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# AN OVERVIEW: MEDICINAL PLANTS

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Phytochemicals, Flavonoid, Drug, Herbal medicine, Pharmacology.

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**ABSTRACT**

India has a long history and strong base of Ayurveda, which is the traditional herbal medical system. Herbal plants play an important role in preventing and treating of human disease. People have been using plant as a traditional medicine for thousand years ago. Plants have been associated with the development of human civilization around the whole world. However, plants are considered as rich sources of phytochemical ingredients which enable to have medicinal value. Medicinal plants are a potential source for the development of new herbal drugs. In the 21th century, the pharmacological effects of medicinal plants have been considered as promising future drug/medicine for the management of health care. In recent years, there has been a resurgence of interest to rediscover medicinal plants as a source of potential drug candidate. Primitive man in search of food and to cope successfully with human sufferings began to distinguish those plants suitable for medicinal purpose from others with definitive pharmacological action. This relationship between plants and man has grown and many plants came to be used as medicines.

**INTRODUCTION:**

Nature is always a golden sign to show the prominent phenomena of coexistence. Natural products from plants, animals and minerals are the basis for treating human disease. Medicinal plants are presently in demand and their acceptance is increasing progressively. Undoubtedly, plants play an importantole by providing essential services in ecosystems. Without plants, humans and other living organisms cannot live in a way living should be. Anyway, herbals especially medicinal herbs have constantly acted as an overall indicator of ecosystem health. Medicinal plants have undoubtedly beeb considered by human being s since ancient times. It can be said that before the history ans since the early humans recognized and exploited the plants around them for use as fuel, clothing , shelter and food, they became aware of their protpertis more or less. Medicinal plants have been transformed into one of the oldest sciences in countries such as China, Greece, Ehypt, and India. In ancient Persia, Plants were commonly used as a drug and disinfectant and aromatic agent. In facr, the use of medicinal plants for the trreatmen of diseases dates back to the history of human life, that is, since human beings have sought a tool in their encironment to recover form a disease, the use of plants was their only choice of treatment. More than a tenth of the plant species (over 50,000 species )are used in pharmaceutical and cosmetic products. However, the distribution of medicinal plants across the world is not uniform , and medicinal herbs are mainly collected from the wildlife population. Indeed, the demand for wildlife sources has increased by 8%-15% pe year in Europe, North America and Asia in recent decases. The term *Medicinal plant* refers to a variety of plants that hage medicinal properties. These plants are a rich source of compounds that can be used to develop drug synthesis. The parts of medicinal plants that way be used are different types of seeds, root, leaf, fruit, skin, flowers or even the whole plant. The active compounds in most parts of the medicinal plants have direct or indirect therapeutic effects and are used as medicinal agents. In the body of these plants, certain materials are produced and stored that are referred to as active compounds (Substance), which have physiological effects on the living organisms. Human is mainly dependent on raw plant materials in order to meet medical needs to maintain health and cure diseases. Medicinal plants are used for treatment because they have certain properties, including synergistic actions. The constituents of the plant may interact with each other, and this interaction can be beneficial for both or adverse to either of them or eliminate the harmaful effects of both. Plant-derived compounds can dramatically improve hard-to-treat illnesses, such as cancer. Plant components are alos characterized by their ability to prevent the development of certain diseases. The toxicity and adverse effects of conventional and allopathic medicines have

also been important factors in the sudden increase in population demands and increase in the number of herbal drug manufactures as well as a reduction in the use of chemical drugs.

Knowing the history of any science is effective in understanding and using that science. Hence, the historical significance of the past and present and future of medicinal herbs will continue to be addressed. In this perspective review, we have highlighted and discussed the history, current challenges, development and future outlook of using medicinal plants and their active compounds.

**PHYTOCHEMICALS:**

Phytochemicals (from the Greek word phyto, meaning plant) are biologically active, naturally occurring chemical compounds found in plants, which provide health benefits for humans further than those attributed to macronutrients and micrountriens. They protect plants from encironmental hazards such as pollution, stress, drought, UV exposure and pathogenic attack are called as phytochemcials. Recently, it is clearly known that they have roles in the protection of human health, when their dietary intake is significant. More than 4,000 phytochemicals have been catalogued and are classified by protective function, physical characteristics and chemical characteristics and about 150 phytoachemicals have been studied in detail.

In wide-ranging dietary phytochemicals are found infruits, vegetables, legumes, whole grains, nuts, seeds, fungi, herbs and spices. Broccoli, cabbage, carrots, onions, garlic, whole wheat bread, tomatoes, grapes, cherries, strawberries, raspberries, beans, legumes, and soy foods are common sources. Phytochemicals accumulate in different parts of the plants, such as in the roots, stems, leaves, flowers, fruits or seeds. Many phtochemicals, particularly the pigment molecules, are often concentrated in the outer layers of the various plant tissues. Levels vary from plant to plant depending upon the variety, processing, cooking and growing conditions. Phytochemicals are also avaible in supplementary forms, but evidence is lacking that they provide the same health benefits as dietary phytochemicals.

These compounds are known as secondary plan metabolites and have biological properties such as antioxidant activity, antimicrobial effects, modulation of detoxification enzymes, stimulation of the immune system, decrease of platelet aggregation and modulation of hormone metabolism and anticancer property. There are more than thousand known and may unknown phytocemocals. It is well-known that plants produce these chemicals to protect themselves, but recent researches demonstrate that many phytochemicals can also protect human against diseases.

Phytochemicals are not essential nutrients and are not required by the human body for sustaining life, but have important properties to prevent or to fight some common diseases. Many

of these benefits suggest a possible role for phytochemicals in the prevention and treatment of disease, because of this property; many researchers have been performed ot reveal the heneficial health effects of phytochemicals. The purpose of the present review is to provide an overview of the extremely diverse phytochemicals presents inmedicinal plants.

**CLASSIFICATION OF PHYTOCHEMICALS:**

The exact classification of phytochemicals could have been performed so far, because of the wide variety of them. In resent year Phytochemicals are classified as primary or secondary constituents, depending on their role in plant metabolism. Primary constituents include the common sugars, amino acids, proteins, purines and pyrimindines of nucleic acids, chlorophyll's etc. Secondary constituents are the remaining plant chemicals such as alkaloids, terpenes, flavonoids, lignans, plant steroids, surcumines, saponins, phenolics, flavonoids and glucosides.

**BIOLOGICAL ACTIVITIES OF PHYTOCHEMICALS:**

The phytochemicals present in plants are responsible for preventing disease and promoting health have been studied extensively to establish their efficacy and to understand the underlying mechanism of their action. Such studies have included identification and isolation of the chemical components, establishment of their biological potency both by *in vitro* and *in vivo* studies in experimental animals and through epidemiological and clinical-case control studies in man. Study findings suggest that phytochemicals may reduce the risk of coronary heart disease by preventing the oxidation of low – dencity lipoprotein (LDL)cholestcherol, reducing the synthesis or absorption of cholesterol, normalizing blood pressure and clotting , and improving arterial elasticity . phytochemicals may detoxify substances that cause cancer.They appear to neutralize free radicals, inhibit enzymes that activate carcinogens, and activate enzymes that detoxify carcinogens. For example, according to data summarized by Meagher and Thomson,genistein prevents the formation of new capillaries that are needed for tumor growth and metastasis. The phytochemicals are well understood and more many research has focused on their possible role in preventing or treating cancer and heart disease. Phytochemicals have also been promoted for the prevention and treatment of diabetes, high blood pressure, and macular degeneration. While phytochemicals are classified by function , an individual compound may have more then one biological function serving as both an antioxidant and antibacterial agent.

**PHARMACOLOGICAL IMPORTANCE OF MEDICINAL PLANTS:**

Plants use as food and in traditional medicine are more likely to yield pharmacologically active compounds. The medicional properties of plants have been investigated in the recent scientific

developments throughout the world , due to their potent therapeutic efficacy and antioxidant activities, no side effects and economic viability. Medicinal plants are serving as raw material for drugs which are effective and reasonable health care for people. However, all plants synthesize phytochemicals, Which are beneficial for our health as they cannot be synthesized in the human body. Plants are also rich dietary sources of biomolecules, vitamins and minerals which are crucial for maintaining the healthy body.

It has been observed that numerous plants have pharmacological effects due to the presence of metabolites. Plantmetabolites are organic compounds include glucose,starch, polysaccharide, protein, lipids and nucleic acid which are beneficial for growth and development of the human body. Plants synthesize secondary metabolites which include alkaloids, flavonoids, saponins, terpenoids, steroids, glycosides, tannins,volatile oils etc., The therapeutic efficacy of plants is because of these secondary metabolites for curing many diseases. Phytochemicals are pharmacologically active compounds. These include alkaloids have an antispasmodic, antimalarial, analgesic, diuretic activities; Terpenoids are known for their antiviral, anthelmintic, antibacterial, anticancer, antimalarial, anti-flammatory properties; Glycosides are reported for antifungal and antibacterial properties; Phenols and flavonoids have an antioxidant, antiallergic, antibacterial properties etc. and Saponins are reported, to have anti-inflammatory, antiviral, defence activities.

A Chinese Pharmacologist, Youyou Tu, discoverd and developed a new herbal antimalarial drug "Artemisinin" from *Artemisia annua (*a sweet Warmwood plant in China). Researchers identified several chemical compounds used in modern medicine,which were derived from plant sources include quinine, digoxin, Aspirin, atropine, and colchicines.

People have beeb suing plants as a medicine without scientific knowledge and proper guidance for thousand years ago. Using plants as medicines it is considered as a natural heaing Medical System. It has been scientifically established that every part of plants has medicinal properties include flower, root and stem, leafs,fruits, seeed and whole plants. However, it has beeb observed that some plants are not safe for health because thet contain some toxic compounds which show adverse effects in the body.

Herbal medicine is widely practiced in worldwide. For centuries, people have truned to natrula remedies to cure common ailments such as colds, allergy, upset stomachs and toothaches and the trend is constantly increasing. Thus, there has beeb a shift in universl trend from syntheric to herbal medicines, which we can ssy "Return to Nature" for the prevention of diseases and ailments. Nature has been a source of medicinal plants/ the World Health Organization (WHO) reported that

4 billion people (80% of the world's population) use herbal medicines for some aspect of primary healthcare. Herbal medicine has beeb recognized by WHO as essential components for primary health care and about 11% of the 252 drugs are derived from plants.

Since time immemorial, human civilization has been used several plants as food, medicine, clothing and shelter. Vegetarian foods contain high amounts of various "Super-nutrients", such as protective antioxidants, phytochemicals, micronutrients, which promote health and protect from disease. Plnats have several pharmacological roles such as antioxidant ,antiviral, anticancer, antimicrobial, antifungal and antiparasitic. Pln=ants have free radical scavenging molecules, including flaconoids, phynolics, anthocynins and vitamins, which show antioxidant kike activity. It has been reported that the antioxidant property of phytochemicals may be mitigated the oxidative stress in the biological system. Phytochemicals have been reduced the risk of many human diseases include cardiovascular disease, hepato-renal diseases, diabetes, cancers and beurodegeneratice disorders. However, several herbal medicines are being derved directly or indirectly from plants that are considered as an important medicine currently in use for cruing various human diseases.

The development of plant drug stared when development of chemistry, isolation, purification, characterization of plant active compounds. Herbal medicine is effective, lesser side effect, and affordable than the midicines bought from an allopathic medicine. Herbal medicines include herbs, herbal materials herba preparations, and herbal products that contain different parts of plants or other plant materials as active ingredients. It has been well documented that herbal plants an dtheir derivatives play critical role sin modern drug development. Medicinal plants are the natural resources in developing of new drugs.

**HEAVYMETALS IN MEDICINAL PLANTS:**

Medicinal plants are worldwide used in various disciplines of health care sustems such as herbal, Ayurvedic, Unani and homeopathic system of medicines in the form of herbs and standardized extracts. According to the adcance researches it has beeb suggested that plants contain secondary metabolites which are not only contain toxic substances (alkaloids), but they are also contaminated with environmental pollutants specially heavy metals, which are very dangerous to all living organisms upon long term exposures. Heacy metals are clsssified in two main categouries i.e. essential nad non essential heavy metals. Essential heacy metals (Cu, Cr, Zn, Fe, and Co), are present in very little concentration in the body for the proper functioning of enzyme systems, vitamin synthesis and haemoglobin formation in men and also required for the growth,

development and photosynthesis in platns. On the other hand toxic metals (Pb, As, Cd and Hg ) are not needed to perform specific function in the nody and they have deleterious effects even at very low concentrations. According to the adcanced research which has shown that crude extract of herbal origin can prove fatal for the health because these drugs may contain toxic metabolites or Some trace elements which cause damages to health.

Some heavy metal are needed by the body in very low concentration for proper functioning or synthesis various biomolecules inside the body. These trace elements are falled essential geavy metals. Heavy metals are present in the environment which is subjected to bioaccumulation in food chains. Anthropogenic processes, involving the organic manure, syntheric fertilizers, industrial residues and lime upon exposer contribute various amount sof heavy metals to the ecosystem. Heavy metals cnnot be decomposed by the microorganisms as they resistance to biodegradation. Drting cultivation process addition of synthetic fertilizers or lime is one cause which lead to enhance the concentration of heavy metals to the siol form where they are absorbed by the plants. Industrial exhause, vehicle exhaust and careless handling of wastes are also the main cause of producing heavy metals which may pullute the environment. These contamination of heavy metals in medicinal plants temain continue during storage and transportation process of plants where these are exposed to encironmental pollution,and heavy metals. The major source of accumulation of heavy metals in human orfans because these medicinal plants are not only used as folk medicines and food supplements, but many of them is utilized as condiments in daily routine. WHO/FAO has put forward this critical issue and analyzed heavy metals in the herbal medicines along with other necessary chemical, biological, and environmental analysis in their guidelins and also suggested the absorption, elimination, and toxic progiles of heavy metals. Although herbal drugs are utilized on lare scale by the people but these may be contaminated with heavy metals beyond their recommended level. The biologcial effects caused by these heavy metals necessitates the need to assess the heavy metals level of medicinal plants before they are utilized or taken for medicinal purposes.

**EXAMPLE:**

**MEDICINAL PLANTS HAVING ANTICANCER POTENTIAL:**

***1. ADIANTUM VENUSUTUM:***

*Adiantum venusutum* (Adiantaceae) is traditionally very useful in treating tumour. The phytochemicals, terpenoids, phytosterols, flavanoids and saponisns are obtained fron the perroleum ether and ethanolic extract of leaves and stem of *Adiantum Venusutum:* and screened

for the anticancer avtivity on Ehrlich Ascites Carcinoma in animals by using dose of 150-250mg/kg. A triterpenic ethr, lanost-20(22)-en-3, 19-ether, named adiantulanostene ether was isolated form A.*Venustum.*

2. ***ABELMOSCHUS MOSCHATUS***

The antiproliferative activites if ethanolic and aqueous extracts of *Abelmoschus moschatus (Malvaceae)* seed (AMS) and *Abelmoschus moschatus* leaf (AML) against two human cell lines-Colorectal adenocarninoma (COLO-205) and retinoblastoma (Y79) were investigated. Flavanoids are responsible for the antiproliferative activity of the extract.

***3. ASPIDOSPERMA TOMENTOSUM:***

The antiproliferative activity terpenoids and alkaloids obtained from crude dicloromethanhane (CHD) and crude hydroalcoholic extract (CHE) extracts of *Aspidosperma tomentosum* (Apocynaceae) twigs and aerial part was sound against five human cells line: K562 (leukemia), MCF7 (breast), NCIADR (BREAST expressing the multidrug resistance phenotype), NCI460 (lung) and UACC62 (melanoma), in a concentration-dependent way.

***4. ANEMOPSIS ACLIFORNICA:***

Three different extract conditions (aqueous EtOH and EtOAc) of four different parts (Bracts, leaves, roots and stems) of *Anemopsis californica* (Saururaceae) were evaluated for their effect on the growth and migration of human colon cancer cells, GCT-8, and the breast cancer cell lines Hs 578T and MCF- 7/AZ.

5. ***ALANGIUM SALVIIFOLIUM:***

The phytoconstituents like sterols, glycodies, saponins, carbohydrates, alkaloies, flavanoids, tannis, peoteins and triterpenoids are idenrified in the ethanolic, chloroform, alcohol and distilled water extract of *Alangium salviifolium* (AS) [Cornaceae (*Alangiaceae)*] seeds, floers, roots and leaves showed significant antitumor acitivity against Ehrich Ascites Carcinoma (ECA) in mice at the dises of 10mg/kg body weight intrpaeritoneally.

6. ***SVOTUD VSLSMUD:***

Several essential oils bioactive compounds like β-asarone (46.78%), linalool (0.41), (0.41), farnesol (11-09%), methyleugenol (6.10%), α- and β-pinene (both 0.06%), [E]-carypphellene (0.11%), β-ele,eme (0.39%), ociemne (0.7%), aromadendrene (0.26%), camphor (0.03%), from *Acorus calamus ( Araceae)* were identified for the antitumor activity and assyed in MDA_MB-435S and Hep3B cell lines. The plant possesses anti-

tumor properties at the dose of 30 µg/ml. Sesquiterpenes, phenylpropanoid etc. are isolated from of the ethanolic extract of *A. Calamus* rhizomes and were evaluated for anticancer activity.

7. ***ANTIARIS AFRICANA:***

The methanol extract from the stem bark of *Antiaris Africana* (Moraceae)as well aw compounds isolated and identified as betulinic acid, 3β-acetoxy-1β,11 α-dihydroxy-olean-12-ene, ursolic acid, oleanolic acid, strophanthidol, periplogenin, convallaroxin, strophanthidinic acid, methyl strophanthinate, and 3, 39-dimethoxy-49-O- β-d-xylopyronosyl ellagic acid, were tested for their anticancer activities against DU-145 and Hep G2 cells.

8. ***AMOORA ROHITUKA:***

Amooranin (AMR),a triterpene acid isolated form the petroleum ether, dichloromethane, and ethanol fraction of stem bark of *Amooea tohituka (Meliaceae).* The mechanism of cell death associated with AMR cytotoxivity in human mammary carcinoma MCF-7, multidrug resistant breast carcinoma MCF-7/TH and breast epithelial MCF-10A cell lines. AMR $IC_{50}$ values ranged between 3.8-6.9 µg/ml among MCF-7, MCF-7/TH and MCF-10A cells. The induction of apoptosis in AMR treated cells was accompanied by the elevation of total caspase and caspase-8 activities.

9. ***AMEBIA NOBILIS:***

Beta-do,etju; acru; sjolpmom from the root of *Arnebia nobilis (Boraginaceae)* posses anti-cancer activity by blocking of cell cycle progression in G1 phase, decreawd ecpression of Cyclin D, CDK 4 and PCNA, inhibition of bcl2 expression at transcriptional level and induction of caspase-3 activity. Arnebin isolated from the roots of *A. Nobilis,* inhibits rat walker carcinosarcoma, but activity was not found in the leaves and the stem.[29]

10. ***AESCULUS HIPPOCASTANUM:***

Recent studies *in vivo* and *In vitro* indicate that aescin (β-escin ) has significant antitumor activities. β-escin from *A hippocastanum (Sapindaceae)* inhibited chemically induced colon carcinogenesis in rats, and *in vitro* exhibited cytotocity at 30 µmol/I. Or above concentrations in colon cancer cell lines.

11. ***AEGLE MARMELOS:***

The hydroalacoholic leaf ectract of *Agele marmelos* (AME) *(Rutaceae)* was studied in the Ehrlich ascites carcinoma bearing Swiss albino mice and anticancer activity is due the

presence of skimmianine in the extract. Butylp-tolyl sulfide, 6-methyl-4-chromanone and 5-methoxypsoralen were isolated from the extracts of *Aegle marmolos* is able to inhibit the *in vitro* Proliferation of human tumor cell lines, including the leukemic K562, T-lymphoid Jurkat, B-lymphoid Raji, erythroleukemic HEL, melanoma Colo38, and breast cancer MCF7 and MDA-MB-231 cell lines.

12. ***ALLIUM SATIVUM:***

The anti-cancer activity of garlic-derived ortanosulfur compounds (OSCs) origination from aqueous extract (GAE) of aerial part and bulbs of *Allium sativum (Alliaceae)* cause cell cycle arrest, inhibit cancer (HeLa) cell line and generate reactive oxygen species (ROS). In addition inhibition of lymphocyte proliferation was observed in the presence of higher concentrations of GAE. The garlic derivative *S*-allylmercaptocysteine (SAMC) inhibits growth, grrests cells in $G_2$-M, and induces apoptosis in human colon cancer cells by thus arrestin cells in mitosis and triggering JNKI and caspase-3 signaling pathways that lead to apoptosis. Allicin, a major component of garlic has antitumoral activity in L5178Y lymphoma bearing mice.

13. ***BIOHHYTUM SENSITIVUM:***

An alcoholic extract to *Biophytum sensitivum (Oxalidaceae)* leaces was also found to be cytotoxic towards L929 cells in culture ar a concentration of 0.1 mg/ml. The extract was 100% toxic at a concentarion of 0.5 mg/ml to Dalton's lymphoma ascites (DLA) and Ehrlich ascites carcinoma (EAC) cells.

14. ***BETULA UTILIS:***

Betulinic acid (3β-Hydroxy-lup-20(29)-en-28-oic acid), pentacyclic lupine-type triterpene is obtained from the chloroform bark extract of *Betula utilis (Betulaceae).* It exhibits selective cytotoxicity against several melanoma-derived cell lines by means of inducing apoptosis in cells irrespective of their $p^{53}$ status.

15. ***CUSCUTA REFLIXA:***

The antitumor activity of the chloroform and ethanol extracts of whole plant of *Cuscuta reflexa (Convolvulaceae)*was evaluated against Ehrlich ascites carcinoma (EAC) tumor in mice at does of 200 and 400mg/kg body weight orally, respectively. Anticancer activity of the water extract of *C. reflexa* was analysed on Hep3B cells.

16. ***CAESALPINIA BONDNCELLA:***

The methanol extract of *Caesalpinia bonducella (Caealpiiaceae)* Leaces (MECB) were evaluated for antitumor activity against Ehrlich ascites carcinoma (EAC)-bearing Swiss albino mice. The extract was administered at the doses of 50, 100, and 200mg/kg body weight per day for 14 days after 24h of tumor inoculation. After the last dose and 18 h fasting, the mice were sacrificed. Life span of EAC-bearing hosts, hemarological profile, and biochemical parameters such as lipid peroxidation (LPO), glutathione content (GSH), superoxide dismutase (SOD), and catalase (CAT) activities.

17. ***CASSIA FISTULA:***

Effects of methanolic extract (ME) of *Cassia fistula (Fabaceae)* seed on the growth of Ehrlich ascites carcinoma (EAC) and on the life span of tumor bearing mice were studied. ME treatment showed an increase of life span, and a decrease in the tumor volume and viable tumor cell count in the EAC tumor hosts [48].

***18. CASSIA TORA:***

Methanolic leaf extract of *Cassia tora (Fabaceae )* (CTME) was evaluated for antiproliferative activity of with Cisplatin using human cervical cancer cells (HeLa). The plant extract induced a marked concentration dependent inhibition on proliferation, reduced DNA content and apoptosis in HELa. Phenolic compounds are responsible for the antiproliferative activity.

19. ***CLEOME GYNANDRA:***

The anticancer activity of the methanol extract of whole plant of *Cleome gynandra (Capparidaceae)* (MECG) was evaluated in Swiss albino mice against Ehrlich Ascites Carcinoma (EAC) cell line at the doses of 200 and 400 mg/kg body weight intrperitoneally.

20. ***CENTELLA ASIATICA:***

The crude extract (CE) of *Centella asiatica (Apiaceae)*inhibited the proliferation of hte transformed cell lines significantly. 50% effective doses was foun don 17 and 22 µg/ml for ehrlich ascites tumour cells (EAC) and dalton's lymphoma ascites tumour cells (DLA), respectively. Oral administration CE retarded the development of solid and ascited tumours and increased the life span of these tumour bearing mice. Asiatic acid (AA) is a pentacyclic triterpene found in *Centella asiatica* decreased viability and induced apoptosis inhuman melanoma SK-MEL-2 cells in time-and dose-dependent manner.

21. ***COLA NITIDA:***

The potential anticarcinogenic effect of aola nut methanol extract on human breast cancer cell lines. MCF-7 was investigated. MCE7 cells treated with 80 µg/ml cola nut extract showed an increaw of 8.29% in population of apoptotic cells with a concomitant decrease in the percentage of cells in the S and G2/M phase of cell cycle compared to DMSO-treated control cells.

22. ***CIRSIUM JAPONICUM:***

Potential antioxidant aavtivities of methanol and water extracts of *Cirsium japonicum (Asteraceae)* (CI) leaves and roots showed a concentration-dependent reducing poer, ranging from 0.228 to 1.072 (0.1-0.5 mg/mL), as well as a high DPPH free radical-scavenging activity ($EC_{50}$=40.25 µg/mL). Anticancer activity of *C. Japonicum* In the S180 and H22 mice was separated and purified with several chromatograpgt techniques and two flavone compounds, pectolinarin and 5,7-dihy-droxy-6,4'-dimethoxyflavone, were isolated and greatly ibhibitedcancer cell growth.

23. ***CEPHAALOTAXUS HARRINGTONIA:***

Several phytochemicals obtained form the chloroform extract of leave and stems of *Cephalotaxus harringronis (Caphalotaxaceae)* are cephalotazxine and its antitumor esters (harringtonine, isoharringtonine and honoharringtonine) in both callus and medium it shows significant activity against experimental P388 leukemia and L-121O leukemia in mice. A new alkaloid deoxyharringtonine (80%), and isoharringtonine, with significant antileukemic activity has been isolated form *C. harringtonia.*

*24.* ***CROCUS SATIVUS:***

Crocin, crocetin, picrocrocin and safranal are isolated form 80% ethanol extracts of the whole plant of *Crocus sativus (lridaceae)* have been reported to inhibit cell growth of human tumor cells, P38B, S-180, EAC and DLA tumor cells *In vitro.* Saffron can prefnt chemically induced skin carcinogenesis in Swiss Albino mice. Crocin Inhibits proliferation, nucleic acid synthesis and induces apoptosis in the human tongue squamous cell Carcinoma Cell Line, Tea 8113.

25. ***CINNMOMUM ZELYANICUM***

The anti-neoplastic activity in the aqueoud extract of cinnamon bark (ACE-*C*) in cervical cancer cell line was reported through increase in intracellular calcium signaling as well as loss of mitochondrial membrace potential, SiHa due to downregulation of MMP-2

expression. In addition, *C. zeylanicum* (Lauraceae) aqueous extract significantly (P<0.01) induced 20 and 37% thymic cells lymphoproliferation at 62.5 and 125 µg.ml respectively.

26. ***CONYZA CANASENSIS:***

Methanol extract of the roots of *Conyza Canadensis* (Asteraceae) led to the isolation of two new dihydropyranones named conyzapyranone A and B and the known 4Z, 8Z-matricaria-ɤ-lactone, 9,12,13,-trihydroxy-10 (E)-octadecenoic acid, epifriedelanol, friendeline, taraxerol, simiarenol, spinasterol, stigmasterol, β-sitosterol, and apigenin. The isolated compounds were demonstrated to exert considerable cell growth-inhibitory activity against juman cervix adenocarcinoma (HeLa), skin carcinoma (A431), and breast adenocarcinoma (MCF-7) cells. The antitumor activities of novel antitumor, duocarmycins (DUMs), A, B1, B2 C1, and C2 obtained form the extract of *Conyza Canadensis* were examined against human and murine tumor cells, also inhibited the growth of adriamycin (ADM)-resistant lines of human nasopharynx carcinoma KB cells and breast carcinoma MCF-7 cells as well as their sensitive lines.

27. ***CLAUSENA LANSIUM:***

An investigation of *C. lansium* seed extract led to the isolation and identification of two new amides, clasue-nalansamide A and clausenalansamide B along with three known human cancer cell lines, KB, MCF7 and NCIH187. The phenolic and flaconoids content of the extract is responsible for antiproliferative activity.

28. ***CROTON MACROBOTRYS:***

n-hexane, dichloromethane and methanol extracts of the whole plant of *Croton macrobotrys* (Euphorbiaceae) were evaluated for their *In vitro* antiproliferative activity on cell lines, 786-0 (kidney), HT-29 (colon), K562 (leukemia), NCI-ADR/RES (drug resistant ovary), NCI-H460 (lung), MCF-7 (mammary), PC-3 (Prostate), OVCAR-3 (ovary), U251 (glioma) and UACC-62 (melanoma).

29. ***DRACOCEPHALUM TANGUTICUM:***

A chloroform extract of the whole plant of *Dracocephalum tanguticum* (CEDT) *(Lamiaceae)* was found to contain high content of sapogenin or saponin (53.7%). 90 µg/ml dose of CEDT was effective in anticancer activity on T98G glioblastomas cells by induction of p21.

30. ***DIOSCOREA COLLETTII:***

Methyl protodioscin (MPD) extracted form *Dioscorea collettii (Dioscoreaceae)* has anti-proliferative effect on the HepG2 cells and cytotoxicity against most cell lines form solid tumors. It results in G2/M arrest and apoptosis in HepG2 cells. Three effects were arrtibuted to down-regulation of Cyclin B1 and the signaling pathways leading to up-regulation of Bax and down-regulation of BCL2, suggesting tht methyl protodioscin may be a novel anti-mitotic agent. MPD, ranging from 2.4 to 20 mM, significantly inhibited growth of HepG2 cells in a time. And dose-dependence manner.

31. ***EMILIA SONCHIFOLI:***

The anricancer efficacy of n-hexane extract of whole plant of *Emiliasonchifolia* (Asteraceae) was determined inmice using Dalton's lymphoma ascetic (DLA) cells. The hexane extract was found to be most acive in an concertration and time-dependent manner; it induced membrane bledding, nuclear condensation, DNA ladder formation, and formation of apoptotic bodies which are characteristic to apoptotic cell death.

32. ***EUPHORBIA HIRTA:***

The antiproliferative activity of the methanol extract of leaves of *Euphorbiahirta (Euphorbiaceae)* on HepG2 cells from human epithelioma of larynx was investigated. The dose, 625 µg/ml of methanol extract showed the antiproliferative activity. The acetone root extracts of *E. Hylonoma* were investigated for 1,1-diphrnyl-2-phcylhydrazyl (DPPH) free radcial, superoxide anion and hydroxyl radical scavengingn activity and cytotoxic activity against hte human hepatoma cell line SMMC-7721, human cervix epitheloid carcinoma cell line HeLa and the human gastric cancer cell line SGC-7901.

33. ***EMBLICA OFFICINALIS:***

The efficacy of methanolic extract of *Emblica officinalis (Phyllanthaceae)* fruits polyphenol fraction (EOP) on the imdcution of apoptosis in mouse send human carcinoma cell lines (Dalton's Lymphoma Ascites (DNA) and CeHa cell) at 200µg/ml dose and its modulatory effect on N-nitrosodiethylamine (NDEA) induced liver tumors at 60 mg/kg. In rats were determined. Aqueous extract of *E. Officinalis* was found to be cytotoxic to L929 cells, ascites and solid tumours in mice induced by DLA cells in a dose dependent manner.

34. ***GMELINA ASIATICA***

The effect of lignans and flavonoids obtained from the ethyl acetate extract of *Gmelina asiatica (Lamiaceae)* roots (EGAR) on estrogen receptor-positive (MCF-7) and negative (MDA-MB-231) human breast cancer cell lines were studied.

35. ***HERACLEUM PERSICUM:***

Antitiumor activity was found in the methanol and petroleum ether extract from the root and frutits of *Heracleum persicum (Apiaceae)* and had inhibition effects on *Agrobacterium tumefaciens* which induced crown gall tumor on potato disk.

36. ***HIBISCUS MUTABILIS:***

A hexameric 150-kDa lection was isolated from dried *Hibiscus mutabilis (Malvaceae)* seeds using a chromatographic protocol that involved ion exchange chromatohraphy on SP-Sepharose, and gel filtration on Superdex 75 and Superdex 200. The hemagglutinating activity of the lectin, which was stable at pH 4-7 and up to 50 degrees C, could be inhibited by 25 mM galactonic acid. This is the first report of a galactonic acid-binding lectin. It potently inhibited HIV-1 reverse transcriptase with an $IC_{50}$ of 0.2 microM.

37. ***HEDYOTIS DIFFUSA:***

The cellular effects of the ethanol extract of whole plant of *Hedyotis Diffusa* (EEHDW) *(Rubiaceae)* in the HT-29 human colon carcinoma cell line inhibited the growth of HT-29 cells, demonstrating EEHDW- induced cell morphological changes, collapse of mitochondrial membrance potential, activation of caspase-9 and caspase-3, and increase of the ratio of pro-apoptotic Bax to anti-apoptotic Bcl-2, suggesting that the HT-29 cell growth inhibit activity of EEHDW. The isolated splenocytes from *H. Diffusa* extract-treated leukemin mice demonstrated an increase of T- and B-cell proliferation *in vivo.*

*38.* ***INDIGOFERA LINNAEI:***

Methanol extract of *indigofera linnaei* (MEIL) of family *fabaceae* was investigated for antitumor actvitiy against transplantable tumors and human cancer cell lines HeLa, Hep-2, HepG-2, MCF-7, HT-29, Vero and NIH 3T3 cells. At the dose of 200 and 400 mg/kg, significantly increase the mean survival time, exerted a protective effect on the hemopoietic system and significantly reduce solid tumor volume. The extract of *l. linnaei* is rich in flavonoids and saponins. Flavonoids have been found to posses antimutagenic and antimalignant effect.

39. ***LEEA INDICA:***

The crude methanolic extract of the leaves of *Leea indica (Vitaceae)* was examined for their anti tumor activity against Ehrlich Ascites Carcinoma (EAC) cells in Swiss albino mice. The compound at the dose of 40mg/kg/day significantly decreases tumor weight. Glycosides, mollic acid arabinoside (MAA) and mollic acid xyloside the growth of $Ca^{2+}$ Ski cervical cancer cells with $IC_{50}$ of 19.21 µM. Remarkable cytotoxic activity shown by *L. indica* extracts can be attributed mainly to phenol, flavonoids and gallic acid. Gallic acid is isolated from the leaves of *L.indica* and active against several cancer cell lines.

40. ***LIRIDENDRON TULIPIFERA:***

The methanolic extract of the stem, leaves and roots bark of *Liriodendron tulipifera (Magnoliaceae)* showed significant activity against the KB cell culture and inhibitory activity towards farnesyl protein transferase (FPTase). 977). Three active constituents, costunolide, tulipinolide, liriodenine and a new germacranolide, were isolated which are having antiproliferative activity.

41. ***LITCHI CHINENSIS:***

The ethyl acetate extract of *Litchi Chinensis (Sapindaceae)* fruit pericarp (LFP) displays inhibitory effects on human breast cancer. The major flavonols in the LEP are reported to be procyanidin B4, procyanidin B2 and epicatechin, while cyanindin-3-rutinside, cyaniding-3-glycoside, quercetin-3-rutinosde and quercetin-3-glucoside are identified as the important anthocyanins.

42. ***MORINGA OLERFERA:***

The chemopreventive efficacy of the hydroalciholic extract of *Moringa oliefera (Moringaceae)* was evaluated in a two stage model of 7, 12-dimethyl benz (a)-anthracene induced skin papillomagenesis. Topical application of the extract at a dose of 5mg/ kg body weight inhibited the tumor multiplicity. The ethanol extract of the seeds of *M. Oleifera* were examined and the new O-ethyl-4-(α-1-rhamnosyloxy) nebzyl carbamate together with seven known compounds, 4 (α-1-rthamnosyloxy)-benzyl isothiocyanate, niaximicin, niazirin, β-sitosterol, glycerol-1-(9-octadecanoate), 3-O-(6'-O-oleoyl-β-d-glucopyranosyl)-β-sitosterol and β-sitosterol-3-O-β-d-glucopyranoside were isolated.

43. ***MAGNOLIA SIEBOLII:***

An aqueous extract of *M. Officinalis (Magnoliaceae)* inhibited cell viability and DNA sunthesis in cultured human urinary bladder cancer 5638 cells. Inhibition of proliferation

was the result of apoptotic induction, because FACS analyses of 5638 cells treated with *M. Officinalis* showed a sub-GI phase accumulation. The extract alos increased cytoplasmic DNA-histone complex dose-dependently.

44. ***MATRICARIA CHAMOMILLA:***

The anticancer properties of aqueous and methanolic extracts of chamomile *(Marticanria chamomilla, Asteraceae)* flower against various human cancer cell lines causes minimal growth inhibitory responses in normal cells, whereas a significant decrease in cell viability was observed in various human cancer cell lines. Chamomile extract confirmed apigenin 7-O-glucoside as the major constituent of chamomile.

45. ***MALLOTUS PHILIPPINENSIS:***

95% ethanolic, 50% ethanolic and aqueous extract of glands/hairs obtained from the fruits of *Mallotus philippinensis (Euphorbiaceae)* at the concentarion of 100 µg/ml were studied for *in vitro* cytotoxic activity against 14 human cancer cell lines from nine different origins. Results revealed that the 95% ethanolic extract showed highest *in vitro* cytotoxic effect against all the 14 human cancer cell lines.

46. ***NELUMBO NUCIFERA:***

(S)-armepavine (C19H23O3N; MW313) from ethanolic leaves extract of *Nelumno nucifera* (Nelumbonaceae) inhibits the proliferationof human PBMCs activated with PHA. The main polyphenols idenfified in the above extract were gallic acid, rutin , and quercetin. Cell-cycle arrest of MCF-7 cells treated with NLE at the G0/G1 phase. Its flowr also has antitumor activity.

47. ***OPERCULINA TURPETHUM:***

A significant increase in lipid peroxidation levels were observed in tested samples of cancer induced rats while the activities of enzymatic antioxidants such as superoxide dismutase, catalyse, glutathione peroxidase and nonenzymatic antioxidants like glutathione, ascorbic acid and alpha tocopherol were decreased in cancer bearing animals when compared to controlled animals. Significant increase in breast tumor weight was observed in DMBA group while breast tumor weight decreased significantly in combination of DMBA and *O. Turpethum* extract group.

48. ***OLDENLANDIA DIFFUSA:***

Leaf methanol and hexane extract of *Oldenlandia diffusa* (Rubiaceae) has been identigied for antitumor properties through *Agrobacterium tumefaciens* infection.

Significant tumor inhibition was observed at 100ppm and 1000ppm of the extract. Maximum tumor inhibition of 40.98, 41.93 and 41.89% were observed at 1000 ppm for the accessions of the *Agrobacterium tumefaciens* AtTs0112, AtAc0114 and AtS10105 respectively.

49. ***OPHIORRHIZA MUNGOS:***

The anticarcinogenic potential of the phytocompound Luteolin-7-O-glucoside (LUT7G) and camptothecin, isolated from the methanolic extract of leaves and roots of *Ophiorrhiza mungos* (Rubiaceae) was studied against 4 different cancer cell lines.

50. ***OCIMUM SANCTUM:***

An aqueous and ethanolic extract of *Ocimum sanctum* (lamiaceae) leaves has been investigated against human fibrosarcoma cells (HFS cells) and a significant reductionin tumor volume of mice bearing Sarcoma -180 solid tumors. Ethanol extracts of *Ocimum sanctum* (EEOS) has antitumor mechanism in A549 cells and the Lewis lung carcinoma (LLC) animal model.

***51. PHASEOLUS VULGARIS:***

Twenty-one-day-old female Sprague Dawley rats were given an intraperitoneal injection of 1-methyl-1-nitrosourea and 7 d after carcinogen injection were randomized to 1 of 5 groups fed a modifications of the AIN-93G diet formulation containing 0, 6.5, 15, 30, or 60% (wt:wt) small red dry bean (*Phaseolus vulgaris, L.) (Fabaceae )* incorporated as cooked, freeze-dried, and milled powder. All experimental diets had the same macronutrient content based on proximate analysis.

52. ***PERISTROPHE BICALYCULATA:***

The oil of *P. Bicalyculata (Acnathaceae)* displayed *in vitro* cytotoxicity (2.5-22.3 µg/ml) to MCF-7 (human breast tumor ) and MDA-MB-468 (human breast tumor) cells. With respect to the oil of *P. Bicalyculata*, beta-caryophyllene (33.9%), alpha-zingiberene (10.4%), germacerne D and globulol (5.0%) were the compounds occurring in abundance.

53. ***PHYLLANTHUS RHEEDII:***

The alcohol (95%) extract of the whole plant of *Phyllantus rheedii (Ehphorniaceae)* has tha antitumoral activity on lung carcinoma cell lines (A549), colon carcinoma cell lines (HCT-116), liver carcinoma cell lines (HEPG-2) and cervical carcinoma cell lines (HELA). The HELA cells were treated with 5 mg/ml and the remarkable ibhibition of cells were found. The water extract of *P. Urinaria did* not exert any cytotoxic effect on normal cells

such as endothelial cells and liver cells. The anti-cancer activity of *P. Urinaria* extract was due to the apoptosis induced in Lewis lung carcinoma cells (LLC), which was demonstratd by DNA fragmentaition analysis and increased caspase-3 activity.

54. ***PARIS POLYPHYLLA:***

Eight compounds were obtained from *Paris polyphalla (Trilliaceae)* and identified as Falcarindiol, β-ecdysterone and six known saponins. The dry rhizomes (5kg) of *P. Polyphylla* were refluxed three times with 70% EtOH extract of *P.polyphylla,* And then tested for their antitumor against HepG2 cells, with $IC_{50}$ values of 13.5 µM and 11.6 µM respectively. The antitumor activity steroid saponis of *P. Polyphylla* against lung adenocarcinoma cells was found.

55. ***PLATYCODON GRANDIFLORUM:***

Petroleum ether extract from *Platycodon grandiflorum (Campanulaceae)* was evaluated using human cancer cell lines (HT-29, HRT-18 and HepG2). *P. Grandiforum* can reduce the extent of a lung metastasis of B16-F10 melanoma cells by inhibiting the adhesion of tumor cells to the basement membrane possibly and activating NK cells. The inhibitory effects of CKS on MMP-2 and MMP-9 activation, relation of tumor invasion and migration in vitro possibly involve mechanisms related to its ability to suppress PMA-enhanced NF-kB activation through ROS signaling pathway. Aqueous extract from the root of *Platycodon grandiflorum* (AEPG) was studied for the cell growth and apoptosis in human lung carcinoma cell line A549.

56. ***PLUMBAGO ZEYLANICA:***

Plumbagin (5-hydroxy-2-methyl-1, 4-naphthoquinone) from *Plumbago zeylannica* (Plumbaginaceae) may have potential as an antitumor agent by releasing of mitochodrail cytochrome c and –independent pathways, as shown by the plumbagin-mediated activationof caspase-3 and -9. Plumbagin exhibited cell proliferation inhibition by inducing cells to undergo $G_2$ –M arrest and atuophagic cell death. Blockade of the cell cycle was associated with increased p21/WAF1 expression and Chk2 activation, and reduced amounts of cyclin B1, cyclin A, Cdc2, and Cdc25C. plumbagin also reduced Cdc2 function by increasing the association of p21/EAF1/Cdc2 complex. The reducing effect plumbagin treatment on viability of human prostate cancer cells (PC-3, LNCaP, and C4-2 ) with apoptosis induction, which was accompanied by ROS generation and depletion of intracellular GSH levels. Plumbagin inhibited-dependent manner.

57. ***PIPER NIGRUM:***

Six alkaloids Piperine, piperidine, piperettine, piperanine, piperlongumine and piperlonuminine extracted form *Piper nigrum (Piperaceae)* sample showed antiproliferative activity against several human cancer cell lines. The incubation of tumor cell lines with 5-FU in the presence of piplartine or piperine produced an increase in tumor growth inhibition and significantly lowered in lung-cancer bearing mice and B16F-10 melanoma cells. The alkaloid piperdine was purified by refluxion method to check the antitumour activity which shows 51.38% of inhibition at 5µg/ml concentration.

58. ***PERILLA FRUTESCENS:***

The methanolic extracts from different parts of *perilla frutescens (Lamiaceae)* were evaluated for their antiparoliferative activities by using human non-small cell lung A549 cancer cells. The methanolic extrct of stalk exhibited moderate antiproliferative activity. Stalk of *P. Frutescens* might be used as a potential source of potential source of natural antioxidants and as anti-tumor agent.

59. ***RHIZPHORA APICULATA:***

*Rhizphaora apiculata (Rhizophoraceae)* extract of whole plants was found to protect mice from cyclophosphamide (CTX) induced leukopenia. Teh leukocyte counts in the *R. Apiculata* extract treated animals was significantly increased (10425 ± 163 $m^3$) whereas the control group shows no significant increase (7855 ± 282 $mm^3$).

60. ***RUBIA CORDIFOLI:***

The powdered roots of *Rubia cordifolia (Rubiaceae)* was percolated with 80% methanol to obtain the methanol extract. Several secondary plant metabolites and four new naphthohydroquinones and two naphthohydroquinone dimmers were isolated form roots of *R. Cordifolia* was investigated for the Cox-2 inhbitory activity which may serve as lead molecules for cancer chemoprevention studies.

61. ***RADIX SOPHORAE:***

Leachianone A, isolated from Radix Sophorae (*Luguminosae),* possesses cytotoxic activity against human hepatoma cell line HepG2 *in vitro* via induction of apoptosis involved both extrinsic and intrinsic pathways, with an $IC_{50}$ value of 3.4 µg/ml 48h post treatment.

62. ***SAUSSUREA LAPPA:***

The dried roots of *Saussurea lappa (Asteraceae)* were investigated for the anticancer constituents from the hexane extract of this plant, a new sesquiterpene was isolated along with the known compounds costunolide, β-cyclocostunolide, dihydro constunolideand dehydro costuslactone having anticancer active isolates and its derivatives were studied. Three components cynaropicrim reynosin , and santamarien, were isolated from the methanol extract of *S. lappa* radix stem bark showed potent inhibitory effect on the production of tumor necrosis factor-α (TNF- α), a proinflammatory cytokine, inmurine macrophage-like cell (RAW246.7 cells).

63. ***TYLOPHORA INDICA:***

Tylophorine was extracted from the leaves of regenerated plants using organic solvents such as like hexane, chloroform and dichloromethane and separated on high performace thin layer chromatography (HPTLC) using toluene: chloroform: ethanol: ammonia (4:3.5:1.5:drop) as mobile phase. Amount of tylophorine obtained was 80 and 71 µg/ml from callus raised and directly cultured *in vitro* plants respectively.

64. ***TARAXACUM OFFICINLE:***

The ethulacetate, butanol, methanol and cold water extracts of the plant had significantly higher radical scavenging (%) and total phenolic contents than the hot water, and hexane extracts. Cytotoxic effects of all the extracts evaluated using the SRB assay on HeLa, HT-29, HepG2 and KB cell lines demonstrated that the ethylacetate extract with an $IC_{50}$ of 15.5 µg/ml was potentially very toxic against human mouth epidermal carcinoma (KB) than all other extracts.

65. ***TAXUS YUNNANENSIS:***

The extract of roots of T. *Yunnanensis (Taxaceae)* showed that they were rich in taxane diterpenoids, including paclitaxel and dihalocephalomannine with anticancer

Property. Two new taxane diterpenes, dantaxusin C and dantaxusin D were isolated from an ethanol extract of the aerial parts of *Taxus yunnanensis* along with 14known taxoids.

66. ***TABEBUIA AVELLANEDAE:***

Callus and cell suspension cultures of *Tabebuia acellanedae (Bignoniaceae)*produced promising antitumour-promoting furananaphthoquinones, 5-hydroxy-2-(1-hydrozyethyl) naphtha [2,3-b] furan-4,9-dione ih high yields. A series pf naphthoquinones based on the naphtha [2,3-b] furan-4,9-dione skeleton such as (-)-5-hydroxy-2-(1'-hydoxyethayl)naphtha

[2,3-b]furan-4,9-dione) and its positional isomer, (-)-8-hydroxy-2-(1'-hydoxyethyl) naphtha [2,3-b] furan-4,9-dione, which are secondary metabolites found in the inner bark of *Tabebuia avellanedae*,were synthesized and their biological activities such as antiproliferative and cancer chemopreventive activity were examined.

67. ***VCCINIUM MACROCARPON:***

Triterpene cinnamates 3-O-p-hydroxycinnamoyl ursolic acid purified from the ethyl acetate extracts of *Vaccinium macrosporan* (Ericaceae) showed slightly greater activity of compound in most tumor cell lines, with $GI_{50}$ values of approximately 20 µM in MCF-7 breast, ME180 cervical and PC3 prostate tumor cell lines. Antiproliferative activities of isolated compounds from cranberries extracts against HepG2 human liver cancer and MCF-7 human breast cancer cells were evaluated.

**MEDICINAL PLANTS OF INDIA:**

**1)** ***PLANTAGO OVATA:***

This is belongs to family Plantaginacea is an annual herb grown during the rabi season. The swelling property of the husk after absorption of water is the cause of its use as famous medicine against constipation and gastrointestinal irritations. It is also used for the treatment of number of other stomach related disorders. Various polysachcharides and amino acids are reported from its seeds. In addition, it is used in food industries for the preparation of ice creams, candy etc. the raw drug is collected solely from cultivation.

2) ***CASSIA ANGUSTIFOLIA:***

The herb is a member of family, Fabaceae. It contains sennosides, which is responsible for the purgative action. The drug is used as a cathartic in giving relief to constipation.

3) ***ALOE BARBADENSIS:***

Aloe-a member of the family Liliaceae. The plant is perennial herb with fleshy leaves and condensed stem. Flowering occurs in winter and the inflorescence stack is about 90-150 cm long with orange coloured flowers. Leaves contain gel (polysaccharides) and leaf exudates contain aloins, which are commercially useful. Gel has a cooling and moisturizing action and hence used in cosmetic industries and the leaf exudates contains aloins and aloe emodine, which are used as pain killer and purgative.

4) ***WITHANIA SOMNIFERA:***

*Withania somnifer* a, member of family Solanaceae and is dostrubuted through out india. Root is the major medicinally important part in addition to leaces ad seeds. Alkaloids (withanoloids and withanins) present in the roots are believed to be effective in treatments of stress induced disorders, fatigue, dropsy, male impotency, nerosis, etc. it is commonly used as a general tonic.

5) ***CHLOROPHYTUM BORIVILIANUM:***

The plant, a member of family Liliaceae is a perennial herb with condensed stem disc and a whirl of sessile leaves. Fasciculated roots contain saponins and are medicinally important. It is used as a general tonic and is a well-known aphrodisiac. Raw drug is collected both from wild as well as from cultivation. The plant is propagated by the stem disc with the attached fleshy roots as well as by seeds. Unorganized collection of the species form the natural habitat has caused endangered species status.

6) ***COMMIPHORA WIGHTII:***

The important medicinal plants belongs to family Burseraceae. The oleo- gum resin of guggal having chief constituents like myrcene and dimyrcene is known to be highly effective in the treatment of obesity, arthritis and several other diseases in Indian system of medicine. The species is included in the Red data book (IUCN) as over exploited species in teh country.

7) ***TINOSPORA CORDIFOLIA:***

It is a deciduous perennial climber belongs to the family Menispermaceae. The stem and leaves are medicinally used as raw drug. Tinospora stem is a common constitiuent of a number of ayurvedic vital tonics for the treatment of general debility, dyspepsia, fevers and urinary diseases. Starch called as “Sat Giloe” present in the stem along with alkaloids is the active principle of the species. Major constituents are tinosporon, tinosporic acid, tinosporoside, tinosporin and cordifolide. Leaf also contains a number of alkaloids. Leaf is used for the treatment of gout, jaundice and rheumatism. Raw drug is mainly obtained from the wild habitats of species.

8) ***ASPARAGUS RACEMOSUS:***

Satavary is a perennial spiny woody climber belongs to the family Liliaceae. Fasciculated roots are medicinally important. It contains saponins and is used for the treatment of dysentery, tumours, rheumatism and kidneyand liver disorders. Powdered roots are a common ingredient of a number of vital tonics, which are believered to cure sexual weaknesses, leucorrhoea and increase lactation in feeding mothers.

9) ***BACOPA MONNIERI:***

Member of Scrophylariacea family is a creeping, branched succulent perennial herb distributed in wet and marshy lands through out India. The whole herb is the source of the source of the ayurvedic drug 'Brahmi'. It is used in improving memory and intelligence and also in the treatment of dermatosis, anaemia, deabetics and insanity. Bacopposide is considered as teh major active ingredient in this plant. Raw drug is mainly collected from the wild.

10) ***CENTELLA ASIATICA:***

A member of family Apiaceae is a prostrate slightly aromatic, perennial herb commoly found as a weed creeping on ground in crop fields. It is used for the treatment of leprosy, skin diseases and to improve memory. Itis also against cholera, ulcers, bronchitis, leucorrhoea and kidney troubles. Asiaticosie, indocentelloside, thankuniside are the major glycosides responsible for the medicinal properties.

11) ***ANDROGRAPHIS PANICULATA:***

Belongs to family Acanthaceae is a brached annual undershrun of about 30-100cm tall. The whole herb is medicinally useful. Andrographolide is the active principle having the therapeutic considered as a blood purifier and used for the treatment of skin deseases.

12) ***SWERTIA CHIRA*YITA:**

It is an erect annual herb belongs to family Gentianaceae. The bitter tonic made from the raw drug inproves bile secreation and used for the treatment of bronchial asthma, liver disorders,and anaemia. The juice of fresh plant or infusion of dry plants is prescribed as a "blood purifier" in skin diseases. The active ingredient of the raw drug includes ophelic acid, glucosides, etc.

13) ***MUCUNA PRURIENS:***

The species is a pubescent annual liana belongs to Fabaceae family. The active principle is L-Dopa. The seeds are used to treat, Parkinson disease, sexual disorders, cholera, urinary troubles and liver and gall bladder diseases. L-dopa present in the seeds is the active principle responsinle for therapeutic action.

14) ***GENTIANA KURROO:***

The plant is a small perennial herb belongs to family Gentianaceae. Gentiopicrin and tannins are present in the raw drug. Rhizome is used as a gastric stimulant and improves appetite. The raw drug is mainly collected from the wild. It is also used for the treatment of fever, abdominal pains,and for the purification.

15) ***VALERIANAWALLICHII:***

Indian valerian belongs to family Valerianaceae is a perennial herb of about 45 cm height and rootstock is thick, nodular and aromatic. Roots of the species are useful in diseases related to eye, blood, liver and spleen. Leaves are used for the treatment of headache. Valeportialtes are obtained from roots and rhizomes. Roots are also used in aromatic industry. Raw drug is collected mainly from the wild since cultivation is not yet popularized.

16) ***PODOPHYLLUM HEXANDRM:***

The species belongs to family Berberidaceae is an erect, succulent herb with creeping perennial rhizome bearing numerous roots. The rhizome and the root constitute the raw drug source of resin, podophyllin or podophyllin resin podophyllotoxin is the active principle of podophyllin. The raw drug is used for the treatment of ulcers, cuts and wounds. It is a purgative and is used in curing skin diseases and tumor growth. Podophyllin has acquired special attention during recent time due to its action against cancers. The raw drug is collected mainly from the wild since the cultivation is not gained momentum.

17) ***GYMNEMA SYLVESTIS:***

It is a woody climber of family Asclepiadaceae. The leaves when chewed temporarily cease one's ability to sense sweet taste. The species gained importance, since it is used to cure diabetics. Leaves are used for the treatment of diabetics. Gymnemic acid present in the leaves is belived to reduce blood glucose level.

Leaves and roots are also used to treat headache, polyuria, leprosy, wounds and prurutis. The raw drug is mainly collected from the wild.

18) ***ACONITUM HETERPHYLLUM:***

It is a biennial herb with fleshy roots belongs to family Ranunculaceae. Roots are used medicinal purposes. It is used in diarrhoea. Dysentery and gastric pain. It is used as a bitter tonic to combat debility after malaria and other fevers. It is also used against hysteria, dyspepsia, vomiting and cough. Wild habitats are the sole source of the raw drug since the plant is not in cultivation.

19) ***TERMINALIA BELLERICA:***

Is a deciduous tree of the family Combretaceae that grows up to 40m heights. The fruit of the species is commercially known as myrobalan or belliric myrobalan and is medicinally important. It is anticanerous, and used against heart against heart diseases, anaemia and rheumatism. Beta sitosterol, gallic acid and bellericanin are the major active ingredients of the raw drug. Raw drug is mainly collected from the forests.

20) ***TERMINALIS CHEBULA:***

Harde is a tree of about 15-24 m tall belongs to the family Combretaceae. In combination with Emblic myrobalam (*Emblica officianalis)* and belliric myrobalan *(Terminalia bellirica),* under the formulation 'triphala' (thrre fruit), *T.chebula* is is used extensively in a number of ailments. The main purgative ingredient of thriphala is harde and the purgative principle is in the pericarp of the fruit, which is a glycoside similar to sennoside A of Senna (*Cassia angusrifolia).* Chebulin, chebulinic acid, tannic acid and behinic acid are the major active ingredient of the raw drug. Forests are the main sourcues of raw drug collection.

21) ***EMBLICA OFFICINALIS:***

The plant is a small to medium sized deciduous tree belongs to family Euphorbiaceae. It is one of the richest sources of vitamin C. the fruits, leaves and bak are rich in tannins, root contains ellagic acid and lupeol. The fruits are used for the treatment of vomiting, biliousness, urinary discharges, constipation, leprosy, piles and diseases related to eyes. Triphala, an ayurvedic formulation includes amla as one of the three constituents.

22) ***PIPER LONGUM:***

Long pepper is a slender aromatic perennial undershrub belonging to the family Piperaceae. Ripened green fruits and roots are used as the raw drug. India imports a large quantity of raw drug from Malaysia and Singapore. The fruits are used as spice also. It has a pepper like taste. Commercially, the raw drug of long pepper is mixed with material from *P. Retrofractum* or *P. Peepuloides* ., and it is very difficult to distinguish the raw drug from these different species. Piperine and piplartine are the two important alkaloids responsible for the therapeutic acion. In addition also the raw drug contains a number of essential oils. The fruits as well as the roots are used for the treatment of diseases related respiratory tracts viz., bronchitis, asthma, cough, etc. it is also used in muscular pains, inflammations, drowsiness, epilepsy, leprosy, dysemtery and ailments related gall bladder and bile duct.

23) ***SIDA CORDIFOLIA:***

An annula herb and member of Malvaceae family. *Sida cordifolia* is considered as the source of raw drug bala in North India while in South India *Sida rhombifolia* is accepted as the source of the raw drug. The root of the species is used as the raw drug for the treatment rheumatism. It imparts strength to the body and is useful in the treatment of facial paralysis, general debility, sciatica, headache, uterine disorders, etc.

24) ***ADHATODA VASICA:***

It is an evergreen, perennial shrub belongs to family Acanthaceae. The species is a source of a well-known raw drug, ‘vasaka’ which is mainly use for the treatment of bronchitis, asthma, cold, cough and whooping cough. Fresh or dried leaves are used mainly as the raw drug. It is used in the form of fresh juice, decoction, infusion or powder. The leaf juice is also used to cure dysentery, diarrhoea and glandular tumour. A number of alkaloids are present in the raw drug of which vascine and vasicinone are important.

25) ***ACORUS CALAMUS:***

The species is a native of Eupore belongs to family Araceae. The dried rhizomes constitute the commercial raw drug of ‘Calamus’. A and β asarone, acoric acid and choline are the major active principle of the raw drug. It is believed to

improve memory power and intellect. It is also useful in the treatment of diarrhoea, dysentery, abdominal obstructions and colic. Anticarcinogenic property of the species is also reported recently.

26) ***SARACA ASOCA:***

It is a medium size, evergreen tree with black belongs to family Fabaceae. The activity of the drug is due to the presence of steroidal component and calcium salt. Bark also contains tannins. It is propagated by seeds and is also aultivated as an ornamental plant. The increased demand of the raw drug in recent years has caused overexploitation of the species in wild habitats. It one of the flagship species targeted for wide scale cultivation in south India.

27) ***RAUVOLFIA SERPENTINA:***

Sarpahandha a member of family Apocynaceae is a perennial under shrub with irregular tubular roots distributed through our India. Roots contain alkaloids (reserpine, desrpidine and reseinamine) which a sedative and used to control high blood pressure. It is also used for the treatment of insomnia, asthma and acute stomachache. Ruthless collection of the species from its wild habitats and the Government of India has prohibited its collection from the wild. The crop is under cultivation and propagated by seeds.

28) ***CATHARANTHUS ROSEUS:***

Periwinkle belongs to the family Apocynaceae is an erect annual or perennial herb with white or pink flowers. All parts of the plant, especially roots contain alkaloids. Leaves are use dto treat menorrhagia nd the plants ar also used to treat diabetics in Ayurveda. However, the alkaloids vincristine and vinblastine present mainly in the roots of the plant in used to treat a various types of cancers including leukaemia in modern medical systems.

29) ***PHYLLANTHUS AMARUS:***

It is a small herb of about 60cm height and belongs to the family Euphorbiaceae. The whole herb is used for the medicinal purpose. It is bitter in taste and is used mainly for the treatment of jaundice. It is also used in dyspepsia, diarrhoea and dysentery. The herbage portion contains the bitter principle phyllanthin which is responsible for the therapeutic action.

30) ***OCIMUM SANCTUM:***

It is an erect highly branched aromatic perennial herb belongs to the family Lamiaceae. Leaves, flowers and occasionally the whole plant are medicinally used to treat heart diseases, leucoderma, asthma, bronchitis and fever. The leaves and tender parts of the shootsm are economically important and it yields essential oils. The essential oils obtained have immense value in aroma industry. The chemical constituents of the essemtial oils are monterpenes, sesquiterpines, sesquiterpines and phenols with their alcohols, esters, aldehydes, etc.

31) ***ATROPA BELLADONNA:***

A perennial branching herb growing to 5 feet tall, with 8 inch long ovate leaves, belongs to family Solanaceae. The medicinal peoperties of Belladonna depend on the presence of Hyoscyamine and Atropine. Belladonna is a most valuable plant in the treatment of eye disease, Atropine, obtained during extraction, being its most important constituent on account of its power of dilating the pupil.

32) ***CINFHONA OFFICINALIS:***

Cinchona officinalis is a tree native to Amazon Rainforest vegeration, belongs to family Rubiaceae. This plant is used for the production of quinine, which is an anti-fever agent especially useful in the prevention and treatment of malaria. There are a number of various other chemicals which are made from this tree, and they include cinchonine, cinchonidine and quinidine.

33) ***PAPAVER SOMNIFERUM:***

The plant is an erect herb characterized by a drooping bud and grey latex, from the family Papaveraceae. In midicne, opium as such, the capsule after the recovery of opium adn teh seeds are used. It is a well-know sedative, having a constipating effect, so used in diarrhooea and pains in the body; the dry capsule may be used where mild action id required. The major alkaloids are morphine, thebaine, noscapine and papacerine.

34) ***DIGITALIS PURPUREA:***

It belongs to family Scrophulariceae. Due to the presencne of the cardiac glycoside digitoxin, the leaves, flowers and seeds of this plant are all poisonous to

humans and some animals and canbe fatal if eaten. In alopathy, cardiac-glycoside digitoxin isolated from the leaves or seeds is used for various heart troubles.

**MAJOR AROMATIC MEDICINAL PLANTS:**

1. ***ABELMOSCHUS MOSCATUS:***

Muskdana belons to family malvaceae is an erect perennial herb with fruits similar to Lady's finger but smaller in size. Seeds are musk scented and are used to flavour food and as a substitute of musk. It is used to treat intestinal problems, stomatitis and heart diseases. In Unai, it is also used to treat dyspepsia, urinary discharges, gonorrhoea, leucoderma and itching.

2. ***CYMBOPOGON FLEXUOSUS:***

Lemongrass belongs to family Poaceae and three species of *Cymbopogon ie., C. flexxuosus, C. citrates and C. pendulus,* commonly jnown as lemongrass. Citral extracred from the oil is of commercially importance. The oil is used in flavouring and medicinal industry and also for production of Vitamin A and synthetic violet. India is one of the major suppliers of lemongrass oil in the world market. A large number of high yielding varieties are available for cultivation.

3. ***CYMBOPOGON MARTINI;***

Palmarosa or Rosha grass is a tall perennial herb belongs to family poaceae. The oil has high demand in perfumery, soap, cosmetic and belnding tobacco products industries. Owing to its oil, hence referred to as East Indian Geranium oil in commeree. The specis is under cultivation in Central, western and southern states of India.

4. ***PELARGONIUM GRACEOLENS:***

The genus *Pelargonium* belonging to the family Pelargoniaceae. Rose scented essential oil, extracted from its leaves and tender shoots are commercially important . the crop is propagated by stem cuttings and root suckers. Geranium oil conatins 60-70% alcohols like, citronellol, geraniol; 20-30% esters like, geranly toglata, geranyl acetate, citronellyl acetate and the rest aldehyde and ketones, etc.

5. ***POGOSTEMIN PATCHOULI:***

The plant belongs to family Lamicaeae is a perennial erect or ascending herb. Oil distilled from shade dried leaces is used in perdumery to give a solid foundationand lasting character of other fragrances since it has a fixative property to prevent teh rapid evaporation of perfumes. The parchuli oil is generally blended with other seesntial oils like geranium

oil or clove oil before use. The oil possesses antibacterial activity and is used an ingredient in insect-repellent preparations. The oil is also used in major food products as a flavouring agent.

6. ***MENTHA ARVENSIS:***

Mentha or minds includes a number of aromatic perennial herbs belonging ro family Lamiaceae. Peppermint oil is carminative, antiseptic and gastro-stimulant properties and used in confectionareis, alcoholic drinks, dental creams and mouthwashes. Spearmint oil is rich in carvone and has digestive and gastrostimulant properties. It is used in confentionary, chewing gum and tooth pastes. Nergamot mint oil is rich in linalyl acetate and linalool and mainly used in cosmetic industry. The herbage of the plants are economically useful which yields essential oils. The chief chemical constituents of the essential oils are menthol, carvone, linalyl acetate and linalool and they are highly demanded in pharmaceutical, food flavour, cosmetics, beverages and related industirs.

7. ***ROSA DAMASCENA :***

Rose belongs to family rosaceae. Half opened flowers have more fragrance and oil yield than the fully opened flowers. In India about 1500 to 2000 hactares of land is under rose cultication, which is mainly located in Uttar Pradesh for extraction of rose oil, rose water, absolute and rose concrete. Different perfumery products obtaine from rose are rose attar, Gulkhand, Gul-roghan, Punkhuri and Otto rose.

8. ***JASMINUM SAMBAC:***

The species belongs to family Oleaceae. The essential oils obtained from the flowers are used in perfumer:

y and are export oriented also.

9. ***POLIANTHUS TUBEROSA:***

It is a short – stemmed plant with underground bulbs belongs to family Amaryllidaceae. Teh fresh flowers yield about 0.08 to 0.11 percent oil. There are different varieties in tuberose based on the number of petal worls or petal type *viz.* Calutta single, single Mexican, semi-double, Variegated, Pearl bouble, Rafat Rekha and Swarna Rekha. The plant is propagated mainly by bulbs.

10. ***VERICERIA ZIZANIOIDES:***

It is a tall perennial grass of about 1.5 to 2.0 m height belongs or family Poaceae. The aromatic roots are traditionally used for making mats, fans, door-screens which produce

fragrance imparting a cooling effect during extreme summer when sprimkled with water. The roots on distillation produce volatile oils. The oil finds extensive use in perfumery as a fizative and as an odour contributor in bases, and also as a raw material for the isolation of vetiverol and veticerone. It is also medicinal and used against flatulence and colic pains.

11. ***CYMBOPOGON WINTERIANUS:***

It is a perennial herb from the family Poacear; Citronella oil is obtained by steam distillation of partially wilted leaves. The oil whose ingredients are citronellal, citronellol and geraniol are employed in the manufacture of soap, pharmaceuticals, and perfumery, cosmetic and flavouring agents.

12. ***LAVANDULA ANGUSTIFOLIA:***

It is a perennial aromatic herb from the family Lameaceae. Major components of the essential oil are linalool and linayl acetate. The essential oil is antiseptic and antispasmodic.

**TABLE 1. SOME COMMON MEDICINAL PLANTS AND PHARMACOLOGICAL USES**

| S.NO | BOTANICAL NAME | FAMILY NAME | PHARMACOLOGICAL USES |
|---|---|---|---|
| 1. | *Acacia asak* | *Fabaceae* | Skin diseases and tooth ache |
| 2. | *Acacia ehrenbergiana* | *Fabaceae* | Toooth ach and ear infection |
| 3. | *Acacia etbaica* | *Fabaceae* | Constipation ,and ringworm infection |
| 4. | *Acacia laeta* | *Fabaceae* | Diabetes and antibiotics |
| 5. | *Acacia lahai* | *Fabaceae* | Taeniacide and rheumatism |
| 6. | *Acacia mellifera* | *Fabaceae* | Evil eyes and diabetes |
| 7. | *Acacia nilotica* | *Fabaceae* | Abdominal pain and antiemetic |
| 8. | *Acacia oerfota* | *Fabaceae* | Eye diesease and evil eyes |
| 9. | *Acacia Oregana* | *Fabaceae* | Easing labor and back pain |
| 10. | *Acacia polyacantha* | *Fabaceae* | Rheumatism and segri |
| 11. | *Acacia Senegal* | *Fabaceae* | Diabetes and Abdominal pain |

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| 12. | *Acacia Seyal* | *Fabaceae* | Diabetes and hypertension |
| 13. | *Acacia Sieberiana* | *Fabaceae* | Abdominal helmentes and scabies |
| 14. | *Acacia Tortilis* | *Fabaceae* | Snake and Scorpion bite and gonfi |
| 15. | *Achyranthes aspara* | *Amaranthaceae* | Tonsillitis and Nails inflammation |
| 16. | *Acokanthera schimperi* | *Apocynaceae* | Skin wound , eye infection |
| 17. | *Adansonia digipata* | *Bombacaceae* | Anti abortion and eye infection |
| 18. | *Aerva lanata* | *Amaranthaceae* | Gerefta , Febrile |
| 19. | *Agave sisalana* | *Agavaceae* | Diarrhea and ear infection |
| 20. | *Ajuga integrifolia* | *lamiaceae* | Malaria hebatis, dysenter and swelling |
| 21. | *Albizia amara* | *Fabaceae* | Blood pressure and anti-lice |
| 22. | *Albizia anthelmintice* | *Fabaceae* | Abdominal helminthes,Diarrhea and burns |
| 23. | *Allium cepa* | *Alliaceae* | Tp hepatitis |
| 24. | *Allium sativum* | *Alliaceae* | Hyper tension, malaria and asthma |
| 25. | *Aloe camperi* | *Aloaceae* | Malaria , hepatomegaly and splenomegaly |
| 26. | *Aloe elegance* | *Aloaceae* | Tiabetics and abdominal pain |
| 27. | *Aloe macrocarpa* | *Aloaceae* | Impotency malaria and easing labor |

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| 28. | *Aloe percarsa* | *Aloaceae* | Anthrax,malaria |
| 29. | *Amara* | *Amaranthaceae* | Back pain, Tooth pain and Anti-helminthes |
| 30. | *Annona muricata* | *Annonaceae* | Kill lice, Bedbugs and Gastritis |
| 31. | *Anogeissus leiocarpus* | *Combreataceae* | Anthrazx, Hepatitis |
| 32. | *Apium graceolnese* | *Apiaceae* | Theumatism, Asthma and Bladder infection |
| 33. | *Argemone Mexicana* | *Papaveraceae* | Antibiotics and Cataracts |
| 34. | *Artemisia annua* | *Astereaceae* | Bladdder infection, Hepatitis and Malaria |
| 35. | *Asparagus africanus* | *Asparagaceae* | Skin lesion and Heart diseases |
| 36. | *Aspilia mosambicensis* | *Asteraceae* | Kidney diseases and Bleeding after delivery |
| 37. | *Astragalus atropilosulus* | *Fabaceae* | Hemorrhoids, latching and diarrhea |
| 38. | *Anicenna marina* | *Verbebaceae* | Ulcers, Diabetics, Asthma and Cancer |
| 39. | *Azadirachta indica* | *Meliaceae* | Haemorrhoids, Fungal and insects |
| 40. | *Balanites aegyptiaca* | *Balanitaceae* | Head ache, abdominal pain and Bhlharzias |
| 41. | *Barbeya oleoides* | *Barbeyaceae* | Wound infection |
| 42. | *Barleria eranthemoides* | *Acanthaceae* | Eye problem, Tonsillitis and Eczema |
| 43. | *Becium grandiflorum* | *Lamiaceae* | Cramps, Anti-inflammatory and Malaria |
| 44. | *Bersama abyssinica* | *Melianthaceae* | Heart disease and tape-worm |
| 45. | *Bidens pilosa* | *Asteraceae* | Gerefta and gonfii |
| 46. | *Boscia angustifoila* | *Capparidaceae* | Snake-bite, Gastritis and Gonfii |
| 47. | *Boscia salicifolia* | *Capparidaceae* | Scabies, Bloating and Choilynichites |
| 48. | *Noscia senegalensis* | *Capparidaceae* | Snake and Scorpion venom |
| 49. | *Boswellia papyrifera* | *Burserceae* | Fever, Tranquilizer and Evil Spirit |
| 50. | *Brassica olearacea* | *Brassicaceae* | Cough and Fungus |
| 51. | *Brassica* | *Brassicaceae* | Gastritis, Rhenmatism and |

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| | *olearacea* | | Asthma |
| 52. | *Brucea antidysenteica* | *Simaroubaceae* | Diarrhea, Evil eyes and Rabies |
| 53. | *Buddleia polystachya* | *Loganiaceae* | Evil eye, Segri and insects |
| 54. | *Cadaba farinose* | *Capparidaceae* | Ophthalmia, insect repellent and body pains |
| 55. | *Cadalia purpurea* | *Fabacase* | Wound infection and nail inflammation |
| 56. | *Colotropis procera* | *Asciepiadaceae* | Homorrhoids, Wound and leprosy |
| 57. | *Calpurnia aurea* | *Fabaceae* | Snake and Scorpion venom and leprosy |
| 58. | *Capparis decidua* | *Capparidaceae* | Chest pains, Jaundice and malaria |
| 59. | *Capparis tomentosa* | *Capparidaceae* | Cold, Wound infection and purgative |
| 60. | *Carica papaya* | *Caricaceae* | Diabetes,Amoeba and Typhoid fever |
| 61. | *Caralluma speciosa* | *Asclepediaceae* | Burns and Wound infection |
| 62. | *Carissa spinarum* | *Apocynaceae* | Malaria, Splenomegaly and Hepatomegaly |
| 63. | *Casimiroa edulis* | *Rutaceae* | Menstrual disorder and Constipation |
| 64. | *Capcicum annuum* | *Solanaceae* | Arm-stream, Alopecia and Hepatomegaly |
| 65. | *Celtis africana* | *Ulmaceae* | Rheumatism and Lung disease |
| 66. | *Chenopodium album* | *Chenopodiacea* | Choilynichitis, Burns and Wounds |
| 67. | *Cicer arietinum* | *Fabaceae* | Malaria and Diarrhea |
| 68. | *Cicorium endive* | *Asteraceae* | Diabetes and wound infection |
| 69. | *Cinnamomum* | *Lauraceae* | Rheumatism, Diabetes and Blood circulation |
| 70. | *Cissus quadrangularis* | *Vitaceae* | Anti-fungal and insects |
| 71. | *Ciddus rotundifolia* | *Vitaceae* | Antibiotic,Gonfi and Antifungal |
| 72. | *Citrus limon* | *Rutaceae* | Gastric and Digestion problem |
| 73. | *Citrus sinensis* | *Turaceae* | Cough and Antibiotic |
| 74. | *Citrus reticulate* | *Rutaceae* | Diarrhea, Helminthic infection |
| 75. | *Clematis simensis* | *Ranunculaceae* | Leishmaniasis and Eczema |

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| 76. | *Cherodendrum myricoides* | *Verbenacea* | Dysentery and Abdominal helmets |
| 77. | *Clutia lanceolata* | *Euphorbiaceae* | Gastrits, Diabets and Rheumatism |
| 78. | *Coffea Arabica* | *Rubiaceae* | Eye diseases, Snake poison and Burns |
| 79. | *Combretum aculeatum* | *Combretaceae* | Conjunctivitis and Ear infection |
| 80. | *Combretum fragrans* | *Combretaceae* | Lung diseases and constipation |
| 81. | *Combretum molle* | *Conbretaceae* | Jaundice and Epidermal wounds |
| 82. | *Conetes abyssinica* | *Carryphyllaceae* | Sun strike, insects and Viral infection |
| 83. | *Commelina Africana* | *Commelinaceae* | Skin diseases and Hypertension |
| 84. | *Commicarpus pedunculosus* | *Nyctaginaceae* | Scorpion and Snake bite |
| 85. | *Commiphora Africana* | *Burseraceae* | Expel the placenta after birth and gastric |
| 86. | *Cannabis sativa* | *Cannabidaceae* | Bronical asthma and Segri |
| 87. | *Cordial Africana* | *Boraginaceae* | Abdominal painand Wound infection |
| 88. | *Cordial monoica* | *Moraginaceae* | Wound infection and Sun strikes |
| 89. | *Coriandrum sativum* | *Apiaceae* | Diuritic and Fever, Hypertension |
| 90. | *Croton macrostychus* | *Euphorbiaceae* | Head ache, Eye diseases, Ascariasis |
| 91. | *Cucumis dipsaceus* | *Cucurbitaceae* | Abdominal helminthes and Diarrhea |
| 92. | *Cucurbita pepo* | *Cucurbitaceae* | Intestinal warms, Diuretics and Lactation |
| 93. | *Cymbopogon citrates* | *Poaceae* | Fever of domestic animals and Ascariasis |
| 94. | *Cynodon dactylon* | *Poaceae* | Snake poison and Skin crack |
| 95. | *Cynoglossum lanceolatum* | *Boraginaceae* | Abdominal pain and Ear infection |
| 96. | *Cyphostemma adenocoule* | *Vitaceae* | Snake poison and Amoeba |
| 97. | *Dalbergia melanoxylon* | *Fabaceae* | Snake poison and insect repellants |
| 98. | *Datura carota* | *Solanaceae* | Rabies, Dandruff and Tooth ache |
| 99. | *Daucus carota* | *Solanaceae* | Diabets, Gastritis and Eye clearness |
| 100. | *Delonix elata* | *Fabaceae* | Laxative and purgative |
| 101. | *Dichrostachys cinerea* | *Fabaceae* | Impotency |
| 102. | *Diospyros abyssinica* | *Ebenaceae* | Fungus and Termite resistant |

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| 103. | *Diospyros mespiliformis* | *Ebenaceae* | Fungus and Termite resistant |
| 104. | *Dobera glabra* | *Salcadoraceae* | Intestinal parasities and Rheumatism |
| 105. | *Dodonaea angustifolia* | *Sapindaceae* | Abdominal Helminthes and Dandtruff |
| 106. | *Dombeya torrid* | *Sterfuliaceae* | Asthma,Cough and Skin wound |
| 107. | *Dracaena schizanta* | *Lilaceae* | Ear ache and Chronic ulcer |
| 108. | *Embelia schimperi* | *Myrsinaceae* | Taeniacide and Insecticides |
| 109. | *Eragrosis teff* | *Poaceae* | Anemia and Constipation |
| 110. | *Erythrina abyssinica* | *Fabaceae* | Tooth pain, Fever and Gastrointestinal |
| 111. | *Eucalyptus camaldulensis* | *Myrtaceae* | Cough, Antibiotic and insecticide |
| 112. | *Eucalyptus globules* | *Myrtaceae* | Diabetes, Cough, Rheumatism and Gonfii |
| 113. | *Euclea racemosa* | *Ebenaceae* | Malaria, Hepatitis and purgative |
| 114. | *Eugenia carophyllata* | *Myrtaceae* | Emetic, Tooth Ache, TB, and Menstruation |
| 115. | *Euphorbia abyssinica* | *Euphorbiaceae* | Abdominal pain, hepatitis and antibiotic |
| 116. | *Eupharbia candelabrum* | *Euphorbiaceae* | Wound haling and Malaria |
| 117. | *Euphorbia nubica* | *Euphorbiaceae* | Kidney problem and insecticides |
| 118. | *Euphorbia plyacantha* | *Euphorbiaceae* | Asthama, leshmaniasis |
| 119. | *Euphorbia prostrate* | *Euphorbiaceae* | Abdominal pain, Hepatitis and Antibiotic |
| 120. | *Euphorbia tirucalli* | *Euphorbiaceae* | Abdominal pain, skin deseases and warts |
| 121. | *Ficus carica* | *Moraceae* | Eczema, alopecia, insecticides and malaria |
| 122. | *Ficus glumosa* | *Moraceae* | Itching and Rabies |
| 123. | *Ficus sucomorus* | *Moraceae* | Internal swell of abdomen |
| 124. | *Ficus thonigii* | *Moraceae* | Insecticides and Cough |
| 125. | *Ficus vasta* | *Moraceae* | Cough, Abdominal pain and Obesity |
| 126. | *Flaceria trinervia* | *Asteraceae* | Malaria, Pneumonia and Diarrhea |
| 127. | *Foeniculum vulgare* | *Apiaceae* | Hemorrhage and Endoparasites |
| 128. | *Flueggia virosa* | *Euphorbiaceae* | Intestinal worms |
| 129. | *Grewia ferrugenia* | *Tiliaceae* | Burns nad Evil eyes |
| 130. | *Grewia flavescens* | *Tiliaceae* | Delivery of the placenta |

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| 131. | *Grewia mollis* | *Tiliaceae* | Burns ans sun strike |
| 132. | *Grewia tenax* | *Tiliaceae* | Throat sore, Bone fracture and Myalgia |
| 133. | *Grewia villosa* | *Tiliaceae* | Relive headache and breathlessness. |
| 134. | *Gulzotia abyssinica* | *Asteraceae* | Tonsillitis, Dandruff and Ring warm |
| 135. | *Heteromorpha arborescens* | *Apiaceae* | Asthama and Tooth ache |
| 136. | *Heliotropium cinerascens* | *Boraginaceae* | Asthama and Tooth ache |
| 137. | *Hibiscus eriospermus* | *Malvaceae* | Tape warm and Gastritis |
| 138. | *Hibiscus macranthus* | *Malcaceae* | Digestion problems and bone setting |
| 139. | *Hibiscus macranthus* | *Malvaceae* | Gastritis, diabetes and Anemia |
| 140. | *Hardeum vulgare* | *Poaceae* | Sun strike, generfta and Dyspepsia |
| 141. | *Hyphaene thebaica* | *Arecaceae* | Evil eyes and diarrhea |
| 142. | *Hypoestes forskaolil* | *Acanthaceae* | Increases lactation and tape warm |
| 143. | *Indigofera arrecta* | *Fabaceae* | Ringworm, laxative and stomach worms |
| 144. | *Jacaranda mimosifolia* | *Bignoniaceae* | Warts and Bloating |
| 145. | *Jasminum gradiflorum* | *Oleaceae* | Over-sweating, fever and madness |
| 146. | *Juniperus procera* | | Cold, intestinal parasites and Burns |
| 147. | *Justicia cordata* | *Acanthaceae* | Purgative, dysentery and spider disease |
| 148. | *Justicia schimperiana* | *Acanthaceae* | Antibiotics, Evil eyes and abscess |
| 149. | *Kalanchoe marmorata* | *Crassulaceae* | Sun-strike, evil-eye and Retain placenta |
| 150. | *Kigelia Africana* | *Bignoniaceae* | Purgative , tonic and stimulant |
| 151. | *Kniphofia isoetifolia* | *Asphodolaceae* | Arthritis, Choilynichitis and Abscess |
| 152. | *Lannea fructicosa* | *Anacardiaceae* | Intestinal worms, Bloating and Menstruation |
| 153. | *Lantana camara* | *Verbenaceae* | TB, Hepatitis, Amoeba and taenia capitis |
| 154. | *Lawsonia inermis* | *Lythracea* | Endo parasites and cold |
| 155. | *Leonotis ocimifolia* | *Lamiaceae* | Cough, gastritis and Arthritis |
| 156. | *Lepidium sativum* | *Lepidium sativum* | Limb inflammation and abdominal pain |
| 157. | *Leucas abussinica* | *Lamiaceae* | Inflammation of nails and gastritis |
| 158. | *Leucas martinensis* | *Lamiaceae* | Constiapation and digestive problem |

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| 159. | *Linum usitatissimun* | *Linaceae* | Bronchitis, diabetes and fever |
| 160. | *Lycopersicum esculentum* | *Solanaceae* | Could, skin inflammation and haemorrhoids |
| 161. | *Malus domestica* | *Rosaceae* | Eye problems and head ache |
| 162. | *Mangifera indica* | *Anacardiaceae* | Arthritis and Eye problems |
| 163. | *Matricoria chamomile* | *Asteraceae* | Fungal diseases and haemorrhoids |
| 164. | *Maytenus arbuitofolia* | *Celesteraceae* | Hypertension and dandruff |
| 165. | *Maytenus senegalensis* | *Celesteraceae* | Hypertension, diabetes and emetics |
| 166. | *Melia azadirachta* | *meliaceae* | Asthma, cough and bladder infection |
| 167. | *Menthe poperita* | *Lamiaceae* | Gerefta and evil eyes |
| 168. | *Meriandra dianthera* | *Lamiaceae* | Anemia, diarrhea and rheumatism |
| 169. | *Mimusops kummel* | *Sapotaceae* | Constipation and digestion disorder |
| 170. | *Mimusops schimperi* | *Sapotaceae* | Head ache and sun strike |
| 171. | *Moringa oleifera* | *Moringaceae* | Tooth-ache and cough |
| 172. | *Musa sapientum* | *Musaceae* | Antibiotic and gerefta |
| 173. | *Nepeta azurea* | *Lamiaceae* | Tooth-ache, insects and snake bite |
| 174. | *Nicandra physaloides* | *Solanaceae* | Digestion prob and bronchila prob |
| 175. | *Nicotiana glauca* | *Solanaceae* | Abscess and myalgia |
| 176. | *Nicotiana tabacum* | *Solanaceae* | Head ache, hypertension and vomiting |
| 177. | *Nigella sativa* | *Ranunculaceae* | Cough malaria and hear disease |
| 178. | *Nuxia cogesta* | *Loganiaceae* | Ring warm, dandruff |
| 179. | *Ocimum basilicum* | *Lamiaceae* | Diuretic, abscess and wounds |
| 180. | *Ocimum forskolei* | *Lamiaceae* | Anti-inflammatory, wound infection |
| 181. | *Olea eruopeana/ cuspidate* | *Oleaceae* | Gastritis and constipation |
| 182. | *Opuntia ficus-indica* | *Cactaceae* | Tonsillitis, arthritis and endo parasites |
| 183. | *Ormocarpum pubescens* | *Fabaceae* | Uvulitis, abdominal-pain and tonsillitis |
| 184. | *Osyris quadrpartita* | *Santalaceae* | Insect and fungal repellent |
| 185. | *Otostegia fruticosa* | *Lamiaceae* | Gynecological problem and arthritis |
| 186. | *Otostegia intefrifolia* | *Lamiaceae* | Eczema and abdominal pain |
| 187. | *Ozoroa insignis* | *Anacardiaceae* | Heae ache, asthma and rheumatism |
| 188. | *Pappea capensis* | *Sapindaceae* | Cancer, evil spirit and diarrhea |

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|---|---|---|---|
| 189. | *Parkinsonia aculeata* | *Fabaceae* | Eye infection and ear infection |
| 190. | *Passiflora molissima* | *Passifloraceae* | Diarrhea, constipation and burn |
| 191. | *Pavetta gardenifolia* | *Rubiaceae* | Urination, gastritis and tb |
| 192. | *Petrolobium stellatusm* | *Fabaceae* | Infectious dermatitis |
| 193. | *Phoenix dactlifea* | *Arecaceae* | Ring warm and antibiotics |
| 194. | *Phytolacca dodecandra* | *Phytolaccaceae* | Rheumatism, evile eye and snake venom |
| 195. | *Piliostingma thonningii* | *Fabaceae* | Asthma and respiratory problems |
| 196. | *Plantoga zeylanica* | *Plantaginaceae* | Choilynichitis and tonsillitis |
| 197. | *Plumbago zeylanica* | *Plumbaginaceae* | Snake bite, and eye disease |
| 198. | *Podocarpes latifolius* | *Podocarpaceae* | Digestion problems |
| 199. | *Pittosporium viridifolium* | *Pittosporaceae* | Constipation |
| 200. | *Pollichia campestris* | *Fabaceae* | Amoeba |
| 201. | *Prosopis juliflora* | *Fabaceae* | Dysentery |
| 202. | *Prunus persica* | *Rosaceae* | Anti-insect |
| 203. | *Psiadia ppunctulata* | *Asteraceae* | Dandruff |
| 204. | *Psiduim guajava* | *Myrtaceae* | Uvulitis |
| 205. | *Psydrax schimperiana* | *Rubiaceae* | Ectoparasites |
| 206. | *Rhamnus prinoides* | *Rhamnaceae* | Scabies |
| 207. | *Rhamnus staddo* | *Rhamnaceae* | Vomiting |
| 208. | *Rhus glutinosa* | *Anacardiaceae* | Diarrhea |
| 209. | *Rhus retinorrhoea* | *Anacardiaceae* | Fungal problems |
| 210. | *Rhus natalensis* | *Anacardiaceae* | Tape warm |
| 211. | *Rhus retinorrhoea* | *Anacardiaceae* | Hypertension |
| 212. | *Ricinus communis* | *Euphorbiaceae* | itching |
| 213. | *Rosa abyssinica* | *Risaceae* | Anti-cancer |
| 214. | *Rosmarinus officinalis* | *Lamiaceae* | Coughing |
| 215. | *Rumex nervosus polygonaceae* | *Polygonaceae* | Antibiotics |
| 216. | *Rumex abyssinica* | *Polygonacea* | purgative |
| 217. | *Ruta chalepnesis* | *Rutaceae* | Malaria |
| 218. | *Sageretia thea* | *Thamnaceae* | Abdominal pain |

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|---|---|---|---|
| 219. | *Salvadora schimperii* | *Salvadoraceae* | Antibiotics |
| 220. | *Salvia schimperii* | *Lamiaceae* | Hepatitis |
| 221. | *Schinus molle* | *Anacardiaceae* | Loss of appetite |
| 222. | *Sclercarya birrea* | *Anacardiaceae* | Urination |
| 223. | *Senna alexandrina* | *Fabaceae* | Loss of hair |
| 224. | *Senna singueana* | *Fabaceae* | Snake and cancer |
| 225. | *Sida schimperiana* | *Malvaceae* | Scabies |
| 226. | *Solanum incanium* | *Solanaceae* | Eye cleaning |
| 227. | *Solanum nigrum* | *Solanaceae* | Nerve problems |
| 228. | *Solanum shcimperianum* | *Solanceae* | Gastritis |
| 229. | *Solanum tuberosum* | *Solanaceae* | Stabbing pain |
| 230. | *Sorghum bicolour* | *Poaceae* | Bronchitis |
| 231. | *Steganotaenia araliaceae* | *Apiaceae* | insecticide |
| 232. | *Stereospermum kunthianum* | *Bignoniaceae* | Emetic |
| 233. | *Suzugium auineens* | *Myrtaceae* | Stomach disorders |
| 234. | *Tagetes minuta* | *Asteraceae* | Cough |
| 235. | *Tamarindus indica* | *Fabaceae* | Fingers inflammation |
| 236. | *Tamarix aphylla* | *Tamaricaceae* | Insecticides |
| 237. | *Teclea nobilis* | *Rutaceae* | Hepatitis |
| 238. | *Tragia pungent* | *Euphorbiaceae* | Asthma |
| 239. | *Trichilia emetic* | *Meliaceae* | Intestinal warm |
| 240. | *Terminalia brownii* | *Combreataceae* | Sun strike |
| 241. | *Trigonella foenum-graecum* | *Facaceae* | Allergies |
| 242. | *Vangueria madagascariensis* | *Tubiaceae* | Sprain |
| 243. | *Verbascum sinaiticum* | *Scrophulariaceae* | Skin burns |
| 244. | *Vernonia amygdalina* | *Asteraceae* | Cold |
| 245. | *Vernonia schimperi* | *Asteraceae* | Arthritis |
| 246. | *Vicia faba* | *Fabaceae* | Abdominal pain |
| 247. | *Vitis viniferia* | *Vitaceae* | Antibiotic |
| 248. | *Withania samnifera* | *Solanaceae* | Arthritis |

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|---|---|---|---|
| 249. | *Xanthium strumarium* | *Asteraceae* | Abdominal helminthes |
| 250. | *Ximenia Americana* | *Olacaceae* | Antibiotic |
| 251. | *Zea mays* | *Poaceae* | Kidney problem |
| 252. | *Zehneria scabra* | *Cucurbitaceae* | Tapeworm expectorant |
| 253. | *Zingiber officibale* | *Zingeberaceae* | Menstruation |
| 254. | *Ziziphus abyssinica* | *Rhamnaceae* | Cough |
| 255. | *Ziziphus mucronata* | *Rhamnaceae* | Sauna |
| 256. | *Ziziphus spina-christi* | *Rhamnaceae* | Fugal migraine |

**TABLE-2. PLANTS USED IN TRADITIONAL MEDICINE AND THE DRUGS DERIVED FROM THEM**

| PLANT | DRUG |
|---|---|
| *Adhatoda vasica* | Vasicine |
| *Ahonis vernalis* | Adoniside |
| *Aesculus hippocastanum* | Aescin |
| *Agrimonia eupatoria* | Agrimophol |
| *Ammi majus* | Xanthotoxin |
| *Ammi visnage* | Khellin |
| *Anabasis aphylla* | Anabasine |
| *Ananas comosus* | Bromelain |
| *Anamirta cocculus* | Picrotoxin |
| *Andrographis paniculate* | Andrographolide<br>Neoandrographolide |
| *Anisodus tanguticus* | Anisodamine<br>Anisodine |
| *Areca catechu* | Arecoline |
| *Ardisia japonica* | Bergenin |
| *Artemisia maritime* | Santonin |
| *Atropa belladonna* | Adropine |
| *Berberis vulgaris* | Berberine |
| *Brassica nigra* | Allyl isothiocyanate |
| *Camellia sinensis* | Caffeine<br>theophylline |
| *Cannabis sativa* | $\Delta^9$ - Tetrahydrocannabinal |
| *Carica papaya* | Chymopapain<br>Papain |
| *Cassia acutifolia* | Sennosiders A & B |
| *Cassia angustifolia* | Sennosiders A & B |

| | |
|---|---|
| *Cassia species* | Danthron |
| *Catharanthus roseus* | Vinblasttine<br>Vincristine |
| *Centella asiatica* | Asiaticoside |
| *Cephaelis ipecacuanha* | Emetine |
| *Chondodendron tomentosum* | Tubocurarine |
| *Cinchona ledgeriana* | Quinidine<br>Quinine |
| *Cinnamomum camphora* | Camphor |
| *Cissampelos pareira* | Cissampeline |
| *Citrus species* | Hesperidin<br>Rutin |
| *Colchicum autumnale* | Colchiceine amide<br>Colchicines<br>Demecolcine |
| *Convallaria majalis* | Convallatoxin |
| *Coptis japonica* | Palamtine |
| *Corydalis ambigua* | (±)- Tetrahydropalmatine |
| *Crotalaria sessiliflora* | Monocrotaline |
| *Curcuma longa* | Curcumin |
| *Cynara scolymus* | Cynarin |
| *Cytisus scoparius* | Sparteine |
| *Daphe genkwa* | Yuanhuacine<br>Yuanhuadine |
| *Datura metel* | Scopolamince |
| *Digenia simplex* | Kainic acid |
| *Digitalis lanata* | Acetyldigoxin<br>Deslanoside<br>Digoxin<br>Lanatosides A, B, C |
| *Digitalis purpurea* | Digitalin<br>Digitoxin<br>Gitalin |
| *Ephedra sinica* | Ephedrine<br>Pseudoehphedrine<br>Pseudoephedrine, nor- |
| *Erythroxylum coca* | Cocaine |
| *Fraxinus rhynchophylla* | Aesculetin |
| *Gaultheria procumbens* | Methyl salicylate |
| *Glaucium glabra* | Glycyrrhizin |

| | |
|---|---|
| *Gossypium species* | Gossypol |
| *Hemsleya amabilis* | Hemsleyadin |
| *Hydrangea macrophylla Var. Thunbergii* | Phylloduclcin |
| *Hydrastis Canadensis* | Hydrastine |
| *Hyoscyamus niger* | Hyoscyamine |
| *Larrea divaricata* | Nordihydroguaiaretic acid |
| *Lobelia inflate* | α – Loneline |
| *Lonchocarpus nicou* | Torenone |
| *Lycoris squamigera* | Galanthamine |
| *Menthe species* | Menthol |
| *Nicotiana tabacum* | Nicotine |
| *Ocotea glaziovii* | Glaziovine |
| *Papaver somniferum* | Codeine<br>Morphine<br>Noscapine<br>Papaverine |
| *Pausinystalia yohimba* | Yohimbine |
| *Physostigma venenosum* | Physostigmine |
| *Pilocarpus jaborandi* | Pilocarpine |
| *Piper methsticum* | Kawain |
| *Podophyllum peltatum* | Etoposide[b]<br>Podophyllotoxin<br>Teniposide[b] |
| *Potentilla fragarioides* | (+) –Catechin |
| *Quisqualis indica* | Quisqualic acid |
| *Rauvolfia canescens* | Deserpidine |
| *Rauvollfia serpentine* | Ajmalicine<br>Rescinnamine<br>Reserpine |
| *Rhododendron molle* | Rhomitoxin |
| *Rorippa indica* | Rorifone |
| *Salix alba* | Salicin |
| *Sanguinaria Canadensis* | Sanguinarine |
| *Silybum marianum* | Silymarin |
| *Simarouba glauca* | Glaucarubin |
| *Sophora pachycarpa* | Pachycarpine |
| *Stephania sinica* | Rotundine |

| | |
|---|---|
| *Stephania tetrandra* | Tertandrine |
| *Stevia rebaudiana* | Stevioside |
| *Strophanthus gratus* | Ouabain |
| *Strychnos nux-vomica* | Strychnine |
| *Therobroma cacao* | Theobromine |
| *Thymus vulgaris* | Thymol |
| *Triachosanthes kirilowii* | Trichosanthin |
| *Urginea maritime* | Scillarin A |
| *Valeriana officinalis* | Valepotriates |
| *Veratrum album* | Protoveratrines A&B |
| *Vinca minor* | Vincamine |
| *Several plants* | Allantoin<br>Benzyl benzoate<br>Borneol<br>Pinitol |

**CONCLUSION:**

Scientists in developing countries are entering an era in which plants can be expected to occupy a prominent position in the list of national priorities. This type of drug research could lead to industrial development in the country where the descoeries are made. The source of starting materials is normally abundant and readily available since in most developing countries the flora remains virtually unexploited, and we believe that over the next two decades many useful drugs will be isolated from plants. The majority of these discoveries should and will be made by enthusiastic, energetic, and highly motivated scientists in developing countries.

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