

Subject Code: 18K3BEL01

**MEDICINAL BOTANY
II B.Sc., -NME 1- III SEMESTER**

UNIT-I

Scope of medicinal Botany, Indian system of medicines - Siddha, Ayurveda, Unani, Homeopathy, Aromotherapy and importance of herbal drugs in Indian system of medicines.

UNIT-II

Pharmacognosy- Definition, scope, Natural source of Drugs – Crude drugs, classification of crude drugs. Collection and processing of crude drugs.

Prepared By

Unit I:

Dr. A.Pauline Fathima Mary
Guest Lecturer in Botany
K.N.G.Arts College (W), Thanjavur-7

Unit II:

Dr. S. Gandhimathi
Guest Lecturer in Botany
K.N.G.Arts College (W), Thanjavur-7

Source:

1. Kumar N.C., 1993, An Introduction to medical Botany and Pharmacognosy, Em.Kay. Publication, Jodhpur.

Unit-I:

Scope of Medicinal Botany:

Medicinal Botany means Study of medicinal plants. Medicinal plants have been discovered and used in traditional medicine practices since prehistoric times. Plants synthesise hundreds of chemical compounds for functions including defence against insects, fungi, diseases, and herbivorous mammals. Numerous phytochemicals with potential or established biological activity have been identified. However, since a single plant contains widely diverse phytochemicals, the effects of using a whole plant as medicine are uncertain. Further, the phytochemical content and pharmacological actions, if any, of many plants having medicinal potential remain unassessed by rigorous scientific research to define efficacy and safety.

Plant medicines are in wide use around the world. In most of the developing world, especially in rural areas, local traditional medicine, including herbalism, is the only source of health care for people, while in the developed world, alternative medicine including use of dietary supplements is marketed aggressively using the claims of traditional medicine. As of 2015, most products made from medicinal plants had not been tested for their safety and efficacy, and products that were marketed in developed economies and provided in the undeveloped world by traditional healers were of uneven quality, sometimes containing dangerous contaminants. Traditional Chinese medicine makes use of a wide variety of plants, among other materials and techniques. Researchers from Kew Gardens found 104 species used for diabetes in Central America, of which seven had been identified in at least three separate studies. The Yanomami of the Brazilian Amazon, assisted by researchers, have described 101 plant species used for traditional medicines.

Drugs derived from plants including opiates, cocaine and cannabis have both medical and recreational uses. Different countries have at various times made use of illegal drugs, partly on the basis of the risks involved in taking psychoactive drugs

Indian System of Medicines:

Siddha:

Siddha medicine is a traditional medicine originating in Tamil Nadu, India and practised over centuries. The Indian Medical Association regards Siddha medicine degrees as "fake" and Siddha therapies as quackery, posing a danger to national health due to absence of training in science-based medicine. Identifying fake medical practitioners without qualifications, the Supreme Court of India stated in 2018 that "unqualified, untrained quacks are posing a great risk to the entire society and playing with the lives of people without having the requisite training and education in the science from approved institutions".

In rural India, siddhars have learned methods traditionally through master-disciple relationships to become local "healers". Siddhars are among an estimated 400,000 traditional healers practicing medicine in India, comprising some 57% of rural medical care. Siddha practitioners believe that five basic elements – earth, water, fire, air, sky – are in food, "humours" of the human body, and herbal, animal

or inorganic chemical compounds, such as sulfur and mercury, used as therapies for treating diseases.

The Ministry of Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy of the Government of India regulates training in Siddha medicine and other traditional practices grouped collectively as AYUSH. Practitioners are called *siddhars* (*vaithiyars* in Tamil), and may have formal training with advanced degrees, such as BSMS (Bachelor in Siddha Medicine and Surgery), MD (Medical Doctor, Siddha) or Doctor of Philosophy (PhD.). The Central Council of Indian Medicine, a statutory body established in 1971 under AYUSH, monitors education in areas of rural Indian medicine, including Siddha medicine.

History:

Siddha is an ancient Indian traditional treatment system which evolved in South India, and is dated to the times of 3rd millennium BCE Indus Valley Civilization or earlier. According to ancient literature of Siddha, it is said that the system of this medicine originated from Hindu God Shiva who taught it to his consort Parvati. Parvati then passed it on to Nandi and Nandi taught about it to nine Devas. Most Siddha medical practitioners are traditionally trained, usually in families and by gurus (teachers). When the guru is a martial arts teacher, he is also known as an *ashan*. Traditionally, it is taught that the siddhars laid the foundation for this system of medication. Siddhars were spiritual adepts who possessed the ashta siddhis. Nandhisar is considered the first siddha and the guru of all siddhars. The Tamil Nadu state runs a 5.5-year course in Siddha medicine (BSMS: Bachelor in Siddha Medicine and Surgery). The Indian Government also gives its focus on Siddha, by starting up medical colleges and research centers like National Institute of Siddha. and Central Council for Research in Siddha. Commercially, Siddha medicine is practiced by siddhars referred in Tamil as *vaithiyars*.

Ayurveda:

The ancient Indian medical system, also known as Ayurveda, is based on ancient writings that rely on a “natural” and holistic approach to physical and mental health. Ayurvedic medicine is one of the world’s oldest medical systems and remains one of India’s traditional health care systems. Ayurvedic treatment combines products (mainly derived from plants, but may also include animal, metal, and mineral), diet, exercise, and lifestyle.

Ayurveda is a 5000-year-old art of treating various diseases and conditions that originated in India. Traditionally, the word Ayurveda means the science of life. Ayur means life, Veda means science or knowledge.

- ‘Ayur’ meaning Life
- ‘Veda’ meaning Science of Knowledge

So what does this ancient art of healing do to your body? Well, this ancient art of healing helps your body to stay vital by making the person realise their full body potential. More than being an ancient art of healing, this art professes that our health is in balance with the environment, body, spirit and mind. These 4 factors draw the basis of Ayurvedic medicine.

Ayurveda has more than just healing, in fact, it ensures that you live a healthy lifestyle. This system is a far more superior form of medicine that provides treatments for a number of various ailments that is usually not found in other forms

of medicine. Before getting an Ayurvedic treatment, here are some interesting facts that you need to know about this ancient art of medicine and healing.

- If you believe that Ayurveda is all about medicinal herbs, then you could be wrong. This art involves the use of butter, honey, rock salts, milk and ghee as its components in its healing process.
- This form of medicine has many specialities such as Shalya-chikitsa (Surgery), Kaayachikitsa (Internal Medicine), Bhutavidya (Psychiatry), Shalakyia (Disease located above the shoulder), Kaumarabhrutyam (Paediatrics), Rasayanam (Rejuvenation) and Agadatantram (Toxicology).
- The effects of Ayurveda on the human body is extreme and can give you long time relief. This is because this practice believes that the body is made up of 5 elements such as water, air, water, earth and fire all of which plays an important role in the way your body functions.
- Ayurveda is said to cure the cause of the problem more than the fighting its symptoms. This means that an Ayurvedic doctor will concentrate on the root of the problem more than paying attention to the symptoms.

Ayurveda is categorised into three different types of life forces (Doshas) namely Vata dosha, Pitta dosha, Kapha dosha. So what are these dosha's and what do they have to do with the human body? Well, it is believed that every human has any one of the above dosha's or life energy. Moreover, an Ayurvedic doctor will first identify which dosha you belong to and then decides upon the treatment you should go through.

Here are some health benefits that this ancient healing art provides:

1. Stress Buster

Yoga and Ayurveda are inter-linked with each other in Vedic Knowledge. Thus, it is important to understand both roles of Ayurveda and Yoga together. Vedic knowledge was designed to show the inner workings of the universe in relation to our consciousness. There are many Ayurvedic methods to release stress namely:

- Dinacharya: This refers to waking up early before the sun rises. This practice is said to give you peace of mind.
- Meditation: This will help you stay relaxed and reduces stress hormones.
- Drink Green Tea: This has stress properties such as L-theanine that keeps you calm and reduces anxiety.

2. Aids in Weight Loss:

Ayurveda helps you reduce weight without affecting your physical and emotional stability. An Ayurvedic doctor will prescribe a healthy diet plan that will aid in weight loss. The diet plan will benefit you in many ways such as:

- Detoxify your body
- Removal of excessive fat from tissues
- Skin purification and toning
- Removes body odour
- Regulates blood circulation
- Reduces cholesterol

3. Balances Hormones

Ayurveda helps balance hormones which result in health menstrual cycle and

pregnancy-related issues. Ayurvedic treatment for regulating menstrual cycle involves detoxification of your body, getting enough rest, regular exercising and Abhyanga (Starting the day with full body massage). In order to get a suitable medication for an irregular menstrual cycle, it is recommended that you consult an Ayurvedic doctor.

4. Reduces Inflammation

Inflammation is usually caused due to poor diet and lack of sleep. Ayurveda consists of herbal treatments that are used for controlling excessive inflammation. Some of these herbs include turmeric, ashwagandha, boswellia and ginger that are combined with each other to reduce inflammation.

Boswellia is usually recommended for people suffering from acute back pain, arthritis and bowel disease. On the same lines, turmeric is used as a powerful antioxidant that can reduce inflammation. Ashwagandha is recommended for the purpose of rejuvenation. Rejuvenation helps keep your mind strong and healthy thinking will keep you away from developing health issues.

5. Removes Bad Toxins From Body

Ayurveda cleanses your mind, body and soul. A vital Ayurvedic treatment called 'Panchakarma' is used to get rid of toxins that interfere with the normal functioning of your body. Also, a full body massage will rejuvenate your body and keep you functioning normally. In order to get the right Ayurvedic treatment, you will have to consult an Ayurvedic doctor, and he/she will put you on a natural diet that is specific for the condition or illness you are dealing with.

6. Reduces Risk of Diseases

Having a healthy diet, sunbathing, and having a breathing exercise will help you avoid the risk of developing any disease. Prevention is the first and most important step that is followed in Ayurveda. There are two goals in Ayurveda i.e. to look at the disease from where it arose and secondly finding a natural way of curing the disease. Ayurvedic treatment will reduce your risk of diseases because it concentrates on preventive measures rather than curing the disease. While modern medicine has X-rays to detect a disease in its later stage, Ayurvedic medicine detects a disease even before you could get it and provides preventive measures to curb it.

7. Benefits Overall Health

Ayurveda is an ancient medicine focuses on the individual rather than the disease itself. In Ayurvedic treatments, all that matters is the root of the disease and using preventive measures to curb it from affecting your body. Moreover, it helps the body both internally and externally. The different medicinal herbs used in this ancient art are turmeric, cloves, cinnamon, cardamom, saffron and Tulsi (Holy Basil). These herbs have inflammatory and antioxidant properties that can prevent you from diseases or illnesses.

8. Healthy Skin

If you are looking for healthy and radiant skin, then here is how you can make use of Ayurveda and get it done naturally. All you need to do is to consume a lot of leafy greens such as lettuce, spinach and cucumber that is easy to digest and aids in glowing skin. Leafy greens have purifying properties that can make your skin look

young and bright. It is also recommended that you consume a lot of nuts and seeds because they contain Omega-3 healthy fatty acids that can make your skin look vibrant and also reduces inflammation.

9. Cures Insomnia

Drinking caffeine before bedtime, staring at your phone's light or a spicy dinner can disrupt your sleep cycle and aggravate your nervous system. Ayurveda can help you have an undisturbed sleep. All you need to do is to simply rub some jasmine or coconut oil on your scalp and feet and then consume a warm glass of almond milk. This simple hack will cure you of insomnia.

10. Reduces Bloating

Bloating is usually the aftermath of eating too much and disturbances in bowel movements. It is usually caused due to excessive production of gas that can cause severe pain, feeling stuffed and discomfort. Ayurveda can manage bloating and aid in good digestion. Ayurvedic herbs, spices and roots such as cardamom, ginger and cumin can cure indigestion in the body. All you need to do is to simply chew cumin along with some ginger and this will aid in digestion.

Unani :

"Unani" or "Yunani medicine" (Urdu: طب یونانی *tibb yūnānī*^[1]) is the term for Perso-Arabic traditional medicine as practiced in Muslim culture in South Asia and modern day Central Asia. Unani medicine is pseudoscientific. The term *Yūnānī* means "Greek", as the Perso-Arabic system of medicine was based on the teachings of the Greek physicians Hippocrates and Galen. The Hellenistic origin of Unani medicine is still visible in its being based on the classical four humours: phlegm (*balgham*), blood (*dam*), yellow bile (*ṣafrā*) and black bile (*saudā*), but it has also been influenced by Indian and Chinese traditional systems. The Supreme Court of India and Indian Medical Association regard the practice of modern medicine by practitioners of Unani, Ayurveda and Siddha medicine as quackery.^{[8][9][10]} Practitioners of any medical system, including Unani medicine, are not authorized to practice medicine in India unless trained at a qualified medical institution, registered with the government, and listed as physicians annually in *The Gazette of India*.^{[8][10]} Referring to practitioners of all medical systems, the Supreme Court of India stated in 2018 that "unqualified, untrained quacks are posing a great risk to the entire society and playing with the lives of people without having the requisite training and education in the science from approved institutions".

According to Unani medicine, management of any disease depends upon the diagnosis of disease. Proper diagnosis depends upon observation of the patient's symptoms and temperament.

Homeopathy:

Homeopathy is a medical system based on the belief that the body can cure itself. Those who practice it use tiny amounts of natural substances, like plants and minerals. They believe these stimulate the healing process. It was developed in the late 1700s in Germany. It's common in many European countries, but it's not quite as popular in the United States.

A basic belief behind homeopathy is "like cures like." In other words, something that brings on symptoms in a healthy person can – in a very small dose – treat an illness with similar symptoms. This is meant to trigger the body's natural defenses. For example, red onion makes your eyes water. That's why it's used in homeopathic remedies for allergies. Treatments for other ailments are made from poison ivy, white arsenic, crushed whole bees, and an herb called arnica.

Homeopathic doctors (who also are called “homeopaths”) weaken these ingredients by adding water or alcohol. Then they shake the mixture as part of a process called “potentization.” They believe this step transfers the healing essence. Homeopaths also believe that the lower the dose, the more powerful the medicine. In fact, many of these remedies no longer contain any molecules of the original substance. They come in a variety of forms, like sugar pellets, liquid drops, creams, gels, and tablets. During your appointment, a homeopath will ask a number of questions about your mental, emotional, and physical health. He’ll prescribe the remedy that best matches all of your symptoms. Then he’ll tailor the treatment for you. You can also buy over-the-counter homeopathic remedies at drugstores and health food stores. The dosage and quality of these products depend on the manufacturer.

It’s used for a wide variety of health issues, including some chronic illnesses:

- Allergies
- Migraines
- Depression
- Chronic fatigue syndrome
- Rheumatoid arthritis
- Irritable bowel syndrome
- Premenstrual syndrome

It can also be used for minor issues like bruises, scrapes, toothaches, headaches, nausea, coughs, and colds.

Don’t use homeopathic medicine for life-threatening illnesses, like asthma, cancer, and heart disease, or in emergencies. You should also avoid using it in place of vaccines. Some homeopathic products called “nosodes” are marketed as an alternative for vaccines, but there’s no research to prove they’re effective.

Aromatherapy:

Aromatherapy is based on the usage of aromatic materials, including essential oils, and other aroma compounds, with claims for improving psychological or physical well-being. It is offered as a complementary therapy or as a form of alternative medicine, the first meaning alongside standard treatments,^[2] the second instead of conventional, evidence-based treatments. Aromatherapists, people who specialize in the practice of aromatherapy, utilize blends of supposedly therapeutic essential oils that can be used as topical application, massage, inhalation or water immersion. There is no good medical evidence that aromatherapy can either prevent, treat, or cure any disease. Placebo-controlled trials are difficult to design, as the point of aromatherapy is the smell of the products. There is disputed evidence that it may be effective in combating postoperative nausea and vomiting.

Importance of Herbal medicines:

Herbal medicines have been used throughout the beginning of human history and played a pivotal role in the prevention and treatment of various diseases. Ancient, Indian medicinal systems viz. Ayurveda, Siddha, Unani, Amchi and local health traditions provides a strong base for the utilization of a large number of plants in terms of safety and effectiveness leads for the management and treatment of different disease conditions. A large number of herbs & herbal formulations are used as rejuvenators. Rasayana therapy is the specialized practice of Ayurveda, which deals with the improvement of the mental & physical health of individual, increase longevity, intellectual capacity & strength and keep the patients free from diseases by using Rasayana plants and formulations. Various Rasayana herbs like

Ashwagandha (*Withania somnifera*), Shatavari (*Asparagus racemosus*), Pippali (*Piper longum*), Brahmi (*Centella asiatica*), Yasthimadhuka (*Glycyrrhiza glabra*) and Triphala (combination of three fruits) contains holistic properties and used science ancient time for prevention of diseases and maintenance & promotion of better health. According to the World Health Organization (WHO) 80% of the people in throughout the world currently uses herbal medicine for primary health care. Herbal medicine is a major component of Ayurvedic, homeopathic, naturopathic, traditional Chinese medicine, and Native American Indian medicine. The proportion plants used in the different systems of medicine is: Ayurveda 2000, Siddha 1300, Unani 1000, Homeopathy 800, Tibetan 500, Modern 200 and folk 4500. As per WHO, 74% of 119 modern plant-derived pharmaceutical medicines are used in ways that correlated directly with their traditional uses.

Unit II

Pharmacognosy :

1. Definition :

- ❖ Pharmacognosy is the study of medicinal uses of various naturally occurring drugs its history, sources, distributions, method of cultivation, active constituents, medicinal uses, identification test, preservation methods, substituents and adulterants.
- ❖ Crude drugs is referred to the natural product that has not been in advanced in value or improved in condition by any process or treatment beyond that which is essential for its proper packaging and prevention from deterioration.
- ❖ Traditional medicine: Traditional Medicine is the systems of medicine based on cultural beliefs and practices handed down from generation to generation
- ❖ Crude drugs: It is used for those natural products such as plants or part of plants, extracts and exudates which are not pure compounds and used in medicine

2. Scope of pharmacognosy:

- ❖ Pharmacognosy is critical in development of different disciplines of science.
- ❖ A pharmacognosist should possess a sound knowledge of the terms used to describe the vegetable and animal drugs as covered under botany and zoology, respectively.
- ❖ The knowledge of plant taxonomy, plant breeding, plant pathology and plant genetics is helpful in the development of cultivation technology for medicinal and aromatic plants.
- ❖ Plant - chemistry (phytochemistry) has undergone significant development in recent years as a distinct discipline.
- ❖ It is concerned with the enormous variety of substances that are synthesized and accumulated by plants and the structural elucidation of these substances.
- ❖ Extraction, isolation, purification and characterization of phytochemicals from natural sources are important for advancement of medicine system.
- ❖ The knowledge of chemotaxonomy, biogenetic pathways for formation of medicinally active primary and secondary metabolites, plant tissue culture and other related fields is essential for complete understanding of Pharmacognosy.
- ❖ One should have the basic knowledge of biochemistry and chemical engineering is essential for development of collection, processing and storage technology of crude drugs.
- ❖ Pharmacognosy is important branch of pharmacy which is playing key role in new drug discovery and development by using natural products.
- ❖ Pharmacognosy has given many leads for new drug discovery and development.
- ❖ It is an important link between modern medicine systems (allopathy) and traditional system of medicine. It is part medicinal system which is affordable as well as accessible to common man.

- ❖ It is acting as bridge between pharmacology, medicinal chemistry and pharmaco therapeutics and also pharmaceuticals.
- ❖ It also bridges pharmaceuticals with other pharmacy subjects.
- ❖ More than 60 percent of world population is still using natural product for their primary healthcare needs.
- ❖ Pharmacognosy can provide safe and effective drugs in combination with modern medicine system.
- ❖ Pharmacognosy includes knowledge about safe use of herbal drugs including toxicity, side effects, drug interaction thereby increasing effectiveness of modern medicine.
- ❖ Pharmacognosy is an important link between pharmacology and medicinal chemistry.
- ❖ As a result of rapid development of phytochemistry and pharmacological testing methods in recent years, new plant drugs are finding their way into medicine as purified phytochemicals, rather than in the form of traditional galenical preparations.
- ❖ Pharmacognosy is the base for development of novel medicines. Most of the compounds obtained from natural product serve as prototype or base for development of new drug which are more active and less toxic.
- ❖ By means of pharmacognosy, natural products can be dispensed, formulated and manufactured in dosage forms acceptable to modern system of medicine.
- ❖ There are vast number of plant and animal species which are not studied systematically.
- ❖ Development of pharmacognosy also leads to development of botany, taxonomy, plant biotechnology, plant genetics, plant pathology, pharmaceuticals, pharmacology, phytochemistry and other branches of science.

3. Natural source of drugs

A. Plant Sources

- ❖ A number of plants have medicinal qualities and have been used for centuries as drugs or drug sources.
- ❖ Like plant products, drugs from animal sources may be crude (unrefined) or refined material.
- ❖ Where the product is used without further processing e.g., ground leaves or bark, boiled concoctions or powdered sap, the substance is called crude drug.
- ❖ The table below shows some pharmacologically active principles or drugs derived from various parts of a plant.

B. Animal Sources

- ❖ Many important drugs are derived from animal source.
- ❖ In most instances, these medicinal substances are derived from the animal's body secretions, fluid or glands. Insulin, heparin, adrenaline, thyroxin, cod liver oil, musk, beeswax, enzymes, and antitoxins sera are some examples of drugs obtained from animal sources.

C. Mineral sources

- ❖ Minerals (both metallic and non-metallic minerals) have been used as drugs since ancient times. Our body requires trace elements of minerals in order to maintain homeostasis.
- ❖ Patients lacking an adequate level of these materials may take specific mineral-based drugs to raise the level of minerals.
- ❖ Examples include ferrous sulfate in iron deficiency anemia; magnesium sulfate as purgative; magnesium trisilicate, aluminum hydroxide and sodium bicarbonate as antacids for hyperacidity and peptic ulcer; zinc oxide ointment as skin protectant, in wounds and eczema; gold salts (solganal, auranofin) as anti-inflammatory and in rheumatoid arthritis; selenium as anti-dandruff.

D. Biosynthetic sources (genetically engineered drugs)

- ❖ This is relatively a new field which is being developed by mixing discoveries from molecular biology, recombinant DNA technology, DNA alteration, gene splicing, immunology, and immune pharmacology.
- ❖ Drugs developed using living organisms with the help of biotechnology or genetic engineering are known as biologics, biopharmaceuticals, recombinant DNA expressed products, bioengineered, or genetically engineered drugs. Examples include recombinant Hepatitis B vaccine, recombinant insulin and others.

3. CLASSIFICATION OF CRUDE DRUGS

- Crude drug i.e Simple drug.
- Crude drugs are plant, animal or their parts which after collection are subjected only to drying or making them into transverse/ longitudinal slices pieces or peeling them in some cases. They exist in natural form.
- Crude drugs may be derived from various natural sources like plants, animals, minerals and microorganisms etc.
- Because of their wide distribution the arrangement of classification in a definite sequence is necessary to understand easily.
- Although each system of classification has its own merits and demerits, but for the purpose of study the drugs are classified in the following different ways:
 - Alphabetical classification
 - Morphological classification
 - Chemical classification
 - Taxonomical classification
 - Pharmacological classification
 - Chemo- taxonomical classification

1. Alphabetical classification

- The crude drugs are arranged according to the alphabetical order/form of their Latin and English names. Some of the Pharmacopoeias and reference books which classify crude drugs according to this system are as follows.
- Indian Pharmacopoeia (IP) 1955 (Latin) 2) Indian Pharmacopoeia (IP) 1966 (English) 3) British Pharmacopoeia (BP) (English) 4) British Pharmacopoeia Codex (BPC) (English) 5) United States of Pharmacopoeia (USP) (English) 6) European Pharmacopoeia (Latin).

Advantages:

- It is simple method, in this system location, tracing and addition of the drug is easy.
- No technical person is required for handling the system.

Disadvantages:

- Scientific nature of the drug cannot be identified by this method, whether they are organised or unorganised drug.
- This system does not help in distinguishing the drugs of plant, animal and mineral source. (Original source is not clear).
- Examples: Acacia, Agar, Benzoin, Beeswax, Cinchona, Cinnamon, Digitalis, Datura, Jalap, Kino, Ephedra, Linseed, Fennel, Ginger, Isapagol, Mustard, Nutmeg, etc.

2. Morphological classification:

- Here the crude according to the drugs part are arranged (Grouped) of the plant or animal represented into organised (Cellular) drugs and unorganised (Acellular) drugs.
- Organised (Cellular):
- Drugs are the direct parts of the plant and are divided into leaves, barks wood, root, rhizome, seed, fruit, flower, stem, hair and fibers.
- Unorganised (Acellular):
- Drugs are the products of plant, animal and mineral source and they are divided into dried latex, dried juice, dried extracts, gums, resins, fixed oils and fats, waxes, volatile oil, animal products, minerals (Solids, liquids, semi solids etc).
- Organised drugs (Plant) (Cellular drugs)

Plant parts	-	Drugs
• Leaves	-	Datura, Senna, Vasaka, Digitalis,
• Barks	-	Cinnamon, Cinchona, Kurchi
• Wood	-	Quassia, Sandalwood, Red sanders
• Roots	-	Rauwolfia, Liquorice, Ipecac

- Rhizomes - Ginger, Podophyllum, Turmeric
- Flowers - Clove, Saffron, Pyrethrum
- Seeds - Nux vomica, Linseed, Isapgol
- Fruits - Coriander, Dill
- Stem - Ephedra
- Hair and Fibres - Cotton, Hemp, Jute
-

Advantages:

- This system of classification is more convenient for practical study especially when the chemical nature of the drug is not clearly understood.
- This type of classification is very useful in identifying the adulterants used.

Disadvantages:

- It does not give an idea about biological source, chemical constituents and uses.
- When different parts of the plant contain different chemical constituents, it is difficult to classify them.

3. Chemical classifications of crude drugs

- Here, the crude drugs are divided into different groups according to the chemical nature of their most important constituent present in the drug to which the pharmacological/therapeutic activity of drug is attributed.
- chemical constituents Drugs
 - Alkaloids - Datura, Vasaka, Vinca, Lobelia
 - Glycosides - Cascara, Senna, Digitalis
 - Tannins - Catechu, Myrobalan, Ashoka
 - Volatile oil - Clove, Eucalyptus, Cinnamon
 - Lipids - Castor oil, Beeswax, Arachis

Advantages :

- Chemical constituents are known,
- Medicinal uses are known

Disadvantages : Drugs of different origin are grouped under similar chemical titles. • This type of classification makes no proper placement of drugs containing two different types of chemicals.

•Eg: Certain drugs are found to contain alkaloids and glycosides (Cinchona), Fixed oil and volatile oil (Nutmeg) of equal importance together and hence it is difficult to categorize them properly.

4. Taxonomical classification of crude drugs

- In this system the drug are arranged according to taxonomical studies. The drugs are arranged according to their phylum, order, family, genus and species.
- It is purely a type of botanical classification or biological classification and restricted mainly to crude drugs from plant source.

Advantages:

- Easy for the classification of crude drugs

Disadvantages:

- The system is criticized for its failure to recognize the organised / unorganised nature of crude drugs in their morphological studies.
- The system fails to take into account chemical nature of active constituent and therapeutic significance of crude drugs.
- The drugs obtained from plants having alternate leaves, flowers, seeds, capsules (Hyocyamus, Datura, Bellodonna, Stramonium) are considered with other members of solanaceae.

5. Pharmacological classification of crude drugs: Here, the crude drugs are grouped according to pharmacological action (Therapeutic action) of their chief active constituent (most important) or therapeutic uses.

- Bitter - Quassia, Cinchona, Gentian Dill
- Carminatives - Clove, Fennel, Coriander
- Emetics - Kurchi Ipecac
- Anti-amoebic - Agar, Isapgol
- Bulk Laxatives - Ipecac Senna,

- Purgatives - I Senna, Castor oil

5. Chemo-taxonomical classification of crude drugs

- In this system of classification, the equal importance is given for taxonomical status and chemical constituents.
- There are certain types of chemical constituents which are characteristics of certain classes of plants.
- Eg: Tropane alkaloids generally occur in most of the members of Solanaceae.
- Eg: Volatile oils occur in the members of Umbelliferae and Rutaceae.


IV. Collection of crude drugs

- Primary or post-harvest processing Medicinal plant raw materials harvested or collected must be discharged and rapidly unpackaged upon receipt at the processing plant.
- Before processing, they should be protected from rain, moisture and other circumstances that could cause their deterioration.
- During the primary processing stage all medicinal plant material must be inspected.
-
- Products with inferior quality or foreign matter must be removed mechanically or by hand.
- Subsequently, the transformation is performed according to the raw material to be obtained:
- Fresh herb: REFRIGERATION • Frozen herb: FREEZING • Dry herb: DRYING
Essential oil: DISTILLATION • Vegetable extract: EXTRACTION

V. *Catharanthus roseus*

- ❖ *Catharanthus roseus*, commonly known as bright eyes, Cape periwinkle, graveyard plant, Madagascar periwinkle, old maid, pink periwinkle, rose periwinkle, is a species of flowering plant in the family Apocynaceae.
- ❖ It is native and endemic to Madagascar, but grown elsewhere as an ornamental and medicinal plant, a source of the drugs vincristine and vinblastine, used to treat cancer.

It was formerly included in the genus *Vinca* as *Vinca rosea*

Kingdom:	Plantae
Clade:	Tracheophytes
Clade:	Angiosperms
Clade:	Eudicots
Clade:	Asterids
Order:	Gentianales
Family:	Apocynaceae
Genus:	Catharanthus
Species:	<i>C. roseus</i>
Binomial name	
<i>Catharanthus roseus</i>	
 G. Don^[1] WPS Office	



Description

- *catharanthus roseus* is an evergreen subshrub or herbaceous plant growing 1 m (39 in) tall.
- The leaves are oval to oblong, 2.5–9 cm (1.0–3.5 in) long and 1–3.5 cm (0.4–1.4 in) broad, glossy green, hairless, with a pale midrib and a short petiole 1–1.8 cm (0.4–0.7 in) long; they are arranged in opposite pairs.
- The flowers are white to dark pink with a darker red centre, with a basal tube 2.5–3 cm (1.0–1.2 in) long and a corolla 2–5 cm (0.8–2.0 in) diameter with five petal-like lobes.

The fruit is a pair of follicles 2–4 cm (0.8–1.6 in) long and 3 mm (0.1 in) broad.

Cultivation

- As an ornamental plant, it is appreciated for its hardiness in dry and nutritionally deficient conditions, popular in subtropical gardens where temperatures never fall below 5–7 °C (41–45 °F), and as a warm-season bedding plant in temperate gardens.
- It is noted for its long flowering period, throughout the year in tropical conditions, and from spring to late autumn, in warm temperate climates. Full sun and well-drained soil are preferred.
- Numerous cultivars have been selected, for variation in flower colour (white, mauve, peach, scarlet and reddish-orange), and also for tolerance of cooler growing conditions in temperate regions.
- Notable cultivars include 'Albus' (white flowers), 'Grape Cooler' (rose-pink; cool-tolerant), the Ocellatus Group (various colours), and 'Peppermint Cooler' (white with a red centre; cool-tolerant).
- In the USA it often remains identified as "Vinca" although botanists have shifted its identification and it often can be seen growing along roadsides in the south.

Phytochemistry

- Vinblastine and vincristine, chemotherapy medications used to treat several types of cancers, are found in the plant and are biosynthesised from the

coupling of the alkaloids catharanthine and vindoline.

- ▶ The newer semi-synthetic chemotherapeutic agent vinorelbine, used in the treatment of non-small-cell lung cancer, can be prepared either from vindoline and catharanthine or from the *vinca* alkaloid leurosine, in both cases via anhydrovinblastine.
- ▶ The insulin-stimulating vincoline has been isolated from the plant.

Rosinidin is the pink anthocyanidin pigment found in the flowers of *C. roseus*. Lochnericine is a major alkaloid in roots.

Uses

- ❖ The species has long been cultivated for herbal medicine.
- ❖ In Ayurveda (Indian traditional medicine) the extracts of its roots and shoots, though poisonous, are used against several diseases.
- ❖ In traditional Chinese medicine, extracts from it have been used against numerous diseases, including diabetes, malaria, and Hodgkin's lymphoma.
- ❖ Many of the *vinca* alkaloids were first isolated from *Catharanthus roseus*, including vinblastine and vincristine used in the treatment of leukemia and Hodgkin's lymphoma.
- ❖ This conflict between historical indigenous use, and recent patents on *C.roseus*-derived drugs by western pharmaceutical companies, without compensation, has led to accusations of biopiracy.
- ❖ *C. roseus* can be extremely toxic if consumed orally by humans, and is cited (under its synonym *Vinca rosea*).
- ❖ *C. roseus* is used in plant pathology as an experimental host for phytoplasmas.^[22] This is because it is easy to infect with a large majority of phytoplasmas, and also often has very distinctive symptoms such as phyllody and significantly reduced leaf size.