Phytomedicine

Plants have been used for medicinal purposes for as long as history has been recorded. China, India, Egypt, and Assyria appear to have been the places which cradled the use of herbs, but herbalism was common in Europe by medieval times. Despite the progress in orthodox medicine, interest in alternative medicine, including herbalism, is on the increase in the West — and for 80% of the world herbal medicine is still the only kind to which ordinary persons have ready access.

A great variety of plants are used for medicinal treatments. Either the dried plant, or a specific part of it (root, leaves, fruit, flowers, seeds), is formulated into suitable preparations — compressed as tablets or made into pills, used to make infusions (teas), extracts, tinctures, etc., or mixed with excipients to make lotions, ointments, creams, etc. Few herbal drugs are subject to legislative control. Obviously control is needed for poppy capsules (which contain opium), belladonna, digitalis, nux vomica beans (which contain strychnine), and rauwolfia (which contains reserpine). Most herbal remedies are freely available, although rarely have any been investigated with the thoroughness of orthodox medicines. The claims made for many herbal remedies are for trivial or minor ailments, due partly to the strictures put on legal claims for efficacy, and partly because herbalists claim to treat the whole person to restore normal physiological balance, rather than to treat or cure a particular medical illness. Activities of herbal medicines are often described in very general terms — such as carminative, laxative, demulcent, antitussive, expectorant, sedative, antiseptic, or astringent. Unlike orthodox medicines, which usually consist of a single, isolated principle often synthetic), plants or extracts of plants contain multiple constituents, not all of them active. Herbalists often claim that the admixture of multiple constituents leads to synergism between the active moieties. Similarly, many consider that since plants are natural materials they are safer and will produce fewer side-effects than synthetic drugs. There is little substance or reason in either of these claims. For example, comfrey (Symphytum officinale) is considered a safe herb and is used as a demulcent. However, it contains pyrrolizidine alkaloids, which are toxic to the liver and can cause liver cancer. Media attention can often cause a major increase in the demand and use of herbal drugs — for example, evening primrose oil, feverfew, Ginko biloba, and ginseng. One of the problems with herbal drugs, especially those with active principles which have well-defined medicinal effects (e.g. digitalis), is that the amount of active principle(s) varies according to the location where the plant is grown, the prevailing weather conditions, etc., so it is vital in these instances that the crude material is assayed appropriately so that the dosage can be accurately controlled, especially where the therapeutic ratio is low. (Therapeutic ratio is the ratio of the dose causing toxic effects to that required for treatment.)

From time to time new drugs are discovered from herbal sources — for example, taxol, derived from the yew, is an important drug for some forms of cancer. The active principle is extracted and purified from plant material for as long as that process remains economically viable compared with chemical synthesis.
Columbia Encyclopedia: herbal medicine, use of natural plant substances (botanicals) to treat and prevent illness. The practice has existed since prehistoric times and flourishes today as the primary form of medicine for perhaps as much as 80% of the world's population. Over 80,000 species of plants are in use throughout the world. Along with acupuncture, herbal medicine is considered primary health care in China, where it has been in documented use for over 2,500 years.

Herbs may be used directly as teas or extracts, or they may be used in the production of drugs. Approximately 25% of the prescription drugs sold in the United States are plant based. Many more herbal ingredients are present in over-the-counter drugs, such as laxatives. Medicines that come from plants include aspirin from willow bark (Salix species) and digitalis from foxglove (Digitalis purpurea).

Scientific interest in herbal medicine in the United States has lagged behind that in the countries of Asia and W Europe; in Germany, for example, one third of graduating physicians have studied herbal medicine, and a comprehensive therapeutic guide to herbal medicines has long been published there. Nonetheless, millions of people in the United States use herbal products to treat a wide variety of ailments or to enhance health. Among the more popular remedies used are ginseng, to increase stamina and as a mild sedative; St.-John's-wort, for mild depression; echinacea, to aid the immune system and alleviate colds; kava, to calm anxiety and treat insomnia; saw palmetto, for enlarged prostate; and ginkgo biloba, to improve short-term memory (see ginkgo). Some people have used botanicals in an attempt to stave off serious illnesses such as AIDS.

This widespread use has prompted demands that herbal remedies be regulated as drugs to insure quality standards. The U.S. Food and Drug Administration (FDA) can require a clinical trial on any herb that has a health claim on its label, but medical testing, which is geared toward observing a particular active component, is difficult to apply to herbs, which may have many interacting ingredients. Debate over botanicals' validity and safety as medicines and over the appropriate degree of government regulation continues. The Dietary Supplement Health and Education Act, passed in 1994, reclassified herbs as dietary supplements rather than food additives. It forbids unreasonable health claims by the manufacturers, but makes it the FDA's responsibility to prove that a marketed product is unsafe. (In contrast, in prescription and over-the-counter drugs, it is the manufacturer's responsibility to prove safety and effectiveness before a drug can be marketed.)

Another concern surrounding herbal medicine is the availability of wild plants for a growing market; it is feared that the limited supplies of known wild herbs are being threatened by overharvesting and habitat loss. The potential of isolating beneficial drugs from plants, however, has prompted large pharmaceutical companies to contribute to the conservation of the tropical rain forest. Biologists have called for more careful study of medicinal plants, especially regarding their capacity for sustainable harvesting and the effects of cultivation on their efficacy as medicaments.
Bibliography


**Veterinary Dictionary:** herbal medicine

Use of naturally occurring substances, usually of plant origin, in the prevention and treatment of disease. Western herbal medicine is based on the use of botanicals commonly available in North America and Europe. Chinese herbal medicine uses a combination of plants, minerals and animal products. See also Chinese traditional medicine. Called also phytotherapy.

**Herbalism** is a traditional medicinal or folk medicine practice based on the use of plants and plant extracts. Herbalism is also known as botanical medicine, medicinal botany, medical herbalism, herbal medicine, herbology, and phytotherapy. Sometimes the scope of herbal medicine is extended to include fungi and bee products, as well as minerals, shells and certain animal parts.

Many plants synthesize substances that are useful to the maintenance of health in humans and other animals. These include aromatic substances, most of which are phenols or their oxygen-substituted derivatives such as tannins. Many are secondary metabolites, of which at least 12,000 have been isolated — a number estimated to be less than 10% of the total. In many cases, these substances (particularly the alkaloids) serve as plant defense mechanisms against predation by microorganisms, insects, and herbivores. Many of the herbs and spices used by humans to season food yield useful medicinal compounds.

With only a few exceptions, most herbal treatments have not been tested for safety and efficacy utilizing scientific studies or clinical trials. The scientific and medical communities state that herbal treatments may be risk the well-being or life of the patient when used in lieu of standard medical treatments.

**Role of herbal medicine in human society**
People on all continents have used hundreds to thousands of indigenous plants for treatment of ailments since prehistoric times. There is evidence from the Shanidar Cave in Iraq that suggests Neanderthals living 60,000 years ago used medicinal plants. A body that was unearthed there had been buried with eight species of plants which are still widely used in ethnomedicine around the world.

The first generally accepted use of plants as healing agents was depicted in the cave paintings discovered in the Lascaux caves in France, which have been radiocarbon-dated to between 13,000-25,000 BCE. Medicinal herbs were found in the personal effects of an "Ice man," whose body was frozen in the Swiss Alps for more than 5,300 years, which appear to have been used to treat the parasites found in his intestines.

Anthropologists theorize that animals evolved a tendency to seek out bitter plant parts in response to illness. This behavior arose because bitterness is an indicator of secondary metabolites. The risk benefit ratio favored animals and protohumans that were inclined to experiment in times of sickness. Over time, and with insight, instinct, and trial-and-error, a base of knowledge would have been acquired within early tribal communities. As this knowledge base expanded over the generations, the specialized role of the herbalist emerged. The process would likely have occurred in varying manners within a wide diversity of cultures.

Indigenous healers often claim to have learned by observing that sick animals change their food preferences to nibble at bitter herbs they would normally reject. Field biologists have provided corroborating evidence based on observation of diverse species, such as chimpanzees, chickens, sheep and butterflies. Lowland gorillas take 90% of their diet from the fruits of Aframomum melegueta, a relative of the ginger plant, that is a potent antimicrobial and apparently keeps shigellosis and similar infections at bay.
Researchers from Ohio Wesleyan University found that some birds select nesting material rich in antimicrobial agents which protect their young from harmful bacteria\[^1\]. Sick animals tend to forage plants rich in secondary metabolites, such as tannins and alkaloids\[^1\] [\[citation needed\]]. Since these phytochemicals often have antiviral, antibacterial, antifungal and antihelminthic properties, a plausible case can be made for self-medication by animals in the wild.\[^1\]

Some animals have digestive systems especially adapted to cope with certain plant toxins. For example, the koala can live on the leaves and shoots of the eucalyptus, a plant that is dangerous to most animals.\[^4\] A plant that is harmless to a particular animal may not be safe for humans to ingest\[^5\] [\[citation needed\]]. A reasonable conjecture is that these discoveries were traditionally collected by the medicine people of indigenous tribes, who then passed on safety information and cautions.

The use of herbs to treat disease is almost universal among non-industrialized societies [\[citation needed\]]. A number of traditions came to dominate the practice of herbal medicine at the end of the twentieth century:

- The herbal medicine system, based on Greek and Roman sources
- The Ayurvedic medicine system from India
- Chinese herbal medicine (Chinese herbology)
- Unani-Tibb medicine
- Shamanic Herbalism
Many of the pharmaceuticals currently available to physicians have a long history of use as herbal remedies, including opium, aspirin, digitalis, and quinine. The World Health Organization (WHO) estimates that 80 percent of the world's population presently uses herbal medicine for some aspect of primary health care. Herbal medicine is a major component in all traditional medicine systems, and a common element in Ayurvedic, homeopathic, naturopathic, traditional Chinese medicine, and Native American medicine. According to the WHO, 74% of 119 modern plant-derived pharmaceutical medicines are used in ways that are similar to their traditional uses. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rainforests and other places for possible new pharmaceuticals.

The use of, and search for, drugs and dietary supplements derived from plants have accelerated in recent years. Pharmacologists, microbiologists, botanists, and natural-products chemists are combing the Earth for phytochemicals and leads that could be developed for treatment of various diseases. In fact, approximately 25% of modern drugs used in the United States have been derived from plants.

- Three quarters of plants that provide active ingredients for prescription drugs came to the attention of researchers because of their use in traditional medicine.

- Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicine today, 75 percent show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived.

- More than two thirds of the world's plant species - at least 35,000 of which are estimated to have medicinal value - come from the developing countries.

- At least 7,000 medical compounds in the modern pharmacopoeia are derived from plants.

**Herbs in history**
In the written record, the study of herbs dates back over 5,000 years to the Sumerians, who described well-established medicinal uses for such plants as laurel, caraway, and thyme. The first known Chinese herb book (or herbal), dating from about 2700 B.C., lists 365 medicinal plants and their uses - including ma-Huang, the shrub that introduced the drug ephedrine to modern medicine. The Egyptians of 1000 B.C. are known to have used garlic, opium, castor oil, coriander, mint, indigo, and other herbs for medicine and the Old Testament also mentions herb use and cultivation, including mandrake, vetch, caraway, wheat, barley, and rye.

Like their predecessors, the ancient Greeks and Romans made medicinal use of plants. Greek and Roman medicinal practices, as preserved in the writings of Hippocrates and - especially - Galen, provided the patterns for later western medicine. Hippocrates advocated the use of a few simple herbal drugs - along with fresh air, rest, and proper diet. Galen, on the other hand, recommended large doses of more or less complicated drug mixtures - including plant, animal, and mineral ingredients. The Greek physician compiled the first European treatise on the properties and uses of medicinal plants, De Materia Medica. In the first century AD, Dioscorides wrote a compendium of more that 500 plants that remained an authoritative reference into the seventeenth century. Similarly important for herbalists and botanists of later centuries was the Greek book that founded the science of botany, Theophrastus’ Historia Plantarum, written in the fourth century B.C.
The uses of plants for medicine and other purposes changed little during the Middle Ages. The early Christian church discouraged the formal practice of medicine, preferring faith healing; but many Greek and Roman writings on medicine, as on other subjects, were preserved by diligent hand copying of manuscripts in monasteries. The monasteries thus tended to become local centers of medical knowledge, and their herb gardens provided the raw materials for simple treatment of common disorders. At the same time, folk medicine in the home and village continues uninterrupted, supporting numerous wandering and settled herbalists. Among these were the “wise-women,” who prescribed herbal remedies often along with spells and enchantments. It was not until the later Middle Ages that women who were knowledgeable in herb lore became the targets of the witch hysteria. One of the most famous women in the herbal tradition was Hildegard of Bingen. A twelfth century Benedictine nun, she wrote a medical text called Causes and Cures.
Medical schools began to return in the eleventh century, teaching Galen’s system. At the time, the Arabic world was more advanced in science than Europe. As a trading culture, the Arabs had access to plant material from distant places such as China and India. Herbals, medical texts and translations of the classics of antiquity filtered in from east to west. Alongside the university system, folk medicine continued to thrive. Plants were burdened with a mass of both pagan and Christian superstition that often was more important than their actual properties. The continuing importance of herbs for the centuries following the Middle Ages is indicated by the hundreds of herbals published after the invention of printing in the fifteenth century. Theophrastus’ Historia Plantarum was one of the first books to be printed, and Dioscorides’ De Materia Medica was not far behind.

The fifteenth, sixteenth, and seventeenth centuries were the great age of herbals, many of them available for the first time in English and other languages rather than Latin or Greek. The first herbal to be published in English was the anonymous Grete Herball of 1526. The two best-known herbals in English were The Herball or General History of Plants (1597) by John Gerard and The English Physician Enlarged (1653) by Nicholas Culpeper. Gerard’s text was basically a pirated translation of a book by the Belgian herbalist Dodoens and his illustrations came from a German botanical work. The original edition contained many errors due to faulty matching of the two parts. Culpeper’s blend of traditional medicine with astrology, magic, and folklore was ridiculed by the physicians of his day yet his book - like Gerard’s and other herbals - enjoyed phenomenal popularity. The Age of Exploration and the Columbian Exchange introduced new medicinal plants to Europe. The Badianus Manuscript was an illustrated Aztec herbal translated into Latin in the 16th century.

But the seventeenth century also saw the beginning of a slow erosion of the pre-eminent position held by plants as sources of therapeutic effects. The introduction by the physician. Paracelsus of active chemical drugs (like arsenic, copper sulfate, iron,
mercury, and sulfur), followed by the rapid development of chemistry and the other physical sciences in the eighteenth and nineteenth centuries, led increasingly to the dominance of chemotherapy - chemical medicine - as the orthodox system of the twentieth century.

**Biological background**

The anthocyanins in sweet violet produce deep red, violet and blue shades.

All plants produce chemical **compounds** as part of their normal **metabolic** activities. These include primary metabolites, such as **sugars** and **fats**, found in all plants, and secondary metabolites found in a smaller range of plants, some useful ones found only in a particular **genus** or **species**. **Pigments** harvest light, protect the organism from radiation and display colors to attract pollinators.

The functions of secondary metabolites are varied. For example, some secondary metabolites are **toxins** used to deter predation, and others are **pheromones** used to attract insects for **pollination**. **Phytoalexins** protect against bacterial and fungal attacks. Allelochemicals inhibit rival plants that are competing for soil and light.

Plants upregulate and downregulate their biochemical paths in response to the local mix of herbivores, pollinators and microorganisms. The chemical profile of a single plant may vary over time as it reacts to changing conditions. It is the secondary metabolites and pigments that can have therapeutic actions in humans and which can be refined to produce drugs.

The carotenoids in primrose produce bright red, yellow and orange shades.
Plants synthesize a bewildering variety of **phytochemicals** but most are derivatives of a few biochemical motifs.

- **Alkaloids** contain a ring with nitrogen. Many alkaloids have dramatic effects on the central nervous system. Caffeine is an alkaloid that provides a mild lift but the alkaloids in *datura* cause severe intoxication and even death.

- **Phenolics** contain phenol rings. The anthocyanins that give grapes their purple color, the isoflavones, the phytoestrogens from soy and the tannins that give tea its astringency are phenolics.

- **Terpenoids** are built up from terpene building blocks. Each terpene consists of two paired isoprenes. The names monoterpenes, sesquiterpenes, diterpenes and triterpenes are based on the number of isoprene units. The fragrance of *rose* and *lavender* is due to monoterpenes. The carotenoids produce the reds, yellows and oranges of pumpkin, corn and tomatoes.

- **Glycosides** consist of a glucose moiety attached to an aglycone. The aglycone is a molecule that is bioactive in its free form but inert until the glycoside bond is broken by water or enzymes. This mechanism allows the plant to defer the availability of the molecule to an appropriate time, similar to a safety lock on a gun. An example is the cyanoglycosides in cherry pits that release toxins only when bitten by a herbivore.

The word drug itself comes from the **Swedish** word "druug", which means 'dried plant'. Some examples are inulin from the roots of dahlias, quinine from the cinchona, morphine and codeine from the poppy, and digoxin from the foxglove.

The active ingredient in willow bark, once prescribed by Hippocrates, is salicin, or salicylic acid. The discovery of salicylic acid lead to the development of "aspirin", also known as "acetylsalicylic acid". "Aspirin" was originally a brand name, and is still a protected trademark in some countries. This medication was patented by Bayer AG.

**Popularity**

A survey released in May 2004 by the National Center for Complementary and Alternative Medicine focused on who used complementary and alternative medicines (CAM), what was used, and why it was used. The survey was limited to adults, aged 18 years and over during 2002, living in the United States.

According to this survey, herbal therapy, or use of natural products other than vitamins and minerals, was the most commonly used CAM therapy (18.9%) when all use of prayer was excluded.

Herbal remedies are very common in Europe. In Germany, herbal medications are dispensed by apothecaries (e.g., Apotheke). Prescription drugs are sold alongside...
essential oils, herbal extracts, or herbal teas. Herbal remedies are seen by some as a treatment to be preferred to chemical medications which have been industrially produced[23][citation needed].

In the United Kingdom, the training of medical herbalists is done by state funded Universities. For example, Bachelor of Science degrees in herbal medicine are offered at Universities such as University of East London, Middlesex University, University of Central Lancashire, University of Westminster, University of Lincoln and Napier University in Edinburgh at the present.

Types of herbal medicine systems

![Dioscorides' Materia Medica, c. 1334 copy in Arabic, describes medicinal features of cumin and dill.](image)

Use of medicinal plants can be as informal as, for example, culinary use or consumption of an herbal tea or supplement, although the sale of some herbs considered dangerous is often restricted to the public. Sometimes such herbs are provided to professional herbalists by specialist companies. Many herbalists, both professional and amateur, often grow or "wildcraft" their own herbs. Many common weeds have medicinal properties (e.g. dandelion).

In traditional Chinese medicine herbs (which may include animal and mineral parts) are divided into "Superior" (food grade), "Moderate" (to be taken for disease for a short time) and "Inferior" (toxic, short term) grades[citation needed]. Disease is attributed to imbalance between yin and yang energy. Yin and yang refer to polarities that may either support or undermine one another. An example would be rest and activity. Herbal formulas are based upon the organ system which is out of balance, with chief herbs addressing the main complaint, deputy herbs which reinforce the actions of the chief or address other
affected organ systems, and servants which may harmonize, balance temperatures or
tastes of the herbs, direct them to various parts of the body or assist penetration.[citation
needed]. Herbal formulas tend to have five to 15 herbs[citation needed].

Some researchers trained in both western and Chinese medicine have attempted to
decompose ancient medical texts in the light of modern science. One hypothesis that has
ermerged is that the yin-yang balance, at least with regard to herbs, corresponds to the pro-
oxidant and anti-oxidant balance. This interpretation is supported by several
investigations of the ORAC ratings of various yin and yang herbs.[24][25]

Eclectic medicine came out of the vitalist tradition, similar to physiomedicalism and
bridged the European and Native American traditions[citation needed]. Cherokee medicine
tends to divide herbs into foods, medicines and toxins and to use seven plants in the
treatment of disease, which is defined with both spiritual and physiological aspects,
according to Cherokee herbalist David Winston.[26]

In India, Ayurvedic medicine has quite complex formulas with 30 or more ingredients,
including a sizable number of ingredients that have undergone "alchemical processing",
chosen to balance "Vatā", "Pitta" or "Kapha."[27]

In addition there are more modern theories of herbal combination like William
LeSassier's triune formula which combined Pythagorean imagery with Chinese medicine
ideas and resulted in 9 herb formulas which supplemented, drained or neutrally nourished
the main organ systems affected and three associated systems[citation needed]. His system has
been taught to thousands of influential American herbalists through his own
apprenticeship programs during his lifetime, the William LeSassier Archive[28] and the
David Winston Center for Herbal Studies[29].

Routes of administration

There are many forms in which herbs can be administered, these include:

- **Tinctures** (alcoholic extracts of herb, such as echinacea extract)
- **Tisanes** (hot-water extracts of herb, such as chamomile)
- **Topical** application of essential oil extracts, as in Oil of Oregano
- **Whole-herb consumption**
- **Inhalation** as in aromatherapy

The easiest route of administration which is common among indigenous healers is to
chew the plant directly[citation needed].

The roots of plants like **echinacea**, the fruit of the plant **lycium** (goji berry), the seeds of
the emetic **lobelia** and the resins of **myrrh** have all been ingested directly as
medicine[citation needed].
Standardization and concentration can boost certain plant constituents while losing others.\[citation needed\].

### Examples of plants used as medicine

The following text needs to be harmonized with text in the article List of plants used as medicine. (See e.g. .)

**Main article: List of plants used as medicine**

Few herbal remedies have conclusively demonstrated any positive effect on humans. Many of the studies cited refer to animal model investigations or in-vitro assays and therefore cannot provide more than weak supportive evidence.\[citation needed\].

- **Artichoke** and several other plants may reduce total serum cholesterol levels in preliminary studies. [30][31]
- **Black cohosh** and other plants that contain phytoestrogens (plant molecules with estrogen activity) have some benefits for treatment of symptoms resulting from menopause. [12]
- **Echinacea** extracts can limit the length and severity of rhinovirus colds; however, the appropriate dosage levels, which might be higher than is available over-the-counter, require further research. [33][34]
- **Elderberry** may speed the recovery from type A and B influenza. [35] However it is possibly risky in the case of avian influenza because the immunostimulatory effects may aggravate the cytokine cascade. [36]
- **Garlic** can lower total cholesterol levels[37].
- Purified extracts of the seeds of Hibiscus sabdariffa may have some anti-microbial effect, but may also have some toxicity to mammalian testes. [38]
- **Nigella sativa** (Black cumin) is a general medicinal plant can be used for diverse ailments such as cough, pulmonary infections, asthma, influenza, allergy, hypertension and stomach ache. [39][40][41]
- **Oregano** may be effective against multi-drug resistant bacteria. [42]
- **Pawpaw** can be used for insecticidal purposes (killing lice, worms). [citation needed]
- **Phytolacca** or Pokeweed is used as a homeopathic remedy to treat many ailments. It can be applied topically or taken internally. Topical treatments have been used for acne and other ailments. Internal treatments include tonsilitis, swollen glands and weight loss. [citation needed]
- **Peppermint** oil may have benefits for individuals with irritable bowel syndrome. [31][44]
- **Rauwolfia Serpentina**, high risk of toxicity if improperly used, used extensively in India for sleeplessness, anxiety, and high blood pressure. The first proven allopathic medicine for high blood pressure was extracted from this herb. [citation needed]
Salvia lavandulaefolia may improve memory.\(^{[45]}\)

St. John's wort, has yielded positive results, proving more effective than a placebo for the treatment of mild to moderate depression in some clinical trials: however, safety and efficacy profiles (that is, amount of drug needed for a clinical effect) have not been shown.\(^{[46]}\)

Valerian root can be used to treat insomnia. Clinical studies show mixed results.\(^{[47][48]}\) A valerian/hops combination has shown efficacy.\(^{[49]}\)

Feverfew can be used to treat migraine headaches.\(^{[50]}\) However, many reviews of these studies show no efficacy\(^{[51]}\) and dangerous side effects.\(^{[52][53]}\)

Saw Palmetto can be used for BPH. Supported in some studies,\(^{[54]}\) failed to confirm in others.\(^{[55]}\)

Lemon juice or apple cider vinegar can be used to treat acne.\(^{[citation needed]}\)

Green tea components may inhibit growth of breast cancer cells\(^{[56]}\) and may heal scars faster.\(^{[57]}\)

Lemon grass can lower cholesterol.\(^{[citation needed]}\)

Honey may reduce cholesterol.\(^{[58]}\) May be useful in wound healing.\(^{[59]}\)

### Risks

A common misconception about herbalism and the use of "natural" products in general, is that "natural" equals safe\(^{[citation needed]}\). However many plants have chemical defense mechanisms against predators that can have adverse or lethal effects on humans, for example poison hemlock and nightshade, which can be deadly, although they are not sold as herbs. Herbs can also have undesirable side-effects just as pharmaceutical products can. These problems are exacerbated by different controls over purity and inconsistent information on dosage\(^{[citation needed]}\) due to the status of herbs in the United States as dietary supplements which are technically not supposed to have medicinal functions\(^{[neutrality disputed][citation needed]}\). Standardization of purity and dosage is not mandated in the United States but even products made to the same specification may differ as a result of biochemical variations within a species of plant.\(^{[60]}\) Furthermore, if given in conjunction with drugs, there is danger of 'summation', where the herb and the drug have similar actions and add together to cause an 'overdose' or reduction in the effects, particularly with the Cytochrome P450.\(^{[citation needed]}\)

There is a danger that herbal remedies will be used in place of other medical treatments which have been scientifically tested for safety and efficacy, resulting in the development or worsening of a medical condition which could have been better prevented or treated\(^{[citation needed]}\). There is also a danger that an herbal remedy may itself cause harm which is unanticipated due to a lack of a full understanding of its composition and biochemical effects.\(^{[citation needed]}\)

### Effectiveness

The gold standard for pharmaceutical testing is repeated, large-scale, randomized, double-blind tests. Some plant products or pharmaceutical drugs derived from them are
incorporated into mainstream medicine. To recoup the considerable costs of testing to the regulatory standards, the substances are patented by pharmaceutical companies and sold at a substantial profit\[61\].

Most herbal traditions have accumulated knowledge without modern scientific controls to distinguish between the placebo effect, the body's natural ability to heal itself, and the actual benefits of the herbs themselves\[citation needed\]. Many herbs have shown positive results in in-vitro, animal model or small-scale clinical tests\[62\]. The few randomized, double-blind tests that receive attention in mainstream medical publications are often questioned on methodological grounds or interpretation. Likewise, studies published in peer-reviewed medical journals such as Journal of the American Medical Association receive more consideration than those published in specialized herbal journals.

Herbalists tend to use parts of plants, such as the roots or leaves but not isolate particular phytochemicals\[63\]. They argue that the synergy of the combined substances enhances the efficacy and dilutes toxicity\[64\]. Unfortunately, this assertion is difficult to prove. Pharmaceutical medicine on the other hand prefers single ingredients on the grounds that dosage can be more easily quantified.

Dosage is in general an outstanding issue for herbal treatments: while most conventional medicines are heavily tested to determine the most effective and safest dosages (especially in relation to things like body weight, drug interactions, etc.), there are few established dosage standards for various herbal treatments on the market\[citation needed\]. Furthermore, herbal medicines taken in whole form cannot generally guarantee a consistent dosage or drug quality (since certain samples may contain more or less of a given active ingredient.

The issue of regulation is an area of continuing controversy in the EU and USA. At one end of the spectrum, some herbalists maintain that traditional remedies have a long history of use, and do not require the level of safety testing as xenobiotics or single ingredients in an artificially concentrated form\[citation needed\]. On the other hand, others are in favor of legally enforced quality standards, safety testing and prescription by a qualified practitioner\[citation needed\]. Some professional herbalist organizations have made statements calling for a category of regulation for herbal products\[62\]. Yet others agree with the need for more quality testing but believe it can be managed through reputation without government intervention\[citation needed\].\[66\]

Evidence-based herbal medicine

In 2004 the U.S. National Center for Complementary and Alternative Medicine of the National Institutes of Health began funding clinical trials into the effectiveness of herbal medicine.\[67\]
Surveys of a scientific approach to herbal medicine can be found in the books *Evidence-based herbal medicine*,[68] and *Herbal and traditional medicine: molecular aspects of health*. [69]

**Name confusion**

The common names of herbs (folk taxonomy) may not reflect differences in scientific taxonomy, and the same (or a very similar) common name might group together different plant species with different effects. For example, in 1993 in Belgium, a formula created by medical doctors including some Traditional Chinese medicine (TCM) herbs for weight loss, one herb (*Stephania tetrandra*) was swapped for another (*Aristolochia fangchi*) whose name in Chinese was extremely similar but which contained higher levels of a renal toxin, aristolochic acid; this *quid pro quo* resulted in 105 cases of kidney damage[citation needed]. Note that neither herb used in a TCM context would be used for weight loss or given for long periods of time.

In Chinese medicine these herbs are used for certain forms of acute arthritis and edema.[70][71][72]

**Standards and quality control**

The legal status of herbal ingredients varies by country.

In the United States, most herbal remedies are regulated as dietary supplements by the Food and Drug Administration[citation needed]. Manufacturers of products falling into this category are not required to prove the safety or efficacy of their product, though the FDA may withdraw a product from sale should it prove harmful.[73][74]

The National Nutritional Foods Association, the industry's largest trade association, has run a program since 2002, examining the products and factory conditions of member companies, giving them the right to display the GMP (Good Manufacturing Practices) seal of approval on their products.[75]

In the UK, herbal remedies that are bought over the counter are regulated as supplements, as in the US[citation needed]. However, herbal remedies prescribed and dispensed by a qualified "Medical Herbalist", after a personal consultation, are regulated as medicines.

A Medical Herbalist can prescribe some herbs which are not available over the counter, covered by Schedule III of the Medicines Act[citation needed]. Forthcoming changes to laws regulating herbal products in the UK, are intended to ensure the quality of herbal products used[citation needed].

Some herbs, such as cannabis, however, are outright banned in most countries for various reasons. Since 2004, the sales of ephedra as an herbal supplement is prohibited in the United States by the FDA.[76]
Drug interactions

In consultation with a physician, usage of herbal remedies should be clarified, as some herbal remedies have the potential to cause adverse drug interactions when used in combination with various prescription and over-the-counter pharmaceuticals.

Dangerously low blood pressure may result from the combination of an herbal remedy that lowers blood pressure together with prescription medicine that has the same effect. In particular, many herbs should be avoided during pregnancy.[2]

See also

- Alternative medicine
- Anesthesia
- Chinese herbology
- Doctrine of signatures
- Ethnobotany
- Folk medicine
- Folk remedy
- Gemmotherapy
- Herbs
- History of alternative medicine
- Homeopathy
- King's American Dispensatory
- List of medicinal herbs
- Naturopathic Medicine
- Paraherbalism
- Pseudoscience
- Quackery

References

1. ^ (a neologism coined by Dr. K. Seshagirirao, University of Hyderabad, India)
5. ^ History of Plants in Medicine.
7. ^ 5300 years ago, the Ice Man used natural laxatives and antibiotics, Capasso L., Lancet. 1998;352:1864, PMID 9851424.
9. ^ Medicinal Plants.
11. ^ a b Wild Health: How Animals Keep Themselves Well and What We Can Learn From Them, Cindy Engel, Houghton Mifflin, 2002
15. ^ Take Time to Identify Toxic Plants to Keep Your Family and Pets Safe.
16. ^ Traditional medicine.
17. ^ Introduction, Herbal Medicine, holisticonline.com
19. ^ Pharmaceutics and Alchemy.
26. ^ Safety & Regulation--Who's Watching the Herbal Store?, Tillotson Institute of Natural Health
28. ^ William LeSassier Archive website
29. ^ David Winston Center for Herbal Studies website
42. "Oregano Oil May Protect Against Drug-Resistant Bacteria, Georgetown Researcher Finds".
45. "Sage Improves Memory, Study Shows".


60. *Botanical Products*

61. *Incentives and Pharmaceutical Innovation*


64. *What is Herb Standardization?*

65. *Wrangling an Herbal Legend.*

EnCognitive.com
66. ^ Some Arguments against the Standardization of Herbalists.
67. ^ Herbal Medicine, NIH Institute and Center Resources, National Center for Complementary and Alternative Medicine, National Institutes of Health.
73. ^ US Dietary Supplement Health and Education Act of 1994
75. ^ Safety & Regulation--Who's Watching the Herbal Store?, Tillotson Institute of Natural Health
76. ^ FDA Issues Regulation Prohibiting Sale of Dietary Supplements Containing Ephedrine Alkaloids and Reiterates Its Advice That Consumers Stop Using These Products
77. ^ Herbs to avoid during pregnancy, Gaia Garden website

**Regulation**

- [National Herbalists Association of Australia](https://www.naha.org.au), official website
- [National Institute of Medical Herbalists](https://www.nimh.org), official website of the National Institute of Medical Herbalists, one of the governing bodies for herbalists in the United Kingdom
- [College of Practitioners of Phytotherapy](https://www.collegeofphytotherapy.org.uk), official website for College of Practitioners of Phytotherapy, one of the governing bodies for herbalists in the United Kingdom
- [American Herbalists Guild- An Association of Herbal Practitioners](https://www.americanherbalistsguild.org), official website of the American Herbalists Guild
- [National Certification Commission for Acupuncture and Oriental Medicine](https://www.nccaom.org), official website
Herbalist

- **Indian medicinal plants**
- LearningHerbs.com Simple herbal education
- Herbs Research Foundation Research and educational foundation
- Center for Complementary and Alternative Medicine (National Institutes of Health)
- The American Botanical Council Research and educational foundation
- HerbMed Research and educational foundation
- Medline All Herbs and Supplements
- Herbs Healing - 800+ pages of articles & resources.
- Herbs by name
- Henriettesherbal.com By a practising herbalist and one of the oldest and largest herbal information sites on the net.
- Natural Standard Evaluation of evidence from a mainstream point of view
- Medicine Hunter By Chris Kilham, an ethnobotanist at the University of Massachusetts at Amherst
- Australasian College of Health Sciences College specializing in online holistic health education
- United Plant Savers Nonprofit foundation to preserve native herbal plants and plant habitats
- London Community Herbalists Network of herbalists in London, UK
- Herbological.com Sharp analysis of current research and debate on herbal medicine and related matters.
- An overview of medicinal plants from the Science Creative Quarterly
- Longwood Herbal Task Force
- Platte Valley Medical Center
- InfoErbe An Italian [phytomedical] database
- Trabajos sobre Botánica
- Really Wild Remedies—Medicinal Plant Use by Animals
- Plants For A Future Edible, medicinal, and useful plants (with extensive references)

Criticism

- New England Journal of Medicine editorial about the risks of alternative medicine
- University of Maryland site about alternative medicine: uses, possible prescription drug interactions, and possible nutrient depletions
- Herbal supplements not child's play - CNN news article
- And the Good Herb Taketh Away
- Herbal Mythology - By Steven Novella MD, President of the New England Skeptical Society
- Selling Supplements - By Steven Novella MD, President of the New England Skeptical Society
- Herbal side effects and warnings - researched by Personal Health Zone staff
- False Tenets of Paraherbalism Ten points to consider when evaluating a herbalist
### Dietary supplements

**Types**
- Amino acids
- Bodybuilding supplement
- Energy drink
- Energy bar
- Fatty acids
- Herbal Supplements
- Minerals
- Probiotics
- Vitamins
- Whole food supplements

**Vitamins and minerals**
- Retinol (Vitamin A)
- B vitamins: Thiamine (B₁)
- Riboflavin (B₂)
- Niacin (B₃)
- Pantothenic acid (B₅)
- Pyridoxine (B₆)
- Biotin (B₇)
- Folic acid (B₉)
- Cyanocobalamin (B₁₂)
- Ascorbic acid (Vitamin C)
- Ergocalciferol and Cholecalciferol (Vitamin D)
- Tocopherol (Vitamin E)
- Naphthoquinone (Vitamin K)
- Calcium
- Choline
- Chlorine
- Chromium
- Cobalt
- Copper
- Fluorine
- Iodine
- Iron
- Magnesium
- Manganese
- Molybdenum
- Phosphorus
- Potassium
- Selenium
- Sodium
- Sulfur
- Zinc

**Other common ingredients**
- Carnitine
- Chondroitin sulfate
- Cod liver oil
- Copper gluconate
- Creatine
- Dietary fiber
- Elemental calcium
- Ephedra
- Fish oil
- Folic acid
- Ginseng
- Glucosamine
- Glutamine
- Iron supplements
- Japanese Honeysuckle
- Krill oil
- Lactobacillus
- Lingzhi
- Linseed oil
- Red yeast rice
- Royal jelly
- Saw palmetto
- Spirulina
- Taurine
- Wheatgrass
- Wolfberry
- Yohimbine
- Zinc gluconate

**Related articles**
- Codex Alimentarius
- Enzyte
- Metabolife
- Hadacol
- Nutraceutical
- Multivitamin