

Indian Herbal Drug for General Healthcare: An Overview

M Pandey, S Rastogi, A Rawat

Citation

M Pandey, S Rastogi, A Rawat. *Indian Herbal Drug for General Healthcare: An Overview*. The Internet Journal of Alternative Medicine. 2007 Volume 6 Number 1.

Abstract

The medicinal plants are important therapeutic aids for alleviating various ailments of humankind. In the recent past there has been a tremendous increase in the use of plant-based health products in developing as well as developed countries resulting in an exponential growth of herbal products globally. An upward trend has been observed in the research on herbals. Export–Import Bank reports reveal that the global trade of plant-derived and plant originated products is around US \$60 billion. Herbal medicines have a strong traditional or conceptual base and the potential to be useful as drugs in terms of safety and effectiveness leads for treating different diseases. India, with its mega-biodiversity and knowledge-rich ancient traditional systems of medicine viz. Ayurveda, Siddha, Unani, Amchi and local health traditions, provides a strong base for the utilization of a large number of plants in general healthcare and alleviation of common ailments of the people. A number of Indian medicinal plants are used as rejuvenators as well as for treating various disease conditions. They may be tonics, antimalarials, antipyretics, aphrodisiacs, expectorants, hepatoprotectives, antirheumatics, diuretics etc. However, proper methodologies for the research and development are the need of the day for tapping the full therapeutic potentials of plants. In the present article an endeavor has been made to present an overview of the Indian medicinal plants used for general healthcare. Since the different systems of medicine practised in India, viz. Ayurveda, Siddha, Unani, Amchi and local health traditions, utilize a large number of plants that are commonly used as tonics, antimalarials, antipyretics, aphrodisiacs, expectorants, hepatoprotectives, antirheumatics, diuretics etc, an attempt has also been made to enumerate some of these plants/ drugs used for the alleviation of some common ailments with special emphasis on Rasayana drugs.

1. HERBAL DRUGS-CURRENT SCENARIO

Use of herbal medicines is wide spread in developing as well as developed countries. The use of plant-based health products was also increased in other European countries [1]. Export–Import Bank reports reveal that the global trade of plant-derived and plant originated products is around US \$60 billion (with growth of 7% per annum) where India holds stake of US \$1 billion [2,3] which is expected to reach 3 trillion US\$ by the end of 2015.

World Health Organization (WHO) has made an attempt to identify all medicinal plants used globally and listed more than 20,000 species. NAPRALERT database documents ethnomedicinal uses alone for 9200 of 33000 species of monocots, dicots, gymnosperms, pteridophytes, bryophytes and lichens, which would suggest that 28 % of plants on earth have been used ethnomedicinally [4].

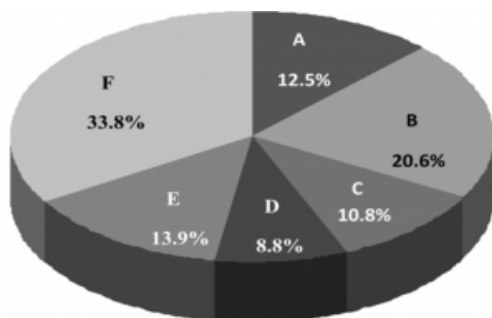
India is also considered as one of the potential exporting countries of medicinal plants. India has 2.4% of world's area with 8% of global biodiversity. It is one of the 12 mega-diversity hot-spot regions of the world, other countries being

Brazil, Colombia, China, South Africa, Mexico, Venezuela, Indonesia, Ecuador, Peru, USA and Bolivia. Across the country, the forests of India are estimated to harbour 90% of India's medicinal plants diversity in the wide range of forest types that occur. Only about 10% of the known medicinal plants of India are restricted to non-forest habitats. According to a report [5], one fifth of all the plants found in India are used for medicinal purpose. Fig. 1 shows the estimated domestic demand of the top 20 medicinal plants of India [6].

Utilizing the healing properties of plants is an integral part of all traditional practices. People in all continents have long used hundreds, of indigenous plants for treatment of various ailments dating back to prehistory. There is evidence that suggests Neanderthals living 60,000 years ago [7]. These plants are still widely used in ethnomedicine around the world.

Figure 1

Figure 1: Percentage demand of 20 major medicinal plants in the Indian market.



A. *Emblica officinalis* Gaertn. (Amla), B. *Asparagus racemosus* Willd. (Shatawar), *Withania somnifera* Dunal (Ashwagandha), *Terminalia chebula* Retz. (Haru), *Saraca asoca* [Roxb.] (Ashoka), C. *Aegle marmelos* Corr. (Bel), *Cassia angustifolia* Vahl (Sonapatir/ Sana), *Adhatoda varica* Nees. (Aduva/ Arava), D. *Piper longum* Linn. (Pippali), *Eacopa monnieri* [Linn.] (Brahmi), *Sida cordifolia* Linn. (Kanghi), *Ocimum sanctum* Linn. (Tulsi), E. *Bambusa bambos* Druce. (Vansalochan), *Boerhaavia diffusa* Linn. (Punarnava), *Asodirachta indica* A. Juss. (Neem), *Solanum nigrum* Linn. (Mokoya), *Woodfordia fruticosa* Kurz. (Dhataki), *Andrographis paniculata* Nees (Kalmegh), *Syzygium aromaticum* (Linn.) (Long/ lavang), *Tricospora cordifolia* [Wild] (Giloe, Guduchi), F. Others.

Traditional and folklore healers are sometimes said to have learned by observing animals. It has been observed that sick animals prefer to eat bitter herbs that they would normally reject. They tend to forage plants rich in secondary metabolites such as tannins and alkaloids which are often associated with medicinal properties like antiviral, antibacterial, antifungal and antihelminth properties. In other words, in the wild the animals go in for self-medication.

Although Ayurveda and other Indian systems of medicine have been developing since the first human civilizations in the Indian subcontinent, scientific evidence to prove the rationale of using these formulations in health care is essential to develop and to preserve the cultural heritage. Around 70% of population in India relies on these systems for primary health care. Ayurveda and ISM utilize a vast number of plants. The proportion of use of plants in the different Indian systems of medicine is: Ayurveda 2000, Siddha 1300, Unani 1000, Homeopathy 800, Tibetan 500, Modern 200 and folk 4500 [8].

In India around 25,000 effective plant-based formulations are used in traditional and folk medicine. More than 1.5 million practitioners are using the traditional medicinal system for health care in India. It is estimated that more than 7800 manufacturing units are involved in the production of natural health products and traditional plant-based formulations in India, which requires more than 2000 tones of medicinal plant raw material annually [8].

In the present scenario, the demand for herbal products is growing exponentially throughout the world and major pharmaceutical companies are currently conducting

extensive research on plant materials for their potential medicinal value. Upward trend has been observed in the number of research publications based on herbal drugs. Many analysis-based studies regarding pharmacological research in India have been conducted in the past.

All plants produce chemical compounds as part of their normal metabolic activities. The autologous functions of secondary metabolites are varied. For example, as toxins to deter predation, or to attract insects for pollination. It is these secondary metabolites which can have therapeutic actions in humans and which can be refined to produce drugs. The word drug itself comes from the Swedish word "drug", which means 'dried plant'. Some examples are inulin from the roots of 'Dahlias', quinine from the 'Cinchona', morphine and codeine from the 'Poppy', and digoxin from the 'Foxglove'. The active ingredient in Willow bark, salacin, or salicylic acid led to the development of aspirin, acetyl-salicylic acid, originally a trade name, patented by Bayer.

The use of and search for drugs and dietary supplements derived from plants have accelerated in recent years. Pharmacologists, microbiologists, botanists, and natural-products chemists are combing the earth for phytochemicals and leads that could be developed for treatment of various diseases. In fact, approximately 25% of modern drugs used in the United States have been derived from plants.

Many of the pharmaceuticals currently available to Western physicians have a long history of use of herbal remedies, including opium, aspirin, digitalis, and quinine. The World Health Organization (WHO) estimates that 80 percent of the world population, presently use herbal medicine for some aspect of primary health care. Herbal medicine is a major component in all traditional medicine systems and a common element in Ayurvedic, homeopathic, naturopathic, traditional Chinese medicine, and Native American Indian medicine. According to the WHO, 74% of 119 modern plant-derived pharmaceutical medicines are used in ways that correlated directly with their traditional uses. Major pharmaceutical companies are currently conducting extensive research on plant materials gathered from the rainforests and other places for possible new pharmaceuticals [9].

The unique feature of traditional medicine in India is that it flourishes at multiple levels. On one hand there are practitioners of Ayurveda, Siddha, Unani and Homeopathy systems who are institutionally qualified and trained in colleges. On the other hand, there is the folk stream or Lok

Parampara which is rich and diverse. About 8000 wild plant species are used by the Indian tribes for a variety of medicinal purposes, which used in various specific preparations/applications [10].

2. AYURVEDA- THE HEALING SCIENCE OF INDIA

Ayurveda, the science of life, prevention and longevity is believed to be the oldest and most holistic or comprehensive medical system available. This entire system of ancient Indian medicine is based on the relationship between man and nature. Ayurveda is one of the most ancient systems of life, health and cure. Its antiquity goes back to the Vedas. This system of knowledge flourished through over 5000 years and has had an unbroken tradition of practice down the ages update. Ayurveda is a highly evolved and codified system of life and health science based on its own unique and original concepts and fundamental principles.

It was placed in written form over 2,000 years ago in India, and said to be a “world medicine”. It is said that the training of Ayurveda was received through direct cognition during meditation. In other words, the knowledge of the use of the various methods of healing, prevention, longevity and surgery came through Divine revelation; there was no guessing or testing or harming of animals.

The science of Ayurveda is based on rational and scientific principles. Ayurveda with its generous and veritable material medica, fulfills the mission of serving the ailing population. It has put together an enormous body of observational data under a theoretical framework and developed methodologies and categories which hold good for all three times: past, present and future. Although research on medicinal science has opened new sources of remedies, Ayurveda is continuing as a mainstay in the treatment due to its easy availability coupled with safe, effective and sustainable claims. Indian people have a tremendous passion for medicinal plants and use them for a wide range of health related applications, from common cold to memory improvements and enhancement of general immunity. India, from the trans-Himalayas, down to the coastal plains has discovered the medical uses of thousands of plants found locally in the ecosystem. India with one of the richest India's medicinal plant culture is of tremendous contemporary relevance for ensuring health security to the teeming millions and provides herbal drugs to the entire world.

Ayurveda, has eight branches. Rasayana (rejuvenation) is one of them. In Indian culture Rasayana are the agents,

which, among other things, cure diseases of the body and mind and delay old age. They also increase power, energy, memory, and the body's disease resistance capacity. They are generally used to rejuvenate the general health of the body and aim at achieving the body's maximum potential. Rasayanas can be used regularly as a food for maintaining balanced mental and physical health. Rasayana or rejuvenation therapy helps to promote and preserve health and longevity in the healthy, and to cure disease in the sick. Rasayanas or vitalizers, as they are called, do exactly the same. They replenish the vital fluids of our body, thus keeping us away from diseases [11].

3. RASAYANA DRUGS

Rasayanas brings about a striking improvement in the mental and physical health of individual. They help in increasing the immunity of the person to keep him away from diseases. The person becomes healthy and strong. Rasayanas deal with the methods to maintain youth, increase longevity, intellectual capacity and strength and keep the patients free from diseases. There are many benefits of taking rasayana which are as follows: Increase in life-span. Increase in memory and intelligence. Freedom from diseases (i.e. immunity is increased). Preservation of youth. Excellence of luster, complexion and voice. Optimum strength of the body. Increase in body glow.

Some of the common herbs used as Rasayanas are mentioned in Table 1 [12,13]. It also enlists their various ethnomedicinal claims as well as their specific uses as mentioned in Ayurvedic texts.

Besides, there are also several formulations e.g. Chyavanaprasha, Pippali rasayana and Triphala rasayana which are used as vitalizers. They are based on specific herbs exhibiting adaptogenic nature. They are frequently used for the betterment of general health of the individual. Some of the best known formulations and their uses as mentioned in the Ayurvedic formulary [14] are listed below.

Asvagandhadi leha- Raktavikara, krsatva, arsa, upadamsa, used as balya, rasayana, Vajikarana.

Kutajavaleha- Amlapitta, atisara, grahani, raktapitta, arsa, aruchi, pandu, kamla, karsya.

Guda pippali- Pliharoga, udara, gula, kasa, jirnavara, sotha, yakrit, good for children.

Chyvanprasa- Kasa, svasa, ksataksina, svarabheda, ksaya, hrdroga, agnimandya, uroroga, vatarakta, vataroga, pipasa,

mutraroga, sukradosa, jara.

Dasamula haritaki- Sopha, arocaka, gara-udararoga, gulma, pliharoga, mutrakrcchra, sukradosa, svasa, jvara, meha, karsya, raktapitta, amavata.

Puga khand- Chardi, sula, amlapitta, murccha, vandyaroga, pradara, pandu, raktarsa, jara, sukraksaya, agnimandya, daurbalya, ajirna, improves bala, varna, dristi.

Brahma rasayana- Randra, sramakiama, mandaurbalyua, jara, valipalita, smrtibhrama.

Satavari guda- Mutrakrcchra, raktapitta, lalimaka, ksaya, padadaha, yonisoda, asrgdara, prameha, mudhavata, kamala, rajodosa, asthisrava, vatapittaroga, used as rasayana.

Kancanara guggulu- Gulma, gandamala, apaci, granthi,

vrana, kushta, bhangandara, slipada.

Kaisora guggulu- Mandagni, vibhandha, vatasonita, prameha pidaka, vrana, kasa, gulma, pandu, meha, jarodasa.

Triphala guggulu- Sotha, bhagandara, arsa, gulma.

Yogiraja guggulu- Rasnasaptaka, amavata, adhyavata, krmi, dusta, vrana, plihavrddhi, arsa, agnimandya, daurbalya, vata.

Eladi gutika- Chardi, hikka, kasa, bhrama, kurccha, raktapitta, jvara, mada, trsna, aruci, amavata, sukraksaya.

Citrakadi gutika- Agnimandya, amadosa, grahani.

Bilvadi gutika- Ajirna, garadosa, jvara, badha.

Sanjivani vati- Ajirna, gulma, visuci, sarapadamsa.

Lasunadi vati- Visucika, ajirna, atisara.

Figure 2

Table 1: Ethnobotanical claims and Ayurvedic uses of some common Rasayana drugs

Plant name	Common/ Ayurvedic name	Ethnomedicinal uses	Ayurvedic uses
<i>Sida cordifolia</i> (Malvaceae)	Bala	Medicine in boils, dysentery, leucorrhoea, thrombosis, renal weakness, spermatogenesis, stomache, venereal disorders and wounds.	Act as dietary adjuvants and good for increasing the strength of tissues and organs (Balya)
<i>Gmelina arborea</i> (Verbenaceae)	Kasmari	Used in asthma, antidote to poison, blood purifier, bone fracture, bronchitis, carminative, cholera, colic, cough, diarrhoea, fever, headache, malaria, rheumatism and as tonic.	Act as dietary adjuvants and good for increasing the strength of tissues and organs (Balya)
<i>Withania somnifera</i> (Solanaceae)	Varahi	Used in asthma, bronchitis, chest complaints, cough, dropsy, epilepsy, eye complaints, insanity, lamboago, rheumatism, skin disorders and wounds.	Act as dietary adjuvants and good for increasing the strength of tissues and organs (Balya)
<i>Piper longum</i> (Piperaceae)	Pippali	Used in bronchitis, asthma, child bath, cholera, diarrhoea, dysentery, fever, cold, cough, indigestion, paralysis, rheumatism, spleen complaints and stomache.	Acts as respiratory Rasayana
<i>Terminalia chebula</i> (Zingiberaceae)	Hartaki	Used in bronchitis, cold, colic, constipation, cough, diabetes, diarrhoea, dysuria, dysentery, eczema, eye disorders, indigestion, menstrial, menstrual complaints, pneumonia, spleen complaints and stomach complaints.	Acts as Digestive Rasayana by eliminating the waste products from the tissue/ organs, gastrointestinal tract
<i>Boerhaavia monnieri</i> (Scrophulariaceae)	Brahmi	Used in abdominal pain, blood purifier, epilepsy, general tonic, cough, eczema, fever, headache, laxative, liver complaints, nerve tonic, rheumatism, stomach complaints and as cooling.	Helps to increase intellect and memory thereby acting as Medhya Rasayana (Brain tonic)
<i>Acorus calamus</i> (Araceae)	Vacha	Used in abdominal pain, asthma, body ache, bronchitis, cold, consumption, cough, dysentery, fever, headache, hysteria, indigestion, inflammation, malaria, skin disorders and as a tonic.	Helps to increase intellect and memory thereby acting as Medhya Rasayana (Brain tonic)
<i>Convolvulus pluricaulis</i> (Convolvulaceae)	Shankhpus hpi	Used in asthma, bronchitis, dysentery, fever, spermatogenesis, ulcer and stomache.	Helps to increase intellect and memory thereby acting as Medhya Rasayana (Brain tonic)
<i>Centella asiatica</i> (Umbelliferae)	Mandukap arni	Used in blood disorder, brain tonic, cholera, cough, diarrhoea, dysentery, fever, gastric disorders, headache, liver complaints, memory loss, nerve disorders, tumors, respiratory disorders, stomache, as a diuretic and tonic.	Helps to increase intellect and memory thereby acting as Medhya Rasayana (Brain tonic)
<i>Commiphora mukul</i> (Burseraceae)	Guggul	Used to cure asthma, headache, bronchitis, typhoid and ulcer.	Helps further digestion of waste products
<i>Bombaca officinalis</i> (Euphorbiaceae)	Amiki	Used as diuretic, laxative, and in diarrhoea, dysentery, anaemia, jaundice and dyspepsia.	Decrease the catabolic process and thus postpones ageing. Known as 'Vayasthapak Rasayana' (Adaptogenic tonic)
<i>Triospora cordifolia</i> (Menispermaceae)	Guduchi	Used as aphrodisiac, antiperiodic, antipyretic and in stomache.	Decrease the catabolic process and thus postpones ageing. Known as 'Vayasthapak Rasayana' (Adaptogenic tonic)
<i>Semecarpus anacardium</i> (Anacardiaceae)	Bhallataka	Used as abortifacient, antifebrile and in asthma, cough, headache, nervous disorder, rheumatism and ulcer.	Powerful immune promoting substance which overcomes many conditions like rheumatoid arthritis and some stages and types of malignancies (cancer)
<i>Boerhaavia diffusa</i> (Nyctagaceae)	Punarnava	Used as tonic, in anaemia, asthma, blood purifier, body heat, childbirth, cold, cough, dysentery, fever, headaches, heart disorder, kidney complaints, liver complaints, pain in abdomen, rheumatism, urine complaints and abortifacient.	Promotes the functions of the kidney and improves the regenerating capacity of the nephrons (a functional unit of kidney)
<i>Asparagus racemosus</i> (Liliaceae)	Shatavari	Aphrodisiac, used in rheumatism, urine complaints, cough, gastric complaints, gonorrhoea, impotency, leucorrhoea, menstrual complaints, stomache and as a tonic.	Best female rejuvenative. Useful for infertility, decreased libido, threatened miscarriage, menopause, leucorrhoea. Also promotes lactation in lactating mothers.
<i>Mucuna pruriens</i> (Leguminosae)	Atmagupta	Aphrodisiac, used to cure ulcer, bone fracture, cancer, cough, digestion complaints, impotency, urine complaints and as a tonic.	Promote generative activities in the tissues, restore senile sexual dysfunctions and cure impotency.
<i>Terminalia bellerica</i> (Combretaceae)	Bahera	Used as a medicine in asthma, bronchitis, cholera, cold, constipation, cough, gastric complaints, liver complaints and stomache.	Tonic, antipyretic used to cure piles, diarrhoea and leprosy.
<i>Ocimum sanctum</i> (Labiatae)	Tulsi	Medicine as abortifacient, blood purifier, bronchitis, cholera, cold, constipation, diarrhoea, fever, gastric disorder and headache.	Gastrointestinal disorders, hepatic affections.
<i>Zingiber officinale</i> (Zingiberaceae)	Ardraka	Used in asthma, bronchitis, cholera, diarrhoea, constipation, cough, indigestion, fever and rheumatism.	Rhizomes used as a stimulant, carminative, adjunct to many tonic and stimulating remedies.
<i>Picrorhiza kurroa</i> (Scrophulariaceae)	Kutki	Used in abdominal pain, anaemia, asthma, cholera, diarrhoea, fever, jaundice and stomach disorder.	Stomach disorders, fever, indigestion.
<i>Piper longum</i> (Piperaceae)	Pipali	Medicine in asthma, bronchitis, cholera, diarrhoea, dysentery, fever, cold, cough, indigestion, rheumatism and spleen complaints.	Tonic, chronic bronchitis, cough and cold.

3.1 CHYAVANAPRASHA

Chyavanprasha is the most popular and widely used Ayurvedic herbal medicine. It is considered as India's oldest longevity tonic. According to Ayurveda, Chyawanprash comes under the category of 'Rasayana', which aims at maintaining youthfulness, vigor, vitality of the body and keeping away aging process, senility and debility. It maintains the proper functioning of the cells and rejuvenates the cells. As such it also keeps away diseases and builds resistance power to fight diseases. Among all the Rasayanas, Chyawanprash is most useful and famous. It is the most popular rejuvenating Ayurvedic tonic in India having a consistency of Jam and consisting of about 48 natural herbs including Amla (*Embellica Officinalis*) the richest natural source of vitamin C. It works on the immune system of the body protecting body against everyday infections like cough cold and fever. Thus it is very useful in children, old persons, tubercular patient, debilitated persons and for those suffering from peitoral lesions. Chyavanprasha is the elixir of Rishi Chyavana and celebrated as the highest rasayana.

3.2 TRIPHALA

According to Ayurveda, perfect digestion is the basis of all health, if your digestive system function properly than it helps the other parts of the body to perform well, including skin health. So traditional Ayurvedic tonic for proper digestion also acts as the best herbal food for the skin because its cleansing action is replenishing instead of draining, and because of its nutrition content, Triphala, the well-known traditional Ayurvedic formulation, makes an excellent skin tonic. Triphala is one of the most famous Ayurvedic medicinal herbs. Triphala literally means "three fruits." The three fruits contained in Triphala are Haritaki, Amalaki and Bibhitaki. And because Triphala is tridoshic--equally balancing for Vata, Pitta and Kapha--it is useful for all skin types. It can be mixed with other herbs in compound formulations. Triphala has the quality to nourish the skin both directly and indirectly. Amla, one of the three ingredients in Triphala, is the richest known natural source of vitamin C. which helps in the production of collagen, which is necessary to keep skin supple and thick. Triphala also contains calcium. Calcium helps enhance skin clarity and brings dull, tired skin to life. Besides nourishing the mind and body and promoting longevity, Triphala has many specific effects. It is particularly rejuvenating for the digestive tract, and is a rasayana for the eyes and the skin. It removes ama from the fat tissue, and balances cholesterol. Triphala also purifies the urine and prevents urinary tract

disease. It enhances all thirteen agnis (digestive fires), especially the main digestive fire in the stomach. It pacifies Kapha and Pitta, and if taken regularly, is a powerful anti-aging rasayana.

3.3 PIPPALI RASAYANA

Among the vitalizers (rasayanas) Pippali is the most widely used of all the Ayurvedic herbs. There are various advantages of this herb. It is one of the best herbs for enhancing digestion, assimilation and metabolism of the foods we eat. It is also highly prized for its ability to enhance assimilation and potency of herbs in a synergistic formula (this is called the Yogavahi effect). The Ayurvedic texts list Pippali as one of the most powerful Rasayana herbs, meaning it is a longevity enhancer. It also cleans the shrotas that transport nutrients and remove wastes, so it is considered important for purification. It balances two of the three laws of nature at work in the mind and body (Vata and Kapha). It also soothes the nerves to improve the quality of sleep at night. It is a very important ingredient for digestion. Along with Black Pepper and Ginger, Pippali is part of the famous digestive formula known as Trikatu (Three Spices). Pippali also has a rejuvenating effect so anybody desirous of rasayana guna (rejuvenation) should consume pippali five, eight, seven or ten in number added with honey and ghee daily for one year it will give a long lasting effect. Pippali rasayana is a traditional Ayurvedic formulation consisting of Piper longum and *Butea monosperma* (palash). Pippali rasayana has traditionally been used in the treatment of chronic dysentery and worm infestations. Ayurveda lists Pippali as one of the most powerful Rasayana herbs, meaning it is a longevity enhancer. It also cleans the shrotas that transport nutrients and remove wastes, so it is considered important for purification. It balances two of the three laws of nature at work in the mind and body (Vata and Kapha). It also soothes the nerves to improve the quality of sleep at night. It provides relief from cough, consumption, dyspnea, hiccup, throat infections, piles, assimilation disorders, anemia, and irregular fever. Pippali enhances all 13 of the metabolic processes (Agnis) that create the 7 categories of bodily tissues (Dhatus).

4. HERBS FOR GENERAL HEALTH/ COMMON AILMENTS

The different systems of medicine practised in India, Ayurveda, Siddha, Unani, Amchi and local health traditions, utilize a large number of plants for the treatment of human diseases. Most of these medicinal plants have been identified and their uses are well documented and described by

different authors [12,15,16,17,18,19]. A number of medicinal plants are used as rejuvenators as well as for treating various disease conditions. They may be tonics, antimalarials, antipyretics, aphrodisiacs, expectorants, hepatoprotectives, antirheumatics, diuretics etc. The following section enlists the commonly used Indian medicinal plants used for general health and the alleviation of some common ailments.

4.1 ALTERATIVES AND TONICS

Aswagandha (*Withania somnifera*), Gokshura (*Tribulus terrestris*), Guduchi (*Tinospora cordifolia*), Guggulu (*Commiphora mukul*), Kushtam (*Saussurea costus*), Nimba (*Azardirachta indica*), Nirgundi (*Vitex negundo*), Pippali (*Piper longum*), Saalmali (*Salmalia malabarica*), Saariba (*Ichnocarpus frutescens*), Vaasaa (*Litsea chinensis*), Vidangam (*Embelia ribes*), Vidaari (*Pueraria tuberosa*), Aakaarakarabha (*Anacyclus pyrethrum*), Aamalaki (*Phyllanthus emblica*), Arka (*Calotropis gigantea*), Asokathwak (*Saraca indica*), Aswattha (*Ficus religiosa*), Bala (*Sida cordifolia*), Bhallaathaka (*Semicarpus anacardium*), Bhaarangi (*Clerodendrum indicum*), Bhringaraja (*Eclipta alba*), Braahmi (*Centella asiatica*), Dhaanyakam (*Coriandrum sativum*), Draaksha (*Vitis vinifera*), Haridra (*Curcuma longa*), Harithaki (*Terminalia chebula*), Hingulam (*Ferula alliacea*), Karpuram (*Cinnamomum camphora*), Katukarohini (*Picrorhiza kurroa*), Khadira (*Acacia catechu*), Kiraatatikta (*Andrographis paniculata*), Manjishta (*Rubia cordifolia*), Patola (*Trichosanthes diaica*), Raktachandanam (*Pterocarpus santalinus*), Sataavari (*Asparagus racemosus*), Taalaka (*Borassus flabellifer*), Vacha (*Acorus calamus*), Vansalochana (*Bambusa arundinacea*), Vibheethaki (*Terminalia belerica*), Vidaari (*Pueraria tuberosa*), Vishamusti (*Strychnos nux vomica*), Yashtimadhu (*Glycyrrhiza glabra*), Kantakaari (*Solanum xanthocarpum*), Jaatiphala (*Myristica fragrans*), Lavangam (*Syzygium aromaticum*), Maricham (*Piper nigrum*), Sunthi (*Zingiber officinale*), Thwak (*Cinnamomum zeylanicum*).

4.2 ANTHELMINTIC AND ANTIPARASITIC

Ajamoda (*Trachyspermum ammi*), Bhallaathaka (*Semicarpus anacardium*), Daadima (*Punica granatum*), Haridra (*Curcuma longa*), Hingu (*Ferula alliacea*), Krishna Jeerakam (*Nigella sativa*), Kuraasaaniyamaani (*Hyoscyamus niger*), Maricham (*Piper nigrum*), Nimba (*Azardirachta indica*), Palaasabeeja (*Butea monopsperma*), Pippalimoolam (*Piper longum*), Vibheethaki (*Terminalia belerica*), Vidangam (*Embelia ribes*), Arka (*Calotropis gigantea*), Dhatura (*Datura metel*), Kirmaani (*Aristolochia bracteata*),

Vacha (*Acorus calamus*).

4.3 ANTIMALARIAL

Arka (*Calotropis gigantea*), Bhoodhaatri (*Phyllanthus urinaria*), Bhringaraaja (*Eclipta alba*), Daaruharidraa (*Berberis aristata*), Katukarohini (*Picrorhiza kurroa*), Kiraata (*Andrographis paniculata*), Maricha (*Piper nigrum*), Nirgundi (*Vitex negundo*), Vishamusti (*Strychnos nux vomica*).

4.4 ANTIPYRETIC

Bhoodhaatri (*Phyllanthus urinaria*), Hingulam (*Ferula alliacea*), Kiraata (*Andrographis paniculata*), Kuberaaksha (*Caesalpinia crista*), Manosila (*Psidium guajava*), Maricham (*Piper nigrum*), Nimba (*Azardirachta indica*), Nirgundi (*Vitex negundo*), Quinine (*Cinchona ledgeriana*), Raktachandanam (*Pterocarpus santalinus*), Taalakam (*Borassus flabellifer*), Vatsanaabhi (*Aconitum ferox*), Bala (*Sida cordifolia*), Bhringaraaja (*Eclipta alba*), Daadima (*Punica granatum*), Daaruharidra (*Berberis aristata*), Dhaanyakam (*Coriandrum sativum*), Dhatura (*Datura metel*), Draaksha (*Vitis vinifera*), Dronapushpi (*Leucos lavandulaefolia*), Guduchi (*Tinospora cordifolia*), Guggulu (*Commiphora mukul*), Jeerakam (*Cuminum cyminum*), Kantakaari (*Solanum xanthocarpum*), Karpuram (*Cinnamomum camphora*), Katukarohini (*Picrorhiza kurroa*), Kiraatatikta (*Andrographis paniculata*), Musta (*Cyperus rotundus*), Parpataka (*Fumaria parviflora*), Patola (*Trichosanthes cucumerina*), Punarnava (*Boerhavia diffusa*), Sunthi (*Zingiber officinale*), Trivrit (*Operculina turpethum*), Useeram (*Vetiveria zizanioides*), Vacha (*Acorus calamus*), Vansalochana (*Bambusa arundinacea*), Yashtimadhu (*Glycyrrhiza glabra*).

4.5 APHRODISIAC

Aakaarakarabha (*Anacyclus pyrethrum*), Aaphenam (*Papaver somniferum*), Aswagandha (*Withania somnifera*), Aswattha (*Ficus religiosa*), Bhallaathaka (*Semicarpus anacardium*), Gokshura (*Tribulus terrestris*), Guduchi (*Tinospora cordifolia*), Guggulu (*Commiphora mukul*), Ikshuraka (*Saccharum officinarum*), Jaatiphala (*Myristica fragrans*), Jataamamsi (*Valeriana jatamansi*), Karpuram (*Cinnamomum camphora*), Maasha (*Phaseolus radiatus*), Saalmali (*Salmalia malabarica*), Saariba (*Ichnocarpus frutescens*), Sataavari (*Asparagus racemosus*), Vacha (*Acorus calamus*), Vansalochana (*Bambusa arundinacea*), Vidaari (*Pueraria tuberosa*), Vishamusti (*Strychnos nux vomica*), Yashtimadu (*Glycyrrhiza glabra*).

4.6 ANTI-ASTHMATIC AND EXPECTORANT

Ajamoda (*Trachyspermum ammi*), Arka (*Calotropis gigantea*), Bhallaathaka (*Semicarpus anacardium*), Dhatura (*Datura metel*), Hingu (*Ferula alliacea*), Kantakaari (*Solanum xanthocarpum*), Kuraasaaniyamaani (*Hyoscyamus niger*), Kushtam (*Saussurea costus*), Maricham (*Piper nigrum*), Patrasnuhi (*Euphorbia nivulia*), Sunthi (*Zingiber officinale*), Vansalochana (*Bambusa arundinacea*), Vaasa (*Litsea chinensis*), Yashtimadhu (*Glycyrrhiza glabra*), Karpuram (*Cinnamomum camphora*), Dhaanyakam (*Coriandrum sativum*), Ela (*Elettaria cardamomum*), Lavangam (*Syzygium aromaticum*), Raasna (*Pluchea lanceolata*), Taalisapatri (*Abies spectabilis*), Vacha (*Acorus calamus*), Kiraatatikta (*Andrographis paniculata*), Pippali (*Piper longum*), Aakaarakarabha (*Anacyclus pyrethrum*), Haridra (*Curcuma longa*), Harithaki (*Terminalia chebula*), Khadira (*Acacia catechu*), Vibheethaki (*Terminalia bellerica*), Bhaarngi (*Clerodendrum serratum*).

4.7 CARMINATIVE AND DIGESTIVE

Chitramoolam (*Plumbago indica*), Daadima (*Punica granatum*), Dhaanyaka (*Coriandrum sativum*), Ela (*Elettaria cardamomum*), Krishnajeerakam (*Nigella sativa*), Taalisapatri (*Abies spectabilis*), Ajamoda (*Trachyspermum ammi*), Bhallaataka (*Semicarpus anacardium*), Devadaaru (*Cedrus deodara*), Hingu (*Ferula alliacea*), Jaatiphala (*Myristica fragrance*), Jeerakam (*Cuminum cyminum*), Kachoram (*Hedychium spicatum*), Karpura (*Cinnamomum camphora*), Maricham (*Piper nigrum*), Naagakesaram (*Mesua ferra*), Nimba (*Azadirachta indica*), Pippali (*Piper longum*), Raasna (*Pluchea lanceolata*), Sunthi (*Zingiber officinale*), Thwak (*Cinnamomum zeylanicum*), Vidangam (*Embelia ribes*), Harithaki (*Terminalia chebula*), Kuraasaaniyamaani (*Hyoscyamus niger*), Kushtam (*Saussurea costus*), Vacha (*Acorus calamus*), Aamalaki (*Emblica officinalis*), Bhringaraaja (*Eclipta alba*), Haridra (*Curcuma longa*), Vishamusti (*Strychnos nux vomica*).

4.8 ANTIDIABETIC

Ahiphenam (*Papaver somniferum*), Aamalaki (*Emblica officinalis*), Draaksha (*Vitis vinifera*), Guduchi (*Tinospora cordifolia*), Harithaki (*Terminalia chebula*), Haridra (*Curcuma longa*), Manjishta (*Rubia cordifolia*), Musta (*Cyperus rotundus*), Vidadri (*Pueraria tuberosa*), Triphala (*Terminalia chebula*, *T. bellerica*, *Emblica officinalis*), Gurmar (*Gymnema sylvestre*), Jamun (*Syzygium jambos*).

4.9 DIARRHOEA AND DYSENTERY

Aaphenam (*Papaver somniferum*), Chandanam (*Santalum*

album), Daadima (*Punica granatum*), Harithaki (*Terminalia chebula*), Jaatiphala (*Myristica fragrans*), Jeerakam (*Cuminum cyminum*), Khadira (*Acacia catechu*), Saalmali (*Salmalia malabarica*), Saariba (*Ichnocarpus frutescens*), Sunthi (*Zingiber officinale*), Thwak (*Cinnamomum zeylanicum*), Vacha (*Acorus calamus*), Vibheethaki (*Terminalia bellerica*), Ajamoda (*Trachyspermum ammi*), Arka (*Calotropis gigantea*), Kushtam (*Saussurea costus*), Maricham (*Piper nigrum*), Musta (*Cyperus rotundus*), Isafgaul seeds (*Plantago amplexicaulis*), Jaatiphala (*Myristica fragrans*), Jeerakam (*Cuminum cyminum*), Khadira (*Acacia catechu*), Kutaja (*Holarrhena antidysenterica*), Lodhra (*Symplocos paniculata*), Naagakesaram (*Mesua ferra*), Vansalochana (*Bambusa arundinacea*).

4.10 HEPATIC DERANGEMENTS AND JAUNDICE

Guduchi (*Tinospora cordifolia*), Ikshuraka (*Saccharum officinarum*), Katukarohini (*Picrorhiza kurroa*), Kiraatatikta (*Andrographis paniculata*), Nimba (*Azadirachta indica*), Ajamoda (*Trachyspermum ammi*), Arka (*Calotropis gigantea*), Chitramulam (*Plumbago indica*), Hingu (*Ferula alliacea*), Jaatiphala (*Myristica fragrance*), Karpuram (*Cinnamomum camphora*), Krishnajeeraam (*Nigella sativa*), Maricham (*Piper nigrum*), Nirgundi (*Vitex negundo*), Sunthi (*Zingiber officinale*), Vacha (*Acorus calamus*), Bhoothatri (*Phyllanthus urinaria*), Bhringaraaja (*Eclipta alba*), Guduchi (*Tinospora cordifolia*), Indravaaruni (*Citrullus colocyntis*), Kumaari (*Aloe barbadensis*), Aamalaki (*Emblica officinalis*), Musta (*Cyperus rotundus*), Trivrit (*Operculina turpethum*).

4.11 COLIC ULCERS

Ajamoda (*Trachyspermum ammi*), Dhaanyakam (*Coriandrum sativum*), Hingu (*Ferula alliacea*), Jaatiphala (*Myristica fragrans*), Kuraasaani Yamaani (*Hyoscyamus niger*), Lavangam (*Syzygium aromaticum*), Nirgundi (*Vitex negundo*), Sunthi (*Zingiber officinale*), Vacha (*Acorus calamus*), Chandanam (*Santalum album*), Chitramoolam (*Plumbago indica*), Devadaaru (*Cedrus deodara*), Haridra (*Curcuma longa*), Karpuram (*Cinnamomum camphora*), Khadira (*Acacia catechu*), Kiraatatikta (*Andrographis paniculata*), Kushtam (*Saussurea costus*), Lodhra (*Symplocos paniculata*), Nimba (*Azadirachta indica*), Saalmali (*Salmalia malabarica*), Triphala (*Terminalia chebula*, *T. bellerica*, *Emblica officinalis*), Yashtimadhu (*Glycyrrhiza glabra*).

4.12 ANTISEPTIC AND ANTIINFLAMMATORY

Ajamodaa (*Trachyspermum ammi*), Aswattha (*Ficus religiosa*), Chandanam (*Santalum album*), Daaruharidra (*Berberis aristata*), Harithaki (*Terminalia chebula*), Haridra (*Curcuma longa*), Hingu (*Ferula alliacea*), Kachoram (*Hedychium spicatum*), Karpuram (*Cinnamomum camphora*), Khadira (*Acacia catechu*), Krishna-jeerakam (*Nigella sativa*), Kumaari (*Aloe barbadensis*), Lavangam (*Syzygium aromaticum*), Manjishta (*Rubia cordifolia*), Nimba (*Azadirachta indica*), Saalmali (*Salmalia malabarica*), Vibheethaki (*Terminalia bellerica*), Ahiphenam (*Papaver somniferum*), Bhallaathaka (*Semicarpus anacardium*), Dhatura (*Datura metel*), Draaksha (*Vitis vinifera*), Erandatailam (*Ricinus communis*), Ikshuraka (*Saccharum officinarum*), Karpuram (*Cinnamomum camphora*), Kumaari (*Aloe barbedensis*), Kushtam (*Saussurea costus*), Punarnava (*Boerhavia diffusa*), Sunthi (*Zingiber officinale*), Trivrit (*Operculina turpethum*), Useeram (*Vetiveria zizanioides*), Vacha (*Acorus calamus*), Yashtimadhu (*Glycyrrhiza glabra*), Triphala (*Terminalia chebula*, *T. bellerica*, *Emblica officinalis*).

4.13 NERVOUS DISORDERS AND NEURITIS

Ahiphenam (*Papaver somniferum*), Arka (*Calotropis gigantea*), Aswagandha (*Withania somnifera*), Aatmagupta (*Baliospermum montanum*), Bala (*Sida cordifolia*), Braahmi (*Centella asiatica*), Draaksha (*Vitis vinifera*), Guggulu (*Commifera mukul*), Hingu (*Ferula alliacea*), Jataamaamsi (*Valariana jatamansi*), Jeerakam (*Cuminum cyminum*), Kushtam (*Saussurea costus*), Manosila (*Psidium guajava*), Maasha (*Phaseolus radiatus*), Raasna (*Pluchea lanceolata*), Sunthi (*Zingiber officinale*), Vacha (*Acorus calamus*), Karpura (*Cinnamomum camphora*), Maricham (*Piper nigrum*).

4.14 RHEUMATISM

Ahiphenam (*Papaver somniferum*), Arka (*Calotropis gigantea*), Ajamoda (*Trachyspermum ammi*), Bala (*Sida cordifolia*), Bhallaathaka (*Semicarpus anacardium*), Devadaaru (*Cedrus deodara*), Dhatura (*Datura metel*), Erandatailam (*Ricinus communis*), Guduchi (*Tinospora cordifolia*), Guggulu (*Commifera mukul*), Jaatiphala (*Myristica fragrans*), Kushtam (*Saussurea costus*), Nirgundi (*Vitex negundo*), Punarnava (*Boerhavia diffusa*), Raasna (*Pluchea lanceolata*), Sunthi (*Zingiber officinale*).

4.15 LAXATIVE

Dantibeejam (*Baliospermum montanum*), Draaksha (*Vitis vinifera*), Erandatailam (*Ricinus communis*), Harithaki

(*Terminalia chebula*), Indravaaruni (*Citrullus colocyntis*), Kantakaari (*Solanum xanthocarpum*), Katukarohini (*Picrorhiza kurroa*), Punarnava (*Boerhavia diffusa*), Tilatailam (*Sesum indicum*), Trivrit (*Operculina turpethum*), Vibheethaki (*Terminalia bellerica*), Yashtimadhu (*Glycyrrhiza glabra*).

4.16 DIURETIC

Aadraka (*Zingiber officinale*), Braahmi (*Centella asiatica*), Daaruharidra (*Berberis aristata*), Devadaaru (*Cedrus deodara*), Draaksha (*Vitis vinifera*), Durva (*Cynodon dactylon*), Ela (*Elettaria cardamomum*), Gokshura (*Tribulus terrestris*), Ikshuraka (*Saccharum officinarum*), Kantakaari (*Solanum xanthocarpum*), Karpuram (*Cinnamomum camphora*), Must (*Cyperus rotundus*), Parpataka (*Fumaria parviflora*), Punarnava (*Boerhavia diffusa*), Saariba (*Ichnocarpus frutescens*), Sataavari (*Asparagus racemosus*), Useeram (*Vetiveria zizanioides*), Vacha (*Acorus calamus*).

4.17 ANTISPASMODIC

Ajamoda (*Trachyspermum ammi*), Aaphenam (*Papaver somniferum*), Arka (*Calotropis gigantea*), Bhaarngi (*Clerodendrum serratum*), Dhatura (*Datura metel*), Guggulu (*Commifera mukul*), Hingu (*Ferula alliacea*), Jataamaamsi (*Valariana jatamansi*), Karpuram (*Cinnamomum camphora*), Kuraasaaniyamaani (*Hyoscyamus niger*), Kushtam (*Saussurea costus*), Lavangam (*Syzygium aromaticum*), Raasna (*Pluchea lanceolata*), Surakshaara (*Ocimum sanctum*), Taalisapatri (*Abies spectabilis*), Twak (*Cinnamomum zeylanicum*), Useeram (*Vetiveria zizanioides*), Vaasa (*Litsea chinensis*), Vatsanaabhi (*Aconitum ferox*).

4.18 ASTRINGENT

Aakaarakarabha (*Anacyclus pyrethrum*), Aamalaki (*Emblica officinalis*), Asokatwak (*Saraca ashoka*), Aswattha (*Ficus religiosa*), Daadima (*Punica granatum*), Harithaki (*Terminalia chebula*), Jaatiphala (*Myristica fragrance*), Khadira (*Acacia catechu*), Kushtam (*Saussurea costus*), Lodhra (*Symplocos paniculata*), Raktachandanam (*Pterocarpus santalinus*), Saalmali (*Salmalia malabarica*), Twak (*Cinnamomum zeylanicum*), Vacha (*Acorus calamus*), Vibheethaki (*Terminalia bellerica*).

5. FUTURE STRATEGIES/ PERSPECTIVES FOR INDIAN HERBAL MEDICINE

The existence of traditional medicine depends on plant species diversity and the related knowledge of their use as herbal medicine. In addition both plant species and

traditional knowledge are important to the herbal medicine trade and the pharmaceutical industry whereby plants provide raw materials and the traditional knowledge prerequisite information [20]. Developing countries like India with traditional knowledge base have leadership potential to develop globally acceptable newer opportunities and applications for herbal industry.

Herbal medicines have a strong traditional or conceptual base and the potential to be useful as drugs in terms of safety and effectiveness but they lack an experimental base and therefore have second class status whereas modern medicines have a very strong experimental basis for their use but have side effects. Thus, it seems, to get a new class of drugs, the researchers are increasingly blending the traditional knowledge with modern experimental methodology for testing the efficacy and safety of herbal drugs. This inclination seems to be a result of people all over the world looking to various alternative systems of medicine, especially herbal drugs which are claimed to be safe, equally effective in comparison to allopathic drugs and which provide some answer to chronic diseases. However, these herbal drugs are marketed with exaggerated claims or in some cases are credited with innumerable pharmacological activities which are not mentioned in the text of various traditional systems of medicine.

Medicinal plants are important for pharmacological research and drug development, not only when plant constituents are used directly as therapeutic agents, but also as starting materials for the synthesis of drugs or as models for pharmacologically active compounds [21]. A considerable amount of research on pharmacognosy, chemistry, pharmacology and clinical therapeutics has been carried out on Ayurvedic medicinal plants [22]. Numerous molecules have come out of Ayurvedic experiential base, including Rauwolfia alkaloids for hypertension, psoralens for vitiligo, Holarrhena alkaloids in amoebiasis, guggulsterons as hypolipidemic agents, Mucuna pruriens for Parkinson's disease, piperidines as bioavailability enhancers, baccosides for mental retention, picosides for hepatic protection, phyllanthins as antivirals, curcumines for inflammation, withanolides and many other steroidal lactones and their glycosides as immunomodulators [23].

The plants used in the Indian Systems of Medicine are of interest to find new leads for treating different diseases. Approaches like high-throughput screening, phytochemical profiling, quality controls and standardization of raw

materials and finished products, clinical trials, herbal therapeutics, pharmacokinetics and herbal pharmacovigilance will not only help to prove the rationale of using these systems but also to get maximum benefits of the natural resources [24,25]. Proper methodologies for the research and development, manufacturing and quality control for the formulations in Ayurveda and investigations of therapeutic potentials of plants used in Ayurveda, with the support of scientific methods may help to use these health products with maximum possible efficacy.

References

1. Schilter B, Andersson C, Anton R, Constable A, Kleiner J, Brien JO, Renwick AG, Korver O, Smit F, Walker R (2003) Food Chem Toxicol 41: 1625-1649.
2. Mathur A (2003) Who owns Traditional Knowledge? Working Paper No. 96 In: Indian Council for Research on International Economic Relations, January, p. 1-33.
3. Raskin I, Ribnicky Dm, Komarnytsky S, Poulev A, Borisjuk N, Brinker A, Moreno Da, Ripoll C, Yakoby N, O'neal J, Cornwell T, Pastor I, Fridlender B (2002) Plants and human health in the twenty-first century. In: Trends in Biotechnology, December, vol. 20, no 12 p 522-531.
4. Farnsworth NR, Soejarto DD (1991) Global importance of medicinal plants In: Conservation of medicinal plants, Akrele, O., Heywood, V., Synge, H (Eds), Cambridge University Press, New York, p 29-35.
5. Schippmann U, Leaman DJ, Cunningham AB (2002) Impact of Cultivation and Gathering of medicinal plants on Biodiversity: Global Trends and Issues. In: Biodiversity and the Ecosystem Approach in Agriculture, Forestry and Fisheries. FAO, p 1-21.
6. Anonymous (2002) Demand study for selected medicinal plants Vol. I (a), Ministry of Health and family welfare, Govt. of India, Deptt. of Indian System of Medicine & Homeopathy and WHO, Centre for research, Planning and action, New Delhi.
7. http://www.lholisticonline.com/Herbal-Med/hol_herb-intro.htm.
8. Ramakrishnappa K (2002) Impact of cultivation and gathering of medicinal plants on biodiversity: case studies from India. In: Biodiversity and the Ecosystem Approach in Agriculture, Forestry and Fisheries, FAO, available from Internet: <http://www.fao.org/DOCREP/005/AA021E/AA021e00.htm>.
9. Rotblatt M, Ziment I (2002) Evidence based herbal medicine. Hanley & Belfus, Philadelphia.
10. Pushpangadan P (1995) The role of traditional medicine in primary health care. In: Science for health, State committee for science technology and environment, Thiruvananthapuram, p 24-28.
11. <http://www.healthepic.com/ayurveda/rasayana/chyavanaprasha.htm>
12. Jain SK (1991) Dictionary of Indian folk medicine and ethnobotany, Deep publication, India.
13. <http://ayurveda-foryou.com/trear/rasayana2.html>.
14. Anonymous (2003) The Ayurvedic formulary of India, Part I, Govt. of India, Ministry of health and family welfare, Department of Indian system of medicine and Homeopathy, New Delhi.
15. Nadkarni KM (1976) Indian Materia Medica, Popular

Prakashan, Bombay.

16. Chatterjee A, Prakarashi SC (1991) *Treatise of Indian Medicinal Plants*, Publication and Information Directorate, New Delhi.

17. Anonymous (1985) *The Wealth of India*, Publication and Information Directorate, CSIR, New Delhi.

18. Kirtikar KR, Basu BD (1995) *Indian Medicinal Plants*, International Book Distributors, Dehradun.

19. Chopra RN, Nayar SL, Chopra IC (1956) *Glossary of Indian Medicinal Plants*, National Institute of Science Communication, New Delhi, India.

20. Tabuti JRS, Iye KA, Dhillon SS (2003) *Journal of Ethnopharmacology* 88: 19-44.

21. Mukherjee PK (2003) GMP for Indian Systems of Medicine. In: Mukherjee, PK and Verpoorte R eds. *GMP for Botanicals: Regulatory and Quality Issues on Phytomedicines*. Business Horizons, New Delhi, p 99-112.

22. Patwardhan B, Vaidya ABD, Chorghade M (2004) *Current Science* 86: 789-799.

23. Patwardhan B (2000) *Indian Drugs* 37: 213-227.

24. Mukherjee PK (2003) *Clinical Research and Regulatory Affairs* 20: 249-264.

25. Mukherjee PK (2005) Exploring green resources for drug development through ethnobotany. In: Shrivastava MM, Sanghi R (Eds.), *Chemistry for Green Environment*. Narosa Publishing House, New Delhi, India, p 287-299.

Author Information

Madan Mohan Pandey

Pharmacognosy & Ethnopharmacognosy Division, National Botanical Research Institute, Rana Pratap Marg

Subha Rastogi

Pharmacognosy & Ethnopharmacognosy Division, National Botanical Research Institute, Rana Pratap Marg

Ajay K.S. Rawat

Pharmacognosy & Ethnopharmacognosy Division, National Botanical Research Institute, Rana Pratap Marg