Plants: A Rich Source of Herbal Medicine

Sudhanshu Tiwari*

*Email: sudhansh4@rediffmail.com

ABSTRACT

Nearly 80% of the global population still depends upon the herbal drugs for their health care. Plant based therapy are marked due to its low cost, easy availability, based on generation to generation knowledge. At present time, plant based industries are rising at international level but unfortunately due to uncontrolled growth of population and unplanned, excess use/misuses of plant species make them endangered. So with increasing use of medicinal plants and raising their demand in pharmaceutical, cosmetic and other industries we should try to make a world wide deep, healthy ethno-botanical knowledge and create attention for cultivation of useful medicinal plants at larger scale and their sustainable, better utilization.

Keywords: Plants; Plant products; Herbal drug; Ethno-botanical knowledge; Sustainable utilization.

INTRODUCTION

From ancient time, plants are rich source of effective and safe medicines. Herbal medicines have been main source of primary healthcare in many nations. About 80% of world populations are still dependent on traditional medicines.

Herbal medicines are “finished, labeled medicinal products that contain as active ingredients, aerial or under ground part of plants or other plant materials, or combination thereof, whether in the crude state or as plant preparations. Plant materials include juices, gums, fatty oils, essential oils and any other substances of this nature. Herbal medicines may contain excipients in addition to the active ingredients. Medicines containing plant materials combined with chemically defined active substances, including chemically defined isolated constituents of plants are not considered to be herbal medicines” (WHO, 1998).
Even at present time very limited knowledge about the ingredients in herbal medicines and their effects in humans, the lack of stringent quality control and the heterogeneous nature of herbal medicines all necessitate the continuous monitoring of the safety of these plant products (Chan, 1997).

While ensuring quality of phyto-pharmaceuticals some important considerations are (Seth and Kakkar, 2003):

- Raw materials are not homogenous.
- The amount and quality of active ingredients can vary due to different cultivation and harvesting methods.
- Herbal drugs are effective due to their complex combinations.
- The method of manufacturing decisively influences the composition of herbal drug.

Indian Vedas describe the widespread use of herbal products and aqueous extract of different plant parts for curing different disease. Maximum 30% of root part of medicinal plant is used in different practices in compression to other plant parts (Ved, et al., 1998).

<table>
<thead>
<tr>
<th>% of Plant parts used of medicinal plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaves 6%</td>
</tr>
<tr>
<td>Roots 30%</td>
</tr>
<tr>
<td>Seeds 4%</td>
</tr>
<tr>
<td>Fruits 7%</td>
</tr>
<tr>
<td>Rhizomes 4%</td>
</tr>
<tr>
<td>Bark 14%</td>
</tr>
<tr>
<td>Whole Plant 16%</td>
</tr>
<tr>
<td>Wood 3%</td>
</tr>
<tr>
<td>Flowers 10%</td>
</tr>
<tr>
<td>Stem 6%</td>
</tr>
<tr>
<td>% of Plant parts used of medicinal plants</td>
</tr>
</tbody>
</table>

General classifications of medicinal plants on the basis of their uses are:
1. Used by traditional ones and herbal patrician’s.
2. Used in formulation of different Ayurvedic products.
3. Used for making herbal products.
4. Used in synthetic medicinal formulation.
5. Used for extraction of their active moiety.
6. Used in other than pharmaceutical industries.

With development of pharmaceutical industries much more attainance has been created on plant products. They have attaince to isolated active constituents from
different plant parts and use them directly as drug or design them as pharmacologically active compounds with or without addition of synthetic ones.

In India traditional communities like tribal and rural populations are frequently using the crude extracts of local plants for medicinal and other purposes. Crude extracts and medicines manufactured on the principles of natural compounds even by pharmaceuticals companies, may lead to large-scale exposure of humans to natural products.

A large no. of plants and plant products are using from anti-biotic to anti-infective and from anti-cancer to anti-aging. Several plants with their families and their specific medicinal properties ((Loi, et al., 2005) are listed in table-1.

**Table-1: Some common medicinal plants and main therapeutic uses of their different plant parts.**

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Plants</th>
<th>Plant parts used</th>
<th>Main therapeutic use/aliments treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anacardiaceae</td>
<td><em>Pistacia lentiscus</em> L.</td>
<td>Fruit</td>
<td>Rheumatism</td>
</tr>
<tr>
<td>Apocynaceae</td>
<td><em>Vinca sardoa</em></td>
<td>Leaf</td>
<td>Sedates nausea</td>
</tr>
<tr>
<td>Araliaceae</td>
<td><em>Hedera helix</em> L.</td>
<td>Leaf</td>
<td>Rheumatism, anti-inflammatory, burns</td>
</tr>
<tr>
<td>Betulaceae</td>
<td><em>Alnus glutinosa</em> L.</td>
<td>Bark</td>
<td>Anti-inflammatory</td>
</tr>
<tr>
<td>Boraginaceae</td>
<td><em>Borago officinalis</em> L.</td>
<td>Leaf</td>
<td>Stomach pain, intestinal regularization, diuretic, hypotensive</td>
</tr>
<tr>
<td></td>
<td><em>Cerinthe major</em> L.</td>
<td>Leaf, flower</td>
<td>Eye inflammation</td>
</tr>
<tr>
<td></td>
<td><em>Cynoglossum creticum</em> Mill.</td>
<td>Root</td>
<td>Emollient, hydrated burns</td>
</tr>
<tr>
<td>Caprifoliaceae</td>
<td><em>Lonicera impexa</em> Aiton</td>
<td>Leaf</td>
<td>Diuretic</td>
</tr>
<tr>
<td>Chenopodiaceae</td>
<td><em>Beta vulgaris</em> L.</td>
<td>Leaf</td>
<td>Lenitive, gentle laxative, reconstituent</td>
</tr>
<tr>
<td>Cistaceae</td>
<td><em>Cistus spp.</em></td>
<td>Leaf</td>
<td>Contusions, analgesic</td>
</tr>
<tr>
<td>Compositae</td>
<td><em>Anthemis arvensis</em> L.</td>
<td>Whole plant</td>
<td>Anti-inflammatory, emetic, sedative</td>
</tr>
<tr>
<td></td>
<td><em>Artemisia arborescens</em> L.</td>
<td>Flower</td>
<td>Digestive, stimulant, expectorant</td>
</tr>
<tr>
<td></td>
<td><em>Calendula arvensis</em> L.</td>
<td>Flower, leaf</td>
<td>Antispasmodic, burns, Diuretic, disinfectant, vulnerary</td>
</tr>
<tr>
<td></td>
<td><em>Cichorium intybus</em> L.</td>
<td>Leaf, root</td>
<td>Blood purification, arteriosclerosis, anti-arthritis, anti-spasmotic, digestive, Hypotensive, aperitif, laxative</td>
</tr>
<tr>
<td></td>
<td><em>Helichrysum microphyllum</em> Wild.</td>
<td>Leaf, flower</td>
<td>Expectorant</td>
</tr>
</tbody>
</table>
### Table-1: Continued

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Plants</th>
<th>Plant parts used</th>
<th>Main therapeutic use/aliments treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convolvulaceae</td>
<td><em>Convolvulus althaeoides</em> L.</td>
<td>Whole plant</td>
<td>Fat digestion</td>
</tr>
<tr>
<td>Crassulaceae</td>
<td><em>Umbilicus rupestris</em></td>
<td>Leaf</td>
<td>Vulnerary</td>
</tr>
<tr>
<td>Cruciferae</td>
<td><em>Capsella bursaparitoris</em> L.</td>
<td>Leaf</td>
<td>Skin emollient, renal calculus</td>
</tr>
<tr>
<td>Cucurbitaceae</td>
<td><em>Ecballium elaterium</em> A. L.</td>
<td>Root</td>
<td>Neuralgia, laxative</td>
</tr>
<tr>
<td>Crassulaceae</td>
<td><em>Umbilicus rupestris</em></td>
<td>Leaf</td>
<td>Vulnerary</td>
</tr>
<tr>
<td>Crassulaceae</td>
<td><em>Capsella bursaparitoris</em> L.</td>
<td>Leaf</td>
<td>Skin emollient, renal calculus</td>
</tr>
<tr>
<td>Cucurbitaceae</td>
<td><em>Ecballium elaterium</em> A. L.</td>
<td>Root</td>
<td>Neuralgia, laxative</td>
</tr>
<tr>
<td>Diascoreaceae</td>
<td><em>Tamus communis</em> L.</td>
<td>Fruit</td>
<td>Rheumatism</td>
</tr>
<tr>
<td>Ericaceae</td>
<td><em>Arbutus unedo</em> L.</td>
<td>Root, fruit</td>
<td>Antipyretic, arteriosclerosis, intestinal astringent</td>
</tr>
<tr>
<td>Euphorbiaceae</td>
<td><em>Euphorbia spp.</em></td>
<td>Latex</td>
<td>Antiverrucose</td>
</tr>
<tr>
<td>Gentianaceae</td>
<td><em>Gentiana lutea</em> L.</td>
<td>Root</td>
<td>Digestive, aperitif, fever, anorexia</td>
</tr>
<tr>
<td>Graminaceae</td>
<td><em>Agropyron junculeum</em> L.</td>
<td>Aerial parts</td>
<td>Diuretic, urinary system, anti-inflammatory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dissepiements</td>
<td>Hemostatic, vulnerary</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fruit</td>
<td>Emollient erythema, headache</td>
</tr>
<tr>
<td>Guttiferae</td>
<td><em>Hypericum perforatum</em> L.</td>
<td>Leaf</td>
<td>Vulnerary, burns</td>
</tr>
<tr>
<td>Labiatae</td>
<td><em>Lavandula stoechas</em> L.</td>
<td>Leaf</td>
<td>Asthma, headache, palpitation</td>
</tr>
<tr>
<td></td>
<td><em>Melissa officinalis</em> L.</td>
<td>Leaf</td>
<td>Digestive, lenitive, bad breath</td>
</tr>
<tr>
<td></td>
<td><em>Mentha rotundifolia</em> L.</td>
<td>Aerial parts</td>
<td>Digestive, lenitive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leaf</td>
<td>Anti-inflammatory, sedative, helminthias</td>
</tr>
<tr>
<td></td>
<td><em>Ocimum basilicum</em> L.</td>
<td>Leaf</td>
<td>Anti-inflammatory</td>
</tr>
<tr>
<td></td>
<td><em>Origanum majorana</em> L.</td>
<td>Leaf</td>
<td>Neuralgia, sedative, stomach pain</td>
</tr>
<tr>
<td></td>
<td><em>Rosmarinus officinalis</em> L.</td>
<td>Leaf</td>
<td>Inappetence, digestive, diuretic, sedative, headache, pruitus</td>
</tr>
<tr>
<td></td>
<td><em>Savia officinalis</em> L.</td>
<td>Leaf</td>
<td>Stomatic, cooling of oral cavity, digestive, vulnerary</td>
</tr>
<tr>
<td></td>
<td><em>Thymus capitatus</em> L.</td>
<td>Whole plant</td>
<td>Digestive, depurative, balsamic, neuralgia, anticitarrhal</td>
</tr>
<tr>
<td>Lauraceae</td>
<td><em>Laurus nobilis</em> L.</td>
<td>Leaf</td>
<td>Anti-inflammatory, digestive</td>
</tr>
<tr>
<td>Leguminosae</td>
<td><em>Pisum elatius</em> Bieb</td>
<td>Fruit</td>
<td>Nutraceutical properties</td>
</tr>
<tr>
<td>Liliaceae</td>
<td><em>Allium cepa</em> L.</td>
<td>Bulb</td>
<td>Renal calculus, antispasmodic</td>
</tr>
<tr>
<td></td>
<td><em>Allium nigrum</em> L.</td>
<td>Bulb</td>
<td>Helminthiasian</td>
</tr>
<tr>
<td></td>
<td><em>Allium roseum</em> L.</td>
<td>Bulb</td>
<td>Helminthiasian</td>
</tr>
</tbody>
</table>
Table-1: Continued

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Plants</th>
<th>Plant parts used</th>
<th>Main therapeutic use/aliments treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liliaceae (continue)</td>
<td><em>Allium sativum</em> L.</td>
<td>Bulb, leaf</td>
<td>Hypotensive, diuretic, stomach pain, antibacterial, antiinflammatory</td>
</tr>
<tr>
<td></td>
<td><em>Asparagus acutifolius</em> L.</td>
<td>shoot</td>
<td>Diuretic, gout</td>
</tr>
<tr>
<td></td>
<td><em>Asphodelus microcarpus</em></td>
<td>Flower</td>
<td>Emollient, lentive, lung diseases</td>
</tr>
<tr>
<td></td>
<td><em>Ruscus aculeatus</em> L.</td>
<td>Rhizome, leaf</td>
<td>Gout, hemorrhoids, anti-verrucose</td>
</tr>
<tr>
<td></td>
<td><em>Smilax aspera</em> L.</td>
<td>Root</td>
<td>Asthma</td>
</tr>
<tr>
<td></td>
<td><em>Linum usitatissimum</em> L.</td>
<td>Seed</td>
<td>Gout, anti-inflammatory, laxative, gentle laxative, erythema</td>
</tr>
<tr>
<td>Malvaceae</td>
<td><em>Malva sylvestris</em> L.</td>
<td>Whole plant, leaf</td>
<td>Expectorant, anti-inflammatory, laxative, emollient, eye inflammation, pressure regulation</td>
</tr>
<tr>
<td>Moraceae</td>
<td><em>Ficus carica</em> L.</td>
<td>Leaf</td>
<td>Antiverrucose, cough sedative, anti-inflammatory</td>
</tr>
<tr>
<td>Myrtaceae</td>
<td><em>Eucalyptus globules</em> Labill.</td>
<td>Leaf</td>
<td>Anti-catarrhal, expectorant</td>
</tr>
<tr>
<td></td>
<td><em>Myrtus communis</em> L.</td>
<td>Leaf, fruit</td>
<td>Vulnerary, cough, sedative, digestive</td>
</tr>
<tr>
<td>Oleaceae</td>
<td><em>Olea europea</em> L.</td>
<td>Leaf, fruit</td>
<td>Hypotensive, baldess, emollient, erythema, laxative, anti-inflammatory, sore throat, otitis</td>
</tr>
<tr>
<td>Papveraceae</td>
<td><em>Papaver rhoeas</em> L.</td>
<td>Leaf, flower</td>
<td>Sedative, analgesic, gout</td>
</tr>
<tr>
<td>Polygonaceae</td>
<td><em>Rumex obtusifolius</em> L.</td>
<td>Leaf</td>
<td>Hypotensive, diuretic</td>
</tr>
<tr>
<td>Polypodiaceae</td>
<td><em>Adiantus capillus veneris</em> L.</td>
<td>Leaf</td>
<td>Diuretic, sedative, emollient</td>
</tr>
<tr>
<td></td>
<td><em>Polypodium vulgare</em> L.</td>
<td>Rhizome</td>
<td>Cough sedative</td>
</tr>
<tr>
<td>Primulaceae</td>
<td><em>Anagallis arvensis</em> L.</td>
<td>Whole plant</td>
<td>Bronchial asthma, sedative, stimulant</td>
</tr>
<tr>
<td></td>
<td><em>Cyclamen repandum</em></td>
<td>Tuber</td>
<td>Abortifacient</td>
</tr>
<tr>
<td>Ramnaceae</td>
<td><em>Zizyphus sativa</em></td>
<td>Fruit</td>
<td>Sedative</td>
</tr>
<tr>
<td>Rosaceae</td>
<td><em>Crataegus monogyna</em></td>
<td>Flower</td>
<td>Diuretic, cardiac sedative</td>
</tr>
<tr>
<td></td>
<td><em>Cydonia oblonga</em></td>
<td>Fruit</td>
<td>Sedative</td>
</tr>
<tr>
<td></td>
<td><em>Pirus spp.</em></td>
<td>Fruit</td>
<td>Digestive, heartburn</td>
</tr>
<tr>
<td></td>
<td><em>Prunus avium</em> L.</td>
<td>Pedicel</td>
<td>Laxative, depurative, nephrolithiasis</td>
</tr>
</tbody>
</table>
India has been identified as one of the top twelve mega bio-diversity center of the world. This is because India has a vast area with wide variation in climate, soil, altitude and latitude. India with its biggest repository of medicinal plants in the world may maintain an important position in the production of raw materials either directly for crude drugs or as the bioactive compounds in the formulation of pharmaceuticals and cosmetics etc.

<table>
<thead>
<tr>
<th>Plant Family</th>
<th>Plants</th>
<th>Plant parts used</th>
<th>Main therapeutic use/aliments treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosaceae (continue)</td>
<td><em>Prunus spinosa</em> L.</td>
<td>Leaf, fruit</td>
<td>Diuretic, laxative</td>
</tr>
<tr>
<td></td>
<td><em>Rosa canina</em> L.</td>
<td>Fruit</td>
<td>Diarrhoea, diuretic, reconstituent</td>
</tr>
<tr>
<td></td>
<td><em>Rubus fruticosus</em> L.</td>
<td>Leaf</td>
<td>Diarrhoea, dysentery</td>
</tr>
<tr>
<td>Rutaceae</td>
<td><em>Citrus limon</em> L.</td>
<td>Fruit</td>
<td>Disinfectant, hypotensive, headache</td>
</tr>
<tr>
<td>Scrophulariaceae</td>
<td><em>Scrophularia trifoliate</em> L.</td>
<td>Leaf, rhizome</td>
<td>Diuretic, vulnerary</td>
</tr>
<tr>
<td>Umbelliferae</td>
<td><em>Apium graveolens</em> L.</td>
<td>Seed</td>
<td>Anti-inflammatory, aperitif</td>
</tr>
<tr>
<td></td>
<td><em>Daucus carota</em> L.</td>
<td>Seed</td>
<td>Intestinal analgesic</td>
</tr>
<tr>
<td></td>
<td><em>Ferula communis</em> L.</td>
<td>Leaf</td>
<td>Analgesic, cardio-kinetic nervous stimulant</td>
</tr>
<tr>
<td></td>
<td><em>Foeniculum vulgare</em></td>
<td>Fruit, seed, leaf</td>
<td>Digestive, galactogen, carminative, sedates nausea</td>
</tr>
<tr>
<td></td>
<td><em>Petroselinum sativum</em></td>
<td>Leaf</td>
<td>Skin emollient, diuretic stomach pain</td>
</tr>
<tr>
<td>Urticaceae</td>
<td><em>Cotyledon umbilicus veneris</em> L.</td>
<td>Leaf</td>
<td>Antiseptic, antibacterial</td>
</tr>
<tr>
<td></td>
<td><em>Parietaria diffusa</em></td>
<td>Whole plant</td>
<td>Cough sedative, headache</td>
</tr>
<tr>
<td></td>
<td><em>Urtica atrovirens</em></td>
<td>Leaf</td>
<td>Baldness, gastritis</td>
</tr>
<tr>
<td></td>
<td><em>Urtica dioica</em> L.</td>
<td>Leaf</td>
<td>Baldness, dandruff</td>
</tr>
<tr>
<td>Verbenaceae</td>
<td><em>Verbena officinalis</em> L.</td>
<td>Whole plant</td>
<td>Inappetence, hepatic diseases, sedative, anti-pyretic, cholagogue</td>
</tr>
<tr>
<td>Vitaceae</td>
<td><em>Vitis vinifera</em> L.</td>
<td>Fruit</td>
<td>Cough sedative</td>
</tr>
</tbody>
</table>
In India nearly 15000 plant species are used as a source of medicine. Distribution of different plant species in India (Singh, et al., 2003) are listed in table-2.

**Table-2: Availability of medicinal plants in different bio-geographical zones of India.**

<table>
<thead>
<tr>
<th>Bio-geographical zones</th>
<th>No. of known medicinal plants</th>
<th>Occurrence of some important medicinal plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>Trans Himalayan zone</strong></td>
<td></td>
<td>Ephedra gerardiana, Hippophae rhamnoides, Arnebia euchroma.</td>
</tr>
<tr>
<td>(i) North West Himalaya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Western Himalaya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii) Central Himalaya</td>
<td></td>
<td>Nardostachys grandiflora, taxus wallichiana, coptis teeta, panax pseudo-ginseng, Swertia chirayita, Rheum australis, picrorhiza kurroa, podophyllum hexandrum, gaultheria fragantissima, entada purwaetha.</td>
</tr>
<tr>
<td>(iv) Eastern Himalaya</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. <strong>Desert zones</strong></td>
<td></td>
<td>Convolvulus microphyllus, Tecomella undulata, Citrullus colocynthis, Cressa cretica.</td>
</tr>
<tr>
<td>Kutch and Thar</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>4. <strong>Semi-arid zone</strong></td>
<td>1,000</td>
<td>Comniphora wightii, Alhagi pseudalhagi, Salvadoraspp.</td>
</tr>
<tr>
<td>5. <strong>Western Ghats</strong></td>
<td>2,000</td>
<td>Myristica malabarica, Coscinium fenestratum, Garcinia indica, Vateria indica, Ulteria salicifolia,</td>
</tr>
<tr>
<td>(i) Western Ghats mountains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Malabar coasts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. <strong>Deccan Peninsula</strong></td>
<td>3,000</td>
<td>Pterocarpus santalinus, Mesua ferrea, Decalepis hamiltonii, Aristolochia spp., Terminalia paliida.</td>
</tr>
<tr>
<td>(i) Deccan Plateau south</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Central Plateau</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii) Eastern Plateau</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iv) Chhota Nagpur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(v) central Highlands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. <strong>Gangetic Plains</strong></td>
<td>1,000</td>
<td>Holarrhena pubscens, Mallotus philippinensis, Pluchealanceolata, Peganum harmala, Chlorophyllum spp., Rauvolfia serpentina, Saraca asoca</td>
</tr>
<tr>
<td>(i) Upper Gangetic Plains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Lower Gangetic Plains</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. <strong>North East India</strong></td>
<td>2,000</td>
<td>Aquilararia malaccensis, Smilax glabra, Abroma augusta, Hydnocarpus kurzii.</td>
</tr>
<tr>
<td>(i) Brahmaputra valley</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Assam hills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. <strong>Islands</strong></td>
<td>1,000</td>
<td>Calophyllum inophyllum, Adenanthera pavonina, Barringtonia asiatica, Aisandra butyacea.</td>
</tr>
<tr>
<td>(i) Andaman islands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Nicobar islands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(iii) Lakshdeep islands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. <strong>Coasts</strong></td>
<td>500</td>
<td>Rhizophora mucronata, Acanthus ilicifolius, Avicennia marina, Sonneratia caseolaris.</td>
</tr>
<tr>
<td>(i) West coasts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) East coasts</td>
<td></td>
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</tr>
</tbody>
</table>
The valuable medicinal properties of different plants are due to presence of several constituents i.e. saponines, tannins, alkaloids, alkenyl phenols, glycoalkaloids, flavonoids, sesquiterpenes lactones, terpenoids and phorbol esters (tiwari and Singh, 2004). Among them some are act as synergistic and enhance the bioactivity of other compounds.

Artemisinin produced by *Artemisia annua* plant is very effective against *Plasmodium falciparum*, *P. vivax* and also drug resist ant parasite. The main active constituents of *Artemisia annua* are sesquiterpenoid lactone endoperonides named artemisinin and artemisinic acid.

Reserpine isolated from raw plant extract of *Rauvolfia serpentine* is used as tranquilizer and in control of high blood pressure. From 2000 years the powdered root of *Rauvolfia serpentine* has been used in treatment of mental illness in India.

Although synthetic drugs are often used in treatment of certain disease but a remarkable interest and confidence on plant medicine was found.

Expert consumers of plant medicines have vast botanical knowledge. And this knowledge is necessary because only a expert can knew the active ingredients, part of plant used in treatment, and they also know right time and method for collecting right amount of plant parts as drug during the time in which the plant materials have bioactive constituents and they also knew right method for drug preparation and their administration.

**CONCLUSION**

I strongly feel that use of these plants and their plant products in medicinal purposes are most convenient due to their:

(i) Easy availability; (ii) Easy biodegradability; (iii) Easy to handle; (iv) Low cost;
(v) Safe for mankind and environment both; (vi) Greater acceptance amongst the users;
(vii) minimum side effect

Most of the studies have been done in the area of biologically active plant compounds but very little literature is available on the mode of action and their effect of non-target organisms. Obviously, these substances cannot be put to commercial use without a study of this aspect as well.

Thus we can concluded that before commercial use of these plant products their strict scientific tests, besides clinical ones on different vital systems is necessary because these natural products may have some few harmful ingredients in them as secondary metabolites, which may have perilous side effects including mutagenic potentials. It is therefore, desirable to evaluate the genotoxicity, physiological and biochemical effects, if any, of materials of plant origin before considering for medicinal and any other purposes.
REFERENCES


