



# REVIEW ON ADVANCE HERBAL TECHNOLOGY

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publish paper

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## ABSTRACT

Due to their various benefits, people are becoming more interested in herbal medications these days. Formulations made from herbs are now widely accepted as effective treatments for many ailments. While the majority of these uses are unconventional, it is a well-known fact that more than 80% of people worldwide rely on herbal products and treatments for good health. The increased usage of herbal goods has also led to a surge in product adulteration and abuse, which has disappointed manufacturers and customers and, in some cases, had deadly results. The creation of reliable and accurate analytical techniques that can characterise the phytochemical makeup, such as quantitative evaluations of markers, bioactive chemicals, and other significant components, is a significant task for scientists. Establishing a standardised biological activity, chemical profile, or even just a quality assurance programme for the manufacture and manufacturing of herbal medications requires standardisation. The current review article describes a number of conventional approaches as well as more recent developments. DNA fingerprinting, metabolomics, chemometrics, X-ray diffraction, differential pulse polarography, and other recent developments are noted. It is also reported that chromatographic methods and capillary electrophoresis have contributed to the standardisation of herbal medications.

**KEY WORDS:** Herbal Drugs, Herbal Technology, DNA fingerprinting, chromatographic techniques, Standardisation, Herbal Extraction

## INTRODUCTION

### HERB IDENTIFICATION:

Most people are familiar with the names of a few fresh herbs that are used in cooking the most frequently. It's easy to remember what basil, thyme, and rosemary are because they have quite a distinctive appearance. Throughout history, herbal medicines have been used to both prevent and cure illness. Since the mid-1990s, the identification of herbal medicinal ingredients by DNA technology has become a common practice. Due to their various benefits, people are becoming more interested in herbal medications these days. Herbal remedies are widely accepted as effective treatments for a variety of illnesses. It is a recognised truth that over 80% of the world's population depends on herbal medications and development for a healthy lifestyle, even though the majority of these uses are unnatural. The increased usage of herbal goods has also led to a variety of product adulterations and misuses, which have disappointed manufacturers and customers and, in some cases, had deadly results.

One of the biggest challenges facing scientists is the creation of reliable, authentic analytical techniques that can profile the phytochemical content. These techniques include quantitative studies of markers, bioactive chemicals, and other important elements. Establishing a standardised biological activity, chemical profile, or even just a quality assurance programme for the manufacture and manufacturing of herbal medications requires

standardisation. The current review article describes a number of convectional approaches as well as more recent developments.

## HERBAL TECHNOLOGY

A product with nutritional, therapeutic, or preventative qualities is referred to as medicine, whereas a preparation made from plants or botanicals is called herbal. Because of this, substances derived from plants that have nutritional, therapeutic, or preventative qualities are referred to as "herbal medicine." As it encompasses all areas of herbal medicine related to botany, medicinal plant research, pharmacognosy, phytochemistry, phytotherapy, botanical medicines, Ayurveda, natural chemistry, agriculture science, Unani medicine, biotechnology, and biochemistry, herbal medicine is an interdisciplinary branch of Ayurveda. An herbalist is a person who works with herbs, particularly medicinal herbs.

## MATERIALS AND METHODS

### EXTRACTION OF HERBAL PLANT

The method of extracting medicinal plants involves using the proper solvent and following a conventional extraction procedure to separate the active plant material (such as alkaloids, flavonoids, terpenes, saponins, steroids, and glycosides) from the inert or inactive material. Menstruum, the solvent used to extract medicinal plants, is poured over coarsely powdered drug material, such as leaves, stem bark, or root bark, inside a container until the drug material is completely covered. This extraction process is known as maceration. After that, the container is sealed and left for a minimum of three days.

**Infusion:** Infusion is a chemical technique that employs volatile botanicals, such as dried herbs and flowers, to quickly release their active compounds into liquids like alcohol or oil. Usually, a boiling liquid is used in this process and then poured over the herbs.

**Digestion:** This type of maceration involves using gentle heat to remove the material. When the temperature is somewhat high, it is used. The menstruum has a higher solvent efficiency.

**Decoction:** To extract oils from plant material, it must first be dried, then chopped to maximise dissolution, and lastly boiled in water.

### IMPORTANCE OF STANDARDIZATION

Good Manufacturing Practises must be implemented in order to standardise herbal formulation (GMP). Furthermore, it is thought to be crucial to research a number of parameters, including pharmacodynamics, pharmacokinetics, dose, stability, self-life, toxicity evaluation, and chemical profiling of herbal formulations. Other equally significant issues include pesticide residue, aflatoxine concentration, heavy metal contamination, and the use of Good Agricultural Practises (GAP) in the standardisation of herbal drugs.

### STANDARDIZATION OF POLYHERBAL FORMULATION

A relatively prevalent medical issue is hyperlipidemia. It is necessary to find a somewhat less intrusive, more effective, and efficient treatment strategy for hyperlipidemia that has minimal to no side effects. Therefore, using traditional herbal medicine may be a useful way to address it. In the sphere of the herbal industry, developing highly standardised polyherbal formulations in terms of their chemical content and medicinal efficacy is regarded as a beneficial strategy. Polyherbal remedies and multi-component therapies are well-known features of traditional medicine. The goal of the current study is to develop and standardise a polyherbal medication for the treatment of hyperlipidemia.

## DIFFERENT METHOD OF IDENTIFICATION OF PLANT

**1Expert determination:** When it comes to accuracy or dependability, expert determination is the greatest identifying technique. Generally speaking, the expert has produced treatments (monographs, revisions, synopses) of the group under consideration, and it's likely that the expert's taxonomic notion is included in more recent floras or manuals.

2) **Recognition:** this relies on the identifier's substantial prior expertise with the relevant plant group.

3) **Comparison:** Comparing an unknown to identified specimens, pictures, drawings, or descriptions is the third technique.

4) **Using Keys and Similar Devices:** This is the most popular approach because it doesn't require the knowledge, resources, or time needed for comparison and identification.

## DIFFERENT EXTRACTION METHODS, INCLUDING ADVANCED EXTRACTION TECHNIQUES LIKE SUPERCRITICAL FLUID

Extraction can be defined as the removal of soluble material from an insoluble residue, either liquid or solid, by treatment with a liquid solvent. It is therefore a solution process that depends on mass transfer phenomena. The controlling factor in the rate of extraction is normally the rate of diffusion of the solute through the liquid boundary layer at the interface. The principle methods of extraction are:

- Maceration
- Percolation
- Digestion
- Infusion
- Decoction

Alternatively referred to as liquid-liquid extraction and partitioning, solvent extraction is a technique for separating substances according to how soluble they are in two distinct immiscible liquids, often water and an organic solvent. It is the process of removing a material from one liquid phase and placing it in another. This is a fundamental method carried out in chemical laboratories with a separatory funnel. To put it another way, this is the process of separating a material from a mixture by dissolving it preferentially in an appropriate solvent. Analytical applications of solvent extraction include mixture separation and the concentration or rejection of certain substances. Typically, this procedure separates an insoluble substance from a soluble one. Nuclear processing, mineral processing, the synthesis of fine organic compounds, perfume processing, and other sectors all use solvent extraction.

Supercritical fluid extraction: separation of the analyte or analytes from a sample matrix is sometimes necessary as a preparatory step in the examination of complicated materials. An analytical separation method should ideally be quick, easy to use, and affordable; it should provide quantitative recovery of analytes without loss or degradation; it should produce an analyte solution that is sufficiently concentrated to allow for the making of the final measurement without the need for concentration; and it should produce little to no waste that needs to be disposed of in the lab. For a long time, One of the most popular techniques for carrying out analytical separations on intricate food, pharmaceutical, environmental, and petroleum samples is based on extracting bulk samples using Soxhlet extractors and hydrocarbon or chlorinated organic solvents. Regrettably, liquid extraction usually falls short of fulfilling a number of desirable requirements.

## SUPERCRITICAL FLUID

Any substance at a temperature and pressure higher than its critical point is called a supercritical fluid. It has the ability to dissolve materials like a liquid and diffuse through solids like a gas. Additionally, many features of a supercritical fluid can be "fine-tuned" near the critical point since slight changes in temperature or pressure cause large changes in density. In many industrial and lab procedures, supercritical fluids can be used in place of organic solvents. The most often utilised supercritical fluids are carbon dioxide and water, which are used for power production and decaffeination, respectively. CO<sub>2</sub> is a type of solvent used in plant extraction. It doesn't leave

anything harmful behind. With small adjustments to temperature and pressure, its extraction properties may be precisely and broadly controlled.

## MICROWAVE-ASSISTED EXTRACTION

Microwaves fall between the 300 MHz and 300 GHz ranges of the electromagnetic spectrum of light, with wavelengths ranging from 1 cm to 1 m (Mandal et al., 2007). These waves are composed of two oscillating fields that are perpendicular to one another and are used to carry information and energy. The first use of microwaves is in their interaction with particular materials, which have the ability to absorb some of their electromagnetic energy and transform it into heat. For this purpose, commercial microwaves require 2450 MHz of energy, which is roughly equal to 600–700 W (Afoakwah et al., 2012).

## ULTRASOUND-ASSISTED EXTRACTION

Probably ever since fire was discovered, extraction has been employed. Innovative extraction and distillation techniques were utilised by the Mayas and Aztecs, the Egyptians and Phoenicians, the Jews and Arabs, the Indians and Chinese, the Greeks and Romans, and even the Egyptians and Phoenicians.

## CONCLUSION:

Since the beginning of human history, people have used plants, herbs, and ethnobotanicals to promote health and treat illness all around the world. The foundation of contemporary medicine is derived from plants and other natural sources, which also play a significant role in the production of commercial medicinal compositions. Plants are the source of about 25% of the medications that are given globally. Herbs are still frequently used in medicine instead of pharmaceuticals. Herbal medicine is the recommended treatment option for certain individuals. Herbs are used by some as a complementary treatment to traditional medications. But in many impoverished nations, the only accessible or reasonably priced medical system is traditional medicine, of which herbal therapy is a fundamental component. For whatever reason, people who use herbal remedies should be certain that the goods they purchase are secure and contain what the ingredients, be it a single herb or a specified quantity of a certain herbal component, are supposed to do. Science-based information on dose, contraindications, and efficacy should also be provided to consumers. Harmonising laws around the globe is necessary to accomplish this goal and ensure that herbal medicines are produced and marketed responsibly. Such legislation should permit the appropriate use of an herb if sufficient scientific proof of its benefits is available, in order to encourage its usage and realise its potential benefits for the treatment and promotion of public health.

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