality and other properties of plant material.

Pest and Pest Management

Pest is an undesired animal or plant which causes loss of cultivated plants.

The different types of pests infecting medicinal plants:

- weeds
- Insects
- Fungi / viruses
- Non-insect pests (like rodents)



1) Agricultural Method

It includes various methods such as crop rotation, inter cropping, integrated weed management systems, solusisation, etc.

2) Biological method

This method involves removing of pests with other living organisms such as employment of cats to combat rats and squirrels, employment of birds to combat insects.

3) Mechanical method

It includes hand picking, burning, pruning, use of pest traps, collection and destruction of eggs larvae and insects.

4) Chemical Method

Pests are controlled using chemical pesticides,

Biopesticides / Bioinsecticides

These are pesticides obtained from natural

sources like microorganisms, plants, animals, insects and certain minerals.

Advantages of biopesticides over chemical pesticides:

- They are non-toxic to plants as well as animals,
- They are biodegradable
- These are less expensive, eco-friendly and do not affect soil fertility,
- safe to handle and use.

Types of biopesticides depending on their source:

- + Biochemical
- + Microbial
- + Plant pesticides

1) Microbial → some fungi are used to control weeds and insects.

2) Biochemical → Naturally occurring chemical substances obtained from insects and animals are used to control pests.
example - insect sex pheromones.

3) Plant Pesticides → some plants having pesticidal or insecticidal

properties can be grown along with cultivated medicinal plants.

example - Neem, Tobacco, Ryania

Indian Systems of Medicine

Traditional System of Medicine

- Traditional medicines are based on the theories, experiences of indigenous people from different cultures.
 - This system applies knowledge, skills, practices of different cultures for the maintenance of health.
- Indian civilisation has rich tradition of various cultures. Indian system of medicine consists mainly Ayurveda.

Basic Principles of Ayurveda

Ayurveda is one of the oldest systems of medicine which came into existence in about 900 BC.

The word 'Ayur' mean 'Life' and 'Veda' means 'Science'.

Charaka was known as father of Ayurveda.

Ayurveda is based on following principles:

- Panchabhuta Siddhanta
- Tridosha theory
- Guna-Rasa Siddhanta

Panch Bhuta Siddhanta

According to this theory, the whole universe is made up of five basic elements known as "Mahabhutas" and they are present in the human body. They are Prithvi (Earth), Jala (water), Vayu (Air), Agni (Fire), Akasha (sky).

Combination of these five elements form seven basic tissues of the body which are referred as "Sapta Dhatus". These are:

- 1) Rasa (Lymph/ Plasma)
- 2) Rakta (Blood)
- 3) Mamsa (Flesh)
- 4) Meda (Fat)
- 5) majja (nerve tissue)
- 6) Shukra (reproductive tissue)
- 7) asthi (bones)

Tridosha Theory

According to this theory, Panch Mahabhutas exist in human body in three different forms:

- 1) Vata (Space + Air)
- 2) Pitta (Fire + Liquid)
- 3) Kapha (Liquid + Solid)

Balanced form of these tridoshas is considered a healthy condition

Vata → It regulates psychic and nervous system,

Pitta → It regulates energy production, digestion, tissue building,

Kapha → It regulates heat, formation of fluids, mucus.

Guna-Rasa-Virya-Virya - Prabhava Siddhanta

These are considered as five pharmacological principles of "Dravya" (drug substances). They are Rasa (Taste), Guna (Quality), Virya (Active principle), Vipaka (Digestive products), Prabhava (Pharmacotherapeutic action,

Siddha System of Medicine

This system originated in Tamil Nadu. "Agastya" believed to be father of Siddha system.

Basic principles

According to Siddha medicine, universe is composed of five elements:

- earth, water, air, fire, ether (sky)

→ Man consumes water and food, breathes the air, maintains heat in body and remains alive because of life force provided by ether.

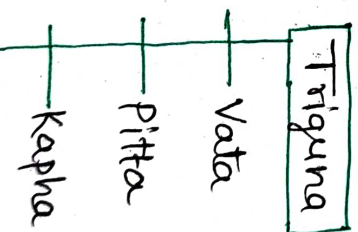
→ Earth provides firm shape to the body

→ Water represents, blood, glandular secretions, fluids.

→ Fire - emotion, vigor

→ Ether - mental and spiritual faculties.

Equilibrium between these makes a person healthy.



Vatta → Increased vata develops flatulence (gas), acidity, obesity, heart attacks, etc.

Pitta → Increased pitta shows early greying of hair, reddish eyes, burning chest, etc.

Kapha → Increased kapha leads to jaundice, heart attack, high fever, mania, etc.

Unani System of Medicine

Unani system of medicine has its roots in Greece. It is based upon Greek philosophy that considers body to be made of four elements.

They are:

- i) Earth
- ii) Water
- iii) Air
- iv) Fire

Interaction of these elements produces four temperatures;

- (i) Hot & Moist (Air)
- (ii) Hot and Dry (Fire)
- (iii) Cold & Moist (Water)
- (iv) Cold & Dry (Earth)

These four qualities represent the nature or temperament / humor of individual known as "Mizaj".

The body consists of simple and compound organs which get their nourishment through four humors.

- i) Blood
- ii) Phlegm
- iii) Yellow bile
- iv) Black bile

The following things are analysed during diagnosis: pulse reading, examination of sputum, urine and stools and patient counselling.

Homeopathy System of Medicine

It is a specialised form of therapeutics developed by Dr. Samuel Christian Friedrich Hahnemann in 1810.

This system works on the principle that if a drug treats the symptoms of a disease, then the same drug can also cause the same symptoms when given to a healthy person.

Basic Principles

It is based on the seven principles:

1) Individualisation

This concept believes that no two individuals in the world are same, hence the same disease affecting them will not result in similar response. Thus, medicines of treatment are also different for both.

2) Principle of similia

Substances which produce any symptoms in healthy individuals can be used to cure the same symptoms in patients.

3) Principle of minimum dose

This rule states that the drug given is inversely proportional to its potency.

4) Law of Proving

If the drug produces similar symptoms in a healthy person as that of a diseased person, the drug is considered as suitable for treating that disease.

Preparation and Standardisation of Ayurvedic Drugs

Ayurvedic formulations can be categorised into four types:

1. Solid dosage forms: vati, Ghritika
2. Semi-solid: Loha, Kalka
3. Liquid dosages: Aristas, Asavas
4. Powder dosage forms: Bhaumas, Churnas,

1. Gritika

Medicament is in the form of pills.

Preparation:

Plant drug material dried → cleaned →
 Finely powdered separately → Minerals made
 to Bhauma + Additives (mixed uniformly) →

Moistened with syrups, extracts → make uniform pencil cylinders → cut into same sizes & rolled in between fingers → Dried in shade or sun,

2) Charra

Fine powder of drugs

Preparation

Plant drug material dried → cleaned and dried → Finely powdered separately → sieved through 80 number separately → Pulverized together → filled in container

3) Bhasma

It is the preparation containing ash obtained through the process of incineration of crude drug.

Preparation

cleaning, detoxification, purification process → reduced to fine powder → React with

mineral herbal extract to form wet mass → converts into pellets or sludge → incineration → white, gray, black coloured as collected

4) Astishta

These are liquid ayurvedic preparations prepared by process of fermentation,

Preparation process

Decoction of drug (extraction) is prepared and placed in fermentation vessel,
 Sugar, jaggery or honey is added
 closed with earthen lid sealed edges with clay and cloth,
 Fermented at constant temperature
 set aside to settle down particulate matter
 Fluid decanted and filtered
 Boil to avoid further fermentation
 Filled in bottle and sealed.

Standardisation of Ayurvedic Dosage Forms

Parameters of evaluation :

1) Taxonomical estimation

2) Organoleptic / Sensory Evaluation

colour / odour

appearance

powder particle size distribution

powder flow

clarity

3) Foreign matter

Foreign plant

own plant

other plant

mineral

4) Physicochemical Evaluation

pH

disintegration time

Friability

hardness

sedimentation rate

solubility

viscosity

Ash value

5) Extracted values

Water soluble

ethanol soluble

ether soluble

6) Oil related values

saponification matter

acid value

ester value

swelling index

foaming index

melting range

optical rotation

7) Pharmacological parameters

Bitterness

anti-microbial activity

hemolytic activity

anti-oxidant activity

8) Toxicological parameters

limit tests

pesticide / heavy metals contain

radioactive contamination

pathogenic and non-pathogenic