International Journal of Pharmacognosy and Life Science

E-ISSN: 2707-2835
P-ISSN: 2707-2827
www.pharmacognosyjournal.com
IJPLS 2023; 4(1): 37-46
Received: 21-11-2022
Accepted: 26-12-2022

SM Kazi
Dr. Babasaheb Ambedkar Technological University, Maharashtra State Technological University, Lonere, Fabtech Collage of Pharmacy, Sangola, Maharashtra, India

SK Bais
Dr. Babasaheb Ambedkar Technological University, Maharashtra State Technological University, Lonere, Fabtech Collage of Pharmacy, Sangola, Maharashtra, India

RS Mali
Dr. Babasaheb Ambedkar Technological University, Maharashtra State Technological University, Lonere, Fabtech Collage of Pharmacy, Sangola, Maharashtra, India

Corresponding Author:
SM Kazi
Dr. Babasaheb Ambedkar Technological University, Maharashtra State Technological University, Lonere, Fabtech Collage of Pharmacy, Sangola, Maharashtra, India

Advance herbal technology

SM Kazi, SK Bais and RS Mali

DOI: https://doi.org/10.33545/27072827.2023.v4.i1a.73

Abstract
Lately peoples are getting attracted towards herbal medicines due to many benefits. Herbal formulations have achieved extensive acceptability as medicinal agents for several diseases. Although, most of these applications are unnatural, it is however a known truth that over 80% of the world population depends on herbal medicines and product for healthful living. This is a development in the use of herbal product has again given height to various forms of misuse and impurity of the products leading to consumers' and manufacturers' dissatisfaction and in some instances fatal effects. The development of original analytical methods which can reliably profile the phytochemical arrangement, including quantitative analyses of marker/bioactive compounds and other major components, is a major challenged to scientists. Standardization is an important step for the organization of a consistent biological activity, a consistent chemical profile, or just a quality confirmation program for exposition and manufacturing of herbal drugs. In current review essay various convectional techniques as well as newer advances are described. Recent advancements includes DNA fingerprinting, metabolomics method, differintial vibration polarography, chemometric, X-ray diffraction…etc. are practical. Capillary electrophoresis and chromatographic methods contributions towards standardization of herbal drugs is also documented.

Keywords: Standardization, herbal drug, DNA fingerprinting, chrmatographic

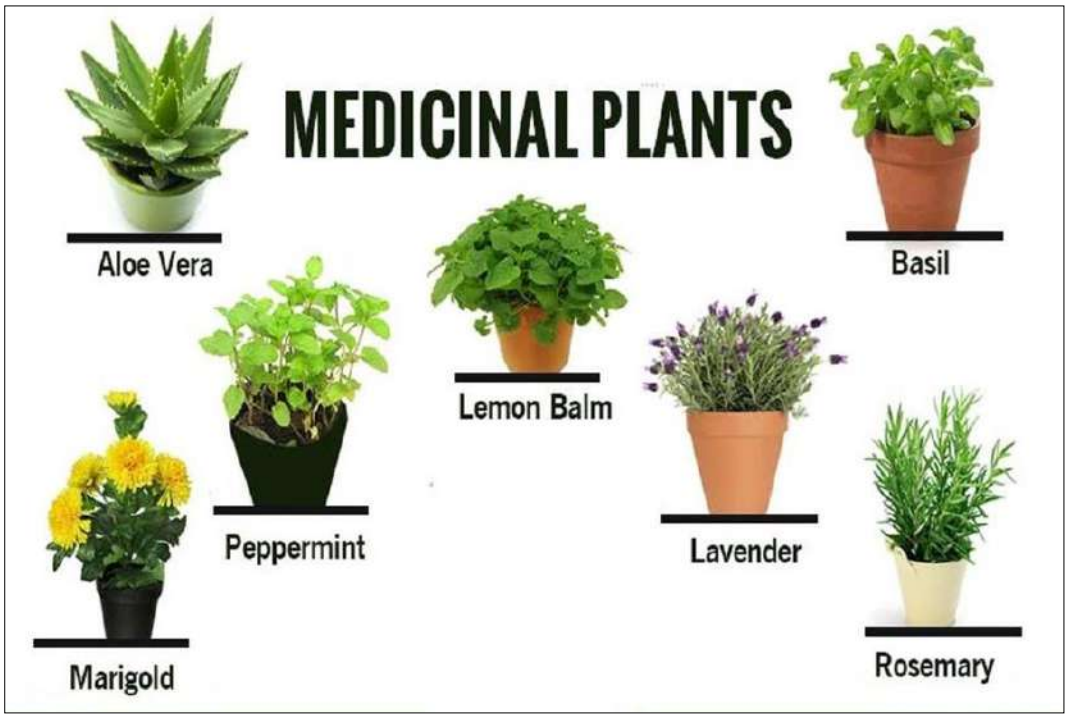
Introduction

Herb identification: What is this herbs?

Most people know the names of a few fresh herbs that are most commonly used in recipes. Basil, thyme and rosemary have quite a distinctive look so it's easy to remember what they are Herbal medicinal materials have been used worldwide for maintain health and to treat disease. Identification of herbal medicinal materials by DNA technology has been widely used, started from the mid-1990s.

The basic resources of medicines comes from nature. They are used medicaments from ancient time.

Now a days peoples are getting attracted towards herbal medicines due to many advantages. Herbal formulations have attained extensive acceptability as medicinal agents for several diseases. Although, most of these applications are unnatural, it is however a known fact that over 80% of the world population counts on herbal medicines and development for healthy living. This growth in the use of herbal product has also given rise to various forms of misuse and adulteration of the products leading to consumers' and manufacturers' disappointment and in some instances fatal consequences. The development of authentic analytical methods which can reliably profile the phytochemical composition, including quantitative analyses of marker/bioactive compounds and other major constituents, is a major challenge to scientists. Standardization is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for production and manufacturing of herbal drugs. In present review article various convectional methods as well as newer advances are described.



Crude Plant Material

The botanical description, including genus, species and sovereignty, description, part of the plant, vigorous and characteristics elements should be determined and, if possible scope limits should be specified. Unfamiliar matter, adulterant and microbial content should be clarified or limited. Voucher examples, representing each lot of plant material processed, should be ascertained by a qualified botanist and should be reserved for at least a 10-year period. A lot digit should be assigned and this should occur on the product title

Plant preparation

The manufacturing method should be characterized in detail. If other implications are added during manufacture in order to modify the plant preparation to a specific level of active or factors members or for any other goal, the additional substances should be mentioned in the manufacturing methods. A method for identification and, where probable, assays of the plant preparation should be added. If designation of an active principle is not possible, it should be adequate to determine a distinctive substance or variety of significances to deliver consistent quality of the prepsubsta

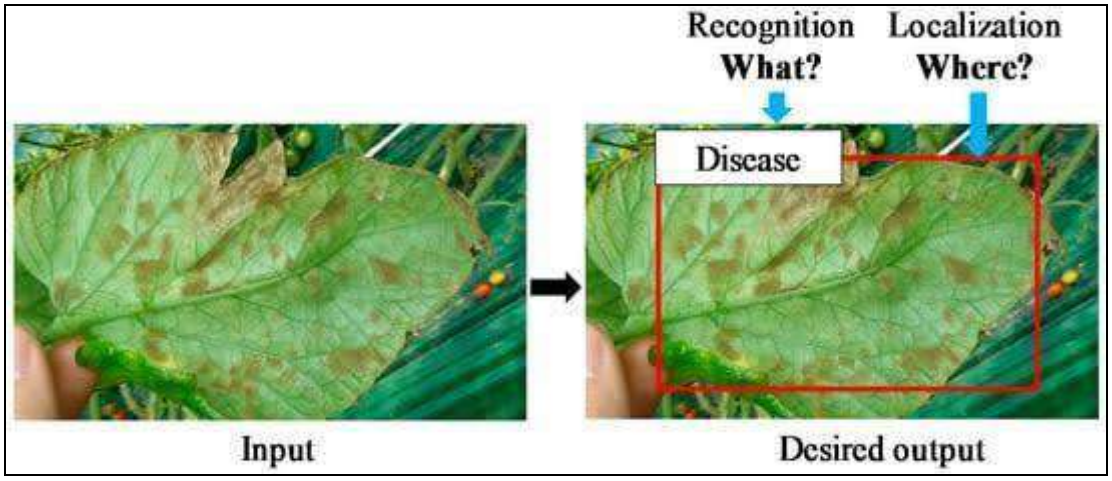
Different methods of identification of plant

1. Expert determination
2. Recognization
3. Comparison
4. The use of key and similar instruments

Designation is a fundamental action and one of the primary purposes of systematics. Although identification is a different action or technique, in method it pertains to both classification and wording. Identification is merely the determination of the parallels or differences between two components, i.e., two components are the same or they are various. The comparison of an enigma plant with a named example and the determination that the two elementsu are the exact also involves category, i.e., when one correctly agrees on that an unknown belongs to the identical group (species, genus, family., etc.) as a known specimen, the data stored in classification procedures becomes availableu and applicable to the fabric at hand. Both processes--identification and classification--involve comparison and conclusion and require a definition of standards of similarities. Designation is, therefore, a basic processes in classification with terminology playing an important role in the recovery of information and as a means of transmission. According to Blackwelder (1967) "identification facilitates us to regain the appropriate truths from the procedure (classification) to be associated with some sample at hand" and is "reasonable described as the healing side of taxonomy." In exercise one commonly determines a plant by direct comparison or the benefit of keys and comes at a name. The empirical aspects and techniques of plant identification and identification systems are examined in this chapter.

How to Identify Plants

Recognition: The best method of identification is skillful determination in words of trustworthiness or accuracy in public the professional have formulated medications (monograph, revision, synopses) of the group in question,its possible that the better current fluors or florus or manual include the expert idea of taxable.



- **Examples**
- **Peppermint leaf**

Synonyms: Peppermint, mentha pepertia
Biological source
pepermint oil,which contain cineol, Limonene, menthofuran, menthol Menthone is obtained from the fresh Leaves of peppermint, mentha Pepermint by steam distillation.

Family: Lamiaceae
Geographical source
It is manly found in Europe, United States And also in damp places of England.

Chemical constituents
Menthol (C10H20O), Eucalyptus C10H18O, Menthone C10H18O, Caryophylene C15H24.

Health and benefits
Peppermint is promoted for irritablebowl Syndrome, other digestive problems, the common cold Sinus infection, headaches & other conditions.
Peppermint oil is promoted to topical used (application to skin for problems like muscle aches, Joint pain, itching.

Side effects
1) Heart burn
2) Nausea
3) Abdominal pain
4) Dry mouth

Fenugreek leaf

Synonyms: Methi, metha
Biological source: It consists of herb of trigonella Foenum graeun

Family: fabaceae
Geographical source:
It can be developed in Asia Europe,Africa, America some parts of Australia in India 80%of fenugreek occurs in Rajasthan.

Description:
Fenugreek herb is aromatic 30-60cm tall, annul herb
It has roots bearing nodules, leaflets are 2- 2.5cm long
Flowers are 1-2 numbers axillary, sensible and white yellow coloured

Chemical constituents:
Fresh Fenugreek contains ascorbic acid B-carotene fibber's, galctonamanund, calcium.

Health benefits
Fenugreek has benefits for decreasing blood sugarlevels, increasing testosterone And increasing milk production in breast feeding mothers.
Fenugreek may also reduce chloestrol level lower inflammation.

Side effects
Possible side effects of fenugreek include diarrhea, Nausea and other digestive tract symptoms and rarely dizziness and headaches.

Authentication of plant

Formal medical systems are moving to the level of stylish medicines in treatment and preventive factors. The increased exchange in medicinal plants delivers revenue citation for herbalists while substitution of occasional ingredients with cheaper and more readily functional species is deluding the end users. The outstanding cause of the problems associated with the standardization of medicinal plants is complex arrangement of herbal drugs used in the form of whole plants, plant parts or extracts. Purposeful adulteration of deliberate components are posing problem in distinguishing the genuine aids. Authentication of medicinal plants by recent molecular methods is inevitable for herbal drug initiatives, researchers and academia. Of late, herbal genomics, molecular studies of medicinal plants and powerful next generation sequencing techniques have been occurred to transform the recent knowledge. An exhibition of variusing our molecular markers used, their efficiency in barcoding for the purpose of accurate authentication of herbal drugs has been tried in this study. Data lived collected from last publications and online storages like NCBI, Pubmed etc. There are various differentmolecular methods that can be exploited for authentication of medicinal plants such as Regulation Fragment Length Polymorphism (RFLP), Random Amplified Polymorphic DNA (RAPD), Amplified Element Length Polymorphism (AFLP), Sequence Characterized Amplified Regional (SCAR),

Selective Amplification of Microsatellite polymorphic loci (SAMPL), Simple

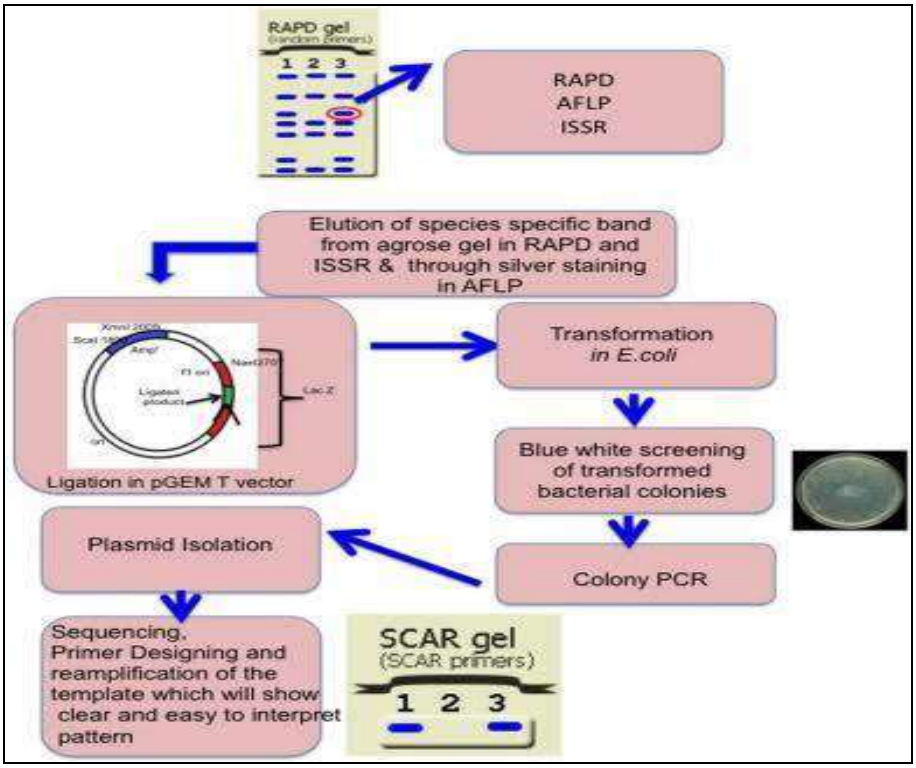
Sequence Repeats (SSR), Inter Simple Sequence Repeat (ISSR), DNA barcoding, Next Generation Sequencing Techniques etc. Few of medicinal plants were documented having molecular data useful in plant designation. The genomics data of poly herbal formulations helps for scientific validation and universal distinction. Even though the challenges associated with reprehensibility, primer designing, amplification derivatives of molecular markers and problems related with DNA separateness and purification, become the main impediment in front of experimenters. It is high time to focus these novel techniques for proper identification to provide the fidelity of conventional herbal products and there by facilitating a step towards the global approval of our indigenous medicinal systems

Authentication of medicinal plant using molecular biology techniques Therapeutic plants have become extremely popular in the United States as botanical supplements, herbal medicines and sources of lead compounds for medication development. It is evaluated that in 1997 Americans used or consumed 5.1 billion US dollars worth of herbal medicines. For the preservation of consumers, authentication of medicinal plants is a vital issue. Ideally, authentication should arise from the harvesting of the plant material to the final product. Unfortunately there is no single or outstanding technique to ensure 100 percent authentication during the entire procedure, but the goal can be achieved through the application of a variety of various methodologies. The whole process starts with good voucher us specimens that act as reference material and to prove chain of detention. Macroscopic and microscopic analyses can be used as quick and inexpensive designation techniques. Chemical examination is by outlying the best method for the detection of contaminants and can be an excellent method for plant identification. Each of these methodologies has constraints and more analytical methods are required to assist in the authentication process. Molecular biology offers an assortment of techniques that can be very useful for authentication of medicinal plants. This study covers various aspects of authentication methods, with particular priority on molecular biology methods.

1) The use of polymerase chain reaction (PCR) to generate DNA markers (DNA sequences) for authenticating botanicals has become increasingly popular and may be the best way to ascertain their identity and purity. DNA markers have demonstrated to be a valuable addition to the utilization of morphological/anatomical and chemical markers one reason is that DNA is the most unambiguous indicator of genetic identity.
2) One is that there can be unequal amplification of DNAs brought about by competition for primer sites and by low annealing temperatures (Wising *et al*., 2005). Another serious problem is the lack of reproducibility from lab to lab in part due to changes in PCR parameters (Itchen *et al*., 2004). Also, although no prior knowledge of the genome is necessary and the primers are arbitrarily designed, RAPDs and related PCR strategies require knowing the identity of the plants being analyzed.
3) For the therapeutic or botanical complemental purposes of plant, especially medicinal plants, authentication of plant resources are a precarious concern. Authentication ought to ensue throughout the several methods for the safety confirmation of plant products because a solitary method could not give the exact identification of plants.
4) These are outer morphological and microscopic identification methods, physicochemical methods such as TLC, HPLC, NMR and X-ray and molecular analysis
5) Botanical authentication frequently also requires entry to voucher specimens in herbaria. Reference models for botanical and microscopic analyses are often not smoothly functional and must be stored under ideal conditions in order to avoid degradation. macroscopic and microscopic methods come to their limits in the case of powdered multiherb combinations, in the case of samples that show little or no cellular distinction between closely associated species and genera, and in the case of material that has been processed to a level beyond which morphological distinction is possible

Authentication of medicinal plant by DNA markers

Medicinal plants have been used worldwide for centuries to conserve health and to treat diseases, more so chronic diseases. However, impurity and use of spurious materials as substitutes have become a major concern for users and industry for reasons of safety and efficacy. Therefore, authentication of medicinal plants is of utmost importance. Morphological, anatomical, chemical and DNA markers solve the problem by differentiating the genuine material from the adulterants, substitutes and spurious drugs. DNA markers use nucleotide sequences to identify species; it takes preference over the other two markers being not age dependent, tissue specific and having a higher discriminating power. Therefore, characterization of plants with such markers is an ideal approach for identification of medicinal plant species and populations/varieties of the same species. Availability of certified taxonomic specimens in herbaria is certainly required for unambiguous confirmation through final visual comparison and analysis.



Medicinal plant species are known to be in use since time immemorial for the treatment and cure of human and animal ailments. Though their use and practice reported a decrease with the advent of antibiotics and sulfa-drugs, the toxicity and harmful impacts associated with synthetic medications and antibiotics have fetched the herbal systems of medicines again

Extraction of Herbs

Natural medicines were the only choice for the prevention and treatment of human diseases for thousands of years. Natural products are significant sources for drug development. The quantities of bioactive natural products in natural medicines are always fairly low. Today, it is very crucial to develop effective and selective techniques for the extraction and isolation of those bioactive natural products. This paper intends to provide a comprehensive view of a variety of methods used in the extraction and isolation of natural products. This article also submits the advantage, drawback and empirical examples of traditional and modern techniques pertained to in natural products research.

Extraction

Extraction is the first step to disentangle the desired natural developments from the natural materials. Extraction techniques contain solvent extraction, distillation method, scraping and sublimation according to the extraction principle. The extraction of natural products advances through the following stages: (1) the solvent penetrates into

the solid matrix; (2) the solute becomes liquid in the solvents; (3) the solutes is diffused out of the solid matrix; (4) the extracted solutes are composed. Any characteristic enhancing the diffusivity and solubility in the above steps will stimulate the extraction. The properties of the extraction solvent, the particles in size of the raw materials, the solvent-to-solid percentage, the extraction temperature and the extraction period will affect the extraction efficiency [6-10].

The choice of the solvent is critical for solvent extraction. Selectivity, solubility, cost and safety should have be assessed in selection of solvents. Founded on the law of resemblance and intermiscibility (like dissolves like), solvents with a rejection importance near to the polarity of the solutes are likely to be to conduct better and vice versa. Alcohols (EtOH and MeOH) are adaptable solvents in solvent extraction for phytochemical examination.

Normally, the finer the particle size is, the better result the extraction achieves. The extraction efficiency will be enhanced by the small particle size due to the enhanced penetration of solvents and distribution of solutes. Too penalty particle size, however, will cost the excessive absorption of solute in solid and difficulty in subsequent filtration.

High temperatures increase the solubility and distribution. Temperatures that too high, however, may result in solvents to be lost, leading to extracts of undesirable impurities and the decomposition of thermolabile components.

The extraction efficiency increases with the growth in extractions duration in a specific time range. Increasing time will not involve the extraction after the stability of the solute is attained inside of and outside the solid material.

The greater the solvent-to-solid ratio is, the higher the extraction yield is; however, a solventto-solid ratio that is too high will cause excessive extraction solvent and requires a long time for concentration.

The conventional extraction methods, including maceration, percolation and reflux extraction, usually use organic solvents and require a large volume of solvents and long extraction time. Some modern or greener extraction methods such as super critical fluid extraction (SFC), pressurized liquid extraction (PLE) and microwave assisted extraction (MAE), have also been applied in natural products extraction, and they offer some advantages such s lower organic solvent consumption, shorter extraction time and higher selectivity. Some extraction methods, however, such as sublimation, expeller pressing and enfleurage are rarely used in current phytochemical investigation and will not discussed in this review. A brief summary of the various extraction methods used for natural products

The extracted products of plant tissues obtained in liquid or semisolid state (after removing the solvent) or in dry powdered form are complex mixtures of metabolites; these products are meant for oral or external use.

- The extracted trials include decoctions, infusions, fluid extracts, tinctures, pilular (semisolid) sections, or powdered extracts; these preparations are named as galenicals after Galen (a Greek physician of 2nd century).
- The extract obtained by this process, after standardization is either used as a medicinal agent in the form of potions or fluid extracts, or is further processed for incorporation in tablet and capsule forms.

Steps of extraction

The drug extraction process is divided into the following steps:

- The solvent penetrates the drug.
- The drug constituents dissolve in the solvent.
- The solution within the cells diffuses out.
- The dissolved portion separates from the exhausted drug.
- In the extraction process there is a mass transfer process in which transfer of mass occur from soluble material like solid to a fluid.
- The different factor which effect the process of mass transfer are temperature, agitation, size reduction and others

Properties of extraction

- It should be non-toxic.
- It should be stable, i.e., physically and chemically inert.
- It should not be too volatile or inflammable.
- It should be selective in nature, i.e., the desired amount of active ingredient can be extracted using minimum amount of inert material.
- Be harmless to man and to the environment.
- Promotion of rapid physiologic absorption of the extract.
- Preservative action.
- Have a high capacity for extraction.
- Not react with the extracted compound or with other compounds.

Methods of extraction

- **Traditional Methods**
- Maceration.
- Digestion.
- Decoction.
- Infusion.
- Percolation.
- Continuous hot extraction (Soxhlet extraction).
- Expression.
- Enfleurage.

Modern Methods

- Supercritical fluid extraction.
- Counter current extraction.
- Microwave assisted extraction.
- Ultrasonic assisted extraction.
- Accelerated Solvent Extraction (ASE).

Maceration

- The word maceration denotes loosening up.
- The maceration process is used for yielding tinctures, sections, and concentrated infusions.
- It is the simplest method of crude drug extraction, which was official in I.P., 1966.
- In maceration, solid ingredients and the solvent are taken in a stoppered container, and left undisturbed for at least 3-7 days with frequent agitation.
- When the soluble matter dissolves in the solvent, the resultant mixture is passed through sieves or nets.
- The marc retained in the sieves is pressed, the liquids are combined, and filtered or decanted after standing.The word maceration denotes softening.
- The maceration process is used for producing tinctures, extracts, and concentrated infusions.

- It is the simplest method of crude drug extraction, which was official in I.P., 1966.
- In maceration, solid ingredients and the solvent are taken in a stoppered container, and left undisturbed for at least 3-7 days with frequent agitation.
- When the soluble matter dissolves in the solvent, the resultant mixture is passed through sieves or nets.
- The marc retained in the sieves is pressed, the liquids are combined, and filtered or decanted after standing.

Decoction

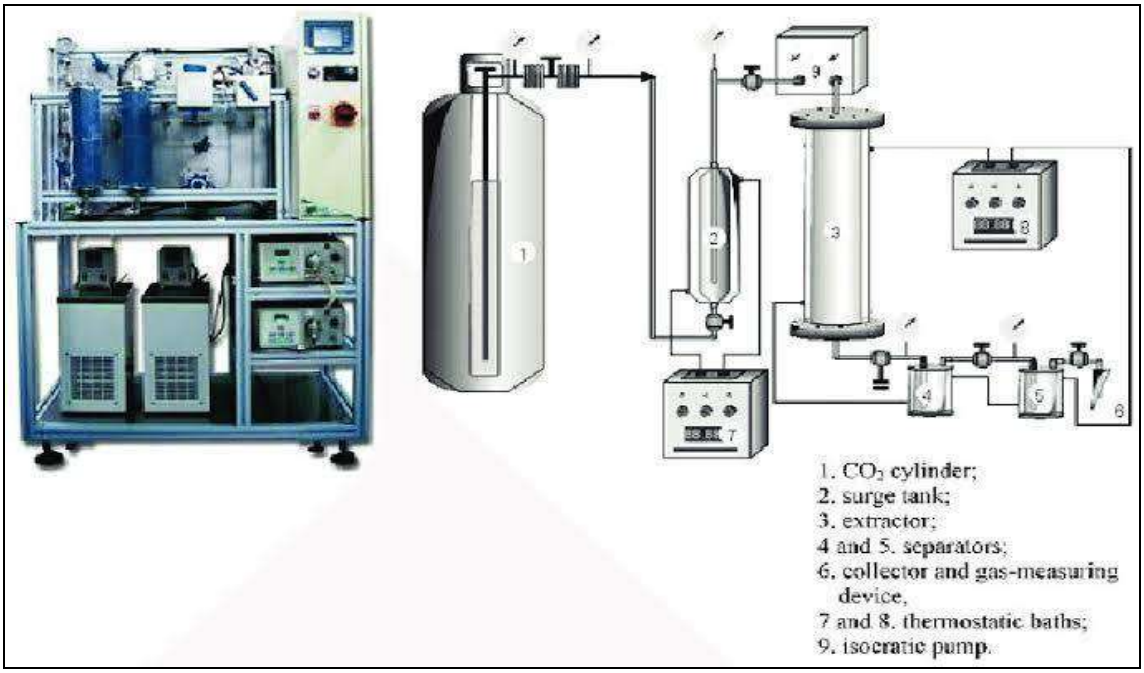
The word decoction means to concentrate by boiling

- In this method, the drug powder can be boiled with water for a few minutes and then filtered.
- This method is suitable for drugs that are hard in nature such as roots, wood, seeds etc. containing water soluble constituents and are not affected by prolonged heating.
- These are mainly useful for making "Herbal Tea".

Advanced extraction methods like advanced techniques

1. Supercritical fluid extraction
2. Microwave assisted extraction
3. Ultrasound assisted extraction
4. Solid phase, Microwave assisted extraction

Supercritical fluid extraction



The critical point of a pure substance is defined as the highest temperature and pressure at which the substance can exist in vapour-liquid equilibrium i.e. physical and thermal properties that are between those of pure liquid and gas.

- SCF's offers liquid like densities, gas like viscosities, gas like compressibility properties and higher diffusivities than liquid.
- Supercritical fluid is a substance at temperature and pressure above its critical point.
- It can diffuse through solids like a gas and dissolve materials like a liquid. • The most commonly used supercritical fluids are carbon dioxide (CO2) and water, which are used for decaffeination and power generation, respectively.

The critical point of a pure substance is defined as the highest temperature and pressure at which the substance can

exist in vapour-liquid equilibrium i.e. physical and thermal properties that are between those of pure liquid and gas.

- SCF's offers liquid like densities, gas like viscosities, gas like compressibility properties and higher diffusivities than liquid.
- Supercritical fluid is a substance at temperature and pressure above its critical point.
- It can diffuse through solids like a gas and dissolve materials like a liquid. • The most commonly used supercritical fluids are carbon dioxide (CO2) and water, which are used for decaffeination and power generation, respectively.

Advantages

- Dissolving power of the SCF is controlled by pressure and/or temperature.
- SCF is easily recoverable from the extract due to its volatility.
- Non-toxic solvents leave no harmful residue.
- High boiling components are extracted at relatively low temperatures.
- Separations not possible by more traditional processes can sometimes be effected.
- Thermally labile compounds can be extracted with minimal damage as low temperatures can be employed by the extraction.

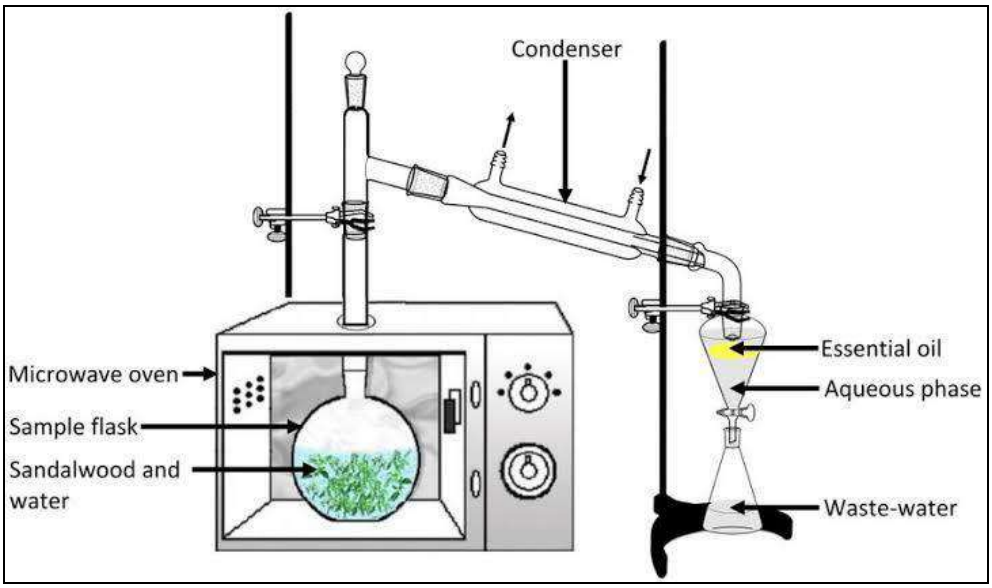
Disadvantages

- Elevated pressure required.
- Compression of solvent requires elaborate recycling measures to reduce energy costs.
- High capital investment for equipment.

Applications

- Recovery of organics from oil shale.
- Separations of biological fluids.
- Bioseparation.
- Petroleum recovery.
- Crude dewaxing.
- Coal processing (reactive extraction and liquefaction).
- Selective extraction of fragrances, oils and impurities from agricultural and food products Pollution control.
- Combustion and many other

Microwave assisted extraction



Microwaves (frequency 300MHz to 300GHz) are non-ionizing electromagnetic waves present in the electromagnetic spectrum between X-rays and infrared rays.

- They are made up of the electric and magnetic field (two oscillating perpendicular fields), of which the former is responsible for heating.
- Mostly the dried plant materials are used for extraction; however, the plant cells containing microscopic traces of moisture also serve as the target for microwave heating.
- When these plant cells are exposed to microwave heat, the moisture within gets heated up and evaporates.
- As a result, the plant cells swell up and exert pressure on the cell wall.
- Under the influence of this pressure, the cells stretch and ultimately rupture, thus leaching out the active constituents into the surrounding solvent and improving the yield of phytoconstituents.
- Common solvent mixture is hexane acetone.

Advantages

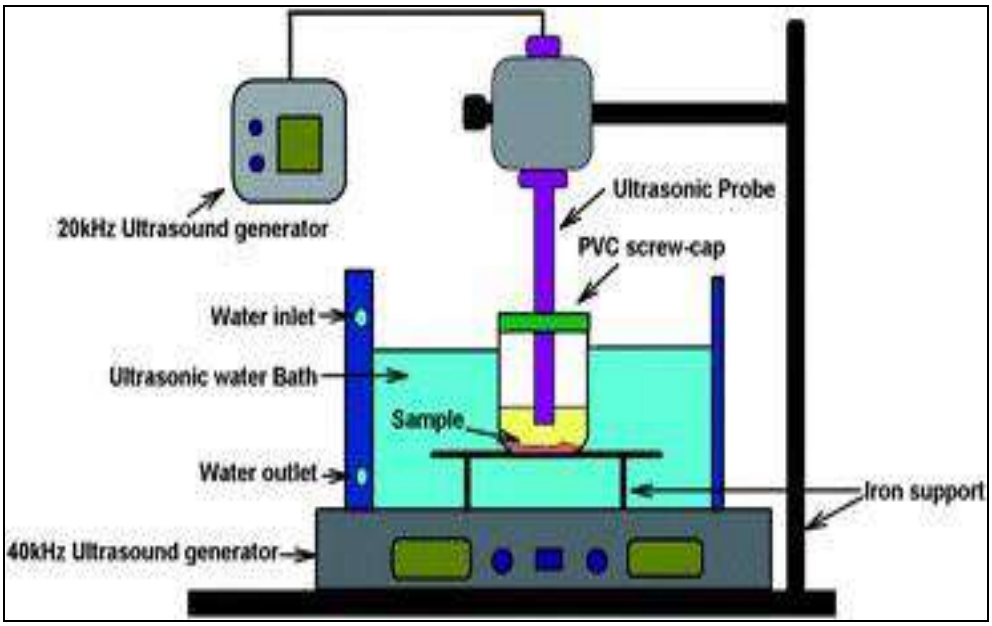
- It is less time -consuming as it takes only a few seconds to few minutes (15-20 minutes) to complete the extraction process.
- It requires less solvent (only a few milliliters).
- It improves the extraction yield.
- Since it is an automatic process, it provides better accuracy and precision.
- It can be used for the extraction of thermolabile constituents.
- It can be used for extracting minute traces of constituents including heavy metals and pesticide residues from a few milligrams of plant sample.
- It provides agitation during extraction, which improves the phenomenon of mass transfer.

- Since its instrumental set up (like Soxwave) combines the features of Soxhlet as well as benefits of microwave, it makes extraction even more attractive.

Disadvantages
- An A more filtration or centrifugation is essential to withdraw the solid residues during MAE.
- Furthermore, the efficiency of microwaves can be extremely poor when either the mark compounds or the solvents are non-polar, or when they are volatile.

Application
extracted logically involved mixtures extracted by microwave- enabled Technique.

Ultrasound assisted extraction



The commonness above the 20,000 Hz are known as ultrasound.
- Ultrasonic waves are using in ultrasonic extraction.
- These waves reason cavitations consequence on the dry cell and destruct the cell wall and release the active members.
- When ultrasonic waves are passed through the liquid media it compresses (produce high pressure) and reaction (low pressure) to the liquid media.
- Due to this process small holes or vacuum beads are formed in the solvent.
- After specific duration these bubbles are not able to soak more power produce by microwave and they bursted.
- At the high tension cycle they bursted which is known as cavitation.
- Due to this cavitation cell wall destructed and functional chemical constituent are extracted.

Advantages
- It is an a reasonable, easy and efficient choice to traditional extractions technique.
- It contain the increase of extraction result and quicker kinetics.
- It decrease the operating temperature permitting the extraction of thermolabile compounds.
- Compared with different novel extraction techniques such as microwaves assisted extraction, the ultrasound machine is cheaper and its process is easier.
- The extraction situations of UAE can be optimised with admiration to time, contradiction amount of solvent, and the quantity and variety of sample.
- The operating time of UAE is comparatively shorter with faster kinetics.

Disadvantages
- The active constituents of medicinal plants through formation of free revolutionaries and consequently unpleasant changes in the drug molecules.
- The free revolutionaries may have undesirable side effect.

Applications
- Used to extract nutraceuticals from plants such as essential oils and lipids dietary complements. e.g. oils from almond, apricot and rice bran.
- Extraction of saponins from ginseng, the experimental total result and saponin yield increased by 15 and 30%, respectively.
- It was found that rice bran oil extraction can be efficiently conducted in 30 min under highintensity
- Extraction of taxanes from Taxus brevifolia needles.
- Azadiractin related luminous from Azadirachta indica seed kernels.
- Extraction of mycorrhizal acid from Glycyrrhizia glabra origins.
- Extraction of artemisinin from Artemisia annual.
- An increased microwave temperature and a short extraction time are better effective in removing anti-oxidative phenolic compounds from tomato usinug MAE.
- MAE was verified as a potential to alternative to conventional methods for extraction of phenols such as chlorogenic acids from green coffee beans.

ultrasound either utilizing hexane or a fundamental aqueous explanation.

- Extraction paces of carvone and limonene by ultrasound-assisted extraction with hexane were 3-2 times more immediate than those by the conventional extraction counting on temperature.:
- Used to extract nutraceuticals from plants such as vital oils and lipids dietary complements.
- e.g. oils from almond, apricot and rice bran.
- Extraction of saponins from ginseng, the empirical total yield and saponin earnings increased by 15 and 30%, respectively.

Conclusion

Plants, herbs, and ethnobotanicals have been used since the before days of humankind and are always used throughout the world for fitness promotion and treatment of infection. Plants and natural sources form the motivation of today's modern medicine and contribute greatly to the commercial drug trials manufactured today. About 25% of drugs prescribed worldwide are derived from plants. Still, herbs, rather than drugs, are often used in health care. For some, herbal medicine is their preferred method of treatment. For others, herbs are used as adjunct therapy to conventional pharmaceuticals. However, in many developing societies, traditional medicine of which herbal medicine is a core part is the only system of health care available or affordable. Regardless of the reason, those using herbal medicines should be assured that the products they are buying are safe and contain what they are supposed to, whether this is a particular herb or a particular amount of a specific herbal component. Consumers should also be given science-based information on dosage, contraindications, and efficacy. To achieve this, global harmonization of legislation is needed to guide the responsible production and marketing of herbal medicines. If sufficient scientific evidence of benefit is available for an herb, then such legislation should allow for this to be.

References

1. Text book of Pharmacognosy (Nirali prakashan) page no 48-49.
2. Text book of Pharmacognosy (kd tripati) page no 28-52
3. Adam's KL, Palmer JD. Evolution of mitochondrial gene content: gene loss and transfer to the nucleus. Molecular Phylogenetics and Evolution. 2003;29(3):380-395.
4. Alvarez I, Wedel JF. Ribosomal ITS sequences and plant phylogenetic inference. Molecular Phylogenetics and Evolution. 2003;29(3):417-434.
5. Abdel Kawy MA, Haggag EG, Abdel Motaal AA, Eissa NA. Quality control of certain slimming herbal products present in the Egyptian market. Life Sci. J. 2012;9(3):2273-2285.
6. Abourashed EA, Khan IA. High-performance liquid chromatography determination of hydrastine and berberine in dietary supplements containing goldenseal. J. Pharm. Sci. 2001;90(7):817-822. DOI:10.1002/jps.1035
7. Ahmed R, Ali Z, Wu Y, Kulkarni S, Avery M, Choudhury M, *et al*. Chemical characterization of a CommercialCommiphora wightiiResin sample and chemical profiling to assess for authenticity. Planta Med. 2011;77(9):945-950. DOI:10.1055/s-0030-1250674
8. Manach VC, Albert ASC, Morand C. Polyphenols: food sources and bioavailability. Am. J Clam Nutr. 2004;79(5):727-747.
9. Venkatesan N, Babu BS, Vyas SP. Protected particulate drug carriers for prolonged systemic circulation–a review. Indian J Pharm. Sci. 2000;62(5):327-333.
10. Longer MA, Ching HS, Robinson JR. Oral delivery of chlorthiazide using a bioadhesive polymer. J Pharm. Sci. 1985;74(4):406-411.
11. Sharma S, Sikarwar M. Phytosome: a review. Planta Indica. A major pharma giant Indena S. P. A. Milan, Italy. Phytosomes technology. 2005;1:1-3. Available at www.indena.com.
12. Bombardelli E, Curri SB, Loggia Della R, *et al*. Complexes between phospholipids and vegetal derivatives of biological interest. Fitoterapia. 1989;60:1-9.
13. Bombardelli E, Crostini A, Morazzoni P. Phytosomes in functional cosmetics. Fitoterapia. 1994;65(5):387-401.
14. Dubey D, Shrivastava S, Kapoor S, *et al*. Phytosome: a novel dosage structure, http://www.pharmainfo.net/reviews/phytosome-novel-dosagestructure; c2007.
15. Gupta A, Ashawal MS, Saraf S. Phytosomes: a novel approach towards functional cosmetics. J. Plant Science; c2007. p. 644-649.
16. Abo KA, Ogunleye VO, Ashidi JS. Anti microbial potential of Spondees mombin, Croton zambesicus and Zygotritoni crocea. Journal of Pharmacological Research. 1991;5(13):494-497.
17. Adedapo AA, Shabi OO, Adedokun OA. Anti helminthic efficacy of the aqueous extract of Eu-phobia hirta (Linn.) in Nigerian dogs. Veterinary Ar-chives. 2005;75(1):39-47.
18. Adekunle AS, Adekunle OC. Preliminary assess-ment of antimicrobial properties of aqueous extract of plants against infectious diseases. Biology and Medicine. 2009;1(3):20-24.
19. Bohlin L. Natural Products Isolation, Drug Discovery Today. 1998;3(12):536-537. Bohlin, L. & Bruhn, J.G. Bioassay methods in natural product research and drug development. 1993;43:288-356.
20. Cowan MM. Plant products as antimicrobial agents. Clinical Microbiology Reviews. 1999;12(4):564-582. Daffre, S, Bulet, P, Spisni, A, Ehret-sabatier, L, Rodriguez, EG. & Travassos, L.R. Studies in Natural Prod-ucts Chemistry. 2008;35:597- 691.
21. Doughari JH, Human IS, Bennade S, Ndakidemi PA. Phyto chemicals as chemotherapeutic agentsand antioxidants: Possible solution to the control of antibiotic resistant verocytotoxin producing bacteria. Journal of Medicinal Plants Research. 2009;3(11):839-848.
22. Fennell CW, Lindsey KL, McGaw LJ, Sparg SG, Staf-ford GI, Elgorashi EE, *et al*. Assessing African medicinal plants for efficacy and safety. Pharmacological screening and toxicology. Journal of Ethnopharmacoly; c1994. p. 205-217.