

G.VENKATASWAMY NAIDU COLLEGE

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Kovilpatti – 628 502

STUDY MATERIAL

for

OPEN ELECTIVE COURSE

(SELF STUDY COURSE)

Subject : HERBAL MEDICINE

Subject Code : U20BO6OE



1. Write the historical background of medicinal plants

Historical Background

- As early as 300 BC, the Chinese ascribed medicinal value of several plants.
- Shen Nung (2838 – 27200 BC) wrote the Chinese Pharmacopedia to describe the medicinal use of plants.
- In India during the Vedic period Charaka (3500 – 1800 BC) wrote Charaka – Samhita and Susruta wrote Susruta – Samhita. These two ancient writings dealt with about 700 drugs of plant origin in practical orientation.
- Hippocrates (460 – 377 BC), commonly called as Father of Medicine, he wrote : “Oath of Hippocrates” – the book for medical practicers.
- Aristotle (384 – 322 BC) contributed to understand the structure and medicinal value of many plants.
- Dioscorides (62 – 182 AD), a roman Military surgeon wrote a famous book “De Materia Medica”. This book described 600 medicinal plants including Opium, Ercot, Balladonna, etc.,
- William Turner (1951) wrote a book on Herbals.
- S.P. Agharkar (1953) described medicinal plants of Bombay.
- K. Biswas (1956) enlisted medicinal plants of Darjeeling and Sikkim.
- R.N. Chopra (1958) wrote on Indigenous drugs of India.

- U.C. Dutt (1961) described medicinal plants of Hindus.
- S.K. Jain (1963) discussed the medicinal plants of Madhya Pradesh.
- R. Mitra and S.K. Jain (1991) have reviewed the medicinal plants of India.
- R.S. Thakur et al., (1992) described the major medicinal plants of India.

2. Mention different form of utilization of medicinal plants

The medicinal plant may be used in the following ways:

(i) Suranam:

The useful part of one or few medicinal plants are pulverized into powder called suranam. This powder or suranam is taken orally with a suitable liquid, namely hot water, milk, buttermilk, etc.,

(ii) Tablets or Kulligal:

The powdered components of medicinal plants are mixed together in a suitable combination and made into tablets. These tablets are often known as Kuligai. They are taken orally with hot water or milk.

(iii) Decoction:

The useful part or whole plant is boiled with water and the liquid portion is filtered and used as drug. The liquid that contains the active principle is called decoction.

(iv) Extract

The useful part is ground with water and filtered through a cheese cloth to get the filtrate. This extract is taken orally.

(v) Paste:

Paste is prepared by grinding the useful part with a little water and applied on the body surface, especially on skin, head wounded sites etc.,

(vi) Oil or Thylam:

A combination of useful plants is added to oil boiled well to get a medicated oil or thylam. This oil may be applied to hairs or body to cure some diseases.

(vii) Lahium:

It is gel made by mixing powders of two or more herbs, cane sugar and cheese.

3. Write short notes on Siddha system of medicine.**SIDDHA SYSTEM MEDICINE**

- Siddha medicine, traditional system of healing that originated in South India and is considered to be one of India's oldest systems of medicine.
- The Siddha system is based on a combination of ancient medicinal practices and spiritual disciplines as well as alchemy and mysticism.

- It is thought to have developed during the Indus civilization, which flourished between 2500 and 1700 BCE.
- According to this theory, it came to South India when the Dravidian people (speakers of Dravidian languages), who may have been the original inhabitants of the Indus valley, migrated southward.
- Siddha medicine appears as part of Tamil culture in the earliest Tamil writings (Tamil is one of the principal Dravidian languages).
- For example, there are references to it in Tamil shangam literature (1st–4th century CE), including mention in the Tolkappiyam (“Ancient Literature”), a treatise on grammar and poetics, and in Tirukkural (“Sacred Couplets”), a work attributed to the Tamil poet-saint Tiruvalluvar.

4. Outline the definition and concept of Ethnobotany

Definitions and Concepts:

- ❖ Several definitions have been assigned to ethno botany but the basic concept has not changed much and the scope of ethno botany is increasing day by day.
- ❖ According to Schultes (1962), ethno botany is defined as the study of the relationships between the people of a primitive society and plants.
- ❖ Alcom (1984) states that ethno botany is the study of contextualized plant use.

- ❖ Jain (1987) elaborated it as the total natural and traditional relationship and interaction between man and his surrounding plant wealth.
 - ❖ Recently, Wickens (1990) defined ethno botany as the study of useful plants prior to commercial exploitation and eventual domestication.
 - ❖ In fact, ethno botany is the first knowledge on plants which primitive and aboriginal people had acquired by sheer necessity, intuition, observation and experimentation in the forests.
 - ❖ It is now almost universally recognized as the total direct or natural relationship between man and plants and it includes the use of plants by both tribals and non-tribals without any implication of primitive or developed societies.
 - ❖ Ethno botany is an interdisciplinary science and has relevance to sociology, anthropology, taxonomy, photochemistry, archaeology, ecology, agriculture, medicine, linguistics etc.
 - ❖ Today ethno botany has become an important and crucial area of research and development in resource management, sustainable utilization and conservation of biodiversity and socioeconomic development.
 - ❖ Now the botanists, social scientists, anthropologists, the practitioners of indigenous medicines all over the world are engaged in the study of man-plant interactions in natural environment.
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5. Write any Ten Importance of ethnobotany.**Importance of Ethno botany:**

- Ethno botanical knowledge is very ancient.
- It provides information regarding the traditional uses of plant wealth which can be utilized in integrated tribal development.
- The ethno botanical studies throw light on certain unknown useful plants and new uses of many known plants which can be exploited for developing new sources for some plant products and agro based industries.
- With the opening of new vistas of ethno botany, the scope of this natural science has now greatly increased both in terms of its theoretical contribution towards the understanding of plant-human relationship and the practical knowledge of tribal people in medicine, agriculture, health and industry.
- The tribals depend mostly on forest flora for meeting their day to day needs and primary health care.
- They collect and utilize many wild plants for food, medicines, fibres, oils, gums, tannins and dyes from the ambient vegetation of their localities.
- The agricultural practices are not technological by advanced and most tribal groups in north-east part of India resort to shifting cultivation widely known as jhum.
- There are community land, clan land and individual land and the individual users of land have right of possessing inherited land.

- Jhuming or shifting cultivation involves felling of forest trees, clearing of shrubs and undergrowth in limited area and turning of soil for sowing crops.
- The cleared land is used for agriculture for short time and when the fertility of the soil decreases, the area is abandoned by tribals and then they shift to new area and clear the forest vegetation for agricultural purpose.
- Jhuming has caused deforestation and soil erosion. Thus the existing land use and its unscientific management have aggravated the problems of soil erosion, floods, depletion of water resources and overall productivity.
- Therefore, it has now become essential for botanists, agricultural scientists, anthropologists and government agencies to take stock of the problems of the tribal communities and make coordinated efforts in this direction.
- It requires proper management of settlements of tribal population because the migration of tribal communities compels them for shifting cultivation.

6. What is alkaloids? Mention any one alkaloid yielding palnt

ALKALOIDS

- Alkaloids are nitrogenous compounds.
- They are derived from plant sources.
- They are basic in nature and contain one or more nitrogen atoms.
- The nitrogen atoms are arranged in heterocyclic in ring.

- Usually it has physiological action on human and animals.

1. ***Catharanthus roseus***

Botanical name : *Catharanthus roseus* or *Vinga rosea*

Family : Apocynaceae

Tamil name : Nithiyakalyani

- It is native plant of Madagascar
- Now it is cultivated for commercial drug purpose in India.

Useful parts: Roots and Leaves

Chemical constitution

- About 15 alkaloids have been isolated from *Catharanthus roseus*.
- Roots contain **vinblastine, vincristine, Catharine** and **Ajmalicine** etc.,
- Leaves contain **Vincalucoblastine**.
- All plant parts are rich in alkaloids.
- The maximum concentration found in the roots.
- **Vinblastine** is the active principle.

Medicinal uses

- Vinblastine, Vincristine, leurosidine, alkaloids used for treatment of various cancers.
- Vincristine is used to treat leukaemia in children.

- This drug is also used to treat lung cancer and breast cancer.
 - The alkaloids from root are effective with hypotensive and sedative properties.
 - The alkaloids of root and leaves are used for diabetes.
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7. Narrate the chemical constitution and uses of *Rauwolfia serpentina*

Chemical constitution

- This plant contains at least 30 alkaloids.
- The main medicinally important alkaloids is **resperine**.
- **Ajmalicine** and **serpentine** are other alkaloids isolated from roots.
- The active principle is **resperine**.

Medicinal uses:

- The resperine and other preparations from rauwolfia are used in the management of hypertention.
 - This drug is used to treat mental disorders.
 - Alkaloids of Rauwolfia are used to control blood pressure.
 - Ajmaline alkaloid of Rauwolfia is used to treat circulatory disease and heart problems.
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8. Describe the botanical description and medicinal uses of *Digitalis purpurea*

Digitalis purpurea

Botanical name : *Digitalis purpurea*

Family : Scrophulariaceae

Common name : Foxglove

Biological sources:

- The botanical name of digitalis is *Digitalis purpurea*.
- The biological source of digitalis is its dried leaves.
- It belongs to the scrophulariaceae plant family.
- It is also known as foxglove leaves, digitalis leaves.

Medicinal Uses:

- It is used to treat congestive heart failure.
- It helps in more powerful contractions of heart and increase excitability of cardiac muscle.
- It has a good effect on kidney which results in diuresis and loss of oedema.
 - It has cardiotonic property.
 - It is also used to treat arterial flutter and atrial fibrillation.
 - It is used to treat paroxysmal atrial tachycardia.

9. Discuss the chemical constituents of *Digitalis purpurea***Chemical constituents:**

- The main chemical constituents of digitalis are primary and secondary glycosides.
 - The amount is 0.2-0.45% which is present in digitalis.
 - Purpurea glycosides A and B(active chemical constituents), glucogetaloxin are the primary glycosides which are present in digitalis.
 - Digitoxin, gitoxin and getaloxin are the secondary glycosides present in digitalis.
 - It also contain odoroside H.
 - Verodoxin is also present in it.
 - Is also consist of anthraquinones derivatives such as digitolutin, methoxy-2 methyl anthraquinones.
 - It also contain saponin and flavonoids as chemical constituents.
 - Tannins and pectin also present in it in small amount.
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10. Explain the uses of *Strophanthus speciosus***Uses:**

- It has an effect on circulation in case of chronic heart weakness.
- It also has diuretic action.
- It helps to treat arteriosclerosis.

- It also used to treat hypertension.
- Various types of heart problem are treated by this.
- It has property of heart stimulant.
- It influence blood circulation in case of chronic heart weakness.
- Its pulp roots and bark are also used to treat malaria, dysentery and gonorrhoea.
- It is also used to treat rheumatic afflictions.
- When it is applied externally, it is used to treat skin disease, leprosy and ulceration.
- Its bark or leaf sap also is used as an antidote against the effects of snakebites.
- In eyes, it is used to treat conjunctivitis.
- Leaf and stem has laxative properties and also used to treat fever.

11. Write down the biological sources and therapeutic uses of *Urginea indica*

Biological sources:

- The botanical name of squill is *Drimys maritima*.
- The biological source of squill is dried slices of bulb *Urginea indica* Kunth.

- It is also known as urGINEA, scillae bulbos, scilla bulb, white squill and jangali pyaj.
- It belongs to the liliaceae family.

Therapeutic/Medicinal Uses:

- It is used as cardiotoxic.
- It has stimulant effect.
- It also has the property of expectorant.
- As expectorant it is used to treat asthma and chronic bronchitis.
- It also has anticancer property against human epidermoid carcinoma of the masopharynx in tissue culture.
- It also has diuretic properties.
- It acts in similar manner to digitalis which slow and strengthening the pulse.

12. Outline the medicinal uses of *Hemidesmus indicus***Medicinal Uses:**

- Skin: It helps in treating Eczema, Erysipelas, Psoriasis, and Urticaria from heat and aggravated Pitta. It 'cleans' the blood, stops itching and reduces supperation. The root powder is used to treat STDs that are damp and hot.
- Urinary: Urinary infections with dark red, cloudy, painful urination; cystitis, urethritis, kidney infections, prostatitis.

- Nerves: Its alterative and purificatory nature extends to the mind, hence its used in disturbed, angry or irritated emotions from high Pitta . It reduces Vata indirectly by calming the flames of Pitta.
- It is used in certain bacterial conditions such as Gonorrhoeal neuralgia, Syphilis, Venereal disease.
- It is used in Auto immune disease such as Rheumatism, Rheumatoid arthritis and also used in Nephritic disorders.
- It is also used in mouth sores of children.
- Benefits : Anantmool is one of the Rasayana plants of ayurveda as it is anabolic in effect. It is used for venereal diseases, herpes, skin diseases, arthritis, gout, epilepsy, chronic nervous disorders, abdominal distention, debility etc. Its saponin content is considered to have a steroidal effect that enhances the production of testosterone.

13. Identify the useful part and uses of *Cassia angustifolia*

Useful parts

Leaves and pods are medicinally useful in *Cassia angustifolia*. The leaves are astringent, bitter, cathartic, depurative, expectorant and febrifuge.

Pods contain sennosides A and B, glycoside of anthroquinones, rhein and chrysophanic acid. Seeds contain β -sitosterol.

Medicinal uses

- In Siddha the leaves are used to treat constipation, abdominal disorders, leprosy, skin diseases, leucoderma, jaundice, cough, bronchitis, typhoid fever and anaemia.
 - In Ayurveda the leaves are used for constipation, decoction of leaves and pods is given for prolonged cough.
 - It cure skin diseases such as acne and ringworm.
 - It prevents absorption of fluid from large intestine, thus contributing to softer stools.
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14. Generalize the family name, common name, morphology of useful part and the uses of *Aegle marmelos****Aegle marmelos***

Family : Rutaceae

English name : Bael

Tamil name : Vilvam

Useful parts

Leaves and fruits, the alkaloid **marmelosin** is the active principle.

Medicinal uses

- The fruit is eaten fresh and dried.
- The young leaves and tender shoots are eaten as salad.
- The fruit is used in religious rituals.

- The fruit is used as a remedy for diarrhea, dysentery, dryness of eyes and common cold.
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15. Discuss the medicinal uses of *Azadirachta indica*

Medicinal uses

- Small twigs are used as tooth brushes. They are prophylactic for mouth and teeth complaints.
 - Leaf extract is useful for sores, eczema and skin diseases.
 - Leaf paste along with turmeric is pasted on the wounds and pustules due to small pox, chicken pox and glandular swellings.
 - Decoction of fresh leaves has antiseptic properties. It cures ulcers and viral fevers.
 - Decoction of leaves and bark is given for cough, diabetes and itching on the skin.
 - Paste of seed is used to expel worms.
 - Neem oil is used in soaps, toothpaste and as a hair oil to kill lice.
 - Dried leaves are burnt to release smoke that kill insects.
 - Neem oil is used is used in the manufacture of pesticides.
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16. List out the medicinal uses of *Ocimum tenuiflorum***Medicinal uses**

- Decoction of roots is given as diaphoretic to treat malarial fever.
 - Leaf extract is useful to cure catarrh and bronchitis.
 - Leaf paste is given orally to kill ringworms and cure skin diseases.
 - Dried leaves are burnt to release smoke that is a good mosquito repellent.
 - Cough syrup is made from *Ocimum sanctum*.
 - Essential oil of *Ocimum sanctum* is applied on the forehead for treating cold.
 - The leaf extract of *Ocimum sanctum* has antibiotic and anticancer properties.
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17. Identify the useful parts and uses of *Phyllanthus amarus*.**Useful parts**

The entire plant is used medicinally. The leaves, stem, flowers, fruits and roots are together used in medicines.

All parts of this plant contain lignans, glycosides, flavonoids, alkaloids, lipids, sterols and flavonols. The alkaloids include Phyllanthin and hypophyllanthine, these are active principles in the medicinal plant.

This plant has antiinflammatory, antihepatotoxic, analgic, hypotensive, antiviral, antibacterial and diuretic properties.

Medicinal uses

- ✓ Leaf juice is given for stomach ache and dysentery.
 - ✓ Decoction of whole plant is given for colic pain and dropsy.
 - ✓ It also cures kidney stones when the patients take the decoction of whole plant continuously for six months.
 - ✓ It also cure stomach ulcers.
 - ✓ Juice from fresh roots cures jaundice.
 - ✓ It also cure liver diseases, indigestion, diabetics and kidney troubles.
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18. Restate the medicinal uses of *Phyllanthus emblica***Medicinal uses**

- ✓ Leaf juice is useful in inflammation, dyspepsia and dysentery.
- ✓ Tender shoots taken with butter milk cures indigestion and diarrhea.
- ✓ Decoction of the root bark is astringent. It is useful in ulcerative stomatitis and gastrohelcosis.
- ✓ The dried fruits have good effect on hair hygiene, they are used as ingredient in shampoo and hair oil.

- ✓ Fruit is rich source of vitamin C, it is used to make nutritive tonic for general weakness.
 - ✓ Seed is used in asthma, bronchitis and biliousness.
 - ✓ Bark juice is useful in gonorrhoea, jaundice and diarrhoea.
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19. Examine the useful part and uses of *Piper nigrum*

Useful parts

Fruits and seeds, Black pepper is dried fruit with seed, White pepper is the seed only. The pepper contains alkaloids such as piperine and volatile pepper oil.

Medicinal uses

- Pepper is a spice. It is used on the dining table often along with a table salt.
 - Paste of black pepper is applied on throat to relieve sore throat.
 - Pepper juice is an aromatic stimulant to relieve weakness after fever.
 - Pepper juice is an antiperiodic (intermittent fever) given for malarial fever.
 - Pepper juice is used as ear drops to relieve ear ache.
 - It also cures gas gangrene, indigestion and liver problems.
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20. Bring out the uses of *Zingiber officinale* in different systems of medicine

Medicinal uses

- ✓ In home medicines, ginger is used to cure indigestion and problems of the gastro-intestinal track.
- ✓ Ginger extract stops vomiting.
- ✓ Ginger extract boiled with palm juice cures flu.

In Ayurveda, ginger is used in the medicines for

- ✓ Constipation
- ✓ Obstruction in the movement of gas in the stomach
- ✓ Colic pain
- ✓ Bleeding from different parts of body
- ✓ Suppressed urination
- ✓ Cough.

In Siddha, it is used for

- ✓ Nausea, arthritis and also prepared for the medicinal oil for arthritis.
- ✓ It dissolves blood clots in the blood vessels
- ✓ Zingerone in the rhizome kills enterotoxigenic *E.Coli* in intestine.

Other uses

- Ginger is a characteristic odour and pungent taste. So, it is spice in various food items.
 - It is used for the flavouring agent in the meat product, breads, cookies, beer and tea.
 - Fresh ginger is used in pickles, canned ginger and ginger cocktails.
 - Oil extract from ginger used to prepare perfumes.
 - Oleoresin extracted from dried ginger is used as a preservative in soft drinks.
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21. Formulate the distribution and utilization of *Aloe vera*.

Distribution

World wide distribution, it grows almost all districts of India. It is found in plains, foot hills, scrub jungles and waste lands. It is cultivated in dry areas.

Medicinal uses

- ✓ Leaf juice is used in the treatment of dyspepsia, amenorrhoea, burns and abdominal tumours.
- ✓ Fresh leaf juice is given in the treatment of piles and rectal fissures.
- ✓ It is used to cool the body temperature at the time of sever fever.
- ✓ Pulp of the leaf is pasted on wounds for promoting wound healing. It is also cures x-ray burns, dermatitis.

- ✓ It cures eye trouble due to continuous exposure to high heat.
 - ✓ Leaf extracts is applied as a face moisturizer. For that reason it is used in the manufacture of face cream and cosmetics.
 - ✓ Juice made from leaf is a good coolant and refrigerant.
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22. Devise various medicinal uses of *Cynodon dactylon*.

Medicinal uses

- Leaf juice is cooling the intestine and cures piles problems.
- It is depuretic, it purifies the blood.
- It prevents haemorrhage (bleeding) from nose and ear.
- It cure skin diseases.
- The whole plant decoction cures anasarca, edema and dropsy (local swelling due to accumulation of body fluid).
- It prevents cough and respiratory problems.
- Decoction of rhizome and stem cures the urino-genital problems. It cures bleeding from the genital track and menstrual risk in women.
- It diuretic, it is used in kidney troubles.
- Whole plant juice prevents blood cancer and allergy.
- Paste from leaves is an antiseptic. It cures sores, worts and wounds on the body surface.
- Drinking the leaf extract cures anaemia.

- Root is demulcent. Applying root paste on body softens the tissue.

23. Analyse any five steps involved in the cultivation of medicinal plants

Steps in the cultivation of Medicinal plants

The cultivation of medicinal plants involved the following steps.

1. Site selection
2. Land preparation
3. Crop improvement
4. Sowing or planting
5. Irrigation
6. Weeding
7. Control insect, pest, diseases
8. Harvesting

1. Site selection

Proper selection of site is important for the commercial cultivation

- The location should have the same conditions as in the natural habitat.
- The location should away from human residences, hospitals, industries, roads.

- If it away from the above areas it free form pollutants, pesticides and chemical fertilizers and pathogenic microbes.

2. Land preparation

The selection site is cleaned to remove weeds, stones and root stocks of plants. It is the preliminary operation to be done before sowing.

If the land is plain, it is simply ploughed and leveled. Then, the land is supplied with plenty of organic manures.

The soil samples may be tested in the laboratory to determine the specific nutrient requirement of the soil.

3. Crop improvement

The medicinal plants are improved by selection, hybridization or micro propagation. The improved plating materials are supplied in the form of seeds or seedlings or rooted cuttings.

4. Sowing or Planting

Medicinal plants are raised in the prepared land by sowing the seeds or planting the seedlings. It should be done in the correct season. Sowing or planting in abnormal season does not give enough yield because of environmental and biotic factors.

- Seed harvested in the previous year should be sown in the field.
- Enough space is provided between the seedlings.
- Stem cutting and root cutting should be taken from healthy, disease free stocks.

5. Irrigation

- Enough water is required for the rapid growth and satisfactory yield of medicinal plants.
- Generally medicinal plants are irrigated when their leaves are dropping due to water deficit.
- Herbaceous annuals need more frequent irrigation.
- Irrigation is given during the hot season.
- Canal irrigation and overhead irrigation are suited for the medicinal plants depending on the water availability.
- The water should be clean and free from contaminants.

6. Weeding

- Removal of unwanted plants in the crop field is called weeding.
- The weeds are uprooted from the soil manually. They should be removed from the seed before the produce seeds.
- Chemical herbicides should not be used in the crop field for the eradication of weeds.

7. Control of insect, pest, diseases

- Insect, pest, diseases are serious menaces to the growth of medicinal plants. They should be controlled in time to get high yield.

- Light traps and pheromone traps may be installed at different places to catch insect pest.
- Companion crop that repels the insects may be grown to control pest / insect.
- Organic pesticides containing herbal extract may be sprayed over the crops to kill the insects.
- Pest may be controlled by introducing predatory birds in the field.

8. Harvesting

- The collection of medicinal plants and plant parts is known as harvesting.
- In some species, the entire plant is used as medicinally useful product. In most others, one or more parts like root, bark, stem leaves, flowers, fruits and seeds are used medicinally.
- The underground rhizome is collected by digging the soil.
- The underground part like root and rhizome are collected after the seed shedding.
- The bark should be stripped partially along with stem.
- Stem bark should not be stripped again and again from the same tree to reform a new bark in the debarking portion.
- In general, leaves of the herbs are collected before flowering.

- Tender leaves, pale leaves, infected leaves and unhealthy leaves are not collected.
 - Only mature, healthy and disease free leaves are collected.
 - The leaf harvest should be done during the growth season.
 - The flowers of tree should be harvested along with flowering tops; it must be done when the flowers have just opened.
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24. Write short notes on Essential oil

- ❖ Essential oil, highly volatile substance isolated by a physical process from an odoriferous plant of a single botanical species.
- ❖ The oil bears the name of the plant from which it is derived; for example, rose oil or peppermint oil.
- ❖ Such oils were called essential because they were thought to represent the very essence of odour and flavour.
- ❖ Distillation is the most common method for isolation of essential oils, but other processes—including enfleurage (extraction by using fat), maceration, solvent extraction, and mechanical pressing—are used for certain products.
- ❖ Younger plants produce more oil than older ones, but old plants are richer in more resinous and darker oils because of the continuing evaporation of the lighter fractions of the oil.
- ❖ Out of the vast number of plant species, essential oils have been well characterized and identified from only a few thousand plants. The oils are stored as microdroplets in glands of plants.
- ❖ After diffusing through the walls of the glands, the droplets spread over the surface of the plant before evaporating and filling the air with perfume.

- ❖ The most odoriferous plants are found in the tropics, where solar energy is greatest.
- ❖ The function of the essential oil in a plant is not well understood. Odours of flowers probably aid in natural selection by acting as attractants for certain insects.
- ❖ Leaf oils, wood oils, and root oils may serve to protect against plant parasites or depredations by animals.
- ❖ Oleoresinous exudations that appear when the trunk of a tree is injured prevent loss of sap and act as a protective seal against parasites and disease organisms.
- ❖ Few essential oils are involved in plant metabolism, and some investigators maintain that many of these materials are simply waste products of plant biosynthesis.

25. Enumerate ethnobotanical uses of Sandalwood oil

Traditional/Ethnobotanical uses

- ❖ Sandalwood oil has a warm, woody odor and is commonly used as a fragrance in incense, cosmetics, perfumes, and soaps. It also is used as a flavor for foods and beverages. The wood has been valued in carving because of its dense character.
- ❖ In traditional medicine, sandalwood oil has been used as an antiseptic and astringent, and for the treatment of headache, stomachache, and urinary and genital disorders. In India, the essential oil, emulsion, or paste of sandalwood is used in the treatment of inflammatory and eruptive skin diseases.

- ❖ The oil has been used in the traditional Ayurvedic medicinal system as a diuretic and mild stimulant, and for smoothing the skin. The leaves and bark were used by early Hawaiians to treat dandruff, lice, skin inflammation, and sexually transmitted diseases.
- ❖ Sandalwood oil has also demonstrated repellency against the crop pest *Tetranychus urticae* (two-spotted spider mite).

General uses

- ❖ Sandalwood oil has been reported to have diuretic and urinary antiseptic properties, but clinical trial data are lacking. The oil has mainly been used as a fragrance enhancer.
-