

4. Medicinal Plants in Everyday Life for Primary Health Care

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Abstract:

Medicinal plants are named so because they possess medicinal properties to cure diseases and they are without side effects and more compatible for human body system. Since ancient times they are used throughout the world. In India a science Ayurveda is dedicated to cure diseases from herbal resources. These plants are easily available in surroundings and can be easily used for primary health care, thus avoiding heavy cost incurred medicines. This present work describes in detail about eleven medicinal plants.

4.1 Introduction:

Medicinal plants are in use since time immemorial to treat various ailments. The use of these plants is described in ancient scriptures like the Rig-Veda, the bible, the Iliad, the Odyssey and in the History of Herodotus. The ancient Chinese are using herbs as far back as 4000B.C. the earliest reference of use of medicinal plants to cure diseases in 'Eber Papyrus' wrote in 1600 B.C. The Greeks and Romans were also familiar with many of the present day drugs as evident from the work of Hippocrates (460-370 B.C.) Aristotle (384-322B.C.), Theophrastus (370-287B.C.), Pliny and Elder (23-79 A.D.), Dioscorides (50-100 A.D.) and Galen (131-201A.D.). Hippocrates, father of medicine was the first person to explain the disease on scientific basis. Dioscorides *De Materia Medica* was an authoritative work on medicinal plants. In the 16th century many herbals published, Brunfels (1530), Bock (1539), Fuchs (1542), Cordus (1561) and L'Obel (1576). At about same time 'Doctrine of Signatures' of Paracelsus (1493-1541) was came, which advocated that all useful plants possessed certain forms and shapes that indicated their use in the treatment of similarly shaped organs of human body, like plants with heart shaped leaves for cardiac disorders, walnut as brain tonic and pomegranate seeds for dental problems. Such superstitions were lost with the advancement of knowledge. In India earliest references to medicinal plants were in Rig-Veda (3500-1600B.C.) and in Atharvaveda. In Ayurveda, definite properties of drugs obtained from plants and their uses have been described. Charak-Samhita and Susruta-Samhita are two important works dealing with about 700 Indian medicinal plants.

In developing countries traditional medicinal plants are still the major source of primary health care, and medicinal plant resources are under enormous pressure. Due to increasing trend towards the use of alternative system of medicinal plant resources are under enormous pressure. Several pharmaceutical industries, institutions, organizations, universities across the world have been engaged in research and documentation of various aspects of these medicinal plants to frame a strategy for their conservation and sustainable use.

Medicinal plants have been identified and used throughout the human history. Plants make chemical compounds that are for biological functions, including defense against insects, fungi and herbivore mammals. At least 12,000 such compounds have been isolated so far, a number estimated to be less than 10% of the total. Chemical compounds in plants mediate their effect on the human body through the processes identical to those already well understood for the chemical compounds in the conventional drugs, thus herbal medicines do not differ much from in term of how they work. This enables herbal medicines not only to have beneficial pharmacology, but also gives them the same potential as conventional pharmaceutical drugs to cause harmful side effects. Moreover, plant materials comes with a variety of compounds which may have undesired effects, through these can be reduced by processing.

The use of medicinal plants pre-dates written human history. Ethno botany the study of tradition medicinal human uses of plants is recognized as an effective way to discover future medicines. In 2001, researchers identified 122 compounds used in modern medicine which were derived from traditional plant sources, 80% of these have had a traditional use identical or related to the current use of active elements of the plant. Some of the pharmaceuticals currently available to physicians are derived from plants that have a long history of use as herbal remedies, including aspirin, digoxins, quinine and opium. Flowering plants were the original source of most plant medicines. Many of the common weeds that populate human settlements, such as nettle, dandelion and chickweed have medicinal properties. The WHO estimates that 80 % of the population of some Asian and African countries presently use herbal medicines for some aspect of primary health care. 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 combating the earth for phytochemicals and leads that could be developed for treatment of various diseases.

Among the 120 active compounds currently isolated from the higher plants and widely used in modern medicines today, 80% show a positive correlation between their modern therapeutic use and the traditional use of the plants from which they are derived. In this study some selected medicinal plants has been discussed which are useful for primary health care in everyday life. These are the plants easily available in our surrounding environment as cultivated plants, weeds and some of them are in use in our kitchen as spices.

4.2 Withania Somnifera:

Common Name: Indian Ginseng/Ashwagandha/poison gooseberry/winter cherry

Family: Solonaceae (nightshade family)

Part: used-roots/root bark

Somnifera: “sleep inducing” in Latin

This is a short, tender perennial under shrub growing 35-75 cm. The roots are fleshy, pale yellow or brown in colour. Hairy branches extend from a central stem. Leaves are simple, oval/elliptic, hairy, green, and simple. The flowers are axillary, small, pentamerous, hermaphrodite, hypogynous, and yellow-green and bell shaped. The ripe fruit is an orange-red berry covered with a peppery accrescent calyx.



Figure 4.1: Withania Plant

Part Used: The plant's long, brown, tuberous roots are used in traditional medicine. The fresh roots smell like horse hence known as Ashwagandha. The main chemical constituents are alkaloids and steroidal lactones. These include withanine, withananine, somniferin, tropine and cuscohygrine. The leaves contain the steroidal lactones, withanolides; withaferin A was first isolated from the plant. Other alkaloids are ashwagandhine, ashwaganidhine etc., identified exclusively in the ashwagandha plant only. Ashwagandha, the Indian ginseng/winter cherry has been used as a valuable herb in the Ayurvedic and indigenous medical system for over 4000 years. The roots, leaves and fruits (berry) possess tremendous medicinal value.

Uses: The roots are used to prepare the herbal remedy ashwagandha. The traditional use is as a powder, mixed with warm milk and honey and taken before bed. The root powder acts as an aphrodisiac, diuretic, narcotic, sedative and is restorative in nature. The dried leaves are made to powder from which a paste is made and used in the treatment of burns and wounds. The berries and leaves are applied externally to tumors, tubercular glands, carbuncles, and ulcers. Ashwagandha is the useful herb in arthritis, which involves painful, dry, swollen and inflamed joints. Ashwagandha has special properties to enhance ojas that is the most subtle, refined level of the physical body is the end result of healthy food which is properly digested. It is responsible for a healthy immune system, physical strength, lustrous complexion, clarity of mind, and sense of well-being.

4.3 Ocimum Sanctum L:

Family: Lamiaceae

Common Name: Tulsi

It is a 30-75 cm high erect herb grown in every part and every house of India as sacred plant. The leaves are opposite-decussate, exstipulate, simple, elliptical-ovate, serrate and acute. The inflorescence is verticillaster with zygomorphic/hermaphrodite flowers. The fruit is a caeruleus. Two types of this plants are known as Sri Tulsi (green) and Krishan Tulsi (purple).

Every Part of the Plant is useful:

Part Used: The plant is a mosquito repellent. Decoction of root is given as a diaphoretic in malarial fever. The leaves are stimulant, diaphoretic, antiperiodic, diuretic, antiseptic, and expectorant, used in catarrh and bronchitis, ringworm and other cutaneous disease. The leaf infusion is used as a stomachic.

Chemical Constituents: A volatile oil obtained by steam distillation of leaves contains 71.3% eugenol, 3.2% carvacol, 20.4% methyl eugenol and 1.7% carophyllene. The oil possesses antibacterial and insecticidal properties.



Figure 4.2: *Ocimum Sanctum* Plant

Uses: The plant is one of the main ingredients of an herbal drug, Koflet used for cough and various respiratory disorders.

- The plant is also one of the ingredients of the drug sushama, which is used in ointment as well as in pills to cure eczema.
- Tulsi is an ingredient of Tefroli, a propriety medicine for viral hepatitis.
- In Homeopathy, the fresh mature leaves are given to children with nasal catarrh and cough, asthma, fever, constipation, and worms.

- They are also used to treat headache, lachrymation, tonsillitis, and leucorrhoea.
- The seeds are mucilaginous and demulcent and are used in genitor-urinary disorders.

4.4 Azadiracta Indica:

Family: Meliaceae

Common Name: Neem

Neem is one of the most popular, auspicious, and well known tree cultivated throughout the country due to its medicinal properties. It is estimated that India has about 1,38,00,000 neem trees with the potential to produce over 83,000 tonnes of neem oil and 3,30,000 tonnes of neem cake from 4,13,000 tonnes neem seeds. Ayurveda of Susruta describes it. It is a tradition of eat neem leaves on the first day of Indian new year to the 9th day of Chaitra month.



Figure 4.3: Azadiracta Indica Plant

Botanical Description: Neem is an evergreen tree, 12-15m high, with a straight trunk and spreading branches. Leaves are alternate, exstipulate, compound and imparipinnate on long slender petiole. Flowers are cream /yellowish white in axillary panicles.

Fruits are one seeded drupes known as ‘nimboli’. Neem is a native of India and China and is now naturalized in many countries like Pakistan and Malaysia.

Plants grow on almost any kind of soil but flourishes on black cotton soil. The sweet scented flowers appear in March-May and the fruit is ripe in July and August. The tree starts fruiting in 4-5 year and takes 10 years to become full protective and may live upto 200 years.

Part Used: Neem is the most useful for dental hygiene; fresh tender twigs are used to clean teeth particularly in Pyorrhoea.

- The leaves are effective in ulcers and skin disease. They are considered antiseptic and applied to boils in the form of poultice. The leaves are also used in preventing diseases like measles, chicken pox and small pox etc.
- The leaves are tied on the doors of house and in infectious conditions can be spread on the bed of the patient to eliminate infections from microorganisms/germs.
- A paste of fresh leaves is used for external application in the treatment of rheumatic pain. -The leaf juice is anthelmintic and is given in worms, jaundice and skin diseases. A decoction of leaves is also useful in intermittent fevers complicated with congestion of the liver.
- Dried leaves are kept in books for keeping away the moths. Odour of burning leaves kills insects.
- The bark of the tree acts as prophylactic against malaria and is useful in intermittent and other paroxysmal fevers, general debility and skin diseases.
- Flowers are tonic and stomachic. An infusion of flowers is given in atonic dyspepsia and general debility.
- The seed contains a resinous oil known as margosa or neem oil, used as a dressing for foul ulcers, as a liniment to rheumatic affections and in headache. It is an effective application in tetanus, leprosy, urticaria, eczema, erysipelas, scrofula and skin disease like ringworm, scabies etc. Neem oil may be mixed with other oils and fats for manufacture of medicated soaps.
- The fruits of neem tree are used in leprosy, intestinal worms, piles and urinary diseases.

4.5 Aloe Vera:

Family: Liliaceae

Common Name: Ghrita-kumari, Ghigvar

Aloe is native of North Africa, Canary Islands, and Spain and has spread to East and West Indies, China, India and other countries. Many of the forms of this species are naturalized in India and are found in semi-wild state in all parts from the dry westward valleys of the Himalayas upto Cape Comorin.



Figure 4.4: Aloe Vera

Botanical Description:

Aloe Vera is a perennial, succulent plant with stout, thick, cylindrical and woody stem. Roots are fibrous and fleshy. Leaves are sessile, densely crowded on the short stem with wide dilated bases. The flowers are borne in cylindrical, terminal racemes on a scape arising from the center of the leaf tuft.

Perianth members are tubular, rather fleshy and bright yellow in colour. The fruit is an oblong-ovoid capsule and dehiscent loculicidally. Seeds are numerous and compressed and grows well even in the driest situations and poorest soils. Plant is propagated by suckers.

Uses:

- The plant is gogue cooling, anthelmintic, aperientmmena, carminative, depurative, diuretic, stomachic, emmenagogue and alexeteric. Its application in medicine dates back to the 4th century B.C.
- In Indian medicine aloes are used as stomachic, purgative and emmenagogue. It is regarded as valuable in the treatment of piles and rectul fissures.
- The mucilage is cooling and is used as a poultice for application on inflamed parts.
- It is an effective remedy for intestinal worms in children.
- Fresh juice of leaves is cathartic and refrigerant, used in liver and spleen ailments and for eye troubles. Cathartic properties of aloe are due to the presence of glycosides called 'aloin'.
- Thickened juice of the leaves is used in haemorrhoidal congestion of stomach and spleen.
- Externally the juice is rubbed around the navel to open the bowels in young children. The juice of the leaf is applied to painful inflammation of the body and to the chronic ulcers; its fresh pulp is soothing in case of burn.
- In recent times its finding its way into all sorts of cosmetics, emollients, lotions and shampoos etc.
- The cooling mucilage is poultice onto inflammations caused by X-ray and other raditiaons burns.
- It is also used as flavour ingredients in various food products, including alcoholic and non-alcoholic beverages, frozen dairy desserts, candy, baked goods, gelatins and puddings. Leaves yield a good fiber. A dye is also obtained from this plant.

4.6 Syzigum Aromaticum Syn. Eugenia Caryophyllata:

Family: Myrtaceae

Common Name: clove

Clove is a native plant of Molaccus Island, situated in East Indonesia also known as Spice Island, Portugese discovered Molaccus in 16th century. Clove is cultivated in Mauritius, French reunion, Zanzibar, Tanzania, Indonesia, India and Sri Lanka. In India it is chiefly grown in Kerala and Tamilnadu.

Botanical Description: The clove plant is an evergreen tree. It is branched, 25-40 feet tall and excurrent in habit. Leaves are opposite bright green in colour and aromatic due to the presence of oil glands. Flowers develop in terminal cymes at the apices of lateral branches. They are crimson coloured and are borne in the groups of three. In cultivated trees, the flowers are plucked before a thesis, that is, in closed state. They are tubular, epigynous bearing numerous stamens. The fruit is a single seeded drupe. It trives well in warm and moist climate. Well drained clayey or black soils are considered best. The seedlings of cloves are prepared by growing them in beds .At 6 months stage the plantlets are transferred to pots and kept in shade. When they are 12-18 months old they are shifted to soil. Cloves are harvested from 8 years of age till the tree is 60 years old.



Figure 4.5: *Syzygium Aromaticum*

Part Used: The unopened flower buds are plucked when they are green in colour, sun dried until turn dark brown. The brownish-black, crisp and slightly rough clove is the clove of commerce. Cloves are graded according to their appearance.

Chemical Constituents:

Clove contains moisture 5.4%, protein, 6.3%; fat, 15.5%; crude fiber, 11.1%; carbohydrate, 57.7%; volatile oil, 13.2%; minerals, 5.0%; and vitamins. It contains 16% volatile oils in which eugenol (70-90%) is the chief constituent that render it a specific odour and taste. Caryophylline is also present in small quantities.

Uses:

- The Characteristic odour and aroma of clove is utilized to prepare different types of meat, vegetables, soups, sauces and ketchups. It is an important constituent of garam masala
- Clove powder is used in bakery and sweet meat preparation.
- It is used in pan to in which it imparts a stimulating effect.
- Clove oil, obtained by distillation is used as a medicine for tooth ache. It is also used in toothpastes and mouthwash.
- The high quality oil is used to make medicines and low quality is in soap industry.

- Clove is an ingredient of an ayurvedic preparation Vismusti Vatis which exhibits antifertility activity but has teratogenic properties.
- Cloves form an ingredient of a pharmaceutical preparation used in the treatment of gastronomic disorders and in prevention of hangovers.
- Clove is a good preservative as well as antioxidants and can be used in processed food by replacing synthetic ones.
- Clove can be used as tonic drugs for antiageing and for body functions.
- It is also useful as skin conditioners, in toothpaste for dental caries and periodontal diseases, therapeutic compositions for dandruff.
- Clove extract is used in foot anti-perspirant and antifungal preparations.
- Antitrichphyton agents useful for treating athletes foot are prepared from it. Clove is an ingredient of dentifrices and gargles and also employed as local analgesic for hypersensitive dentines and carious cavities.
- It is used externally as a rubefacient and counter-irritant and internally as a carminative and antispasmodic.
- Clove oil is used in topical formulations for use in cryotherapy for treating circulatory diseases such as post traumatic oedema.

4.7 Elettaria Cardamomum:

Family: Zingiberaceae

Common Name: Cardamom



Figure 4.6: *Elettaria Cardamomum* Fruit

Cardamom is native of India which is also the biggest cardamom producing and exporting country in the world. It is known as queen of spices as India earns maximum revenue from it after the black pepper. It is cultivated in Kerala, Karnataka, Maharashtra, Assam, Sikkim, and Tamilnadu.

Botanical Description: The plant is a perennial herb with an underground rhizome. Adventitious roots arise from the rhizome. Aerial, leafy branches develop from the above ground parts and are of two types-vegetative shoots and reproductive shoots.

Vegetative shoots are long and have alternately arranged linear lanceolate leaves with sheathing leaf bases. The reproductive shoots are leafless and bear white flowers in a panicle.

The fruit is a triangular capsule covered by a papery pericarp. The fruit is many seeded and each seed is enclosed in a membranous aril.

Useful Plant Parts: Cardamom seeds are used as a flavouring spice. The capsules are plucked when young and sun dried. The seeds are allowed to remain in the pericarp so as to retain their aroma.

Chemical Constituents: The seeds contain 45% starch, 10% protein, 9% fibers, and 8.5% volatile oils along with vitamin A and C. The aroma and taste of cardmom is due to essential oils such as cineol, Terpeneol, sabinene and Limorene.

Uses: Cardamom is used as an important flavouring agent in sweets, milk products, cakes, biscuits and bakery products.

- It is popular masticatory, chewed singly or along with betel leaf.
- It is used in making garam masala and as a flavouring agent in tea, coffee and other beverages.
- Cardamom oil is obtained after distillation of fruits is used as an important flavouring agent.
- It is used as a stimulant and carminative agent in medicine.
- Seeds are used as a condiment in cordials, bitters and other pharmaceutical preparations. Medicinally they are used as carminative, aromatic, stimulant and diuretic and are chiefly used in nausea and vomiting.
- Tinctures of cardamom are used chiefly in medicines for windiness or stomachic, seeds are chewed to prevent bad smell in the mouth, indigestion and pyrosis. Gargaling with the infusion of cardamom and cinnamon cures pharyngitis, sore throat and hoarsness during the infective stage of flu.
- Cardamom possesses anti-inflammatory, analgesic and cariotonic properties.
- Cardamom forms one of the ingredients of Ayurvedic drug Kanchnar guggulu used in the management of various glandular swellings.
- Cardamom is also one of the ingredients of the Unani drug **Majoon-e-Azaraqui**, used as a general nervine tonic.

4.8 Cuminum Cyminum:

Family: Umbelliferae/Apiaceae

Common Name: Cumin



Figure 4.7: Cuminum Cyminum

Cumin is a native of Mediterranean centre of origin. It is cultivated in Malta, Morocco, Turkey, Iran, Russia, Cyprus, Syria, Egypt, India, Japan, Indonesia and many other countries. Iran is the largest producer and exporter of the cumin. In India cumin is chiefly grown in U.P., Punjab, Gujarat, Rajasthan and Tamil Nadu.

Botanical Description: The plant is a small, branched & erect annual herb. The leaves are decomposed and flowers are small, white or light purple in colour and develop in compound umbel inflorescence. Two mericarps united by a carpopophores constitute the fruit Cremocarp. It is an ovate/elongate structure. The two mericarps split from each other upon maturity. Minute hair is present on the pericarp.

Useful Plant Part: The useful plant part is cumin.

Chemical Constituents: On steam distillation of crushed seeds volatile oil is obtained. The percentage of oil varies upon the quality and age of seeds. It is colourless/pale yellow and turn dark with time. The distinct aroma is due to volatile oils (2-4%) and the taste is slightly bitter. The physiochemical characters of oil are; specific gravity at 150 C, 0.8923-0.9246; optical rotation +3 to +60 30°; refractive index 1.4945-1.5060. Cuminaldehyde (920-40%) is the chief constituent of the oil. Besides this cumin contains 10% Fixed greenish oil with a strong aromatic flavour. Cumin seed contains moisture 6.2%, proteins 17.7%, fats 23.8%, carbohydrate 35.5%, mineral 7.7%, crude fiber 9.1%, and vitamins, vitamin B1 0.73, vitamin B2 0.38, niacin 2.5, vit C 17.2, vita 175 I.U./100g.

Uses: It is used in soups, souces, pickles, meat and cakes as a spice.

- The fruits are used as a condiment in cooking.
- Roasted seeds are added to curd, buttermilk and other salted drinks to aid in digestion.

- It is used as a stimulant, carminative and stomachic, astringent useful in dyspepsia and diarrhoea.
- The oil obtained after distillation is used in for flavouring liqueurs, cordials and perfumeries.
- Cumin seeds are one of the constituents of Siddha preparations Attalieuranam, Kalasakadi and Dadi mastaka curna. The seeds have aphrodisiac properties, chiefly used in veterinary medicines.

4.9 Curcuma Longa:

Family: Zingiberaceae

Common Name: Haldi

A native of south eastern Asia, highly esteemed as a condiment, dyestuff, and medicine since time immemorial. Most important and ancient species of India, and has prime position in the world production of turmeric, 80% of world production comes from India. Cultivated throughout the country, in warm and moist places, large scale cultivation is confined to southern and eastern India. Commercial crop of tropics, mainly cultivated in India, Sri Lanka, Indonesia, Taiwan and China.

Botanical Description: Plant is a perennial herb, 60-90 cm in height, with a short thickened rhizome bearing a tuft of large, broad, lanceolate leaves. The pale yellow flowers are borne in dense spikes terminating the stem and remain covered by pink bracts.

Part Used: The main rhizome along with fingerlike offshoots is carefully dug out by hand and the fibrous roots are cut off. Rhizomes are cleared and subjected to various treatments, required for development of the attractive yellow colour and characteristic aroma.

The rhizomes are first boiled in water, drained, dried in sun for 10-15 days until they become dry and hard, cleaned and polished mechanically in hand/power rotated drum. Cured and finished turmeric is deep yellow to orange yellow in colour and has a distinctive pungent flavor.



Figure 4.8: Curcuma Longa Rhizome Plant

Chemical Constituents:

Dry turmeric rhizome contains moisture, 5.8%; protein, 8.6%; fats, 8.9%; carbohydrate, 63%; fiber, 6.9%; mineral matter, 6.8%; calcium 0.015%; phosphorus, 0.26%; iron, 0.05%; sodium, 0.015; potassium, 2.5%; vit. A, 175 I.U. / 100g; vit B1, 0.09mg/100g; vit B2, 0.19; vit C, 49.8 and niacin, 4.8mg/100g.

On steam distillation it yields orange yellow volatile oil (5-6%), gives it characteristic musky odour.

The main constituent of oil is d- α -phellandrene, d-sabinene, cineol, borneol, zingibrene, and sesquiterpene and the colouring is due to curcumin.

Uses:

- Turmeric is valued for distinctive colour, flavour and aroma.
- It is a condiment and colouring agent, stimulant, and tonic, stomachic and depurative.
- It is widely used for dyeing silk, leather, fiber, paper etc.
- In the Indian system of medicine, turmeric occupies an important place as an ingredient of medicinal oils, ointments, used to aid digestion as a tonic, blood purifier.
- Turmeric is boiled with milk and taken internally; it relieves sore throat and common cold. Burnt turmeric used as tooth powder relieves dental problems.
- The juice of rhizome relieves purulent ophthalmia.
- It is useful in treating gall stones and also used in compositions for sprains and bruises.
- Various turmeric preparations, like 'kumkum' and 'parani' are indigenous beauty aids.
- Smearing turmeric paste on the face and limbs clears the skin and beautify the face. It also checks the growth of unwanted hairs on the feminine skin.
- Turmeric oleoresin has significant use in the production of margarine.

4.10 Prosopis Cineraria L:

Family: Fabaceae

Common Name: Khejri

It is native to arid and semiarid portions of South America, Africa, and Asian subcontinent, including Afghanistan, Iran, India, Oman, Pakistan, Saudi Arabia, the United Arab Emirates, and Yemen. In India it is found in the various parts of Rajasthan, Gujarat, Haryana, Uttar Pradesh and Tamil nadu.



Figure 4.9: *Prosopis Cineraria* Plant

Botanical Description:

It is a perennial tree, xerophilous, aculeate up to 12 metres height, straight and scattered prickles. Root system is deep tap root as well as a superficial root system, both having different functions during different seasons, The deep root system is made up of one, two or three (rarely more) main tap roots, which may divide at lower depths. Sometimes reaching to the unusual depth of 40 m, combined with extensive lateral roots. Especially suitable for dry sites with annual rainfall between 150 –700 mm. Once the water source is reached, the roots extend horizontally in the direction of the water flow.

The depth of the roots depends on the quality and structure of the soil and the availability of soil water. Leaves are **green**, bipinnately compound, alternate, 2.5 cm length, and 1 cm Breadth, odourless with a bitter taste, stipulate, stipules modified into spines. Leaflets are in 15–18 pairs, shaped oblong with an entire margin, apiculate apex, obtuse base, and glabrous surface, reticulate venation, petiolate, petiole - 0.5–4cm long. Flowers are solitary or in terminal panicles, Inflorescence is Racemose Spike, fruit is Legume.

Chemical Constituents: Phytochemically a few of phytoconstituents have been isolated from different parts of *Prosopis cineraria*. Flowers contain patuletin glycoside patulitrin sitosterol, spicigerine, Flavones derivatives were reported by (Sharma et al., 1964). Piperidine alkaloids spicigerine and prosophylline were reported by (Jewers et al., 1976).

The seed lipids, contain a relatively large proportion of unsaturated fatty acids, linoleic and oleic acids, Prosogerin C, was reported by (Bhardwaj et al., 1978). Prosogerin-A and Prosogerin B were reported by (Bhardwaj et al., 1979). Prosogerin D was isolated from the seeds of *Prosopis cineraria* by (Bhardwaj et al., 1980). Prosogerin E, Gallic acid, patuletin, patulitrin, luteolin, and rutin were reported by (Bhardwaj et al., 1981).

Leaves contain steroids like campesterol, cholesterol, sitosterol and stigma sterol, actacosanol, hentriacontane, methyl docosanoate, Diisopropyl-10, 11 -dihydroxyicosane- 1, 20-dioate, Tricosan-1-ol, and 7, 24-Tirucalladien-3- one along with a piperidine alkaloid spicigerine was reported by (Malik and Kalidhar, 2007).

Gangal et al., (2009) studied that the seed lipids contain a relatively large proportion of unsaturated fatty acids, with linoleic and oleic acids being predominant. A compound Quercetin-3`Undecyloxy-3-galloyl trimethyl ether was reported from the leaves of *Prosopis cineraria* and it was screened for cytotoxicity activity on human cancer cell lines viz. HeLa and MCF- 7 using MTT assay by Robertson and Narayanan, (2014).

Uses:

- It is called Kalpataru in Ayurveda and Siddha literature (Robertson and Narayanan, 2014). Leaf paste of *P. cineraria* is applied on boils and blisters, including mouth ulcers in livestock and leaf infusion on open sores on the skin. -The smoke of the leaves is considered to be a good remedy for ailments of the eye.
- The bark is prescribed for scorpion stings (Yoganarasimhan, 2000). *Prosopis cineraria* flower is mixed with sugar and used during pregnancy as safeguard against miscarriage.
- The pod is considered as astringent. Bark of the tree is used in the treatment of asthma, bronchitis, dysentery, leucoderma, leprosy, dyspepsia, muscle tremors and piles.
- The plant is recommended for the treatment of snakebite. It is used traditionally for treatment of various ailments (Nadkarni KM, 1976).

4.11 Moringa Oleifera:

Family: Moringaceae

Moringa oleifera is a fast-growing, drought-resistant tree of the family Moringaceae, native to the Indian subcontinent (Olson, 2010). Common names include **moringa**, **drumstick tree** (from the long, slender, triangular seed-pods), and **horseradish tree** (from the taste of the roots, which resembles horseradish, and ben oil **tree** or **benzolive tree**).

It is widely cultivated for its young seed pods and leaves, used as vegetables and for traditional herbal medicine. It is also used for water purification Kalibbalaet. Al, 2009, Kalibbala, 2012).

Although listed as an invasive species in several countries, *M. oleifera* has "not been observed invading intact habitats or displacing native flora", so "should be regarded at present as a widely cultivated species with low invasive potential".



Figure 4.10- *Moringa Oleifera*

Nutrient Content: Fresh pods and Leaves: carbohydrates 12.5 and 3.7%, protein: 6.7 and 2.5%, fat: 1.7 and 0.1%, fiber: 0.9 and 4.8%, Ca: 440 and 30mg, K: 42 and 24mg, Mg: 259 and 260mg and, P: 70 mg and 110 mg, Vitamin A and C are higher than in carrot and orange, all essential amino acids are present.

Parts Used: Fresh leaves, flowers, green pods and Seeds, Flowers are cooked as vegetable, young pods are used in curry for asparagus like taste, seeds are boiled and consumed with other foods.

Medicinal Uses: Nutritious, diuretic, laxative, expectorant, bacterial and fungal infections, anti-biotic, cardiac and circulatory problems, tonic for inflammation, appetizer and digestive, cold remedy, rubefacient, tuberculosis and septicemia.

- **Protecting and Nourishing Skin and Hair:**

Moringa seed oil is beneficial for protecting hair against free radicals and keeps it clean and healthy. Moringa also contains protein, which means it is helpful in protecting skin cells from damage. It also contains hydrating and detoxifying elements, which also boost the skin and hair. It can be successful in curing skin infections and sores.

- **Treating Edema:**

Edema is a painful condition where fluid builds up in specific tissues in the body. The anti-inflammatory properties of moringa may be effective in preventing edema from developing.

- **Protecting the Liver:**

Moringa appears to protect the liver against damage caused by anti-tubercular drugs and can quicken its repair process.

- **Preventing and Treating Cancer:**

Moringa extracts contain properties that might help prevent cancer developing. It also contains niazimicin, which is a compound that suppresses the development of cancer cells.

- **Treating Stomach Complaints:**

Moringa extracts might help treat some stomach disorders, such as constipation, gastritis, and ulcerative colitis. The antibiotic and antibacterial properties of moringa may help inhibit the growth of various pathogens, and its high vitamin B content helps with digestion.

- **Fighting Against Bacterial Diseases:**

Due to its antibacterial, antifungal, and antimicrobial properties, moringa extracts might combat infections caused by *Salmonella*, *Rhizopus*, and *E. coli*.

- **Making Bones Healthier:**

Moringa also contains calcium and phosphorous, which help keep bones healthy and strong. Along with its anti-inflammatory properties moringa extract might help to treat conditions such as arthritis and may also heal damaged bones.

- **Treating Mood Disorders:**

Moringa is thought to be helpful in treating depression, anxiety, and fatigue.

- **Protecting the Cardiovascular System:**

The powerful antioxidants found in Moringa extract might help prevent cardiac damage and has also been shown to maintain a healthy heart.

- **Helping Wounds to Heal:**

Extract of moringa has been shown to help wounds close as well as reduce the appearance of scars.

- **Treating Diabetes:**

Moringa helps to reduce the amount of glucose in the blood, as well as sugar and protein in the urine. This improved the hemoglobin levels and overall protein content in those tested.

- **Treating Asthma:**

Moringa may help reduce the severity of some asthma attacks and protect against bronchial constrictions. It has also been shown to assist with better lung function and breathing overall.

- **Protecting Against Kidney Disorders:**

People may be less likely to develop stones in the kidneys, bladder or uterus if they ingest moringa extract. Moringa contains high levels of antioxidants that might aid toxicity levels in the kidneys.

- **Reducing High Blood Pressure:**

Moringa contains isothiocyanate and niaziminin, compounds that help to stop arteries from thickening, which can cause blood pressure to rise.

- **Improving Eye Health:**

Moringa contains eyesight-improving properties thanks to its high antioxidant levels. Moringa may stop the dilation of retinal vessels, prevent the thickening of capillary membranes, and inhibit retinal dysfunction.

- **Treating Anemia and Sickle Cell Disease:**

Moringa might help a person's body absorb more iron, therefore increasing their red blood cell count. It is thought the plant extract is very helpful in treating and preventing anemia and sickle cell disease.

4.12 *Amaranthus Cruentus*:

Family: Amaranthaceae

Common Name: Chaulai

Botanical Description:

Amaranthus cruentus is an annual herbaceous plant which reproduces only by seeds and has a short growing period of 4–6 weeks (Makinde et.al.2010). It produces one dominant, large, central root (tap root). Thick stems are often straight and branched, 0.1 to 2.0 m in height, ribbed, and red dyed. Leaves are arranged spirally, simple, without stipules, and their shape varies from ovate to rhombic-ovate. Small fine hairs cover leaf and stem

surfaces. Numerous unisexual flowers are green and form finger-like spikes with long and dense terminal panicle and axillary spikes below. At maturity, the whole plant may be reddish (Grubben, 2004; Śmigierska, 2016). The large and complex inflorescence consists of numerous concentrated cymes arranged axillary, ended with racemes and spikes. The top one, with numerous laterals, is perpendicular, with thin branches up to 45 cm long. There are 2-3 mm long bracts. The inflorescence is more than 50 cm long, characterized by high colour variability. Each of them produces about 50 000 seeds in round or more often in lenticular shape, 1-1.5 mm in diameter, shiny, and dark brown (Grubben, 2004; Robertson, 2003). Either light only or together with high temperatures stimulate germination. Temperatures of 20/35°C and light give the greatest rise (Weaver, 1984). The grain of amaranth is small, around 0.9 to 1.7 mm in diameter. The mass of 1000 seeds is around 0.6-1.0 g (Alvarez-Jubete, 2010). Grains are lenticular, with a color that varies from white, pink, through gold and brown to black. The coat of the seed is smooth and thin (Wolosik, K. and Markowska, A., 2019).



Figure 4.11: Amaranthus Cruentus

Chemical Constituents: Amaranth seeds contain about 1% of inositol, a small amount of glucose, fructose, other monosaccharides (0.05-0.67%) and disaccharides such as raffinose (0.27-2.3%), sucrose (0.4-2%), maltose (0.02-0.36%), and stachyose (0.02-0.29%). The raffinose content is higher than in wheat, but less than that in corn (Januszewska-Józwiak and Synowiecki, 2008; Silva-Sánchez et.al., 2004; Lopez, 1994). The contents of low-molecular-weight carbohydrates in *A. cruentus* and *A. caudatus* were reported in the following ranges (g/100 g): fructose (0.12 to 0.17), glucose (0.34 to 0.42), inositol (0.02 to 0.04), maltose (0.24 to 0.28), raffinose (0.39-0.48), stachyose (0.15-0.130), and sucrose (0.58-0.75) (Venskutonis, and Kraujalis, 2006; Gamel et.al., 1994)

Part Use: Leaves and Seeds: cooked

Fresh leaves of this nutritious legume plants grow as weed in uncultivated land during rainy season are used as vegetable.

Nutrient: carbohydrate-4g/100g, protein 5g, high content of Ca (330mg/100g), Fe (19mg/100g).

Uses: Soup, curry, leaves are cooked with salt, chillies, tamarind, garlic and eaten with sorghum pan cake or finger millet balls.

Medicinal Uses: emollient and vermifuge, dysentery and inflammation, constipation, boils, heart troubles, blood purification. *Amaranthus cruentus* is a pseudocereal with a particularly highly regarded nutritional value, which is determined by:

- Presence of proteins that consist of albumin, globulin, glutelin, and prolamin fractions. Seeds do not contain gluten, so they can be introduced into the diet of patients suffering from celiac disease.
- Large amounts of lysine, tryptophan, and sulfur amino acids that support high nutritional quality of the seed.
- Bioactive peptides and lunasin-like peptides thought to have antioxidant, anticancer, anti-allergic, and antihypertensive properties.
- The main constituent of the carbohydrate fraction found in the seeds is starch, which shows good gelatinization properties and freeze/thaw stability that is appreciated in the food industry.
- The physiological effect of amaranth is important because of the fiber presence.
- Amaranth grain is rich in easily absorbed iron, magnesium, calcium, and potassium.
- The seeds of amaranth are not different from other cereals in composition of vitamins, characterized by the presence of folic acid, pantothenic acid, niacin, and B vitamins, but accumulate significant amounts of both β - and γ -tocotrienols.
- There is a high biological significance of the flavonoids and phenolic acids in amaranth grain.
- Seeds contain more total fat, compared with other cereals: quinoa, wheat, barley, rye, and oat. The lipid fraction contains mostly unsaturated fatty acids with linoleic acid predominant. Palmitic and oleic acids were also found in amaranth seeds. Grains are also a source of valuable squalene, with wide biological activity and antioxidant properties.

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