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Significance of some medicinal plants in Bhimtal region: Introduction, importance and their market formulations

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Abstract

The plants are indispensable to man in his life. Apart from being an excellent source of food, clothing and shelter the plant kingdom has provided us with enormous plants with healing and curing properties to treat various diseases. Plants have been used since ancient times to heal and cure diseases and to improve health and wellbeing. Medicinal plants are chiefly used for curing stomach pain, fever, cold and cough, bleeding and wounds, fungal infection, burns, rheumatic pain, insect bite, influenza, diarrhoea, jaundice and cirrhosis. Medicinal plant provides herbal medicines to the peoples. Herbal medicines are also referred to as herbal remedies, herbal products, herbal medicinal products, phytomedicines, phytotherapeutic agents and phytopharmaceuticals. These medicinal plants are of great importance in various drug dosage forms. For the purpose of this study to collect sixteen medicinal plants from Bhimtal region. The collection of drug was done in the month of April and May 2014. The detailed study of these medicinal plants along with their marketed formulations was done from various sources.

Keywords: Medicinal plant, market formulation, microscopy, macroscopy, chemical constituents, uses

Introduction

The study has shown that medicinal plants play an important role in the field of treatment of various disease. We were found the various plant collections in order to their medicinal importance in high altitude of Kumaun region of Uttarakhand. The study revealed that the growing demand for medicinal plants is related to the great cultural significance attached to medicinal plants and promote the cultivation of those medicinal plants with a large market potential. Select a suitable area with favorable agro-ecological conditions and relatively low levels of economic development. It also help to increase the knowledge about the need of pharmaceutical and food industry. To increase awareness about herbal supplements and herbal remedies among the villagers we also need to revise state forest policies that support conservation and sustainable use of medicinal plants in Uttarakhand ^[1, 8, 10].

Asparagus racemosus

Synonym: Shatavari, Shatmuli ^[1].

Biological Source: It consists of dried leaves and roots of *Asparagus racemosus*, belonging to family Liliaceae ^[1].

Description: Macroscopic characteristics

Colour: Roots are silver white or ash coloured, externally and white internally.

Odour: None

Taste: Starchy, slightly bitter followed by sweet taste

Size: 5 to 15 cm×2cm in thickness

Shape: Spindle shaped

Extra features: Longitudinally wrinkled with yellow hand central core ^[1].



Fig 1: Leaves of *Asparagus racemosus*

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Microscopic characteristics

Shows an outer layer of piliferous cells, ruptured at place. Composed of small, thin walled, rectangular asymmetrical cells, a number of cells elongated to form unicellular root hairs cortex comprises of 25-29 layers, distinct in two zones, outer and inner cortex, outer cortex consists of 6 or 7 layers, compactly arranged, irregular to polygonal, thick walled, lignified cells, inner cortex comprises of 21-23 layers, oval to polygonal, thin walled, tangentially elongated cells with intercellular space, stone cells, either singly or in groups, form a discontinuous to continuous ring in the upper part of this region. Raphides of Ca⁺ oxalate also present in this region, 2 or 3 layers of this region, 2 or 3 layers of stone cells encircle the endodermis composed of thin walled parenchymatous cells, pericycle present below endodermis, stele of vessels, trachids and parenchyma xylem vessels have pitted thickening, phloem patches consist of usual element pith composed of circular to oval parenchymatous cells a few cells slightly lignified.

Powder: Yellowish cream, fragment of lignified, thick walled cells, vessels with simple pits, piece of raphides, numerous, lignified, rectangular elongated stone cells. Having clear striations with wide as well as narrow lumen and groups of parenchyma [3].

Chemical Constituents: Satavari roots contains 4 steroid saponins—shatavarin I-IV. Shatavarin-I is the major glycoside moiety attached to sarsapogenin. Whereas in shatavarin- IV, 2-glucose and 1-rhamnose moiety are attached. Flowers and fruits of shatavarin contains quercetin, rutin and hyperoside, while leaves contains diosgenine and quercetin [1].

Uses: Roots are used as galactogogue, tonic and diuretic. Shatavarin-I is reported to antioxiotoxic property. Roots are used in treatment of rheumatism and nervine disorder. It is used in Ayurveda in threatened abortion and safe delivery by uterine blocking activity [1].

Market Formulations

Femiplex Lukol, Renalka, Shatavarykalp, Himalayashatavari, Vivaansunthishatavari, Shatavari capsule, Shatavarigulam, Neo, Ojus, Himaplasia, Tantex Geriforte, M2-tone [4, 17, 19, 32].

Solanum xanthocarpum

Synonym: Kantkari [2].

Biological source: It consist of mature dried whole plant of *Solanum xanthocarpum*. Family- Solanaceae [2].

Description –Macroscopic characteristics

Diffuse herb with prickly stem, leaves and calyx. Root almost cylindrical and tapering, fracture, short, taste bitter with no characteristic odour. Leaves ovate- oblong, acute, pinnately 7-11 lobed, sparsely stellate pubescent. Odour and taste not distinct. Stem nodes and internodes prominent. Fracture short to slightly fibrous. Flower purple in few flowered axillary chymes. Fruit a globular berry, green and white stripes when young, yellow when mature. Seed smooth, compressed, reniform, taste bitter [2].



Fig 2: Whole plant of *Solanum xanthocarpum*.

Microscopic characteristics

Root: Cork comprising of 3-6 layer of thin walled, rectangular and tangentially elongated cells. Secondary phloem composed of sieve elements and phloem parenchyma transverse by medullary rays. Stone cells single or in group of 2-20. Xylem composed of tracheids, vessels fibre tracheid and parenchyma. Vessels and tracheid with bordered pits and fibres with simple pits.

Stem: In young stem epidermis covering the cortex, remain intact for a long time, secondary cortex, and consist of 7-11 layers of parenchymatous cells. Some cells forming stone cells. Secondary phloem consist of sieve elements parenchyma, fibres and stone cells. Inner phloem consists of fibres. Vessels and tracheids with bordered pits. Fibres much elongated, thick walled, lignified with tapering & pointed ends. Some has bifurcations at one or both ends.

Leaves: Epidermis wavy in outline, stellate hairs & anisocytic stomata on both the surface. One large bicollateral, central vascular bundle & two small lateral vascular bundles present in the T.S. of the petiole [2].

Chemical constituents: Steroidal alkaloid solasodine, solasurine, solamargine, β -solamargine, solasonine, sterols viz. Cycloartenol, norcapesterol, cholesterol & their derivative [2].

Uses: The root is reputed as antiasthmatic, antiemetic diuretics and expectorant, used to prepare an Ayurvedic medicine. The leaves are anodyne, leaf juice is given with black pepper in rheumatism. The stem flower and fruits are bitter and carminatives. Useful in burning sensation of feet accompanied by vesicular watery eruption. The plant has alternative. Antiasthmatic aperient, diuretic, digestive and febrifuge properties and is used to cure bronchitis, cough, constipation and dropsy [5].

Market formulations

Kantkariavleha, Kantkarighrit, Vyaghlharitaki, Chyavanpras, Dasamoolkwith, Dasamoolarist [4, 32].

Datura stramonium

Synonym- Datura, Thornapple [1].

Biological source: It consist of dried leaves and flowering tops of *Datura stramonium*, belonging to family- Solanaceae [1].

Description –Macroscopic characteristics

Leaf simple, alternate with short cylindrical petiole, dark green upper surface and polar on the lower surface. Lamina ovate or triangular ovate base wedged or cordata, margin dentately lobed and irregularly serrate apex acuminate, thin and brittle, leaves nearly glabrous, odour characteristic, taste unpleasantly bitter [2].



Fig 3: Leaves and flowering tops of *Datura stramonium*

Microscopic characteristics

T.S. Shows a bifacial structure. Upper epidermis single layered cells rectangular with cuticularized outer walls. Trichomes both covering and glandular covering trichomes uniseriate, multicellular, and warty and stalk of one cells and a 2 to 4 celled grandular head. Mesophyll differentiated into palisade and spongy parenchyma. Cluster crystals, microsperoidal crystals and vascular strands are found in the upper larger of spongy parenchyma lower epidermis. Epidermal layers of lamina continuous in the midrib region also Strips of collenchyma sappers below the upper and above the lower epidermis. This is followed by cortical parenchyma containing prism of calcium oxalate and microspheroidal crystals, embedded in the central region of the cortical parenchyma is a bicollateral bundle. Surface preparation shows anisocytic stomata on both surface best on the lower [2].

Chemical constituents: The amount of total alkaloids found between 0.2-0.5% in which 1-hyoscyamine and hyoscyine. The percentage of alkaloid is very less in stems and hence contain 3% seed contain 0.2% alkaloids and 25% fixed oil [1].

Uses: D.stramonium is the parasympatholytic drug with anticholinergic properties. Leaves are used in the treatment of asthma. It is used to control salivation, muscular rigidity and the tremors in Parkinsonism.

Hyoscyine lack the central stimulant action of atropine. Its sedative properties enable it to be used in the control of motion sickness [1].

Market formulations

Jimson weed, Thornapple, Kankasava, Asthma relifalarex, Spasmolin [18, 33]

Acorus calamus

Synonym: Bach, Sweat flag, Calamus [17].

Biological source: It consists of dried peeled or unpeeled rhizomes of *Acorus calamus*. Family- Araceae [5].

Description: Macroscopic characteristics

Size: 5-15 cm in length and 1-2 cm in thickness.

Shape: Rhizome are cylindrical and branched.

They are somewhat shrunken and with deep longitudinal wrinkles. The leaf scars are more prominent on upper surface and encircle the rhizomes. The under surface of rhizomes bear very small but raised circulation root scars. The fracture is short [3].

Microscopic characteristics T.S. of unpeeled acrous shows cork, cortex, vascular bundles (scattered throughout the section), oleoresinous cells, abundant starch grains, ca+ oxalate prism, endodermis and are of concentric type, secretive cells are present in parenchyma [3].



Fig 4: Plant of *Acorus calamus*.

Chemical constituents: A volatile oil, a bitter principle acroeline, calamine, volatile oil contains asaraldehydeasarone and eugenol. The small volume of palmitic heptylic and butyric acids, asaronaldehyde, calamol, calamine and azulene [1, 3].

Uses: Carminative, expectorant, bitter stimulant and vermifuge. Volatile oil is used in perfumery as insect repellent, used as antispasmodic and nervine sedative [1].

Market formulations

Acorus calamus / calamus root, Memodin syrup, Memodin tablet, Sanjivanivati, Sumento Alarsin, M2- tone [4, 35]

Oxalis corniculata

Synonym: Indian sorrel, Ambilosa [3].

Biological source: It consists dried leaves and whole plant of *Oxalis corniculata* family- Oxalidaceae [3].

Description – Macroscopic characteristics Indian sorrel is an appressed pubescent, defuse creeping, perennial herb and occasionally act as an annual. It grows to a height of 12-50 cm.

Leaves: Leaves are trifoliate compound leaf made up of 3 similar leaflets. Each has an inverted heart shape. Leaf outline is entire the leaf stalk is hairy and 8 cm long.

Stem: Stem is thin, delicate, hairy and usually prostrate or semi erect, it has several branches.



Fig 5: Whole plant of *Oxalis corniculata*

Flowers: Flowers are bright yellow 6 mm long and 15 mm across. Flowers are made up of 5 partially fused yellow petals which have the shape of trumpet. It possesses 10 stamens and a below 5 stigmas stamens are arranged in two whorls 5 stamen are central band have long filaments and other 5 are peripheral and shorter. The 5 sepals are lance shaped. Ovary situated above the flower parts (the calyx, corolla and androecium) pollen is yellow in colour and oval shaped.

Fruits: Fruits sub cylindrical, tomatoes or glabrous 5 angled capsules and hairy fruits split open when the seed are ripe.

Seed: Seeds numerous, transversely ribbed, tiny and dark brown^[3].

Microscopic characteristics

Root: Shows 3-4 layers of cork, composed of thin-walled rectangular cells, brownish in appearance; cortex, a wide zone, consisting of rectangular and oval, thin-walled parenchymatous cells filled with simple starch grains, yellowish pigment and tannin; inner cortical cells rectangular and polygonal, smaller in size than outer ones; xylem consists of vessels, tracheids, fibres and xylem parenchyma; vessels cylindrical, tracheids pitted with pointed ends; few starch grains simple, round to oval measuring 3-11 μ in dia., present scattered throughout the region.

Stem: Shows single layered epidermis, composed of rectangular to oval cells, some of which are elongated to become unicellular covering trichomes; cortex consist of 4-5 layers of thin walled, circular and polyhedral parenchymatous cells; endodermis single layers of thin-walled, circular cells; pericycle composed of two or three layers of squarish and polygonal sclerenchymatous cells; vascular bundle 6-7 in number, arranged in a ring, xylem composed of thin-walled, parenchymatous cells, a few simple, round to oval starch grains measuring 3-11 μ in dia. scattered throughout the region.

Leaf: Petiole- shows rounded or plano-convex outline consisting of single layered epidermis of rectangular or circular, thin-walled cells; cortex 3-4 layers of thin-walled, circular, oval or polygonal parenchymatous cells, generally filled with green pigment; endodermis single layered followed by 2-3 layers of sclerenchymatous pericycle, less developed towards upper side of petiole; vascular bundles 5 in number, arranged in a ring, consisting of phloem towards outer side and xylem towards inner side; centre occupied by a small pith a few simple, round to oval starch grains, measuring 3-11 μ in dia. Scattered throughout^[3].

Chemical constituent: Leaves of oxalis contain acid and vit c. Leaves and stem contain tartaric acid, citric acid. Stem also contain malic acid. Leaves contain the flavonoids, vitexinisoveterin^[21].

Uses: Good source of vit c and used in the treatment of scurvy. Fresh leaf juice mixed with honey is good medicines for dysentery and cough and stomachache. Used in influenza, diarrhoea, sprain. Antibacterial activity. Antidote to poisoning by datura, arsenic, mercury^[20, 21].

Market formulations

Sure guard, Cool powder, Antibacterial cream^[36].

Berberis aristata

Synonym: Indian berberry, Daruhald^[7].

Biological source: It consists of wood, root, bark and extract of *Berberis aristata*. Family-Berberidaceae^[5].

Description-Macroscopic characteristics

The genus characterized by dimorphic shoots, with long shoots which form the structure of the plant and short shoots only 1-2mm long. The leaves on long shoots are non-photosynthetic, developed in to three spined thorns 3-30 mm long. The bud in the axil of each thorn- leaf then develop a short shoot with several normal, photosynthetic leaves. These are 1-10 cm long, simple and either entire, or with spiny margins.

Stem pieces are nearly cylindrical, variable in length about 15-20 mm in width.



Fig 6: Plant of *Berberis aristata*

The nodes swollen, and surface rough, finely wrinkled longitudinally or deeply furrowed and bears occasional leaf scars. Bark thin, yellowish brown short in the bark and splintery in wood, taste bitter, odour none.

The flower are produced singly or in racemes of upto to 20 a single flower head. They are yellow or orange, 3-6 mm long, with six sepals and six petals in alternating whorls of three, the sepals usually coloured like the petals^[5].

Microscopic characteristics

Transversely cut surface of the stem is circular in outline with outer well developed cork, narrow cortex and pericycle traversed by stone cells, central narrow pith surrounded by wide xylem traversed by wide medullary rays occupying more than two thirds the area of the section, T.S. of stem shows multi-layered cork consisting to squarish radially arranged suberized cell, the outer most few being compressed and obliterated; cortex narrow, composed of tangentially elongated parenchymatous tissue, traversed by isolated or groups of 2-3 stone cells; pericycle characterized by discontinuous band of isolated or groups of 2-5, lignified fibres, phloem narrow, traversed with lignified fibres and iangesnially running band of ceratenchyma; medullary rays multiseiate. Simple starch grains and prismatic crystals of calcium oxalate are present throughout the parenchymatous cells of the section, occasionally dark brownish contents are also found in the ray cells^[4, 5].

Chemical constituents: From roots of β -asiaticaberberine, palmatine, jatrorrhizine, columbamine, tetra hydropalmatine, berbamine, oxyberberine and palmitine occurs as chlorides^[5].

Uses: Roots of *Berberis* has antipyretics, febrifuge, carminatives, aperients, anticancer and antiprotozoal properties. Used in eye disease, piles, diarrhoea, and mehrrhegia. Useful for intestinal and hepatic amoebiasis in cholera and gastroenteritis [4].

Market formulation

Darbyadi-kwath, Darbudi-leha, Femiplex, Livomyn [4, 12].

Centella asiatica

Synonym: Mandukparni, Gotu kola [1].

Biological source: It consists of the dried aerial parts, preferably leaves of *Centella asiatica*. Belonging to family-Apiaceae [1].

Description

Macroscopic characteristics

Slender, prostrate or creeping perennial herb, with long internodes and rooting at nodes. Leaves simple, orbicular-reniform, base cordate with angular sinus, margin crenate-dentate, apex rotund, basally 5-7 nerved long- petioled, flowers small, brownish in axillary few-flowered umbels. Fruit 2 seeded, indehiscent, laterally compressed, seed brown, oblong, odour characteristic and slightly bitter sweet taste [2].



Fig 7: Aerial parts of *Centella asiatica*

Microscopic characteristics

T.S. of the shows a dorsiventral nature. A thin cutical covers the upper epidermal cells. Mostly paracytic stomata are seen in surface view of both surfaces. No trichomes of any type whatsoever. Palisade differentiated into two layers, spongy parenchyma consists of 3 layers with intercellular spaces and some cells may contain crystals of calcium oxalate. Midrib region shows 2-3 layers of collenchymas below the upper epidermis and above the lower epidermis. The vascular bundle is in centre and has xylem on the ventral side and phloem on the dorsal side. The petiole in T.S. shows an epidermis covered by a cuticle and its inner walls adjoining the cortex are thickened. Below the epidermis is a collenchymatous zone consisting of 2 to 3 layer of cells and next to that is a broad zone of parenchyma with intercellular spaces. Seven vascular bundles lie within this parenchymatous zone. Two of these are less developed and are present in the projecting arms of the petioles. Some crystal of calcium oxalate may be seen in the parenchyma cells [2].

Chemical constituents: Mainly contains saponins in form of α -amyrin derivatives called asiaticoside and madecassoside. It also contains Asiatic acid, madecassic acid brahmie acid isobrahmic acid arabinose, glucose and rhamnose [1].

Uses: Used as nervine tonic. It shows sedative, spasmolytic, anti- anxiety and anti- stress action. The drug is also employed in skin diseases, leprosy and syphilis [1].

Market formulations

Brahmi amla oil, Brahmivati, Brahmi tablet, Brahmi capsule [18, 19]

Ricinus communis

Synonym: Castor, Ricinus [1].

Biological source: It consists of dried seeds of *Ricinus communis*, family- Euphorbiaceae [1].

Description

Macroscopic characteristics

Leaf: Leaves green or reddish green, broad, palmately lobed, with 5-11 lobes, 30-60 cm dia. nearly orbicular, lobes oblong linear, acute or acuminate, margin serrate, vary from 4-11 cm long, cylindrical or slightly flattened towards distal and peltately attached to the blade, solid when young become hollow on maturity.

Seeds: Seeds oblong on face convex and the other slightly flattened, 1-1.5 cm long, 0.6-0.9 cm wide, 0.4-0.8 cm thick, testa hard, glossy, smooth, grey or brown to reddish brown or black and may be striped, raphe extends from the caracole to chalaza, odour not distinct, taste, weakly acrid [3].



Fig 8: *Ricinus communis* tree.

Microscopic characteristics

Seeds shows a hard testa, membraneoustegmen, a fleshy endosperm and thin embryo with flat broad cotyledons, testa consist of hard, single layered epidermis radially elongated, compactly arranged, slightly curved tubular cells, having reddish brown content followed by 8-10 layered, tangentialy, elongated parenchymatous cells, most of them containing oil globules, fibro- vascular bundles found scattred in this zone, endosperm consisting of oval, irregular cells filled with oil globules, abundant, aleurone grains, measuring 8.2-13.75 in dia. thin, flat and leafly.

Power: Dark brown, oil, shows fragments of numerous elongated thick walled, polygonal cells of testa, reddish brown tabular cells, thin walled oval to round parenchymatous cells of endosperm oil globules, numerous aleurone grains measuring upto 13.75 μ in dia. and including crystalloids and globoids within [3].

Chemical constituents: Castor oil chiefly contains triglyceride are also present in the isoricinoleic, linoleic, stearic and isostearic acids. The viscosity of the castor oil is due to ricinoleic acid. Castor oil also contains heptaldehyde (heptanal), undecenoic acid, sebacic acid [1].

Uses: It used as cathartic and lubricant. Several other forms of the castor, such as dehydrated castor oil or hydrogenated

castor oil are used industrially for other purposes.

It is used in preparation of paints, enamel, varnishes, grease, polishes, printing ink, hydraulic and brake spirit with little modifications. It is used in abortifacient paste and ricinoleic acid is used in contraceptive creams and jellies [1].

Market formulations

Zinc & castor oil ointment BP, Zinc & castor oil cream BP, Jamaican Black castor oil shampoo, Now Food Castor oil 650 mg, Cibolic capsule [20, 26, 27].

Cannabis sativa

Synonym: Indian hemp, Bhang [1].

Biological source: Cannabis consists of dried flowering tops of the cultivated female plants of *Cannabis sativa*. Family-Cannabinaceae [1].

Description – Macroscopic characteristics

Colour: Dull green

Odour: Strong, characteristic and narcotic.

Taste: Somewhat acrid and pungent.

Shape: Flattened or cylindrical masses consisting of braches, upper part of stem with bracts, bracteoles pistillate flower, fruits and seeds. Stem which are not more than 3 mm in dia. Also constitute the drug. Stem are thin, straight, cylindrical and longitudinally furrowed. Bracts are 1.5 to 2 cm long, simple or lobed with sublance stipules. Bracteoles are in pairs, present in the axil of bract. Flower are formed in axil of each bracteole with 2 long brownish red hairy stigmas. Achene type of fruits is about 5 to 6 mm in length and



Fig 9: Leaves of *Cannabis sativa*. 4 mm in width ovate glossy green or yellowish green in colour with single seed [1].

Microscopic characteristics

a) The fragments of the bracts in surface view- the upper epidermis is composed of straight walled polygonal cells with a faintly striated cuticle; short, conical, unicellular cytolithic trichomes are present and these are very much enlarged at the base, with the calcium carbonate deposits well-defined; a few small glandular trichomes also occur; the cells of the underlying palisad are small and glandular trichomes also occur the cells contains a cluster crystal of calcium oxalate. The lower epidermis and the walls are distinctly sinuous, very numerous anomocytic stomata are present; glandular trichomes are also fairly frequent. Occasional fragments of the bracts are also found in sectional view showing a single layered palisade beneath

the upper epidermis; the palisade cells which contain calcium oxalate cluster crystals are frequently divided tangentially to form two smaller cells with a crystal in each.

- b) The fragments of the bracteoles in surface view. The upper epidermis is composed of polygonal cells with unevenly thickened and beaded walls. The cells of the lower epidermis are smaller than those of the upper epidermis; the walls are more sinuous and only slightly thickened and beaded anomocytic stomata are present and also numerous short, conical, unicellular covering trichomes which are wide at the base and taper abruptly to a point at apex. Small cluster of calcium oxalate are present in the mesophyll cells underlying both epidermises.
- c) The very abundant trichomes; these are found scattered and some of the smaller ones are also found attached to fragments of epidermises. The covering trichomes are of various types they are all conical and unicellular but some are cystolithic while other do not contain cystoliths. The covering trichomes which do not contain cystoliths are also of two main types, some being fairly short, slightly enlarged at the base and abruptly tapering to the apex whilst others are larger, more elongated with little enlarged at the base and gradually tapering to the apex. The glandular trichomes are very distinct and characteristic, these multicellular, multiseriate stalk with a multicellular head containing from 8-12 or more radiating cells; the stalks are cylindrical, 3-5 cells in diameter and the constituents cells are elongated with slightly thickened walls.
- d) The fragment of the stigma which are fairly abundant; they are reddish-brown and the epidermal cells, which are rather indistinct, are extended to form elongated papillae. These papillae are thin-walled, cylindrical and rounded at the tip; many become detached and are found scattered in the powder [9].

Chemical constituents: Indian hemp comprises 15-20% of resin which contain the major active euphoric principle 1-3-4 tetrahydrocannabinol. It contains volatile oil, trigonelline and cannabidiol, cannabidiolic acid, cannabichromene and cannabigerol. Indian hemp seed contain about 20% of fixed oil [1].

Uses: It is a narcotic sedative and analgesic. It has psychotropic properties due to tetrahydrocannabinol. At causes intoxication. Euphoria and later mental disturbances [1].

Market formulation

Marinol (Dronabinol) [20].

Catharanthus roseus

Synonym- Vinca, Catharanthus [1].

Biological source- It consists of dried whole plant of *Catharanthus roseus*.

Family – Apocynaceae [1].

Description-Macroscopic characteristics

Colour: Leaves- green

Roots- Pale grey

Flowers- Violet pink-white or carmine-red.

Odour: Characteristic

Taste- Bitter

Shape- Leaves- simple, petiolate, ovate or oblong, unicostate, entire brittle with acute apex and glossy appearance.

Flower-Bractate, pedicellate, complete, hermaphrodite, normally 2-3 cm in cymoseasillary clusters.

Fruits -Follicles with several black seeds ^[1].



Fig 10: Whole plant of *Catharanthus roseus*

Microscopic characteristics

Upper surface shows presence of single layer of rectangular celled epidermis with unicellular covering trichomes. Palisade is made up of single layer beneath epidermis and contains compact elongated cells. Spongy parenchyma is 5-8 layered with intercellular spaces. Midrib shows presence of collenchymas below the upper epidermis. Xylem and phloem are present in the centre. Cruciferous stomata are present more frequently on lower epidermis. Calcium oxalate crystals are absent ^[1].

Chemical constituents: A large numbers of indole alkaloid are present in vinca. Out of them about 20 dimetic indole dihydroindole alkaloids possess on collytic activity. And among them vincristine and vinblastine are most significant. Vinblastin contains indole alkaloid part called catharanthine and dihydroindole alkaloid part called vindoline. The other alkaloids present in vinca are ajmalcine, lochnerine serpentine and tetrahydroalstonine. It requires about 500 kg crud drug to extract out 1 g of vincristine, because of its extreme low content ^[1].

Uses: Vincristine sulphate is an antineoplastic agents which may act by arresting mitosis at the metaphase. It is given intravenously in the treatment of acute leukemias are also reported.

Industrial Hodgkin, S diseases, reticulum cell sarcoma, lymphosarcoma and myosarcoma have shown remission. It also exhibits hypotensive and antidiabetic action ^[1].

Market formulations

Vincristin sulphate injection. USP, Vincasar PFS ^[20].

Pelargonium graveolence

Synonym: Geranium ^[6].

Biological source: It is consists of fresh leaves and stem of *Pelargonium graveolence*. Family- Geraniaceae ^[6].

Description: The plant grows as a small herb (60-90 cm height) with remified stems. The leaves are sharply denticulated with 5-7 lobes which are more or less divided.

They give a strong scent of rose when crushed. The essential oil is present in small glands, distributed over the green parts of the plant, particularly over the surface of the leaves, particularly over the surface of the leaves. The leaves and stems are covered with two kinds of bristles. Some long and fine, other short and scarcely visible. The flowers are small and are formed among the leaves in dense little umbels on short peduncle they are nearly or quite sessile.



Fig 11: Leaves and stem of *Pelargonium graveolence*

The corolla is about 1-2 cm long, rose or pink, and veined purple. The petals are entire, the two upper ones longer than the others.

It has colourless to slightly yellowish colours liquid, with characteristic pleasant flavour which is insoluble in water and soluble in alcohol ^[6].

Chemical constituents

All varieties of geranium generally contain 0.08-0.4% of fragment volatile oil. It contains alkaloids and ester. The alcohols are β- citranellol and geraniol about 60-70% while ester namely geranyl acetate, geranyl tiglate, citranellylformate and acetate, contribute about 20-30% of the oil. several sesquiterpene hydrocarbons, sesquiterpine alcohol also reported in the oil and an responsible for the pleasant fragrance ^[6].

Uses: Flavouring agent for cream, lotion, soup and other cosmetic products where as 0.001% in alcoholic, non – alcoholic beverages, candy, puddings and other dairy products ^[6].

Market formulations

Geranium & lime hempseed oil soap, Rose geranium cream, Nature^{’s} gate persimmon & Rose geranium shampoo, Mrs. Meyer^{’s} geranium hand soap ^[29].

Achyranthes aspera

Synonym: Apamarga Prickly chaff flower, Chirchita ^[3].

Biological source: It consists of the entire plant of *Achyranthes aspera*. Family- Amaranthaceae ^[7].

Description- Macroscopic characteristics

Tap root cylindrical slightly ribbed, upto 1.0 cm in thickness, gradually tapering, rough due to presence of some root scars, secondary and tertiary root present; yellowish- brown; odour, taste not characteristic ^[3].

Microscopic characteristics

Mature root shows 6-10 layered, rectangular, tangentially elongated, thin- walled parenchymatous cells having scattered, thick-walled, irregular lignified stone cells,

followed by 5-6 discontinuous rings of anomalous secondary thickening composed, of vascular tissues.



Fig 12: Entire plant of *Achyranthes aspera*

The small patches of sieve tubes are distinct in the phloem parenchyma demarcating the xylem rings; secondary xylem composed of tracheids, fibres and parenchyma, vessels with both simple and bordered pits and with scalariform thickening, measuring 135-348 μ in length and 32-64 μ in width; fibers pointed at both ends with walls moderately thickened, measuring 260-740 μ in length and 12-24 μ in width, tracheids have tapering ends, measuring 165-535 μ in length and 17-34 μ in width.

Powder: Yellowish brown shows fragment of rectangular cork cells, stone cells. Vessels showing bordered pits and scalariform thickening, fibres and a few prismatic crystals of Ca^{+} oxalate [3].

Chemical constituents

The seeds contain saponins, pentatriacontane, hexatriacontane and triacontane. The whole plant contains the alkaloids, achyranthine and betain. Achyranthine, a water soluble alkaloid, dilates the blood vessels, lower the blood presser, depresses and increases the rate and amplitude of respiration. Ecdysterone is also present in stem and leaves. *Achyranthes aspera* contains triterpenoids saponins which possess oleanolic acid as the aglycone. Ecdysterone an insect moulting hormone and long chain alcohol are also found in *Achyranthes aspera* [2].

Uses: The plant is pungent, astringent pectoral and diuretic. It is used as an emmenagogue and in the piles and skin eruptions. A decoction of the plant is useful in pneumonia and ophthalmia, toothache and dysentery. The benzene extract of stem bark showed significant abortifacient activity. The leaves are used as a cure gonorrhoea and excessive perspiration. Their extracts showed antibiotic action. The roots are astringent, their paste is applied to clear opacity of cornea and to wounds as a haemostatic. A decoction of the root is used for stomach troubles and an aqueous extract for stone in bladder. The flowers are used for menorrhagia and to treat rabies. Seeds are emetic and given for biliousness. A medicated oil is dropped into the ear in deafness and noise in the ears [7].

Market formulations

Himalaya cytone, Nefrotec [31].

Urticadioica

Synonym: *Urtica*, Stinging nettle [17].

Biological source: *Urticadioica* is indigenous herb belonging to family- Urticaceae.

Description: Perennial, erect, pubescent herb or shrubs, 2.5 m high stem, greenish pale obscured 4 angled furrowed back fibrous petioles leaves, branches covered with stinging bristles. Leaves memberanous wrinkled, ovate, ovate cordate, ovate lanceolate 6-12 \times 3-7.5 cm. Acuminate, crenate seerate, sub cordate or truncate petioles 6-10 cm long in the connect ovate oblong. Entire puberulous flower small, pale green, clustered or spreing auxiliary. 4-8 cm long cymes shortly peduncle, slender, off use auxiliary and forming an erect terminal pyramidal panicle. It is monocious, lower males more simple inner fruiting sepals rounded twice as long as the outer male and fruiting sepal hispid. Male flower with 4-perianth segment and 4 stamens, female perianthsegmenter unequal [13].



Fig 13: Indigenous herb of *Urticadioica*

Chemical constituents: Leave with their intact hairs contain acetylcoline (318.4 μ g/g), histamine (38.8 μ g/g). In the leaves are rich in chlorophyll. It contains 3, 4-divanillyltetrahydrofuran, mordin, leukotrienes and formic acid [14].

Uses: It is believed to be a galactogogue. It has analgesic effect in rodents was found to have inhibited activity of 5 LOX (5-lipoxygenase) and showed concentration dependent inhibition of the synthesis of COX derived reaction therefore this study under taken to evaluate analgesic activity of urticadioica. Reduced biosynthesis of leukotriens by enhance production of the S Cytokines TNF- α , IL-1 & IL-6. Used in urinary tract infection or inflammation also used in fevers. A hair wash is used as a tonic and antidandruff treatment [14].

Market formulation

Jaxsen cream [19].

Rhododendron arboretum

Synonym: Burans [16].

Biological source: It consists of leaves and flowers of *Rhododendron arboretum*, family- Ericaceae [16].

Description: An evergreen, much branched tree, upto 14 m in height and 2.4 m in girth. Bark is reddish brown, soft rough, exfoliates in thin flakes. Leaves are lanceolate or oblong, crowd towards the ends of the branches. Flower are shows red in dence, globose chime and blooming in month of March- April [16].

Chemical constituents: Green leaves contain glucoside, ericolin, ursolic and a-amyrin, epiferiedelinol, quercetin and hyperoside. Bark contain leuco- perlargonidin. Flowers contain ursolic acid, quercitrin acid and resin [16].



Fig 14: Leaves and flowers of *Rhododendron arboretum*

Uses: Young leaves are poisonous, applied to forehead for headache. Flowers are used in diarrhoea and dysentery [16].

Market formulations: Burans flower herbal drink. Burans juice [19].

Equisetum arvense

Synonym- Horsetail [17].

Biological source: It consist of green stem of *Equisetum arvense*. Family- Equisetaceae [17].

Description

A perennial, non-flowering herb with black rhizomes bearing two kinds of hollow stems with 6-19 grooves, the first in spring stems are jointed without chlorophyll and with a compact terminal cone of sporangia, the sterile summer stem are green with grooved toothed sheaths at the joints and branches are solid. The sheath teeth have black tips [15].



Fig 15: Green stem of *Equisetum arvense*

Chemical constituents: Main aglycone of saponine showed haemolytic action. Isoquercitrin isolated from herb, isolation and characterisation of 6-chloroapigenin, a new flavonoid – protogenkwanin-4 glucoside- isolated genkwanin-5-0- β-D-glucopyranoside and luteolin-5-0-β-D-glucopyranoside isolated. Saponaretin apigenin-5- glucoside, protogenkwanin glycoside and gossypitrin isolated from fertile sprouts, identified as gossypitirin and herbacitrin respectively [15].

Uses: The green stem used as diuretic & ant diaphoretic it is used in tea mixture to treat kidney and bladder disorder. Eriosclerosis and to check internal and external bleeding. It was once used to treat pulmonary treatment such as T.B. it is added to compresses on in bath preparation to treat stubborn wounds, skin rashes and skin ulcer [15].

Market formulations

Nature's sunshine horsetail cap. Hair, skin & nail support [30].

Ageratum conyzoides

Synonym: goat weed [17].

Biological source: It consists of dried leaves of *Ageratum conyzoides*, family- Asteraceae [17].

Description –Macroscopic characteristics

Size: It is an erect, herbaceous annual, 30-80 cm tall plant.

Stem: Are covered with fine white hairs.

Leaves: Dark green in colour, opposite, pubescent with long petioles and include glandular trichomes.

Flower: Inflorescence contains 30-50 whitish purple flowers arranged as corymbs and are self- incompatible.

Seeds: Positively photoblastic and viability is often lost within 12-months [33].



Fig 16: Leaves of *Ageratum conyzoides*

Chemical constituents: It includes volatile oil mainly precocene-I, precocene-II 3,3- dimethyl-5- tertbutylindone, B-caryophyllene, Y- bisabolene and fenchyl acetate. A wide rangeof chemical compounds including alkaloids, flovonoids, chromenes, benzofurans and terpenoids. Luteolin is present [25].

Uses: Infusion prepared with leaves employed to treat colic, colds, fevers, diarrhoea, rheumatism, spasms and uses as tonic. It is highly recommended for burns and wounds, leaves should be chewed generously and swallowed as an antidote, whole plant is styptic (stopping bleeding). The juice is into the wound and the bruised leaf left on it [25].

Market formulation

Ageratum market grower blue 300 flower seeds [34].

Conclusions: The finding of this study was suggested that an initial effort to increase awareness of both the potential and problems associated with cultivation, conservation of biodiversity and trade in medicinal plants.Medicinal plants have a promising future because there are about half million plants around the world, and most of them their medical activities have not investigate yet, and their medical activities could be decisive in the treatment of present or future studies.

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