Ethnobotany is the study of the interaction and relationship between plants and people. This includes the use, knowledge, belief, management system, classification system and language that both modern and traditional cultures have for plants and their associated terrestrial and aquatic ecosystems.

Medicinal plants are potential source of therapeutic drugs and play a central role in the healthcare system throughout world. The health care system of majority of the population in the developing world is still dependent on the surrounding vegetation. They rely on medicinal plants because of their effectiveness, cultural preferences and lack of modern health care alternatives (Sinha, 1996). Therefore, the ethnobotanical knowledge of people and listing of plants of a particular region are important tools that might help in the understanding of human-environment interactions. The richness of plant diversity in any area is not evaluated merely by the number of species occurring there, but by the intensity, and dependence of the indigenous communities on that wealth.

Traditional medicine is a comprehensive term used to refer two systems such as organized systems (i.e., traditional Chinese medicine, Indian Ayurveda and Siddha and Arabic Unani medicine) and various forms of unorganized medicinal practices (i.e., indigenous, folk or tribal medicine). Traditional medicine is often termed as complementary, alternative or non-conventional medicine. Tradition is defined as the belief, opinion, custom or knowledge passed down from ancestors to posterity.

**Historical account of traditional system of medicine**

Traditional medicine comprises medical knowledge systems that were developed over centuries within various societies before the era of modern medicine. Traditional
medicines that include Ayurvedic, Egyptian, Roman, Unani, Ancient Iranian, Siddha, Arabic and traditional Chinese medicine, acupuncture, and other medical systems and practices all over the globe were developed from various cultures. The indigenous systems of medicine, viz., Ayurveda, Siddha, Unani and Homeopathy are dependent on medicinal plants.

In the ancient period, Indian saints handled plants and herbs for long life with better health and lived for more than thousand years. Since the number of people preferring natural health remedies and herbal health remedies are increasing day by day, Indian medical systems like Ayurveda is gaining popularity all over the world.

**Ayurvedic system of medicine**

Ayurvedic medicine is more than 5,000 year-old comprehensive system of medicine based on a holistic approach rooted in Vedic culture (Patwardhan, 2000). Ayurveda literally means the 'science of life'. It forms part of the ancient Indian text 'Athravaveda'. Ayurveda is based on the interdependence of man and nature. Ayurveda was developed against the rich background of social, cultural, and philosophical principles prevailing in India between 600 B.C. and 700 A.D. The famous treatises of Ayurveda, 'Charaka Samhita' by sage 'Charaka', detail the prevention and treatment of disease and 'Sushruta Samhita' of sage 'Sushruta' deals with Ayurvedic surgical procedures. The Charaka Samhita is an ancient Indian Ayurvedic text on internal medicine and describes about 350 plants and their medicinal uses. Sushruta Samhita contains 184 chapters with description of 1120 illnesses, 700 medicinal plants, 64 preparations from mineral sources and 57 preparations based on animal sources. Sushruta Samhita is devoted to surgery, medicine, pathology, anatomy, ophthalmology and hygiene. Ayurveda stresses a balance of three substances: wind/spirit/air, phlegm and bile, each representing a divine force. The main concept of Ayurvedic medicine is the
theory that health exists when there is a harmony among the three fundamental bodily humours or doshas known as ‘Vata, Pitta and Kapha’.

Ayurvedic medicine, one of the oldest systems of medicine in the world, is still being used by millions of people in India, Nepal, and Sri Lanka and increasingly, of late, in the western countries. Ayurveda is now a recognized medical system of healthcare like other medical systems existing in India. Some of the legendary figures devoted to the development of Ayurveda were Atreya, Charaka, Sushruta, Vaghbhatt, Nagarjuna and others.

**Siddha system of Medicine**

Siddha system of medicine is considered as the oldest among the traditional Indian medical systems. According to Siddha experts, in the usage of metals, minerals and other chemicals, this system is far more advanced than Ayurveda. Herbal and animal products as well as inorganic substances are being used as drugs in Siddha system. This system was developed and popularized by 18 Siddhars. These Siddhars or Siddhas (founder fathers of Siddha system of medicine) were spiritual scientists of Tamil land who lived between 1000 BC and 500 AD. They had their own teams and traveled from villages to villages treating the physical ailments of people for free. Siddhars classified diseases in different topics and described a total of 4448 diseases in the human body (Haddad *et al.*, 1998). More and more herbal preparations were predicted by different Siddhars depending on the kind of herbals used. Siddha system of science is the most effective, valuable system for human beings on all occasions without any side-effects. Siddha system believes that all objects in the universe including human body are composed of five basic primordial elements, namely earth, water, fire, air and space. The Siddhars documented their knowledge in tamil on palm leaf manuscripts, fragments of which were found in different parts of South India. From these manuscripts, the Siddha
system of medicine developed into a part of Indian medical science. The Siddha system was documented in about 800 texts, of which 180 are in print. Generally, the basic concepts of the Siddha medicine are almost similar to Ayurveda. The only difference in the Siddha medicine being the predominance of vatham, pitham and kapam in childhood, adulthood and old age, respectively. In Ayurveda, it is totally reversed i.e. kapam is dominant in childhood, vatham in old age and pitham in adults.

Tibetan system of medicine

Tibetan medical practices could be traced back to 2,500 years. Tibetan medicine is one of the renowned historical medical systems of mankind. Tibetan medicine is a century-old traditional medical system that employs a complex approach to diagnosis, incorporating techniques such as pulse and urine analysis, and utilizes behavior and dietary modification, and medicines consisted of natural materials (i.e., herbs and minerals) and physical therapies (i.e., Tibetan acupuncture and moxabustion) to treat the illness. Ayurveda has contributed to a great deal in enriching Tibetan medicine. The Tibetan medical system is based upon a synthesis of the Indian (Ayurveda), Persian (Unani), Greek, indigenous Tibetan, and Chinese medical systems, and it continues to be practiced in Tibet, India, Nepal, Bhutan, Siberia, China and Mongolia, as well as, more recently in parts of Europe and North America (Sinha and Sinha, 2001). It embraces the traditional Buddhist belief that all illness ultimately results from the "three poisons" of the mind: ignorance, attachment and aversion. The treatise of Tibetan medicine is called 'Chzud-shi', which can be described as a manual compiled over thousands of years. In addition to the medical theory, this manual also incorporates the Tibetan pharmacopoeia.

Unani system of medicine

The term Unani is derived from 'Unan', which means 'Greece' in Arabic and Urdu. The Unani system was born in Greece, developed in European and Arabian countries,
and now spread in countries such as India, Pakistan, Bangladesh and Sri Lanka (Al-Qura’n, 2008). In India, the Unani system of medicine was introduced by the Arabs. It soon got acceptance by masses due to its efficacy and non-toxicity of the drugs. The Unani system of Medicine bases itself on the teachings of Hippocrates (460-377 BC), the father of medicine, and his disciple Galen (131-210 AD). Later, eminent personalities like Zakarya Razes (850-925 AD) and Avicenna (980-1037 AD) developed this system. Since these physicians worked and rendered their services purely on humanitarian ground for the ailing humanity, they secured all their knowledge and experience in books for their successors.

The Unani medicine was based on the principles that disease is a natural process, and that its symptoms were the reactions of the body. It advocated that the chief function of a physician is to aid the natural forces of the body in combating the disease. In Unani, diseases are mainly diagnosed with the help of pulse, and physical examination of the urine and stool. The development of the Unani as well as the other Indian systems of medicine gained momentum after India became independent.

**Traditional Chinese medicine**

The roots of traditional Chinese medicine dates back to more than 2000 years. The idea of this system arose between 200 BC and 100 AD and the information about medical practices was recorded in the book “Yellow Emperor’s Classic of Internal Medicine” (Prajapathi et al., 2003). Traditional Chinese medicine includes a range of traditional medical practices originating in China. Although well accepted in the mainstream of medical care throughout East Asia, it is considered as an alternative medical system in much of the western world. This system claims to be rooted in the meticulous observation of nature, cosmos, and human body, and to be thousands of years
old. Traditional Chinese medicine practices include herbal medicine, acupuncture, dietary therapy and massage.

The ancient Chinese proposed that every living thing is sustained by a balance of two opposing forces of energy called Yin and Yang. Together, they make up the life essence, or Qi - a type of energy that flows through the body via invisible channels called meridians. Half of certain organs and meridians are governed by Yin and the other half by Yang. When Yin and Yang are out of balance in the body, this causes a blockage of Qi and a subsequent illness. Yin and Yang imbalances could be caused by stress, pollution, poor diet, emotional upsets or infection. The balances of these two opposing forces meant good health.

**Homeopathy system of medicine**

The theory of homeopathy was developed by the German physician Samuel Hahnemann (1755–1843) and first published in 1796. Homeopathy is a form of alternative medicine that treat patients with heavily diluted preparations which are thought to cause effects similar to the symptoms presented. Homeopathy achieved its greatest popularity in the nineteenth century (Sinha and Sinha, 2001). Homeopathy is developed on the principle that “a substance which will create the symptoms of a disease in a healthy person will actually cure the symptoms of the disease in a sick person”. Hahnemann called this principle "similia similibus curentur" or "let like be cured by like".

Homeopathy is particularly popular in France, England, Germany, Greece, India, Pakistan, Brazil, Argentina, Mexico and South Africa. This medical system that was developed in Germany more than 200 years ago is being practiced in the United States since the early nineteenth century. Market research showed that the sale of homeopathic medicines has grown at the rate of 25-50% per year during the past ten years. The
remedies used in homeopathy are mostly derived from angiosperms, though some conifers and ferns as well as fungi, including lichens, brown and red algae are also used.

**Development of ethnobotanical study**

The scope of ethnobotany has greatly enlarged both in terms of its theoretical contributions to an understanding of plant-human relationship, as well as the practical application(s) of the biological knowledge of tribal / ethnic people in medicine, agriculture, health and industry.

In the earlier days, many explorers and adventurers observed and documented much information about plants and their uses from various aboriginal societies of different regions of the world. They contributed immensely to the growth and development of ethnobotany. In 1492, Christopher Columbus discovered tobacco in Cuba during his famous voyage. In 1542, Leonhart Fuchs catalogued 400 plant species native to Germany and Austria. John Josselyn, an European naturalist, spent eight years in observing the use of herbs by native Indians of New England and published the book "New England's Rarities Discovered" in 1672. John Ray (1686-1704) provided the first definition of "species" in his "Historia Plantarum": In 1753, Carl Linnaeus wrote "Species Plantarum", which included information of 5,900 plants. William Withering (1741-1799) documented and investigated the use of *Digitalis purpurea* for curing dropsy by folk people of England. He published his conclusions in ‘*An account of the foxglove and some of its medicinal uses: with practical remarks on dropsy and other diseases*’. Later, two active compounds called digitoxin and digitalin known as cardiac glycosides were isolated form *Digitalis purpurea* (Cotton, 1997). In 1770, Captain Cook collected the detailed information about plants and their uses by Australian aborigines.

Nineteenth century saw the peak of botanical exploration. During this period, major botanical gardens were started, for instance, Kew Gardens of London. Richard
Spruce, a scientist and naturalist explored much of the Rio Negro and its tributaries between 1851 and 1854 and described the ritual use of a number of psycho-active plants in England. Edward Palmer, an American botanist published the systematically collected data in his book ‘Food products of the North American Indian’ in 1870. He also collected artifacts and botanical specimens from people in the North American West (Great Basin) and Mexico from 1860 to 1890. In 1873, Stephen Powers introduced the term ‘aboriginal botany’ to describe the botanical investigations of the native plant use. This term was readily accepted by the academic community over the next 25 years.

The term "ethnobotany" was first coined by the US botanist John William Harshberger in 1895, to indicate ‘plants used by the aborigines’. Leopold Glueck, a German physician, published his work on traditional medical uses of plants by rural people in Bosnia (1896) which was considered the first modern ethnobotanical work. In 1900, the first thesis in ethnobotany “The ethnobotany of the Coahuilla Indians of Southern California” by David Barrows was considered for doctoral degree by the University of Chicago (Cotton, 1997). Robbins, Freire Marreco and Harrington (1916) gave a broad definition for ethnobotany and considered ethnobotany as a study and evaluation of the knowledge of all phases of plant life amongst primitive societies and the effect of the vegetal environment upon the life, customs and beliefs. M.R. Gilmore (1930) founded the first ethnobotanical laboratory in the world at the Museum of Anthropology, Michigan. This aimed at identifying the plant species from the archeological remains. Later, many workers contributed significantly to the knowledge base of ethnobotany. Dr. Richard Evans Schultes of Harvard University spent around 12 years (1943-1955) and conducted explorations in regions of Amazon, Mexico, Oklahoma, and Oaxaca and published his valuable ethnobotanical accounts (Sinha, 1996), In 1945, Gunther published his book ‘Ethnobotany of Western Washington’ after the thorough study. Dr. Robin of Missouri Botanical garden worked for more than 25
years on Ovambo culture and published his account of the ethnobotany of the Kwanyama Ovambos. Faulks published his book ‘An introduction to ethnobotany’ in 1958; the first book on ethnobotany. Schultes (1962) explained ethnobotany as ‘the study of the relationship which exist between humans and their ambient vegetation’.

The definitions and concepts that were evolved during the 20th century gave a broad dimension to the field of ethnobotany. In the beginning of the 20th century, the field of ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual re-orientation. This was also the beginning of academic ethnobotany. Richard Evans Schultes (1915–2001) could be considered as the ‘father of modern ethnobotany’ for his studies of indigenous people, and uses of plants, including the hallucinogenic plants (particularly, in Mexico and the Amazon). Martin (1995) described ethnobotany as ‘all studies which describe local people’s interaction with the natural environment’. During the last two decades, a considerable progress has been made on the documentation of ethnobotanical knowledge throughout the world by studying the culture and tradition of various indigenous/tribal/ethnic communities living in different regions of the world.

Apart from the above valuable works, a number of institutions, societies, organizations and Universities are contributing to the development of ethnobotany worldwide. Among them, National Geographic Society, Society of Economic Botany, Richard Spruce Foundation, Harvard University, University of Michigan, Arizona University, and University of Colorado are some of the important world centres working on ethnobotany.

In modern period, Bodding (1925) documented the information of herbal medicinal practices in Bihar and West Bengal. The valuable contribution by Kirthikar and Basu (1935) on “Indian medicinal plants” included information of 1775 medicinal plants. “Miracles of Indian herbs” by Verma (1955) gives an account of indigenous medicines and the “Glossary of Indian medicinal plants” by Chopra (1956) gives
information of 3500 medicinal plants. *Indian Materia Medica* written by Nadakarni (1994) accounts for nearly 3500 plant species and various crude drugs both of indigenous and exotic origin.

The study of ethnobotany, first initiated by Botanical Survey of India in 1954 under the leadership of Dr. Janaki Ammal was a significant step in the documentation of ethnobotanical knowledge. She studied subsistence food plants of certain tribals of south India, particularly to explore better prospects of Dioscoreas in India. Dr. S.K. Jain, the great ethnobotanist and Emeritus Scientist, started the work on ethnobotany in 1960, continued his efforts and contributed significantly to this field for 25 years in the Indian subcontinent. He edited a book entitled “Glimpses of Indian Ethnobotany” in 1981 which is the first book dealing with Indian ethnobotany. His observations of newer plant resources and intimate relationship of tribals with their plant environment encouraged other researchers to document ethnobotanical information from many parts of India. Some of the prominent ethnobotanists of India who contributed a lot to the development of ethnobotany are, Vishnu Mitre, R.R. Rao, V. Mudgal, M. Gadgil, Manilal, K.K. Kapoor, G.L. Shah, H.S. Puri, D.C. Pal, Tarafder, Goel and many others (Sinha and Sinha, 2001). Institutions/organizations like National Botanical Research Institute, National Bureau of Plant Genetic Resources, Central Drug Research Institute, Botanical Survey of India, Central Council for Research in Ayurveda and Siddha, Birbal Sahni Institute of Paleobotany, Central Institute of Medicinal and Aromatic Plants, Central Ecological Sciences and Foundation for Revitalisation of Local Health Traditions (FRLHT) have undertaken a lot of research work on ethnobotany.

**Recent ethnobotanical studies in different countries**

The indigenous societies of different regions of the world have discovered various uses of natural resources around them. Traditional knowledge is said to be the wisdom developed by any people over many generations for proper utilization of their lands,
natural resources and environment. It is reflected by their life styles, innovations and practices. This traditional knowledge is based on their necessity, instinct, observation, trial and error and, long experience. Ethnomedicine or folk medical claims are important components of this knowledge that include medicinal uses of plant and animal products. As for as the scientific application of this knowledge is concerned, researchers are continuously subjecting it to a variety of tests through field, laboratory or clinical research.

Plants have been an integral part of life of many indigenous communities. The western influences have, however, led to an accelerating decline of this tradition. Most knowledge is still transferred entirely orally in many communities. The western style health care supplied by the government has been expanded in the last decade. But it is still often not readily available and many regions remain completely deprived. Consequently, most communities still use herbal remedies as they are readily available cheap alternative.

Traditional herbal medicine is practiced in several parts of the world: Australia, Africa, Brazil, China, Caribbean States, Europe, Spain, North and South America, Russia and Pacific islands where large ethnic communities still live in. History has revealed that most of the people of the world have been using plants, animals and minerals for treating their illness. Traditional herbal medicines in the last one decade have gained importance in many developed countries. In this part, an attempt has been made to collect the available ethnobotanical information in the literature.

African countries

Most of Africa’s biodiversity play major specific roles in the cultural evolution of human societies (Mugabe and Clark, 1998). Traditional remedies are part of the cultural and religious life of the people in Africa. In Africa, herbal medicine is particularly very
popular and it is estimated that 80% of the population resort to traditional medicine to treat human and livestock diseases. The African tradition lack written records and one may wonder as to how traditional healers acquired knowledge of plants with medicinal value. Ethnobotanical studies conducted throughout Africa confirm that native plants are the main constituents of traditional African medicines. Rural African communities have relied upon the spiritual and practical skills of the traditional medicinal practitioners, whose knowledge of plant species and their ecology and scarcity are invaluable. Most tribes in Africa have immense knowledge of indigenous health remedies which have been developed for hundreds or perhaps thousands of years (Kiringe, 2005).

Stretching from Ethiopia, Tanzania, South Africa, and Zambia to Cameroon, Nigeria, and Ghana, indigenous African healing systems remained highly utilized by large segments of the population (rural).

Noumi et al. (1999) recorded 26 plants to treat hypertension in the Bafia region of Cameroon. Some of the reported recipes, liable to produce un-toward side-effects, were used under the direction of the traditional healers who can control their level of toxicity. For example, the decoction of *Bidens pilosa*, largely used in delivery for its ocytocic effect, should not be taken by pregnant women. Noumi and Yami (2001) also reported the use of 78 plant species of 46 families to treat intestinal diseases in Mbalmayo region of the Central Province of Cameroon. *Amaranthus spinosus, Cassia occidentalis, Commelina bengalensis, Ficus exasperate* and *Spilanthes filicaulis* with new therapeutic uses have been recorded.

Jouad et al. (2001) carried out the ethnobotanical survey of medicinal plants used for the treatment of diabetes, cardiac and renal diseases in the north central region of Morocco. They reported about 90 plants, of which 54 plants were used to treat diabetes, 11 for cardiac problems, 19 for hypertension and 33 for renal diseases by 25 local traditional herbal healers. Giday (2001) collected the information of 33 species of
medicinal plants by the Zay people of Ethiopia. The juice prepared from crushed leaves of *Cyanoglossum lanceolatum* for eye problems was one of the most important observations of this area.

Quinlan *et al.* (2002) documented five plants - *Ambrosia hispida, Aristolochia trilobata, Chenopodium ambrosioides, Portulaca oleracea* and *Artimisia absinthium* used to treat intestinal worms in Dominica of West Indies. The cognitive salience of these plant remedies coupled with the evidence of biochemical properties suggested their efficacy in treating intestinal parasites.

Kristensen and Lykke (2003) investigated the application of woody savanna species using a new informant-based valuation system. Two hundred informants from 10 villages evaluated the importance of 20 pre-selected woody species for nine selected uses like medicine, edible fruits, vegetables, fire wood, field trees, construction, and conservation. Three plant species such as *Parkia bigloba, Vitellaria paradoxa* and *Tamarindus indica* were used to cure malaria, fever, stomach ache, and hemorrhoids by local healers of West Africa.

Siddiqui (2004) studied over 100 plants of ethnobotanical importance used by the village herbal practitioners of Barind tract of Africa for medicinal purposes. Wild plant species with edible/food value, medicinal plant species and others were used for traditional health care system to cure major ailments. The data pertaining to the above were collected from the local people with great difficulty because of their reticence in divulging the secret(s) of the identity of plants of their traditional reputation.

Togola *et al.* (2005) surveyed and collected information on uses of *Opilia celtidifolia, Anthocleista djalonensis, Erythrina senegalensis, Heliotropium indicum, Trichilia emetica, Piliostigma thonningii* and *Cochlospermum tinctorium* in rural areas in the nearby regions of West Africa. About 50 medical indications of these plants were reported in their traditional knowledge. The most important ailments reported were
malaria, abdominal pain and dermatitis. The highest number of usages was reported for the treatment of malaria (22%). In 2005, Ajibade et al. recorded the ethnomedicinal knowledge of local people on 30 species of plants in Iloria of Nigeria. The study revealed that every respondent of the sample village within some specified age in both sexes had some knowledge of the medicinal value of their flora around them.

Lulekal et al. (2008) documented the information of 230 plant species used by local folk in Mana Angetu district of South eastern Ethiopia. Most of the plants (78.7%) used to treat human diseases, were collected from the wild (90.4%). The principal threatening factors reported were deforestation, agricultural expansion and fire.

Aiyeloja and Bello (2006) recorded ethnobotanical potentials of common herbs in Enugu state. A total of 200 questionnaires were administered on herb sellers in major herb markets. The respondents, both men and women of various ages revealed that diabetes could be controlled by the use of Vernonia amigytdolina, Psidium guajava and Ocimum gratissimum.

Kisangau (2007) recorded the information of 75 plant species to treat one or more HIV related infections in the district of West Africa. The highest number of reported herbal remedies was associated with the treatment of TB, but the highest consensus number of independent reports on the plant remedies was against Herpes zoster. Gronhaug et al. (2008) surveyed and collected the information of the use of six medicinal plants - Biophytum petersianum, Cola cordifolia, Combretum molle, Opilia celtidifolia, Parkia biglobosa and Ximenia americana for 60 medical indications from Mali of West Africa. The most frequently reported ailments were malaria, and different types of pain and dermatitis. The healer's consensus for the main indications was fairly high for the former four plants.

In east and central Africa (Somalia, Kenya, Sudan, Chad, Central African Republic, Tanzania, Uganda, Burundi, Congo and Rwanda), medicinal and aromatic
plants play an important role in the health of millions of people. Demand for medicinal plants is increasing with the growth of the population. Over-use of the medicinal and aromatic plants caused further economic, social and ecological deterioration in Africa.

**American continent**

Native American traditional healing is a holistic approach to health. Each tribe has its own healing traditions. Native Americans were the first people to utilize plants growing in the United States soil for their medicinal properties (Cox, 2000). Many of the today's medicines were originally derived from plants known to the native Americans, for their curative value. The American continent is a rich source of plant species, with thousands of indigenous plants and many hundreds that have been imported and naturalised by the immigrant populations who settled there.

Brazil, among south American countries is one of the richest source of biodiversity and various ethnic groups such as Jivaros, Ketchwas, Makunas, Sionas, Tikunas and Witotos who practice traditional herbal medicine. Voeks (1996) enumerated the useful species in one hectare of primary and secondary forest plots and surveyed the regional plant pharmacopoeia of the Atlantic forests of Brazil. Healers demonstrated a strong preference for distribution over the primary forest. Forest plots with secondary growth yielded 2.7 times the number of medicinal species identified in primary forest plots. Reyes-Garcia *et al.* (2006) assessed the association of eight indices of traditional ecological knowledge from data collected from 650 native Amazonians. The information was collected from all adults from 30 villages along the Moniq river of Brazil.

In Latin American countries also, herbal medicine is deeply rooted, practiced extensively by indigenous groups, and frequently used by a broad cross-section of the larger society. Two hundred and fifteen medicinal plants were recorded by Bussmann (2006) in Southern Ecuador. Most plant species registered were only used medicinally. The highest number of species was used for the treatment of "magical" (psychosomatic)
ailments (39 species), followed by respiratory disorders (34), problems of the urinary tract (28), fever/malaria (25), rheumatism (23) and nervous system problems (20). In the same year, Bussmann and Sharon (2006) documented the medicinal uses of 510 plant species used by local herbal healers of Northern Peru. Most of the plants used (83%) were native to Peru. Fresh wild plants were used in the preparation of herbal decoction for ingestion or as poultices.

Dewalt et al. (1999) interviewed 13 Tacana men and women to identify and enumerate the use of trees, palm and lianas in Bolivia. Quantitative ethnobotanical methods were applied to document and compare the knowledge of plants held by different native and non-native groups. Palm trees seemed to be the most used species for medicinal purposes since many parts such as seed, root and bark could be utilized.

Balick et al. (2000) examined the use of medicinal plants by Latino healers in New York City to treat women’s illness. A total of 67 plant species were prescribed by healers in the form of mixtures or as individual plants. Studies of immigrant traditional healers and the plants used provided interesting ethnobotanical data and information to assist in diagnosing conditions and contributing to treatment of patients from Latino as well as non-Latino communities.

Estrada et al. (2007) recorded 240 species of 69 families used for 146 different medicinal purposes. Most of the plants were used for medicinal purposes, while the some of them were referred to for various purposes such as fodder, fire wood, construction materials, live fences and human consumption.

**Australia**

Australia has evolved a biodiversity with unique flora very different from that of the other parts of the world. Australia is the only continent to have been occupied exclusively by nomadic hunters and gatherers until recent times. Aboriginal people of
Australia have maintained their health by using plants as medicine, over thousand years. Many ethnobotanical studies have been undertaken to allow documentation and conservation of Australian aboriginal medicinal plant knowledge (Cribb and Cribb, 1981).

In Australia, a large number of rural people depend on traditional medicine called bush medicine. Traditional medicine is still practiced by tribal aborigines in central and northern Australia. Traditional aboriginal medicine is a complex system closely linked to the culture and beliefs of the people and knowledge of their land and, its flora and fauna (Devanesen and Maher, 2003).

Europe

A large section of the European countries like England, France, Germany, Italy and Turkey use a high percentage of herbal drugs following disappointment over modern medicine. Europe had enjoyed a long tradition in the production of herbal pharmacopea. In Europe, herbs are being largely used in medicine. Herbal medicines are a relevant economic factor in the European area since sales of herbal remedies were estimated at USD 6 billion of in 1994. Germany holds the biggest share with USD 2.5 billion, followed by France with USD 1.6 billion and Italy with USD 600 million. Every citizen of the EU spends about USD 17.4 per year on herbal remedies. This situation is the result of the use, in the Europe, of about 1,400 herbal medicines (Benzi and Ceci, 1997)

Among 66 folk medicinal plants from Isparta of Turkey reported by Tuzlaci and Erol (1999), 56 species were wild and 10 species were cultivated plants. They were mostly used for kidney stones, ulcer, hemorrhoids, rheumatism, cold and as analgesic, diuretic and carminative. Genc and Ozhatay (2006) examined 58 wild species out of 68 flowering plant species used for medicinal treatment in Catalca (European part of
Istanbul) of Turkey. The plants were mostly used for treatment of stomach and kidney ailments, cough, diabetes, inflammation and rheumatism.

Ballero et al. (2001) reported for 65 species of plants belonging to 35 families used in folk medicine in the territory of Fluminimaggiore of Italy. The exotic species used to treat various ailments were *Allium sativum, A. cepa, Citrus lemon, Eucalyptus sp.*, *Juglans regia, Matricaria camomilla, Melissa officinalis, Ocimum basilicum, Opuntia ficus-indica, Pimpinella anisum, Petroselinum hortense, Prunus cerasus, Pyrus malus, Ricinus communis,* and *Vitis inifera.* The most widely used families were the Asteraceae, Lamiaceae and Liliaceae with six species each. Later, in 2007, Guarrera and Lucia collected data through open interviews, mainly of farm house, shepherds and elderly people born or living in these areas for a long time. Phytotherapy in central and southern Italy now-a-days is being practiced by a few elderly people who resort to medicinal plants only for mild complaints.

Rivera et al. (2005) recorded 145 medicinal and food plant species from southern Spain. Among them, 81 were used in folk medicine and 61 were orally administered. Majority of the species are used to treat cardiovascular problems. A high proportion of the flora (20 to 30 %) was known for its medicinal properties. The information was collected through semi-structured interview and structured questionnaire. The highest proportion, in both areas, of recorded remedies was for digestive, dermatological, cardiovascular and respiratory diseases as well as disorders of the nervous system (7-14%).

Asia

Traditional herbal medicine has gained its popularity in a number of Asian countries such as, China, India, Indonesia, Bangladesh, Malaysia, Nepal and Pakistan.

Today, the health care system in China is a combined form of both traditional medicine and western medicine. Discovery of the anti-malarial drug from *Artemisia*
annua and the medicine for hepatitis derived from *Swertia milensis* have further proved the future potential of Chinese medicinal plants.

Long and Li (2004) collected 66 medicinal plant species traditionally used by the Red-headed Yao people in Jinping county of Yunnan Province in China. The information on traditional medicine was documented through the approaches of ethnobotany, anthropology and participatory rural appraisal (PRA). Among these plants, 27 species were recorded to have medicinal values for the first time. The Red-headed Yao medicinal herb doctors have conserved medicinal plants and their habitats over the years. Long et al. (2009) also studied the status and features of medicinal plants used in traditional Yi societies of Chuxiong in central Yunnan Province of Southwest China. Among the 116 species used by the local people in the treatment of various diseases or disorders, 25 were found to have new curative effects and 40 species were recorded for their new preparation methods.

Ahmad and Ismail (2003) reported 50 plant species used by the Kadazandusun community living around the Crocker Range Sabha of Malaysia. Some of the plants commonly used include *Blumea balsamifera* for fever, *Cassia alata* for skin diseases, *Centella asiatica* for stomach-ache, *Phyllanthus niruri* for malaria and *Tinospora crispa* for hypertension. Later, Kulip (2003) investigated medicinal and other useful plants used traditionally by the Muruts in Sabah of Malaysia. During the field study, a total of 91 species of plants were collected; among these, 68 were indicated by Muruts informants as medicines, and 64 as other useful plants.

Abu-Rabia (2005) collected the knowledge of folk medicine among the Pastoral nomadic tribes of Jordan. Unstructured interviews and the observation of participants were carried out in the homes of the informant’s as well as traditional healers aged between 40-80 years. Eighty five plants species with medicinal potential were used mainly against diseases of urinary tract. Later, Al-Quran (2008) investigated 87 aquatic
plant species used by 80 informants for various medicinal purposes in Jordan. The study also revealed that Jordan has exhibited highly diversified wild aquatic medicinal plant species. This was due to the type of people inhabiting this area and interviewed. Most of them were rural inhabitants and have long experience in folk medicine as local healers, herbalists, shepherds and experienced persons.

The area of Indonesian tropical forests is believed to cover 143 million hectares and inhabited by about 80% of the world medicinal plants. The richness of the Indonesian tropical forests ranks second in the world after Brazil with the Amazon. It is estimated that in the Indonesian tropical forest, there are about 28,000 species of plants, and about 1000 of them are currently known and used as medicinal plants. Indonesia has a wealth of biological resources and is home to a large number of different ethnic and cultural groups, many of which have developed their own, distinct health care systems (Pramono, 2002).

Roosita et al. (2008) collected the information about medicinal therapies from 19 herbal healers of Sundanese community of west Java, Indonesia and also compared the information with those mentioned in the encyclopedic book series of Plant Resources of South-East Asia (PROSEA). The healers reported 96 therapies for illnesses (classified into 23 categories) using 117 plant species. There were 257 types of illness–plant pairs, and only 114 of them (44.4%) were judged conformed to those mentioned in the PROSEA. Sundanese villagers have depended heavily on herbal medicine, and high proportion of non-conformed illness–plant pairs suggests the necessity of further studies about Sundanese medicinal plants, particularly their pharmacological effects.
Indian Subcontinent

Large number of tribal, ethnic and rural communities inhabit the Indian subcontinental countries like India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan, and they largely depended on plant species for their healthcare needs.

Bangladesh

In Bangladesh, a large proportion of rural population do not have access to modern medical facilities and now, the government is using traditional medicinal healers like 'Ojhas' to supplement its rural health programmes. Anisuzzaman et al. (2007) documented information through repeated visits to various sites, participant observation, structured, semi-structured and unstructured questionnaires, focuses, group discussions and personal contacts with Garo community of Bangladesh. These types of information could be used for primary healthcare programmes, economic and agricultural policy, alternative food programmes, discovery of new drugs and biodiversity conservation and management in Bangladesh. The study also revealed that Garo community used plant species, which are not generally used by other population of the village.

Nepal

Nepal is rich in ethnic and socio-cultural ecosystems and floristic diversity. The rural people of Nepal still rely on biological resources of forests for their subsistence. People obtain important medicines, both of plant and animal origin, to maintain the health of themselves and animals. Many workers surveyed the plant resources used by different ethnic or tribal communities in Nepal (Manandhar, 1991, 1992, 1993, 1998).

Kunwar et al. (2006) examined the ethnobotany and traditional use of plant species extracted from vulnerable alpine zone in the Dolpa, Humla, Jumla and Mustang districts of Nepal. There were 107 species of plants with ethnomedicinal importance. Commonest species of this pharmacopoeia included, \textit{Allium wallichii}, \textit{Cordyceps}
sinensis, Dactylorhiza hataziraca and Rheum australe that occurred commonly in the study area. The largest number of remedies was used to treat respiratory problems followed by gastrointestinal complaints, skeleto-muscular, dermatological and ENT problems.

Chepangs of Nepal used 219 plant parts from 115 species including mushrooms for medicinal uses. Out of these, 75 species had 118 different new medicinal uses and 18 of them were not reported in any previous documents from Nepal (Rijal, 2008).

Pakistan

Hussain et al. (2006) recorded the use of 126 species of 59 families for various purposes by the local community of Ghalegy, Swat District, Pakistan. Based on their traditional local uses, 57 were classified as medicinal, 47 fire wood, 45 forage, 28 honey bee species, 27 vegetable species, 25 edible fruits, 13 timber wood, 12 ornamental, 11 furniture wood, 10 shelter and thatch makers, 10 fencing, five poisonous, and four religious/superstitious species; three each were used for making walking sticks and wooden tools, utensil cleaning, and evil repellent and, one was used as fish poisoning species.

Humayun (2007) collected the information of medicinal plants in the local markets and their trade. Most medicinal plants found their way in to national herb markets of Lahore, Karachi and Peshawar while, some species were exported to the international markets. The people also started selling these medicinal plants in the local markets for earning livelihood as well as to buy allopathic medicine.

India

India with a total area of about 3.029 million hectares is considered to be one of the 12 mega-biodiversity centres of origin and diversity of several plant species in the world. Of the 17,500 flowering plant species (5000 endemic) (Jain, 2000), there are 4,050
plants with 1,600 endemic species (40%) in a 17,000 sq. km strip of forest along the
seaward side of the Western Ghats in Maharashtra, Karnataka, Tamil Nadu and Kerala.
India harbours about 15% of the 20,000 medicinal plants of the world. About 90% of
them are found growing in wild in different climatic regions of the country. There are
about 400 families in the world of flowering plants; at least 315 are represented in India
(Prajapathi et al., 2003).

In India, about 2,500 plant species of more than 1,000 genera are being used in
the indigenous systems of medicine. India is one of the tenth plant rich countries of the
world and fourth among the Asian countries. Much of the current work in ethnobotany is
done in the back drop of the loss of traditional knowledge and the preservation of
biological diversity in remote parts of the world, where culture and their ecosystems are
being destroyed by development. Ethnobotanical studies have become the subject of great
medicinal importance. Documentation of such ethnobotanical data will pave the way for
bioprospecting.

In India, many workers have carried out ethnobotanical studies in different area
that include geographical regions, indigenous/ethnic/tribal societies, plant families or
individual plant species, important diseases, folkloric medicine, and conservation
practices. Some of the recent and notable documentation in different states are detailed
below.

Andaman and Nicobar Islands

Sharief et al. (2005) documented 25 plant species of 17 families used by Karens
of middle Andaman for the treatment of various ailments. Most plants used by Karen
tribe were herbs and herbal formulations were prepared on a traditional stone called
“Chowpii”. The herbal preparations were sometimes applied with the help of hen’s
feather or needle prepared from bat bone.
Das et al. (2006) surveyed Bay Islands and documented the knowledge of herbal formulations being used by Nicobere, Shompains, Jarawas, Senetens, Ongese and Great Andamanese. About 156 plants were reported to have medicinal properties, 58 multi-purpose ones used for more than one ailment. Maximum number of plant species were used for gastrointestinal problems, skin infections, fever, and chest and joint pain.

**Andhra Pradesh**

Reddy et al. (1991) also documented *Adhatoda zeylanica* used for piles, *Bamboosa arundinacea*, *Erthoxylum monogynum*, *Ruella tuberosa*, *Nigella sativa* and *Feronia lemonia* used for cancers.

Raju and Reddy (2005) enumerated 37 plant species for gastro-enteric problems by various tribes such as Konda, Reddi and Koyas in Khamman district of Andhra Pradesh. In most of the cases, single plant drug was used except in the case of dysentery. Ratnam and Raju (2005) surveyed 25 little known plant crude drugs used for leucorrhoea and menorrhhea by tribal communities inhabiting in the Eastern Ghats of Andhra Pradesh. Of 25 plant species, 16 were used only for leucorrhoea. *Azadirachta indica* and *Sterculia villosa* were used only for menorrhcea, while *Argemone mexicana*, *Cassia auriculata*, *Enicostemma axillare*, *Euphorbia heyneana*, *Prosopis ciniericula*, *Tephrosia purpurea* and *Xanthium strumarium* were used for both leucorrhoea and menorrhcea.

Reddy et al. (2007) collected information on 51 plant species to cure 26 ailments. Most remedies prepared from herbs and tree species were taken orally, accounting for 62% of medicinal use. Chenchus have identified a large number of medicinal plants for the treatment of fever and skin disease. Reddy (2008) also reported medicinal uses of 49 plant species by Gonds of Warangal district, Andhra Pradesh. The ethno-phyto-medicines for different pathologies were often used in the form of aqueous extracts.
Arunachal pradesh

Das and Tag (2006) recorded ethnobotanical knowledge of Khamti tribe. Khamti tribe used 45 plant species for various purposes. The science of orthopedics is highly developed as the bone healers heal the patient within one week. Their medicinal preparation techniques mostly accompanied with the enchanting of Mantra.

Assam

Kalita et al. (2005) studied the plant- and animal-based folk medicine used by rural people of Dibrugarh district, Assam for the treatment of different diseases viz., ascites, body pain, carbuncle, diabetes, epilepsy, gastritis, indigestion, obesity, piles, pimples and urinary tract infection.

Mishings, one of the distinct tribes of Assam, are dependent on the nature for their food, shelter, and medicines. Madhumitha and Kalita (2007) recorded 22 plant species used by Mishings for the treatment of diseases like allergy, back ache, constipation, diabetes, lice control, piles, ring worm infection and cut injuries.

Gujarat

Tribals of Saurashtra like Maher, Sagar, Bhanusali, Sindhi, Bharvad, Koli, Rabari and Kardia strongly believed in traditional herbal medicines. Ethnobotanical survey revealed the utilization of 94 plants for the treatment in hemorrhoids. Leaves and fruits were preferred for drug preparation over roots and seeds (Jadeja et al. 2006). Jadeja et al. (2006) also recorded 74 plant species that were used for treating different ailments in animals. A total of about 573 individuals from 42 villages across Porabandar of Gujarat were interviewed. Forty one per cent interviewed persons claimed to have ethnoveterinary knowledge. Dabagar (2006) recorded 30 plant species being used traditionally in Ghaghret of Gujarat. Seventeen medicinal formulations were new and claimed for cough, skin diseases, antibiotic, cardiac problems and ear complaints.
Himachal Pradesh

Nautiyal (2001) studied the traditional uses, cultivation practices and economic contribution of medicinal plants to the rural economy in the Nandadevi biosphere in Central Himalaya of India. For medicinal purposes, about 100 plants were used by the local people. Of these, 28 species were used to cure wound/boils, 19 to treat/relieve muscular and rheumatic pain and 22 for gastric/liver disorders, 16 for cough and cold, seven for eye problems and two for urinary problems.

Uniyal et al. (2006) reported 35 plant species commonly used by local people of the Western Himalaya for curing 21 ailments ranging from stomach-ache to highly complicated male and female disorders. In most of the cases (45%), underground part of the plant was used. New medicinal uses of *Ranunculus hirtellus* and *Anemone rupicola* were reported from this area.

Kanwar and Yadav (2005) documented 31 plant species used by the local people in traditional healthcare system in six villages of Kangra district of Himachal Pradesh. The information was recorded using questionnaire and PRA techniques with the help of village elders, key informants and local healers. Twenty plant species were used for curing more than one disease. *Aloe barbadensis*, *Asparagus racemosus* and *Tinospora cordifolia* were used for more than five diseases.

Jammu and Kashmir

Beigh et al. (2004) gathered information on herbal therapies for the treatment of livestock from Bakerweals and shepherds who work with farm animal in Himalayan mountain region of Kashmir. A total of 25 plants of 19 families were identified for the treatment of a variety of animal infections. In addition, herbal medications were believed to produce few adverse side-effects, leave no harmful residues in milk or meat and have contamination free environment.
Kerala

Udayan et al. (2007) enumerated the traditional uses of 27 plants used by Malapandaram tribes of Achenkovil forest of Kollam district, Kerala. The use of *Pittosporum tetraspermum* and *Thottea siliquosa* for snake bite and *Plectranthes amboinicus* for fever are some of the noteworthy observations.

Madhya Pradesh

Tiwari and Yadav (2003) recorded ethnomedicinal value of 10 plant species by Gond tribe residing at Naoradehi Wildlife sanctuary, Madhya Pradesh. Some of the important observations were the use of *Vanda tesselata* for ear pain, *Cleome gynandra* for head ache and *Bauhinia variegata* for chest pain.

Maharashtra

Patil and Patil (2005) reported the ethnomedical knowledge of 30 plant species from aboriginal and rural populace of Nasik district in Maharastra. Out of these, *Canscora diffusa, Geoderm densiflorum, Kedrostis rostrata* and *Punicum milliaceum* were not so far recorded in ethnobotanical literature.

Manipur

Khumbongmayum et al. (2005) reported the ethnomedicinal plants in the sacred groves of Manipur. Ethnobotanical studies carried out in the four sacred groves of Manipur revealed therapeutic applications of 120 plant species representing 106 genera and 57 families. Tree species contributed the maximum having 42% while herbs recorded 33% of the total medicinal plants. These plants are used for a wide range of common ailments like skin disorder, ulcer, rheumatism and bronchitis.
Mizoram

The tribal/ethnic group used plants in a different effective novel manner. Bharadwaj and Gakhar (2005) enumerated the use of 17 wild plants to cure cuts and wounds by the tribals of Mizoram. Fruits of *Partula roxburghii* and stem juice of *Schima wallichii* and leaf juice of *Combretum flagrocarpum* were used to cure wound.

Orissa

Pattanaik and Reddy (2008) studied the medicinal plant wealth of Kuldiha Wildlife sanctuary in Orissa and reported 49 plant species of 32 plant families to cure 21 diseases such as skin problems, gastrointestinal complaints, respiratory problems and snake bite. They also reported 11 new ethnomedical applications of plant materials.

Rajasthan

Jain *et al.* (2005) reported the ethnomedicinal uses of 20 plants belonging to 15 families for the treatment of sexual diseases and ailments related to digestive, respiratory and liver systems. Plants such as *Leea macrophylla*, *Eulophia ochratea*, *Costus speciosus*, *Curcuma amada* and *Tubiflora acaulis* were used to cure more than one disease by tribes of southern Rajasthan.

Mahavar and Jaroli (2007) conducted interview through structured questionnaire with 21 selected respondents and collected the information on the use of animals and their products in folk medicine from Saharia tribe of Rajasthan, India. In this study, 15 animal species were used for 19 medicinal purposes. The zoo therapeutic knowledge was mostly based on domestic animals but some protected animals like peacock, turtle and sambar were also mentioned.
Sikkim

Pradhan and Badola (2008) documented 118 species of plants for treating 66 ailments by Lepcha tribe, of which, 36 species were used to treat stomach related disorders such as diarrhoea, dysentery, indigestion, gas expelling and others. However, 23 species figured in curing cuts and wounds, inflammation, and sprain and joint pain. About 70% respondents indicated *Swertia chirayita* as the most frequently used and highly extracted species (whole plant) for its applicability in many common diseases, such as, fever, cold, cough, diarrhoea and stomach-ache.

Tamil Nadu

Udayan *et al.* (2005) documented 51 plant species used by the Chellipale community of Namakkal district, Tamil Nadu for their primary healthcare needs. More than 90% of the people inhabiting Kolli hills of Tamil Nadu depended on the traditional herbal medicine.

Ayunur and Ignacimuthu (2005) documented 28 plants that were found to be used by Kani tribes living in and around the forest areas of Tirunelveli hills of Tamil Nadu for the treatment of skin diseases and poisonous bites. Paste of leaf and root bark of *Albizia amara* was used to cure both skin diseases and poisonous bites. They used tubers of *Gloriosa superba* to treat skin diseases.

Ignacimuthu *et al.* (2006) documented 60 ethnomedicinal plants used by Paliyar tribes in Tamil Nadu. This information was gathered by an integrated approach of botanical collections, group discussions and interviews with questionnaires. The survey revealed that the ethnomedicinal plants were mostly used to cure skin disease, poison bites and nervous disorders. Interesting observation of this study were fruits of *Solanum erianthum* to apply topically on their legs while entering into forest to protect from leach
bite. *Adhatoda zeylanica*, *Vitex negundo* and *Piper nigrum* were the leading species used as remedies against a variety of complaints.

Dhivaharan *et al.* (2008) collected the information of 113 species of plants with ethnobotanical values in Thirumani Lake of Tamil Nadu. Important observations in study area include the use of *Boerhavia diffusia* and *Sphaeranthus indicus* for jaundice, *Toddalia asiatica* and *Rotula aquatica* for diabetics, *Mollugo indicus*, *Moringa oleifera* and *Commelina benghalensis* for galactogogue, *Atlantia moniphylla* for leucorrhoea and *Ammenia baccifera* and *Cida rhombifolia* for rectifying seminal weakness.

**Uttaranchal**

Uniyal and Shiva (2005) interviewed 70 women of 11 villages, on the basis of their traditional knowledge, on the various uses of medicinal plants found in the adjoining forest and agricultural areas of Uttaranchal. A total of 113 medicinal plant species were recorded and respondent’s age ranged between 20 and 65 years.

In Uttarachal, Darmies have great wisdom of traditional knowledge about the animal husbandry and veterinary practices. Darmies used plant parts and their products, animal parts, animal products and minerals along with magico-religious practices for the treatment of the animal ailments. Tiwari and Pandey (2006) recorded 47 plants and plant products and nine animals and animal products in the treatment of the different veterinary diseases. Darmies treated important diseases like dysentery, broken horn, snake bite, bone fracture, foot and mouth disease, galactogogue and swelling.

**Uttar Pradesh**

Ethnobotanical survey of Moradabad district was done by Ali in 1999 who collected the information of 45 plant species used as folk drugs for the treatment of various diseases of domestic animals. Most of the remedies consisted of single plant
species. In many cases recipes were made up of two to five different plant species and ingredients of non-plant origin (alum, ammonium chloride and sodium bicarbonate).

Khan and Khan (2004) surveyed and collected the ethnomedicinal information from traditional healers of western Uttar Pradesh. Herbal healers used 30 plant species for different male sexual disorders and debilities.

**West Bengal**

Ethnoveterinary medicine practiced by Kheria, Oraon, Rabha and Santal community was recorded from Koch Bihar district, West Bengal (Bandopadhyya and Mukherjee, 2005). Twenty three plant species were used for swollen abdomen, retention of urine and stool, loose motion, intestinal worm, swollen of neck due to cold, suppression of milk and mastitis by various tribal groups. Medicinal plants used to cure intestinal, malarial and sexual diseases traditionally by the tribals of Puruliya, West Bengal were reported by Basu in 2005. The report dealt with 36 ethnomedicinal plants used to cure cholera, colic, constipation, dysentery, gonorrhoea and syphilis.

**Karnataka**

In Karnataka State, there are only a few reports of the documentation of ethnic knowledge of certain tribal and rural communities.

In 1995, Kalyanasundaram recorded ethnobotanical information from Kodavas and other tribes of Kodagu district. A total of 240 plant species including 105 medicinal plants, 65 food plants, 60 timber yielding plants and for other purposes were recorded.

Bhandary *et al.* (1995) reported the medicinal ethnobotany of the Siddis of Uttara Kannada district situated in the Western Ghata of Karnataka. Ninety eight medicinal preparations involving 69 species of plants used by Siddis were described. The finding included 40 hitherto unknown medicinal uses of known medical plants. In 1996, Bhandary *et al.* also reported that the Gowlis in Uttara Kannada district were
knowledgeable with 69 uses of 41 species of plants. Harsha et al. (2002) documented the ethnobotanical knowledge of plants used by the Kunabi tribe of Uttara Kannada district. Forty five species of plants of 26 families were used to treat a wide range of discomforts like fever, cough, skin diseases, jaundice, rheumatism, snake bite and dysentery. Later, in 2005, Harsha et al. also documented the traditional ethnoveterinary practices of rural folk in Uttara Kannada district. Twenty five formulations from 39 plant species of 30 families were used to treat 21 diseases of domestic animals. Certain plants were used to treat render pest and foot and mouth diseases of animals.

Maruthi et al. (2000) surveyed the villages located in Davangere district and documented 30 angiosperm plants including Lobelia nicotianaefolia, Hydnocarpus pentandra and Hyptage benghalensis to cure skin diseases.

Kshirsagar and Singh (2001) investigated the ethnobotanical knowledge of different tribal group such as Jenukuruba, Bettakuruba, Soliga, Yerava, Panjariyerava, Malekudia, Thammadi, Medha, Hakki-pikki, Paniyerava, Gowda-kuruba, Kadu-kuruba, Kaniyan and Girijana in Mysore and Coorg districts of Karnataka. The tribals used 76 medicinal plants for skin problems, stomach complaints, gynaecological problems, snake bite and other diseases.

Parinitha et al. (2004) documented the ethnobotanical wealth of Bhadra Wildlife sanctuary of Karnataka. Results indicated that 60 plant species of 50 genera and 35 families were used for preparing at least 78 herbal drugs by the medicine men to treat various ailments. Parinitha et al. (2005) also reported the medicinal plant wealth of local communities in some villages in Shimoga district. The survey revealed the utilization of 47 species of plants of 46 genera in 28 families to treat 9 infectious and 16 non-infectious diseases. Shivanna et al. (2008) recorded the ethnomedicinal knowledge of Lambani community in Chikmagalur district who used 62 plant species to treat 37 human and 8 veterinary ailments. Among them, 10 were new claims.
Prashanthkumar and Vidhyasagar (2008) reported the medicinal plant knowledge of local ethnic groups like Halakki, Kadukuruba and Lambani for primary health care in Bidar district. They listed 30 plants of 29 genera and 20 families as medicines in the treatment of various ailments like snake bite, bone fracture, wounds, jaundice, menorrhagia, leucorrhoea and diabetes. Prakasha and Krishnappa (2006) documented medicinal uses of 11 plants by the local people in Sringeri taluk of Chikmagalur district to cure ailments like skin disease, snake bite, toothache, fever, epilepsy and diabetes. Treatment of small pox with *Hibiscus rosa-sinensis* and *Vitex negundo* was a notable observation. Most medicinal plants were used for skin diseases, especially ringworm, eczema and scabies.

The survey of literature suggest that the documentation is incomplete, and there are a large number of ethnic/rural communities in Karnataka whose traditional medico-botanical knowledge needs documentation and extensive study.

**Ethnobotanical documentation and its importance**

Plants and animals have been used as the source of medicine from ancient times and even in modern times, animal and plant based systems continue to play an essential role in primary health care. Now-a-day, the ethnobotanical studies are gaining more importance for search of potential new medicines and economic plants. Traditional medicine particularly, the folk herbal medicine, is recently receiving heightened interest in the world-over. However, this knowledge is rapidly disappearing, owing to the cultural change and declining access in both urban and rural areas to sources of natural medicinal products. Biodiversity losses diminish the supply of raw materials for drug discovery and it also directly affects the discovery of potential medicines. In this context, research opportunities should focus on the documentation of the traditional uses of plants in traditional medicine.
The ethnic/tribal communities understand the need for conservation and consequences of over-exploitation of the natural resources especially, medicinal plants. They worship several plants and avoid their collection. Ethnobotanical studies emphasize the importance of biodiversity preserved in primeval forests, in the form of sacred groves (Sinha and Sinha, 2001). The vanishing forest has an adverse effect on the tribal or ethnic population and their knowledge. The indigenous knowledge of medicinal plants could be used as the potential source of herbal/modem medicines against chronic diseases and documented for posterity. This type of data base is important considering the problems related to IPR and bio-piracy (Udayan et al., 2005). The documentation of traditional knowledge is now an important task to reduce the possibilities of bio-piracy and to effectively protect the rights of the people who are the knowledge-holders. This was clearly shown by the turmeric case, in which India succeeded overturning a patent granted by the United States Patent and Trademark office on turmeric powder and the objection was mainly based on the traditional knowledge known to the country for generations. Among 32 documents provided by India for claiming against the patent, the written document in the 8th Century AD ‘Matsya Purana’ stands novel and the patent was revoked (Udgaoonkar, 2002). Based on the well documented traditional knowledge, India won in the battle against bio-piracy. Similarly, India won the battle over the EPO & US PTO patent granted to neem and Basmathi rice, respectively (Mashelker, 2001). These cases clearly suggested the importance of documentation of traditional knowledge. To prevent such bio-piracy incidents in future, India has developed Traditional Knowledge Digital Library (TKDL), a digital database of prior art related to medicinal plants, which are already in the public domain.

One of the examples from India shows benefit sharing models for indigenous innovation. In 1987, during an ethnobotanical expedition, a team of scientist from Tropical Botanical Garden and Research Institute (TBGRI) found that the plant
'Trichopus zeylanicus ssp. travancorius' is being used by Kani tribe, in tropical forests of the Western Ghats in Kerala, for hundred years to gain energy. Then, TBGRI was successful in developing a scientifically validated drug called 'Jeevani' and releasing a commercial production by Arya Vaidya Pharmacy of Kerala in 1995. To transfer the technology for the production of drug to the pharmaceutical company, the TBGRI agreed to share the license fee and royalty with the Kani tribe on a 50:50 basis (Mashelker, 2001).

The traditional use of plants as herbal remedies has further declined due to the scarcity of such plants which is caused by multifarious human activity coupled with natural calamity like drought, thus threatening the diversity of medicinal herbs. Therefore, an urgent need is felt to study and document this precious knowledge for posterity (Kala, 2000).

The use of plants for healing, by any cultural group, is integrally related to local concepts of the nature of diseases, the nature of plants and the world’s view of the culture. A recent concern by indigenous people regarding the appropriation of their medicinal plant knowledge means that some groups prefer to keep their healing knowledge private, thus limiting the possibilities of comparison.

Data collection, processing and exploitation of ethnobotanical knowledge

The concept of selection of the study area by previous ethnobotanical workers varied depending on the criteria they selected for such studies. Some of the workers conducted field surveys in the area, where indigenous or tribal communities live since early days in particular geographical regions. For example, aboriginal community of Northern Australia (Gorman et al., 2006), Yanomami Indians of Brazil (Prance, 2003), Tamang tribe of Nepal (Manandhar, 1991) and Didayi tribe of India (Pattanaik et al., 2008) who lived in specific localities. During the field survey, researchers collected the
useful information regarding the life style, culture, customs, religious beliefs, and diagnosis of disease of local communities, and utilization of plants for different purposes including medicinal purposes. This type of study was very helpful in the improvement of socio-economic status of communities in these regions. The uplifting of the economic status of Kani tribe in the Western Ghats (Mashelker, 2001) was possible because of this.

In certain cases, ethnobotanists selected the remote area for ethnobotanical investigation, where the local people lived in inaccessible area and far away from the urban area or towns that lacked basic facilities like primary health care centre, transportation and education and the people in these area depended largely on the natural resources that are available around their locality. Certain area might lie close to or inside National parks, Wildlife Sanctuaries or Bio-parks which are abodes for animal and plant wealth (Novais et al., 2004; Kunwar et al., 2006). Certain researchers preferred these regions for the documentation of the traditional knowledge on utilization of plant resources by the inhabitants in the secluded area (Harsha et al., 2002; Parinitha et al., 2004). The richness of plant diversity in any area is not evaluated merely by the number of species occurring there, but by the intensity and dependence of the indigenous communities on that wealth (Voeks et al., 1996; Leonti, 2003).

A wide range of techniques are being used for documenting ethnobotanical information effectively. For collecting the data, ethnobotanists used four basic interview techniques namely open ended, semi-structured and structured interviews, and questionnaires. The first two are used for the collection of qualitative data, while the latter for quantitative data (Martin, 1995). In the open ended and semi-structured interviews, the information on life histories of traditional societies was collected with the help of casual conversations and it also facilitated the development of informal relationship between local and external participants. Quantitative techniques such as structured interviews and printed questionnaires use a series of pre-determined questions
which are useful for analytical purposes and facilitate the numerical evaluation of factors such as use-value (uv) or relative importance of a given species. The combination of qualitative and quantitative methods is very useful in the evaluation of ethnobotanical data which are both accurate and complete (Cotton, 1997).

Collins et al. (2006) conducted ethnobotanical survey in the proposed Conis Santana National Park in Lautem district of East Timor. The consultant for the study was selected by the chief of a nearby village on the basis of the most knowledgeable member of the community concerning the use of medicinal and poisonous plants. The ethnobotanical data were collected from the consultant by using the classical descriptive ethnobotanical techniques (i.e., no quantitative measures) through an unstructured open ended interview. A limitation for that study was that the consensus indices and hypothesis testing were not possible as only one traditional medicine expert from the resistance army was made available by local authorities. The authors observed that although the report did not utilize quantitative methods, it was a relevant contribution to ethnobotanical literature since the research was undertaken in a biodiversity hotspot relative to other habitats in East Timor and to describe medicinal plant use in a conflict situation, and also help in the documentation of the unstudied traditional botanical knowledge of East Timor.

Gazzaneo et al. (2005) documented 125 plant species using the semi-structured technique to record interviews on personal information and topics related to the medicinal use of specific plants. They determined the relative importance of the plant species and also calculated the informant consensus factor in relation to medicinal plant use. The study demonstrated that the local people tend to agree with each other in terms of the plants being used to treat blood related problems, but cite much more diverse group of plants to treat respiratory and digestive problems. The species with highest use value by the communities was *Pithecellobium cochliocarpum*, a native plant of the Atlantic forest.
in Brazil with an UV of 1.8. The main importance of this plant species resides in its healing effects on wounds.

Lulekal *et al.* (2008) using semi-structured interviews, collected the ethnobotanical information on field observations, preference and direct matrix ranking with traditional medicine practitioners of Southeastern Ethiopia.

Previous works on ethnobotanical studies aimed only at the documentation of different plant species for various purposes such as food, medicine, fodder, fiber and fuel. This information was collected from various tribal groups or ethnic communities or rural folk of different regions throughout the world through casual interviews and discussion. This type of data was not treated with any statistical tools such as data collection techniques and data analysis methods. If the data is collected according to the proper analytical tools, the results obtained after statistical analysis are reliable and good conclusions could be drawn. The statistical analysis of data result in worthwhile conclusion in the presence of variations and this provide a measure for the probable truth of the statement.

New quantitative methods of collecting and analyzing data have produced novel findings in ethnobiology. The field of ethnobotany is moving towards hypothesis-driven analytical research in recent years and away from simple inventories and descriptive work. As part of this movement, quantitative ethnobotany is an increasingly useful field that is necessary both for analyzing big amounts of plant use data being generated and for improving the rigor and validity of ethnobotany as a science (Trotter and Logan, 1986).

Some of the most common statistics used in ethnobotany are the analysis of variance, chi-square test, correlation and regression (Martin, 1995). Vinegar and Yewhalaw (2007) investigated the Spearman rank correlation test to determine the correlation of the indigenous plant use knowledge with the age of traditional healers and their level of education. The Spearman correlation test did not demonstrate significant
correlation between the educational level of traditional healers and the number of species reported. No significant correlation was also observed between the age of traditional healers and the number of species reported.

Now-a-day, different statistical tools were employed for ethnobotanical data analysis by various researchers such as Informant consensus factor (ICF) - to evaluate informant's consensus on managing ailments (Trotter and Logan, 1986), Fidelity level (FL) - to identify the most important medicinal plant species used to treat a particular ailment (Friedman et al., 1986; Alexiades, 1996) and Use value index - a quantitative method that demonstrate the relative importance of a species known locally (Philips et al., 1996).

Heinrich et al. (1998) studied the relative importance of a medicinal plant within a culture using a quantitative method. They examined the herbal healer's consensus and cultural importance of Mexican Indians, Maya, Nahua and Zapotec of Mexico. Ethnobotanical data were compared and analyzed using Trotter and Logan consensus factor. For the analysis, the uses were grouped into 9-10 categories of indigenous uses. The results revealed that the ICF was higher among the Zapotecs. This showed a more consistent use of medicinal resources. Zapotecs culture-bound syndromes had high (0.75) factor of informant consensus, and among the Nahua, it ranked first (0.68) together with gastro-intestinal illness. The data indicated that a well-defined section of species was culturally important for treating these illnesses.

Ankli (1999) documented the use of 320 species in three Yuctec Maya communities during 18 months of field work. The 1549 individual reports documented were divided into nine groups, based on indigenous uses. The frequency of the usage of the individual plant reported was employed in the analysis of the ethnobotanical importance of the respective taxa. Species cited more frequently in a group of indigenous uses are regarded to be of greater ethnobotanical importance than those cited only by a
few informants. This type of study was the basis for phytochemical and pharmacological evaluation of the traditional use.

Collins et al. (2006) compared the data of two east Timorese cultures using quantitative ethnobotanical methods. The information collected from the Laklei and Idate culture was compared using informant agreement ratio. The study revealed that ICF was greater in Laklei, where informants had more consistency to the same medicinal plants when treating the same usage categories. Out of 86 medicinal plants, only 11 plants were used by both culture and 6 had similar mentions. These findings have important implications in understanding ethnobotany as they demonstrate how relatively closely situated cultural groups can have significantly different traditional knowledge systems.

Black et al. (2008) recorded the traditional medicinal uses of plant by the Inuit of Nunamit, Canada and analyzed data using the quantitative ethnobotanical methodology. An information consensus index value F_{ic}>0.7 for many use categories revealed a high level of informant agreement, consistent with a well preserved oral traditional and few floral diversity. The average F_{ic} value for all illness categories was 0.75. The study also demonstrated that the medicinal knowledge was a well preserved tradition held by the Inuit, although the overall species of medicinal diversity present in the Arctic is lower than that in southern latitudes. This type of ethnobotanical information gathered and the use of a consensus index to depict the most cited plant for a specific usage category may be accepted as tools to optimize modern medical practices for doctors working within indigenous culture(s).

Yineger et al. (2008) studied medicinal plant species used to manage human ailments at Bale Mountains National Park, Southeastern Ethiopia. They examined the ethnobotanical data by using ICF and results showed that the consensus of traditional healers was high in managing eczema (ICF = 0.58), tinea versicolor (ICF = 0.50), rheumatism (ICF = 0.43), haemorrhoids (ICF = 0.33), earache (ICF = 0.33) and
gonorrhoea (ICF = 0.27). Most medicinal plant species reported in Southeastern Ethiopia were found to be under threat and this calls for urgent conservation measures so as to maximize the sustainable use of these vital resources in the study area.

Al-Quran (2008) interviewed and collected information on medicinal plants used for therapeutic purposes through structured interviews with 80 informants of Jordan. The data were verified by calculating Fidelity level, Relative popularity level and Rank order priority. The study revealed that 45 medicinal species (14.17%) were found to have ROP values above 50 (26.4%) and this is because the local people in the Southern part of Jordan still have higher linkage with folk medicine and natural resources.

Raghupathy et al. (2008) examined the consensus factor of the medicinal knowledge of Malasar community occupying the forests of the Velliangiri holy hills of the Western Ghats in South India. A total of 95 species belonging to 50 families were identified for medicinal and general health purposes. The results revealed a high level of agreement among the informants usage of a particular plant at a local scale. The high consensus factor of 0.92 showed in category jaundice included only two species, indicating greater homogeneity among informants. Malasar informants consistently reported the use of Euphorbia thymifolia and Indigofera caerulea to treat jaundice. Authors opined that a high consensus factor indicate the presence of some key phytochemical ingredient(s) in these plants which require phyto-pharmacological analyses.

Consensus analysis is a crucial tool in establishing a comparative estimation of the level of informant consensus on the use of medicinal plant remedies. Consensus factor provides an estimate of the importance of each plant species in traditional knowledge. The quantifying consensus of local traditional knowledge recently described in the ethnobotanical literature assumes that respondents were interviewed independently and their reports were treated as independent observations. The application of these
methods helps to test falsifiable hypotheses concerning human selection and use of plants (Trotter and Logan, 1986; Heinrich et al, 1998). The informant consensus factor can help in identifying important and interesting species for future cultural and pharmacological research (Amiguet et al., 2005).

**Phytochemistry and pharmacological evaluation of ethno-medicinal plants**

The plants form an important source of biologically active compounds. Compared to the availability of large number of medicinal plant species, only a small number of them have been screened for their bioactive compounds. Much of the current research is devoted to the phytochemical investigation of higher plants with ethnobotanical information associated with them (Harborne, 1998).

A significant portion of the presently available non-synthetic or semi-synthetic pharmaceuticals in clinical use is comprised of drugs derived from higher plants followed by microbial and animal origin and mineral products. A great number of these natural products have come from the scientific study of remedies rationally employed by various human cultures, most of them being plant-derived. Information regarding ethnic/tribal or indigenous knowledge on medicinal plants had always played a vital role in the discovery of novel products. The ethnobotanical information serves as a base for new compounds with active principles for phytochemical, pharmacological, pharmacognostical and clinical research.

Today, a large number of pharmaceutical industries depend mainly on the ethno-medicinal plants as source of useful drugs to treat chronic ailments like cancer, jaundice, paralysis, diabetes, cardiac and respiratory problems. Traditional herbal medicines are drawing significant attention in global health debates. Many hope traditional herbal medicine research will play a critical role in global health. China, India, Nigeria, and the United States of America and, WHO have all made substantial research investments in
traditional herbal medicines. Industries have also invested millions of US dollars looking for promising medicinal herbs and novel chemical compounds. Previous ethnobotanical studies recognized that the traditional knowledge of our fore-fathers led to the discovery of most of the food plants of today (Prescott-Allen and Prescott-Allen, 1990). It was in order to preserve and document this traditional knowledge on plants and other natural resources that the science of ethnobotany came into existence. Use of wild plants or ethnobotany not only gives an idea of the richness of traditional knowledge but also clue to new or lesser-known sources of medicine, food, fibre and others (Jain and Mudgal, 1999).

Non-availability of satisfactory medicines in allopathic medicine for the treatment of chronic diseases such as cancer, liver disorders, cardiac problems, diabetes and paralysis has prompted scientists to screen ethnomedicinal information for better health care of humans. Two main strategies are being used for the selection of plant species for the development of drugs: random screening and ethnobotany. With over 5,00,000 plant species on earth, and each of these have leaves, bark, roots and other parts with different phytochemical composition, as well as seasonal and geographical variations in the phytochemistry of many plant species, the likelihood of finding an active plant sample from a random screening survey is fairly small (Hostettman et al., 1998). It is even less likely that the active compound isolated from the plant sample is novel or has a novel mode of action that is more efficient than any product currently available in the market. These problems can often be overcome by using ethnobotany to investigate those species that have been traditionally used as medicines for many generations (Hostettman et al., 1998).

Natural products continue to play an important role in the drug discovery programs of the pharmaceutical industry and other research organizations. Out of 119 plant-derived drugs commonly in use, in one or more countries, 74% of them were
discovered as a result of chemical studies directed at the isolation of active constituents of plants used in traditional medicine (Fabricant and Farnsworth, 2001). Significant drugs developed from traditional medicinal plants include the cardiac glycosides from *Digitalis purpurea*, the anti-hypertensive agent reserpine from East Indian snakeroot *Rauwolfia serpentina*, the anti-malarial agent quinine from *Cinchona* spp., and the analgesics codeine and morphine from *Papaver somniferum* (Dev, 2001). Secondary metabolites isolated from medicinal plants have also served as precursors or models for the preparation of effective agents through semi-synthesis or lead-based total synthesis. For example, the anti-cancer agent, etoposide, a semi-synthetic derivative of epipodophyllotoxin isolated from *Podophyllum* spp., and anti-cholinergic drugs modeled on belladonna alkaloids and atropine isolated from *Atropa* sp. (Fabricant and Farnsworth, 2001).

The most effective strategy is to perform multi-disciplinary work on the development of drugs from plants which can only be effectively tackled by collaboration between botanists, ethnobotanists, pharmacognosists, phytochemists, biologists, pharmacologists and medical doctors.

Many botanists and pharmacologists all over the world investigated the medicinal plants used in traditions and folklore to extract the active constituents. The proper scientific means and techniques of extraction and identification are being used to determine, finally, the therapeutic effects and dosages (Harborne, 1998; Joud et al., 2001). Screening of crude extract of medicinal plants help in determining the presence of biologically active compound(s), and therefore validate the use of such plants in traditional medicines (Palombo and Semple, 2001).

The chemical compound discovered in a plant source could be identified on the basis of chromatographic and spectroscopic methods. The classical procedure for obtaining the chemical constituents from dried plant material is through the continuous
extraction in a Soxhlet apparatus with a range of solvents. In recent years, rapid and accurate methods of screening of plants for phytochemicals are employed that use different chromatographic techniques such as thin layer chromatography, gas liquid chromatography and high performance liquid chromatography. Organic molecules present in plant extracts could be identified more accurately with the help of spectroscopic methods such as ultra-violet (uv), infrared (IR), nuclear magnetic resonance (NMR) and mass spectroscopy (MS) and X-ray crystallography (Harborne, 1998).

**Antimicrobial activity**

Many drug resistant infectious microorganisms cause greater problems in health care sector throughout the world (Lentz *et al.*, 1998). Now-a day, due to the indiscriminate use of allopathic antibiotics for treating infectious diseases, there is an leads to the increase in the incidence of multiple drug resistance in human pathogenic microorganisms (Parekh and Chanda, 2007). In addition to this, these antibiotics produce certain adverse effects such as hypersensitivity, immune-suppression and allergic reactions on host (Ahmed *et al.*, 1998). Hence, researchers are much interested in screening medicinal plants possessing antimicrobial activity (Parekh and Chanda, 2008; Kone *et al.*, 2004). Many active compounds of plant origin were identified as effective antibiotics for many human pathogenic microorganisms (Basile *et al.*, 2000; Kone *et al.*, 2004). The secondary metabolites such as alkaloids, glycosides, flavanoids, terpenoids, steroids, tannins, resins and essential oil from plant species have good antimicrobial activity (Ikram and Inamaul, 1980; Nino *et al.*, 2006). Certain active chemical compounds such as asiaticode, benzoin and emetine have been isolated from plants which possessed antimicrobial activity (Cox, 1994).
Greater number of plant species used in traditional medicines for the treatment of microbial infections seems to be an easy step for exploiting the antimicrobial compounds. Based on the ethno-medicinal information, large number of medicinal plants have been screened for their antimicrobial activity against human as well as plant pathogenic microorganisms (Lentz et al., 1998; Srinivasan et al., 2001; Karou et al., 2005).

**Wound healing activity**

Wounds are physical injuries that result in an opening or breaking of the skin (Olodejo, 2003). Wound healing is a dynamic process involving biochemical and physiological phenomenon that behave in a harmonium way in order to guarantee tissue restoration. Wound healing consists of an orderly progression of events that re-establish the integrity of the damaged tissue. Wound healing involves three overlapping phases such as inflammation (0-3 days), cellular proliferation (3-12 days) and remodeling (3-6 months). Healing of wound is essential for the restoration of disrupted anatomical continuity and disturbed functional status of the skin. Granulation, collagen maturation, matrix formation and scar formation are some of the steps in wound healing which run concurrently but independently of each other.

Many traditional systems of medicine like ayurveda, siddha and unani comprise large number of prescriptions for wound healing purposes (Kumar et al., 2007). In China, Yi ethnic group used 55 plant species for treating wound and bone fracture (Long et al., 2009). For the treatment of cuts and wounds, 17 plant species were used by the tribals of Mizoram (Bharadwaj and Gakhar, 2005). The medicinal plant species like *Centella asiatica*, *Rubia cordifolia*, *Curcuma longa*, *Aloe vera*, *Tectona grandis* and *Ageratum conyzoides* have been used for decades to enhance wound repair (Biswa and Mukherjee, 2003; Oladejo et al., 2003; Nayak et al., 2008). Most of the wound healing studies support the folk use of plants in the treatment of wound care. Many experimental studies
were conducted to examine the wound healing property of medicinal plants using different wound models. Lodhi et al., (2006) worked on the wound healing efficacy of *Tephrosia purpurea*. The study also supported with histopathological studies indicated that ethanol extract caused significant increase in tensile strength, rate of wound contraction and collagen levels. An alcoholic leaf extract of *Memecylon umbellatum* showed significant wound healing activity in both the excision and incision wound models (Puratchikody and Nagalakshi, 2007). The animals treated with extract of *Quercus infectoria* in dead-space wound model showed a significant increase in dry granuloma weight and hydroxyproline content, and histological studies revealed increased collagen deposition as compared to the control group (Umachigi et al., 2007). The number of secondary metabolites isolated from plants have been demonstrated using animal models for wound healing activity (Shukla et al., 1999; Mackay and Miller, 2003; Houghton et al., 2005; Chaudhari and Mengi, 2006). For example, sitosterol from *Aloe vera* (Krishnan, 2006), asiaticoside from *Centella asiatica* (Shukla et al., 1999), curcumin from *Curcuma longa* (Jagetia nad Rajinikanth, 2004) and phenolic acids from *Chromolaena odorata* (Phan et al., 2001) are some of the active compounds with proven determining the wound healing activity in animal models (Ayyanar and Ignacimuthu, 2009).

**Vallaris solanacea (Roth) Kuntze**

*Vallaris solanacea* of family Apocynaceae is a large woody climber. It is commonly known as bread flowers in English and Bugudi hambu in Kannada, Bhadravalli in Sanskrit and Ramsar in Hindi. This plant is native to India and Burma. It is commonly distributed in Deccan and Carnatic regions of India, mainly in dry forests and hedges and also in West Coast. Some times it is cultivated in gardens for their fragrant
flowers. The descriptions of the plant are as follows: Leaves opposite, elliptic-oblong and minutely dotted. Flowers white, bowl shaped found 3-6 flowered cymes in leaf axils. Calyx 5-lobed, lobes narrow, corolla salver shaped, stamens inserted at the top of the tube of the corolla, style filiform, stigma thick, 2 lobed at tip. Fruits of 2 follicles, 6 inches long, seeds 2-seriate, testa rugose. Flowering and fruiting occur during December to April.

The plant has a variety of medicinal uses in different folk medicine. Milky latex of this plant is mainly used for sores and wound (Tiwari et al., 2010), whole plant for leprosy (Nair and Mohanan, 1998) and for wounds (Sharma et al., 1979). Seeds contain chemical constituents such as vallaroside, vallorosolanoside, solanoside and acoschimperoside (Khare, 2007). The chemical constituent - O-acetyl-solanoside extracted from seeds of *V. solanacea* possessed cardiotonic activity (Vohra et al., 1966).

In Shimoga district, the resident healers frequently used leaves of *V. solanacea* for wounds and bone fracture in both humans as well as veterinary animals. The above review of literature indicated the lack of information on the pharmacological screening of leaf extract of *V. solanacea* for wound healing and antimicrobial activities.

A perusal of the above literature indicated that the ethnomedico-botanical knowledge in Karnataka has been documented to some extent from certain regions. Although scientific methods were employed for the collection of data from tribal/rural/folk communities, the data were not analysed quantitatively, for an effective understanding of the utilization of ethnic herbal formulations for treating human and veterinary ailments. There is no complete documentation of ethnomedical knowledge that is practiced in Shimoga district of Karnataka. Since Shimoga district lies in the heart of the Western Ghats region which is rich in biodiversity, many plants are thought to be used by local communities for medicinal purposes. The present investigation aims to address these issues.