

MEDICINAL PLANTS EXTRACTION TECHNIQUES

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INTRODUCTION

India has a varied plant flora and one of the highest levels of biodiversity. Since ancient times, medicinal plants have been used to treat a wide range of illness conditions because they are a source of several physiologically active compounds. Many contemporary drugs are also derived from conventional medicinal herbs. In cases of drug resistance, herbal remedies may be used as an alternate form of treatment. Plants as a source of medicine have recently gained international popularity due to their natural origin, availability in local communities, lower cost of purchase, ease of administration, and possibly less troublesome. Herbal medicine may also be an effective alternative treatment in cases of severe side effects and drug resistance.



POINTS MUST BE FOLLOWED FOR EXTRACTION-

- Selection of plant materials.
- Proper collection of selected plants.
- Authentication of plant material.
- Drying of plant materials.
- Grinding of the dried plants.
- Garbling of the dried plants
- Packing, storage and preservation
- Extraction of constituents.
- Methods of separation and purification

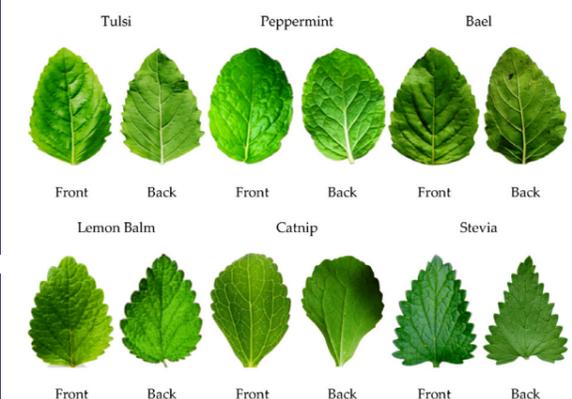
TYPES OF SOLVENTS

It should be depend on type of plant to be extracted, which part of plant is needed, nature of bioactive compound and availability of solvent. Basically it is categorized into two types namely- Polar and Non-polar.

Type of Solvents	Name	Properties	Specific For
A- Polar	1. Water	Universal solvent, Nontoxic	Tanins, Terpenoids, Starch, lectins, Saponins,
	2. Alcohol (ethanol, methanol)	Self-preservative, Non-toxic	Sterols, Saponins, Lactones, Glycosides, Secondary Metabolite, Tannins, flavones, Phenones, terpenoids, alkaloid
B- Non-polar	1. Chloroform	Well absorb and metabolize in body, sweet smell & soluble in alcohol	Terpenoids, Flavonoids Fats & Oils
	2. Ether	Stable compound, not react with acid-base, metals. Miscible in water	Alkaloids fatty acid, terpenoids
	3. Hexane	Tasteless	Fatty acid

GOOD SOLVENT PROPERTIES -

It should be good tissue penetration, low toxicity to host, good evaporation at low heat, good preservative action, fast action as vehicle/ solute, economic, readily available.



EXTRACTION

Extraction is the separation of medicinally active components from inactive or inert components in plant or animal tissues using selective solvents in standard extraction procedures. Decoctions, infusions, fluid extracts, tinctures, and powdered extracts are examples of these preparations. The goals are to achieve the therapeutically desired portion and to eliminate the inert material through treatment with menstrum, a selective solvent.

Types of extract-

- 1. Aqueous extract-** for decoction, infusion and digestion.
- 2. Alcoholic extract-** for tinctures.
- 3. Soft extracts** – for ointment and suppositories.
- 4. Dry extracts-** for capsules and tablets



PRINCIPAL METHODS OF EXTRACTION ARE:

Maceration, Infusion, Digestion, Decoction, Percolation, Continuous hot extraction technique (Soxhlet extraction process), Liquid-liquid extraction (counter current) and Ultrasound extraction.

1- Maceration

- 1. Simple maceration-**It is done for 7 days.
- 2. Double maceration-**It is done for 14 days.
- 3. Triple maceration** -It is done for 14 days

2- Infusion

Fresh infusions are prepared by macerating the crude drug for a short period of time with

cold or boiling water. These are dilute solutions of the readily soluble constituents of crude drugs.

3- Digestion

It is a form of maceration in which gentle heat (50°C) required for extraction and extraction is carried out.

4- Decoction

A predetermined amount of crude medication is boiled for a predetermined amount of time—typically 15 minutes—before being cooled and strained or filtered. suited for extracting components that are heat- and water-stable. Typically used in preparation of Ayurvedic extracts called “quath” or “kawath”. The starting ratio of crude drug to water is fixed, e.g. 1:4 or

1:16; the volume is then brought down to one-fourth its original volume by boiling during the extraction procedure.

5- Percolation

In most cases, a percolator—a narrow, conical vessel open at both ends—is utilised. Menstruum is used to wet solid materials, which are then allowed to remain for about 4 hours in a tightly closed container before the mass is packed and the percolator's top is covered. Additional menstruum is added to form a shallow layer above the mass, and the mixture is allowed to macerate in the closed percolator for 24 h. The outlet of the percolator then is opened and the liquid contained therein is allowed to drip slowly. Additional menstruum is added as required, until the percolate measures about three-quarters of the required volume of the finished product.

6- Hot Continuous

Extraction (Soxhlet)

A permeable bag, or "thimble," containing the finely ground crude drug, is inserted into the Soxhlet equipment' chamber. Heating the extracting solvent in the flask causes the vapours to condense in the condenser. The condensed extractant drips into the thimble containing the crude drug and extracts it by contact. When the liquid level in the chamber rises to the top of the syphon tube, the liquid contents of the chamber syphon drop into

the flask. The process is repeated indefinitely until a drop of solvent from the syphon tube evaporates without leaving residue.

7- Aqueous Alcoholic

Extraction by Fermentation

Procedure involves soaking the crude drug, in the form of either a powder or a decoction, for a specified period, during which it undergoes fermentation generates alcohol in situ; this facilitates the extraction of the active constituents contained in the plant material. The alcohol thus generated also serves as a preservative.

8- Counter-current Extraction

Extract is moved in one direction (generally in the form of a fine slurry) within a cylindrical extractor where it comes into contact with extraction solvent after wet raw material is pulverised to produce a fine slurry. Finally, concentrated extract comes out at one end of the extractor while the marc (practically free of visible solvent) falls out from the other end.

9- Ultrasound Extraction

(Sonication)

Involves the use of ultrasound with frequencies ranging from 20 kHz to 2000 kHz; this increases the permeability of cell walls and produces cavitation.

CONCLUSION

Because of the presence of essential extract (oils), most medicinal plants have antimicrobial activity. The nature, structural composition, and functional groups found in essential oils all play a role in determining antimicrobial activity. Extracts contain a variety of volatile molecules, including terpenes and terpenoids, aromatic and aliphatic compounds derived from phenol, which may have bactericidal, virucidal, and fungicidal properties. As a result, it has been proposed that extracts from medicinal plants could be used as alternative antimicrobial natural substances, as well as play an important role in the discovery of new drugs.