CHAPTER-1

INTRODUCTION
General Introduction
India has vast treasure of herbs in the world. From Kashmir to Kanyakumari India is rich in medicinal plant diversity. All known types of agroclimatic, ecological and edaphic conditions are met within India. The biogeographic position of India is so unique that all known types of ecosystems ranging from coldest place like the Nubra Valley with -57°C, dry cold deserts of Ladakh, temperate and alpine and subtropical regions of the North-West and trans-Himalayas, rain forests with the world’s highest rainfall in Cherapunji in Meghalaya, wet evergreen humid tropics of Western Ghats, arid and semi-arid conditions of Peninsular India, dry desert conditions of Rajasthan and Gujarat to the tidal mangroves of the Sunderban. India is rich in all the three levels of biodiversity—i.e. species diversity, genetic diversity and habitat diversity. There are about 426 biomes representing different habitat diversity that gave rise to one of the richest centers in the world for plant genetic resources. The total number of flowering plant species, though only 17,000, the intraspecific variability found in them, makes it one of the highest in the world. Out of 17,000 plants, the classic systems of medicines like Ayurveda, Siddha and Unani make use of only about 2000 plants in various formulations. The classical traditions were prevalent in the past, particularly in the urban elite society. The rural people who constitute 70 to 75% of the Indian population live in about 5,76,000 villages located in different agroclimatic conditions. The village people have their own diverse systems of health management. While most of the common ailments were managed in the house by home remedies which included many species and condiments such as pepper, ginger, turmeric, coriander, cumins, tamarind, tulsi, etc., more complicated cases were attended by the traditional physicians who use a large number of plants from the ambient vegetations and some products of animal or mineral origin to deal with the local diseases and ailments. These are indeed community-managed systems independent of official or government system and are generally known as Local Health Tradition (LHT). The traditional village physicians of India are using about 4500 to 5000 species of plants for medicinal purpose. There is however no complete systematic inventory and documentation about the folk remedies of India. There is

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urgent need to document this fast disappearing precious knowledge system. The oral traditions of the villagers use about 5000 plants for medicinal purposes.

Medicinal plants as a group comprise approximately 8000 species and account for around 50% of all the higher flowering plant species of India. Millions of rural households use medicinal plants in a self-help mode. Over one and a half million practitioners of the Indian System of Medicine in the oral and codified streams use medicinal plants in preventive, promotive and curative applications. There are estimated to be over 7800 manufacturing units in India. In recent years, the growing demand for herbal product has led to a quantum jump in volume of plant materials traded within and across the countries. An estimate of the EXIM Bank puts the international market of medicinal plants related trade at US$ 60 billion per year growing at the rate of 7% only. Though India has a rich biodiversity, the growing demand is putting a heavy strain on the existing resources. While the demand for medicinal plants is growing, some of them are increasingly being threatened in their natural habitat. For meeting the future needs cultivation of medicinal plant has to be encouraged.

Macro-analysis of the distribution of medicinal plants shows that they are distributed across diverse habitats and landscape elements. Around 70% of India's medicinal plants are found in tropical areas mostly in the various forest types spread across the Western and Eastern Ghats, the Vindhyas, Chotta Nagpur plateau, Aravalis and Himalayas. Although less than 30% of the medicinal plants are found in the temperate and alpine areas and higher altitudes they include species of high medicinal value. Macro study shows that a larger percent of the known medicinal plants occurs in the dry and moist deciduous vegetation, as compared to the evergreen or temperate habitats. Analysis of habits of medicinal plants indicates that they are distributed across various habitats, one third of trees and an equal portion is of shrubs and the remaining one third herbs, grasses and climbers. A very small proportion of the medicinal plants are lower plants like lichens, ferns, algae, etc. Majority of the medicinal plants are higher flowering plants.
Fig. 1: Distribution of medicinal plants by habit

About 90% of medicinal plants used by the industries are collected from the wild. While over 800 species are used in production by industry, less than 20 species of plants are under commercial cultivation. Over 70% of the plant collections involve destructive harvesting because of the use of parts like roots, bark, wood, stem and the whole plant in case of herbs. This poses a definite threat to the genetic stocks and to the diversity of medicinal plants, if biodiversity is not sustainably used.

Fig. 2: Various uses of medicinal plants

Crude drugs are usually the dried parts of medicinal plants (roots, stem wood, bark, leaves, flowers, seeds, fruits, and whole plants etc.) that form the essential raw materials for the production of traditional remedies of Ayurveda, Siddha, Unani,
Homeopathy, Tibetan and other systems of medicine including the folk, ethno or tribal medicines. The crude drugs are also used to obtain therapeutically active chemical constituents by specialized methods of extraction, isolation, fractionation and purification and are used as phytochemicals for the production of modern allopathic medicines or herbal/phytomedicines.

India is one of the 12 mega biodiversity country having vast variety of flora and fauna, commanding 7% of world biodiversity and supports 16 major forest types, varying from alpine pasture in Himalayas to temperate, sub-tropical forest and mangroves in the coastal areas. The recorded forest area has 76.5 million hectare or 23.3% of the total geographical area of the country. However, the actual forest cover is 66.34 million hectare of which 26.13 million are degraded. There is another 5.72 million hectare shrub forest in addition to the reported forest area of 63.34 million hectares. Thus in total 31.85 million hectare of forests in the country are degraded or open. Considering the growing demand for plant based medicine, health products, pharmaceuticals, food supplements, cosmetics, etc. in the national and international markets it is obligatory to grow medicinal plants in the degraded forest areas. It is proposed to identify 200 Medicinal Plant Development Areas (MPDA) which will be known as 'Vanaspiti Van' extending over one million hectare of open forests.

The plants and trees present around us can treat most of the ills of our body. Herbs, fruits, cereals, vegetables and other plant parts are the source, which has good properties to heal our ills. It’s our duty and also necessity to harness the power of these plants in the right way, since to neglect them, is to throw away our grateful treasure. Good health plants have been used for defence, protection and nourishment by human being with the dawn of civilization. The primitive man used the raw materials and raw extracts of the plant to help them in sickness without the knowledge of their composition. With the growth of civilization, the multifarious uses of plant products began to be appreciated and in course of time, their images in different fields have been developed accordingly.

From various experiences it can be said that, herbal medicines are gradually becoming popular day by day. But efficacy of medicinal plants is some times confusing. One lot of a drug may be ineffective, and other lot of same drug may be
effective. This must be related to chemical variability of drugs collected from nature. The cause is not only genotypic but also environmental, agic or phasic.

Reports on qualitative and quantitative variation of medicinal compounds with growth and development as in Scopalia (Gritsaeva et al., 1966), Datura innoxia (Cucu and Paun, 1968), Aloe (McCarthy et al., 1986) Chrysophleum (Shimuzu 1969), Dioscorea (Buchkova and Gerasimenco, 1973), Rhubarb (Trease and Evans, 1985), Urginea (Iha and Sen, 1982) Jasmine (Nofol et al., 1983) Pyrethrum (Singh et al., 1983) Ervatamias sphaerocarpa (Biswas, 1973), Rauwolfia (Sen and Datta, 1986) Azadiractica indica (Sanyal and Datta, 1986), etc. are not enough in consideration of the no of plants used.

In Physoclaiana orientalis (Aslanavo, 1983), proportion of alkaloids differs according to organs and phase. During fruiting the maximum total alkaloids and thyoseyanin occur in whole plants. The maximum scopolamine occurs in the leaves and roots during fruiting and in the stem during budding. The maximum pyrethrin in Crysanthemum occurs at the starting of anthesis (Singh et al., 1983). These facts suggest that selection of a high yielder biomass for industries, is not enough. Scientists have also to suggest a proper phase or age or season for harvesting.

Potentially, every plant occurring on this planet has one or more medicinal properties. An increasing number of investigations have been developing attention to the vast stored knowledge about the properties and uses of plants, still existing in nature and cultures, in several parts of the country. But without paying attention on traditional and ecological aspects between men and his surrounding plants, it is not possible to conserve these plants forever along with their medicinal properties. Exploitation can be sustained through the ecological studies of all species along with their rational uses. Through the conservation of plants, ethno ecology, man can preserve his survival. Like other organisms’ plants or plant communities, germinate, grow, become mature and ultimately die. Majority of life processes i.e., reproduction, growth and yield of plant are governed by various habitat factors such as; climate, physiographic and biotic influences etc. India presents extreme variety in its climatic condition of active principles in them. Vegetation plays a key role in the structural configuration of nature and it can be managed either for physical and recreational

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benefits, they confer; or for productive purposes. Plants exercise a moderating influence on air, water, temperature and other various factors. Besides alternating the physical and chemical properties of soil, they play an important role in checking flood, drought, erosion and vagaries of nature. Several factors such as soil, rainfall, altitudes, light and method of cultivation etc. play a major role for economical success of large-scale cultivation of plants. Numerous activities of man influence the growth and production of plants.

In the present scenario much stress is given to point out the potential of medicinal plants and to explore the possibility of finding and improving new uses of the plant species. It is worthwhile to tap traditional knowledge, while the elderly medicine men, who are familiar with curative values of plants, are still alive. This field has received considerable attention in India as well as abroad. Observation and inferences, accidents and institutions, philosophy and traditions, medications and sliding into deep prolonged thought all seems to have contributed in the birth and growth of Indian system of medicine.

Traditions and culture of India and the world have been given rise by the green and beautiful vegetation that is the plants [“goddess on earth] and in turn the plant is raised by a very tiny creation, the ‘Seed’. High quality of seed is an actual necessity because seed is the major means of propagation of most of the plant species. From healthy parent tree, quality seeds with desired characteristics are obtained. These seeds with proper environmental condition give rise to healthy plant. The seed comprises the hidden blue print of the life of a plant. The seed is the most important agricultural input. It is the basic unit for distribution and maintenance of plant populations. It carries the genetic potential of the crop plant, determining the upper limit on yield.

Seed is the greatest miracle ever created by nature. In this small structure of only few milligrams in weight, an admirable program for the creation of huge tree weighing several tons is stored. A seed represents two generations, the one in which it is born and the other is to which it will give rise. Seed is the start and seed is the end of the life of a plant what takes in between is a biochemical mystery, the seed is neither the start nor the end in the life of a plant but it is a resting phase.
Medicinal plants of India have drawn attention of the scientists from all over the world. We can observe that various drugs have accidentally came into existence through the work of travelers and explorers then further evaluation of these drugs as made by Chemist, Botanist and Ethnobotanist in their own research to find out new drugs. The pharmacological action of the herbal plants have been described in Ayurvedic system of medicine according to their properties and action in terms of “Rasa, Guna, Veerya, Vipaka and Prabhava and their effect on Dosha, Dhatu, Mala, Agni, Ama, Ojas etc.

However it is not understood by scientists to elucidate the mode of action of these terms on scientific parameters (Tripathi et al., 1984).

Medicinal plants have always been part of man’s life on earth and there is a close relationship between plants and human beings. Man depends on plants for his existence and relation must be sustainable. Herbs have saved man’s life on innumerable occasions and for this reason their over use concern everyone. The plant required for these industries are mostly harvested from the wild. With this increasing harvesting pressure, the plant supplies will, in time, dwindle and eventually become extinct. To ensure that medicinal plants are sustainably available and hence we must learn to grow them for our needs.

Much modern-day medicine is directly or indirectly derived from plant sources, so it would be feeblish to conclude that plants offer no further potential for the treatment or cure of major diseases. Worldwide, the botanical pharmacopoeia contains tens of thousands of plants used for medicinal purposes. Hundreds, perhaps thousand of definitive texts, monographs, and tomes on herbal remedies exist but most of this information is outside current databases and remains unavailable to physicians, researchers, and consumers.

The demand for the plant-derived drugs by the population seems to increase, as the scepticism against synthetic drugs and their side effect grows. It is true that for acute ailment, there is no crude drug to offer an equivalent alternative to chemically defined drugs. However, with no harmful side effects, plant preparations are often considered useful for the treatment of less serious diseases, for the supportive treatment of chronic diseases over long periods of time and for possible prophylactic
medication. Thus medicinal plants continue to receive attention of scientists for their chemical, pharmacological and clinical investigation in India and abroad. Besides these the studies on folk medicines through ethanobotanical survey are gaining importance in present day researches as these reveal new biodynamic compound of therapeutic value. Procurement, cultivation, regeneration and import/export of medicinal plants used in indigenous systems of medicine are yet another aspect of current scientific importance as pharmaceutical industry depends on it for raw materials.

The objective of the present work is to study some medicinal plants in relation to ecophysiological conditions and their relationship with phytochemical active principles, which will enhance the medicinal property there by higher economic return. Ecophysiology involves both the descriptive study of the responses of organisms to ambient conditions and causal analysis of the corresponding ecologically dependent physiological mechanism, at every level of organization. The ecophysiological approach must take into account polymorphism in individual responses, which are largely responsible for the adaptive capacity of any given population. In this respect, ecophysiological study yields information, which is fundamental for an understanding of the mechanisms underlying adaptive strategies. (Ebbs, 2005)

The physical factors, the atmosphere, the climate and the soil affect the physiological functions of the plant in all its manifestation so that, to a large degree, plant ecology is a phase of plant physiology under the natural and uncontrolled condition. In fact it has been called “outdoor physiology. Plants are intensely sensitive to the forces of environment and largely the character of climate and soil determines both their association into communities and their geographical distribution. More over, the pressures of the climate and of organisms upon each other are potent forces, which lead to the creation of new species and continuing evolution of large groups.

In view of the above-mentioned background the present work has been focused mainly on the ecophysiology, seed germination and phytochemistry of medicinally important plants i.e. C. paniculata, W. somnifera, A. calamus, C. aromatic on the following lines.

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1. (a) Selection of native study sites.
   (b) Field survey for collection of plants, seeds and propagule.
2. (a) Methods for raising the plants.
   (b) Best Soil for the growth of plants.
   (c) Determination of growth behaviour in response to certain treatment.
3. Seed viability, seed production, and seed dormancy and germination studies under different condition.
4. Phytochemical studies on proposed plant species was done to ascertain the active chemical principles present in them by standard phytochemical method.
Review of Literature
MEDICINAL herbs are moving from fringe to mainstream use with a greater number of people seeking remedies and health approaches free from side effects caused by synthetic chemicals. Recently, considerable attention has been paid to utilize eco-friendly and bio-friendly plant-based products for the prevention and cure of different human diseases. Considering the adverse effects of synthetic drugs (Gijtenbeek et al., 1999 & Johnson et al., 2002) the western population is looking for natural remedies, which are safe and effective. It is documented that 80% of the world’s population has faith in traditional medicine, particularly plant drugs for their primary healthcare.

India is sitting on a gold mine of well-recorded and traditionally well-practiced knowledge of herbal medicine. This country is perhaps the largest producer of medicinal herbs and is rightly called the botanical garden of the world. There are very few medicinal herbs of commercial importance, which are not found in this country. India officially recognizes over 3000 plants for their medicinal value (Tewari, 2000). It is generally estimated that over 6000 plants in India are in use in traditional, folk and herbal medicine, representing about 75% of the medicinal needs of the Third World countries (Rajshekharan, 2002). Three of the ten most widely selling herbal medicines in the developed countries, namely preparations of *Allium sativum, Aloe barbedensis* and *Panax* species are available in India. There are about 7000 firms manufacturing traditional medicines with or without standardization.

Medicinal herbs have been in use in one form or another, under indigenous systems of medicine like Ayurveda, Sidha and Unani. India, with its traditional background, needs to increase its share in the world market. But unlike China, India has not been able to capitalize on this herbal wealth by promoting its use in the developed world, despite their renewed interest in herbal medicines. This can be achieved by judicious product identification based on diseases prevalent in the developed world for which no medicine or palliative therapy is available. Such herbal medicines will find speedy access into those countries.

Undoubtedly, the plant kingdom still holds many species of plants containing substances of medicinal value, which have yet to be discovered. India is a land of
immense biodiversity in which two out of thirty four hot spots of the world are located. India is also one of the twelve mega-biodiversity countries in the world. The total number of plant species of all groups recorded from India is 45,000 (the total number may be even close to 60,000, as several parts of India are yet to be botanically explored). Of these, seed bearing plants account for nearly 15,000–18,000. India enjoys the benefits of varied climate, from alpine in the Himalaya to tropical wet in the south and arid in Rajasthan. Such climatic conditions have given rise to rich and varied flora in the Indian subcontinent.

In order to promote Indian herbal drugs, there is an urgent need to evaluate the therapeutic potentials of the drugs as per WHO guidelines (WHO, 2000). Ironically, not many Indian products are available in standardized form, which is the minimum requirement for introducing a product in the western market.

Plant resources are invaluable assets and socioeconomic heritage of our country. Central India is particularly rich in these resources, which include thousands of species of various categories viz. trees, shrubs and herbs. Medicinal plants constitute an important category and form an integral part of the rural and urban lifestyle. For betterment of health, medicine and rural economy medicinal plants become irreplaceable.

Ancient Indian literature incorporates remarkably a broad definition of medicinal plants and considers "all plant entities to be potential source of medicinal substances", while all plant entities are thus potentially medicinal at a practical level, only those plants are considered ‘medicinal’ whose medicinal uses has already been discovered for human and veterinary application. Such an application could either be in the western bio-medical system or homeopathy or any of the traditional system of medicine like Ayurveda, Unani and Siddha or the rich and diverse folk medical traditions, which are eco-system and ethnic community specific.

Most folk medicine, throughout history’s different civilizations, has been derived from plants. It is probably those human beings, as soon as they reached the stage of reasoning, discovered, by the process of trial and error, which plants might be used as foods, which of them were poisonous and which had medicinal value. Over 4000 years ago, Chinese emperor Chi en nung compiled a book of medicinal plants,
called ‘Pen Tsao Ching’ which contained descriptions of more than three hundred plants, several of which are still used in medicines. As early as the Warring states period (475-221 BC) herbal medicine begins to develop as an independent branch of Chinese medical science.

Ansile (1813) wrote “Materia Medica of Hindustan.” Several drugs being used in modern medicine have figured in ancient manuscripts such as the Rigved. Over 6000 years ago, the ancient Chinese were the first to use the natural vegetation as medicine.

The first great Indian physician known, Charaka, who practiced about 1000 BC, recorded some five hundred medicinal plants, and Sushruta, another famous Indian physician, recorded 760 medicinal plants in the 5th century AD. The Greeks and Romans like Hippocrates (460-370), Aristotle (380-322BC) and Theophrastus (370-287BC) wrote extensively about medicinal herbs, giving their names, putative healing properties and also complex descriptions for the interpretation of medicines.

In the middle ages, Islamic scholars made a great contribution to the study of Botany and, in particular, of medicinal plants, and Al Dinwani’s six-volume “Book of plants” compiled in the 9th century, was considered to be of outstanding importance. It combined a philological, historical and botanical approach to the study of plants, the medicinal properties of which he detailed. Another Islamic scholar, Al Biruni (973-1048), listed in his “book of drugs” some 850 drugs of every conceivable origin, giving their names in several languages. Avicenna, the great Islamic physician, philosopher and scientist produced his treatise on cardiac drugs in the 11th century, in which the evaluation of many of the sixty four drugs mentioned; based on medicinal plants, closely resemble the assessment made by modern scientists.

The study of medicinal plants is as old as human civilization. The most important documentation of Indian Medicinal plant is by Kritikar and Basu (1918), showed the properties of different types of medicinal plants. During the last century lots of work has been done in the field of medicinal plants resulted in the discovery of various chemical constituents. “The Wealth of India Raw Material” was published by CSIR in 1948 and 1966 by eminent Indian authors. Chopra et al. (1956) has made a very valuable contribution to the knowledge of Indian medicinal plants. Kurup et al.
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(1979) through the “Hand book of medicinal plants” has described the distribution, parts used and the doses of herbal drugs supported by beautiful colored photographs. Raffauf and Robert (1970) have written ‘A hand Book of alkaloids and alkaloids-containing plants’. In the catalogue of Medicinal Plants Exhibit, Bal (1984) has described the uses of some important medicinal plants of Central India, their distribution, and medicinal uses are included in ‘Drug Plant Resources of Central India’ by Shrivastava (1998).

“Compendium of Indian medicinal plants” (1960) by Rastogi and Mehrotra revised in 1991-2002 in five volumes has been published by CSIR India, including 500 medicinal plants mention with their chemical constituents. Thakur et al. (1989) has reported 143 major medicinal plants of India with their chemical constituents. Mamgain et al. (1998) has reported distribution, medicinal properties, uses and conservation assessment of ten medicinal plants species, exploited indiscriminately.

Raychaudhri (1995) described about 161 medicinal plants of significance in India, their production and utilization on sustainable basis will help not only our national interest but the tribal and rural India will be much benefited. Northeastern region of India is very rich in forest resources and is considered as a major center for plant diversity. Study of some important food plant and medicinal plants and their conservation is described by Biswas (1997).

A recent communication by Das and Padhye (1997) question the identity of Amanita with soma. They came across a shloka in “Manusmruti” which relates to the vegetables prohibited as human food. Das (1997) has reported some rarely known plants of medicinal uses among the tribes of Arunachal Pradesh. Vedprakash (1998) has reported the current status of knowledge on Indian medicinal plants in relation to their use in Ayurveda, ethnomedicine and modern medicine and also on the efforts of researchers towards the development of modern medicine.

Sivarajan & Balachandra (1994) have introduced Ayurvedic applications of a large number of medicinal plants. Bhakuni (1997) discussed on research, development aspects of aromatic and medicinal plants. Tiwari et al. (1998), mentioned in their edition about rare medicinal plants their cultivation and conservation. Shrivastava et al. (1999) reported his research work on ‘conservation
strategies of medicinal plants of Madhya Pradesh’. Research and survey work pertaining to medicinal plants were carried out by State Forest Research Institute (SFRI) Jabalpur (MP) and published in the institute’s publication- “Vaniki Sandesh” and “Technical Bulletins”. Handa had written on varied aspects of medicinal plants including their distribution, cultivation, trade, therapeutics, cytology and biochemistry.

A list of 39 medicinal plants species have presented with their flowering time, frequency and local uses by Banerjee (1999a). An account of 33 tree species belonging to 23 families has been presented along with their medicinal and other uses by Banerjee (1999b). The glossary of Indian medicinal plant by Chopra et al. (1999) showed the distribution and properties of different medicinal plants.

Bhattacharjee (2000) has described nomenclature, distribution, cultivation, processing and chemical properties of 560 medicinal plants from all over the world. Maheshwari (2000) has compiled a number of research reports on ethnobotanical studies on folklore medicinal plants of Indian subcontinent. Herbal medicine standardization, are discussed by Kamboj (2000). Medicinal plants of India, their distribution, resources and ethnobotanical uses have been given by Joshi (2000). Three volumes of ‘A Lexicon of Medicinal plants of India’ published by Bakshi et al. (1999-2001), provides information about a large number of medicinal plants with their uses, distribution and chemical properties. ‘Medicinal Plants and Raw Drugs of India’ (Kaushik & Dhiman, 2000) covers more than 300 medicinal plants with their therapeutic uses. ‘Ethnobotanical Wisdom of Gaddi Tribe in Western Himalaya’ has been described by Singh & Kumar (2000).

Anil Kumar (2001) has listed threatened medicinal plants of Bihar with suggestions to their conservation. A very useful contribution has been made on ‘India’s Threatened Wild Life and Medicinal Plants’ by Chaudhuri & Sarkar (2002). Very recently Singh & Prakash (2003) have introduced about the indigenous knowledge of useful threatened plant species, ethnic diversity of tribes of the states of Uttar Pradesh and Uttarakhand through Indian Medical Science Series No.131 entitled ‘Tribal Wisdom on Medicinal and Economic plants’. Medicinal plants used in biological systems are mentioned in ‘Medical Botany’ (Lewis & Lewis, 2003).

Bhagwat et al. (2004) studied the roots of *Withania somnifera* and regarded it as tonic, restorative, aphrodisiac and antitumour. Use of Ashwagandha to relieve cataract blindness through natural antioxidant is well known (Thiagarajan and Venu et al., 2004). Marongiu et al. (2005) studied on chemical composition of the essential oil supercritical CO$_2$ extract of *Commiphora myrrha* and *Acorus calamus*. Shukla et al. (2005) worked on isolation of poly (A) mRNA for downstream reaction from some medicinal and aromatic plants. Anwar et al. (2005) studied on effect of organic manures and inorganic fertilizers on growth, herb and oil yield, nutrient accumulation and oil quality of French basil. Jain et al. (2006) had studied the hypoglycemic activity of *W. somnifera, Allium sativum, Gymnema sylvestris, Ferula Foetida* and *Murraya koenigii*. The extracts of these plants were studied on experimental model of type-1 diabetes.

Jigna et al. (2006) made an attempt to carry out screening for the preliminary antibacterial activity of different plants used in Indian folk medicine. The aim of the study was to select an active plant extract, which may be useful in developing new lead compounds to combat deadly diseases. Schippman et al. (2006) gave the method for cultivation and wild collection of medicinal and aromatic plants under sustainability aspects. Nadkarni (2006) published his book ‘Indian Plants and Drugs: With their Medicinal Properties and Uses’ with the aim and object to serve not only the professional medical men in India but also the non-professional educated public in general.

The World Health Organization (WHO) has also entered in to publication of ‘Monographs on Selected Medicinal plants’. It contains standard for quality of drugs together with a therapeutic section; several more monographs are due for publication. The United States Pharmacopoeia (USP) is also producing herbal monographs. Pharmacogonosony titles are a computer abstract coverage of phytochemical research publications up to 1974 (10 volumes) produced under the direction of N. Fransworth, University of Illinois. Subsequently, Fransworth introduced NAPRALERT, a natural
product Database that is mainly, a collection of pharmacognostic information. Among other useful database having a relevance to pharmacognosy and published on the web are MEDLINE, compiled by the US National Library of Medicine and EMBASE, produced by Excerpta Medica.

Some journals, for example, Planta Medica, Journal of Ethnopharmacology, Phytochemistry and Journal of natural products, periodically contain reviews on some aspect of medicinal plants. Other periodical publications are devoted to reviews on some aspects of plant constituents and are useful for updating; often the reviews cover only the advances in particular field over the previous volume. Examples are Natural Product Reports (six issue per year) and Alkaloids (Academic Press). Now available to western scientists interested in oriental medicine is the quarterly journal Abstract of Chinese Medicine, published by the Chinese University of Hong Kong. The abstracts of this journal are available in English, which are not readily available outside china.


NISCOM (National Institute of Science Communication) provides bibliographic details, number of references and an informative abstract on cultivation, chemical constituents, and pharmacological investigations on medicinal plants in each issue of MAPA (Medicinal & Aromatic Plants Abstract), which it started in 1979, and published still today.

Indian Council of Forestry Research and Education (ICFRE) have brought out two special issues of Indian Forester (2003) on Indian Medicinal & Aromatic plants Volumes I & II.

All System of Medicine in India function through 2 social streams: -

Folk streams: comprising mostly the oral traditions practiced by the rural villages. The carriers of these traditions are millions of housewives; thousands of
traditional birth attendants, bone sellers, village practitioners skilled in acupressure, eye treatments, treatment of snakebites and the traditional village physicians/herbal healers, the ‘Vaidyas’ or ‘the tribal physicians’. These streams of inherited traditions are together known as Local Health Traditions (LHT). LHT represent an autonomous community supported health care system; but its full potential is still not fully utilized and also that the great service it is rendering to the rural people go largely unnoticed because of the dominant western medicine.

Classical Streams: At the second level of traditional health care system is the scientific or classical system of medicine. This comprises of the codified and organized medicinal wisdom with sophisticated theoretical foundations and philosophical explanations expressed in classical text like ‘Charaka Samhita’ and Sushruta Samhita, hundreds of other treaties including some in the regional languages covering treatise of all branches of medicine and surgery. Systems like Ayurveda, Siddha, Unani, Amchi and Tibetan etc. are expression of the same. Ayurveda was taught in the ancient Universities in India and evolved, developed and flourished mostly among the urban centers and thus used to be a refined system of medicine.

Major system of herbal medicine

Ayurveda (Science of Life)

Ayurveda is one of the most ancient medical systems where the concept of specialization originated. Be it in surgery, internal medicine or psychiatry, they all evolved in Ayurveda before anywhere else in the world. This system, also called the mother of medicines, focuses not only on eliminating the disease but also on providing a holistic cure, propounding total well-being. The origin of Ayurveda has been lost in prehistoric antiquity, but their characteristic concepts appear to have been nurtured between 2500 and 500BC in India (Mukherjee, 2001).

Ayurveda is an offshoot of Atharvaveda written over 3000 years ago. The Charak and Sushruta describe a large number of crude drugs and large part of them has their origin to plants. However, some part of it has been translated from Sanskrit to Japanese and the Japan society of Ayurveda under Dr. Namba is very active in this field, but many of the crude drugs described remain to be identified to its plant source in botanical terms and the Institute of Traditional Medicine is the prime center for

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understanding the nature and morphology of crude drugs of Ayurvedic origin and their identification to the plant level.

Ayurveda is based on the experiences as if experimented. After full development of Ayurveda, it has branched into 8 wings, which are called Astanga Ayurveda as follows.

- Kaya chikitsa (medicine)
- Salya chikitsa (surgery)
- Bala chikitsa (pediatric treatment)
- Jara chikitsa (ENT treatment)
- Rasayan chikitsa (Treatment with chemical)
- Vajikarama chikitsa (Treatment with rejuvenation and aphrodisiacs)
- Graham chikitsa (Planetary effects)
- Visha chikitsa (Toxicology)

The basic philosophy of Ayurveda considers that man is inseparable part of the universe. The human body, mind and spirit continuum is an integral whole and the individual is also linked to the family, society, environment and ultimately the Universe. The definition of health is that “it is a state of complete psychosomatic equilibrium”. It does not mean only absence of disease but a state in which the mind, sense and spirit are pleasant and active. This agrees with the definition propounded by W.H.O, according to which “health is a state of complete physical, mental and social well being and not merely the absence of disease or infirmity”.

Ayurvedic medicine is an example of a well-organized system of traditional health care, both preventive and curative, that has a long tradition behind it (originating in India 3000 years ago) and which is widely practiced in India and other parts of Asia. It is not only a system of medicine in the conventional sense of curing disease but also a way of life that teaches how to maintain and protect good health. The ancient Ayurvedic medical Shastras (manuals), written or engraved on palm leaves and pieces of bamboo wood have been handed down from generation to generation. There is an estimated 400,000 practitioners of Ayurveda as well as over two hundred Ayurvedic hospitals are working in rural areas, providing health care to at least 500 million in India alone.

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The Brihatrayee Ratna Award, India’s most prestigious honour for outstanding work done in the field of Ayurveda, was established in 1994, and a ten-member jury of eminent Ayurvedic Specialists selects the winner each year.

**Siddha system of medicine**

The term Siddha comes from ‘siddhi’—means attainment of perfection. This system is almost akin to Ayurveda. It is an ancient traditional system of medicine developed by 18 Siddhars who glorified human beings as the highest form of birth and believed that to preserve human body it is essential to achieve eternal bliss (Pillai, 1998).

Siddha system believes that things in the universe are made up of basic elements—earth, water, fire, air and space, which constitute the human body and other worldly substances. This system describes 96 principal constituents of human beings, which include physical, physiological, moral and intellectual components of individual. When there is any imbalance or slight deviation with these 96 units, diseases occur. The diagnostic methodology in Siddha system is eight-fold including examination of pulse, tongue, complexion, speech, palpatory findings etc. The Siddha medicine consists of psychosomatic system where attention is given to metals rather than plant constituents.

There is extensive reference to Siddha in ancient Tamil literature—Thirukural and Tamil grammar work—Tholkappiam, which is pointer to its period of origin. There are similarities between Siddha and Ayurveda in their basic principles. The Siddha system also believes that everything in the world and universe around it are made up of five basic elements—earth, water, fire, air and space. Like Ayurveda, which is completely based on the theory of Panchambhuta, Siddha also explains the elements that constitute the human body and other worldly substance as Panchaboothas panjeekaranam (Mukherjee, 2001).

According to Siddha system, man is not merely a composite of bones, muscles, tissues, etc but there exists a close nexus between man and nature. Siddha system believes in five-element theory revolving earth, water heat, air and ether of external world and internal man as fundamental principles for creation, preservation and destruction (Thirunavukarasu et al., 1990).
There are always a complete interplay and minerals in Siddha system. The use of metals and minerals form an integral part of Siddha system of therapy to cure diseases. According to Siddha practitioners, the conceptual framework is that every organ in the body is essentially made up of particular elements. For example, if liver is not functioning well, it is believed that the concentration of those particular minerals/metals elements in liver is low resulting in dysfunction, if that particular metallic element is rich and targeted against the liver; it seems to correct the dysfunction of the liver. All the metals and minerals used in Siddha system are completely in a detoxified state as per the method known as “Shodhana”. During this process the metal molecules are rendered non-toxic. Further, on boiling with several herbs and animal products, the inorganic metal is converted into organic compound.

Traditional Chinese system of medicine

The earliest known document of Chinese traditional medicine is the Nei ching, written in the 3rd century BC ascribed to the yellow emperor, Huang ti, which describes interalia, the human anatomy including the circulation of the blood. The earliest concepts of Indian medicine are set out in the sacred writing called the Vedas and probably date as far back as the second millennium BC. The first two great Indian physician, Charaka (circa 1000BC) and Sushruta (5th century AD) both wrote encyclopedic medical treatises called Samhitas, Charaka’s work, which has survived to our time, has been described in the following terms [it] stands as the finest [medical] document of the creative period of the last centuries before the beginning of our era, both in regard to the extent of its contents and to its state of preservation.

Traditional medicine continues to be an important part of health care in many developing countries and various “alternative” or complementary therapies enjoy a widespread following in developed countries. Traditional medicine has not however, been incorporated into most national health systems, and the potential of services provided by traditional practitioners is far from being fully utilized. There is a continuing need for better assessment of the benefits of alternative forms of medicine including traditional ones.”
Traditional Chinese medical system has been using various plants and herbs since time immemorial. More than five thousand varieties of medicinal herbs have now been catalogued in China, and their use, in conjunction with western medical techniques, helps China to reduce its expenditure on synthetic drugs. Responsible for the adaptive capacity of any given population in this respect, ecophysiological study yields information which is fundamental for an understanding of the mechanisms underlying adaptive strategies.