CHAPTER - 1
INTRODUCTION

Plants have always been a major component of traditional system of healing in developing countries, which have also been an integral part of their history and culture. Medicinal plants offer alternative remedies with tremendous opportunities. Many traditional healing herbs and plant parts have been shown to have medicinal value especially in the rural areas and that these can be used to prevent and cure several human diseases. Even to day, majority of the world population depends on herbal healthcare practice. The strategic importance of reviving indigenous medical practices to provide safe and affordable primary healthcare to the people of the world is now recognized. During the last two decades or so, WHO’s health Assembly has passed a number of resolutions in response to this resurgence of interest in the study and use of traditional medicines and in recognition of the importance of medicinal plants to health care of people in many developing countries (Subramoniam, 2001).

Traditional systems of medicine, whether they are of Indian, Chinese, Tibetan, Thai, Vietnamese and other origins, have evolved over several hundreds or thousands of years through transfer of knowledge, usage, and practices from generation to generation. These systems utilize the resources of plant and animal kingdom. Plants are the major source among them, as they are a treasure house of potential drugs.

The indigenous traditional knowledge of medicinal plants of various ethnic communities, which were transmitted orally from generation to generation for many centuries, is fast disappearing from the face of the earth due to the advent of modern technology and transformation of the traditional culture. For this purpose ethnobiologists have great responsibilities, they need not only inventories these medicinal plants but help conserve and revitalize the traditional culture and beliefs and also safeguard this knowledge from being misused by the modern societies.
1.1 HISTORICAL BACKGROUND OF MEDICINAL PLANTS

Records of early civilizations of the world reveal that a considerable number of drugs used in modern medicine were in use even in ancient times. The use of plants for curing various diseases figured in manuscripts such as The Bible, The Rig-Vedas, The Iliad and The Odyssey and the History of Herodotus (Kochar, 1998). The ancient Chinese used medicinal plants 6000 years ago. The Babylonians, Egyptians, Greeks, Romans and Sumerians, all developed their respective characteristic *Materia Medica*. On the other side of the world, the Aztecs, Mayans and Incas had developed primitive medicines. The oldest and most comprehensive Chinese work about herbal drugs the "Yellow Emperor's Internal Classic" was dated 300 B.C. Ancient Egyptian textbooks 'Papyri' (such as Edwin Smith Papyrus and the Ebers Papyrus), written as early as 1600 B.C., indicate that the Egyptians had an amazingly complex *Materia Medica*. These textbooks contained names of medicinal plants then known and prescriptions for several diseases (Samuel, 2004).

Initially, the plants were part of folk – medicine practiced by ancient man in different parts of the world, which include India, China, the Middle East, Africa and South America. The same herbs, trees and shrubs employed by ancient people have continued to be valued through the ages – by Egyptians, Greeks, Romans and Indians. In the long struggle to achieve mastery over powerful forces of nature, man has always turned to plants for help. When pain, injury or disease struck early man, he had little choice but to come to plants.

Around 90 percent of the medicines were of plant origin until 1930 (Swain, 1972). The period of chemotherapy began in the 1930s, with the synthesis of sulphonamides. The era of antibiotics began in the following decade, when the Second World War ended. From the 1960s, over 75 percent of all standard medicines are of synthetic origin, lowering medicines of plant origin to a secondary role (Rao, 2000).
With the advancement of western medicine, the indigenous systems were overshadowed, although it survived the test of time and competition from vastly popular allopathic system. With the emergence of environment concept and popularization of environment friendly activities, the herbal medicare system also revived with the result that a sudden herbal drug boom emerged during last three decades (Pushpangandhan and Nair, 1997; Rao, 2000). The western society now recognized the great potential of the herbals in healing many present day ailments. This has now resulted in high-level market demand for such herbs and herbal derived products (Hazel et. al., 1999; Dhar et. al., 2002).

1.2 ETHNOBOTANY: ORIGIN AND DEFINITION

The present day ethnobotanic study begun in 1873 with the work of Stephan Power who used the term “Aboriginal botany”, which elucidated the total aboriginal dependence on plants for food and medicine. The term ethnobotany was first introduced by Harshberger (1895) as “The study of plants used by primitive and aboriginal people”. Before the introduction of the term “Ethnobotany”, the study of traditional botanical knowledge was focused almost entirely on the applications and economic potential of plants by native people. At this time the subject included mere identification and catalogue of plants used by the primitive people. In 1916, Robins Harrington and Feiro Marreco promulgated the broad definition of ethnobotany and considered it as a study and evaluation of the knowledge of all phases of plant life amongst primitive societies, and of the effects of vegetal environment upon the life, customs, beliefs and history of the people of such societies. Later in middle of the 20th century anthropological and ecological aspects were also included with it. Ethnobotanical study escalated during 1980's and the subject became multidisciplinary (Cotton, 1996). Since time immemorial man has used various parts of plants in the treatment and prevention of many ailments. (Chah et. al., 2006).
Ethnobotany is the science simply defined as “the existing interrelationship between plant-animal, animal-human and plant-human”. In last few decades ethnobotany has become an important thrust area of research for the documentation and preservation of historical traditional knowledge at tribal level as well as to develop resource management, conservation of biological diversity at genus, species, ecosystem, forest type and regional level. On other hand Ethnobotanical knowledge has been described so far as variety of terms that can be each interpreted in slightly different ways. Indigenous Traditional Knowledge (ITK) and Indigenous Botanical knowledge (IBK) are some of the terms used recently for the description of the information with reference to ethnobotanical importance.

With the advancement of ethnobotany, many definitions have been given for the term, from time to time. Some of the popular definitions are:

a. Aboriginal botany: The study of all forms of vegetation which aborigines use for commodities such as medicine food, textile and ornaments (Power, 1873).

b. Ethnobotany: The study of plants used by the primitive and aboriginal people (Harshberger, 1895).

c. Not just a record of plant use but the traditional impressions of the total environment has revealed through custom and ritual. (Robins et. al., 1916).

d. The study of the relations which exist between humans and their ambient vegetation. (Schultes, 1941).

e. The Study of interrelations of primitive man and plants (Jones, 1941).


g. All studies (concerning plants) which describe local people's interaction with the natural environment. (Martin, 1995).

h. Total natural and direct interrelationship between man and plants and his domesticated animals (Jain, 2002).
Ethnobotany deals with the direct relationship of plants with man. The term has often been considered synonymous with either economic botany or with traditional medicine. Early origins of traditional medicine must have had their roots in ethnobotanical folklore, but today traditional medicine incorporates several well organized, distinct systems of diagnosis and cure. In India alone, three traditional systems of medicine namely Ayurveda, Siddha and Unani are distinguished. Further, ethnobotany includes study of foods, fibers, dyes, and tans, other useful and harmful plants, taboos, avoidances and even magico-religious beliefs about plants (Jain, 1967; Ford, 1978).

The first book published titled “aboriginal botany” (Power, 1873) describe the botanical investigation of native plant use, a term which was readily accepted by the academic community over the next 25 years. However, as the nineteenth century drew to a close, interest in aboriginal botany began to broaden, particularly during preparations for the 1893 World's Fair which involved both anthropologists and archaeologists in the collection of traditionally useful plant products (Ford, 1978). Significantly, this exhibition included the hazard collection, a range of preserved plant products used by the ancestors of the Pueblo Indians in Mancos Canon in Colorado, and which was later sent to the University of Pennsylvania for analysis. There, a botanist, John Harshberger examined the collection, and in December 1895 he finally delivered a lecture in which he described items of food, dress, household utensils and agricultural tools of plant origin preserved in the hazard collection; it was during this lecture the term ‘ethnobotany’ was first used (Harshberger, 1896).

In the decades which followed, the study of ethnobotany entered a phase of rapid expansion and change. Only a year after his historical lecture, anthropologist Walter Fewkes introduced Harshberger’s term to the anthropological literature, where he emphasized Hopi Indian plant names and their etymology; in 1900 the first doctoral dissertation in ethnobotany, “The ethno-botany of the Coahuilla Indians of Southern California” was
awarded to David Barrows by the University of Chicago. In 1916 “ethnobotany” had expanded to include not only how plants were used by indigenous peoples, but also how they were perceived and understood within different cultures (Robbins cited in Castetter, 1944). This last point was later expanded by American ethnologist Melvin Gilmore who argued both the need to interpret ethnobotanical data within its cultural context, and the important role of linguistics in ethnobotanical study.

The present century has witnessed the emergence of Ethnobotany as a distinct academic branch of the natural science. All over the world, these has been an increasing interest in the scientific study of man-plant interaction in the natural environment which is clearly visible among various indigenous people commonly designated as Aboriginal, Natives, Autochthonous, Adivasi, Vanyajati, Forest dwellers, Adimjati, Janjati, Tribals etc. Ethnomedicine is a component of Ethnobotany which refers to the use of plants by humans as medicine.

Recent development of Ethnobotany in India has been strongly oriented towards the promotion of documentation of traditional knowledge, traditional herbal medicine, traditional famine foods, traditional resource utilization, traditional sustainable use and management of natural resources, traditional conservation practices of natural biological resources etc. with applied approaches in the field.

1.3 CURRENT STATUS OF MEDICINAL PLANTS IN THE WORLD

The importance of Traditional System of Medicine has now been recognized all over the world. This has lead the WHO experts to define the traditional medicine as “the sum total of all knowledge and practices whether explicable or not used in diagnosis, prevention, and elimination of physical, mental and social imbalance and relying exclusively on practical experience and observation handed down from generation to generation whether verbally or
in writing. The traditional system of medicine might also be considered as a solid amalgamation of dynamic medical source, how an ancient experience”. This is the foundation stone of Ayurveda in utilizing the plant material available in India from times immemorial. The term “herbal drug” determines the part/parts of a plant (leaves, flowers, seeds, roots, barks, stems, etc.) used for preparing medicines. Furthermore, WHO (2001) defines medicinal plant as herbal preparations produced by subjecting plant materials to extraction, fractionation, purification, concentration or other physical or biological processes which may be produced for immediate consumption or as a basis for herbal products.

Despite the increasing utilisation of modern medicine with consequent reduction in morbidity and mortality, traditional medical systems still persist and exert significant influence on the state of health, medical decisions, and outcomes in developing societies. Modern medicine generally has been established in these societies not so much by displacing indigenous medicine but by increasing the medical options available to the people. In these pluralistic medical situations, one medical system may be influencing the other. Modern medicine can more effectively serve populations in developing areas by utilising the resources of indigenous medical systems. Knowledge of the reasons for these choices would be of practical value to improve local, regional and world health and also can contribute to a general understanding of human behavior in relation to culture changes.

Ackerchnecht (1942) said that medicine is no where independent and follows its own motivations. Its character and dynamism depend on the place it takes in every cultural pattern. They do not of course cover the whole range of misfortune a society may face and they can reflect its member’s view of misfortune in a general sense (Maclean, 1966).

Plants have been used as source of medicine by man from ancient times, and it is accepted that plants are useful in their crude or advanced forms as drugs. Medicinal plants are plants containing inherent active ingredients used to cure disease or relieve pain (Okigbo
et. al., 2008). The use of traditional medicines and medicinal plants in most developing countries as therapeutic agents for the maintenance of good health has been widely observed (UNESCO, 1996). The total number of prescription dispensed in public pharmacies in U.S.A had consistently contained about 25% of plant derived drugs. In Africa, 80% of the prescription depends mainly on herbal medicine and this situation is likely to continue (Bickmann, 1984).

According to an estimate of the World Health Organization (WHO), approximately 80% of the people in developing countries rely chiefly on traditional medicine for primary health care needs. It is assumed that 20,000 – 30,000 species of higher plants are used as medicines in various culture of the world. In India the contributions made during the last one hundred years have meticulously brought into focus much of the diverse information on a large number of medicinal plants. In recent times, the interest in the use of herbal products and the focus on plant research has grown dramatically in the western world as well as developing countries (Loya et. al., 2009; Mythilypiya et. al., 2007; Sparreboom et. al., 2004; Vaidya, 1997). Medicinal herbs as potential source of therapeutic aid has attained a significant role today in health system all over the world, not only in the diseased condition but also as potential material for maintaining proper health. The size of the worldwide market of herbal medicines is estimated to be around US $80 billion to US $100 billion and this market is expected to reach US $2500 billion in near future (Mathur, 2003; Agrawal and Raju, 2006). In the west, the demand for herbal drugs has reached a new high in recent years. Since 1999, the global market for herbal supplements exceeded US $15 billion, with a US $7 billion market in Europe, US $2.4 billion in Japan, US $2.7 in the rest of Asia and US $3 billion in North America (Wakdikar, 2004). The results of a nationwide survey in USA indicated a marked increase in the number of individuals using alternative therapies between 1990 and 1997 estimating total out-of-pocket expenditures for alternative therapies at $27
billion (Eisenberg et. al., 1998). According to a recent estimate in a study, 70-80% of the world populations especially in developing countries rely on traditional medicine, mostly plant drugs for their primary healthcare needs (Agrawal and Raju, 2006). About one third of the adults in developed countries and more than 60% Asians use herb as an alternative medicines (Zhou, 2007).

As the use of herbal medicines is steadily growing, public, academic and government interest in traditional medicines is growing exponentially due to the increased incidence of the adverse drug reactions and economic burden of the modern system of medicine (Charrois et. al., 2007). The total turnover of the herbal drug industry is estimated to be around US $500 millions. The global market for herbal medicines is 150000 crores of rupees, as estimated by a United Nations Development Programme (UNDP) study. It is expected to grow to ten times in the near future (Karki, 2000). There are estimated to be over 5000 plant-based medicine-manufacturing units in India with an annual turnover of over Rs. 2000 crores per year (Anonymous, 2000). The herbal cosmetic industry also uses these plants. The annual turnover of the Indian Herbal Industry is estimated to be around Rs. 2300 crores per year (FRLHT, 1999).

Modernization is posing serious threats to medicinal plants and associated systems. Public are attracted to the modern system of medicine, which provides quick relief, at lower cost. But, in recent times, there has been an increasing awareness about the significance of medicinal plants and their use. There has been revival of interest in knowing about many medicinal plants and their by-products which are inherently safer and more efficacious than the modern, potent synthetic drugs which very often produce undesirable side effects in man. This prompted the people to return to the ancient and traditional system of phytomedicines or herbal medicines. With the result, the use of natural medicines or herbal
drugs has gained momentum and the demand for herbal raw drugs and other products is increasing many fold.

It is noteworthy that some of the most important drugs of the last 50 years for some serious diseases, which did not have suitable remedies in the modern system have been developed from plants (Trivedi, 2004). Thus medicinal plants constitute a group of industrially important crops which bring appreciable income to the country by way of export. Apart from health care this enterprise provides means of livelihood to scores of people.

1.4 SCENARIO OF MEDICINAL PLANTS IN INDIA

Western Scientists were attracted by the richness of Indian medicinal plant wealth long time ago, the first one being Garcia de Orta (1563), a reputed pharmacist, who adopted over a dozen of the Indian species into his personal Materia Medica. The Dutch Governor to Malabar Henderik Adriaan Van Rheed, during the period 1678 to 1693, published Hortus Malabaricus in 12 volumes. It contains the description of 791 species, illustrations of 742 species and information on medicinal and other uses of these plants of the Malabar region, and the book is a landmark in Indian botany and medicinal plants.

'Doctrine of signatures' advocated by an eccentric genius Paracelsus (1493-1541) suggested that plants possessed certain signs given by God, which indicated their usefulness in treating diseases of similarly shaped organs in the human body. Plants, for example, with heart shaped leaves were used for heart diseases. The lanecolate leaves of Sansevieria roxburghiana with transverse striations have some likeness to the striated body surface of vipers and the plant has been used by the Kani tribes of Kerala as a remedy for snake poison (Jawahar, 1996).

A survey conducted by the All India Co-ordinated Research Project on Ethnobiology (AICRPE) during the last decade recorded over 8000 species of wild plants used by the tribal
and other traditional communities in India for treating various health problems. The recorded plant species include trees (33%), herbs (32%), shrubs (20%), climbers (12%) and epiphytes, grasses, lichens, ferns and algae put together (3%). Among 2,000 drugs being used in curing human ailments in India, only 200 are of animal origin, 300 of mineral origin and the rest 1500 drugs are extracted from various plants (Aggarwal and Ghosh, 1985).

The world trade now is estimated to be over US $ 60 billion per year. The World Health Organization’s (WHO) forecast is that the global market for herbal products is expected to be US $ 5 trillion by 2050 (NMPB, 2002). India is rich in all the three levels of medicinal biodiversity such as species diversity, genetic diversity and habitat diversity. All known types of agro climatic, ecological and edaphically conditions are met within India. Schultes (1962) explained about the Indian ethnobotanical emporia in his words: India with her many living groups of people, having diversified ethnic culture, history of rituals and performances, who are more or less isolated from modern world, and are closely associated with their ambient vegetation is the emporia of ethnobotanical research”.

The tribal people or the indigenous people (as they are acknowledged by the environmental agencies and United Nations) living closest to nature are influenced more by socio-cultural and environmental dimension in their healing practices. India with its sizeable tribal population (12% of the total population) consisting of 162 major tribes and 270 minor tribal communities has much more to contribute to the traditional health care and healing systems (Mahanti, 1994).

1.5 PROSPECTS FOR THE DEVELOPMENT OF MEDICINAL PLANTS

The opening up of global markets is bringing in expanding opportunities and demand for new resources, materials and products. Increasing awareness regarding the protection of the interests of the disadvantaged people and bio-diversity conservation is also
leading to renewed interest in medicinal plants. Search for new medicines for the prevention and cure of deadly diseases also provides prospects for developing medicinal plants. Medicinal plants are among the few developing country natural resources that sell at premium prices. Thus global clamor for more herbal ingredients creates possibilities for the local cultivation of medicinal plants as well as for the regulated and sustainable harvest of wild stands. Such endeavors could help in raising rural employment in the developing countries, boost commerce around the world, and perhaps contribute to the health of many people.

The use of plant-based medicines is expanding rapidly worldwide and any economic activity relating to the growing of medicinal plants for commercial purpose is bound to be a viable enterprise. The entire scheme is low-cost and provides an effective way of treating illness without consuming costly medicines (FRLHT, 1999). As a large amount of private sector investment is possible in this sector, medicinal plants can be developed as a mean for sustainable economic development, safe and affordable health care and conservation of biodiversity.

1.6 DOMESTICATION OF MEDICINAL PLANTS

Domestication of medicinal plants involves their manipulation and cultivation for specific uses. During the domestication process, wild plants are first brought to some form of management. In a later stage of the process, wild plants are actively cultivated. In the final phase, the process involves the selection and breeding of selected genotypes resulting in rather uniform plant populations with a narrow genetic base (Wiersum, 1995). Broadly speaking, it is the process of increasing human-plant interactions. Domestication has several advantages: a consistent, predictable supply; an opportunity to select for desirable genetic traits; and protection of diminishing wild resources.
The first stage of domestication of medicinal plants, viz. gathering wild plants and managing them is already under way in many countries. The second stage, namely cultivation of medicinal plants has not gained momentum. Systematic cultivation of these plants could be initiated only if there is a continuous demand for the raw materials. It is therefore necessary to establish processing facilities in the vicinity of cultivation in order to create a demand and assure the farmers of the sale of raw materials (Silva, 1995).

If developed properly, the domestication of medicinal plants has the features of providing the poor with a route out of poverty, saving a heritage of human knowledge and putting it to global use, revitalizing the economies of many developing countries, saving natural bio-diversity and improving the output from natural forests and tree plantations.

1.7 SCOPE OF THE STUDY

About 35000 to 70000 plant species have at one time or other been used in some culture or other for medicinal purposes. They are used in both traditional and modern systems of medicine. At least 25 per cent of the drugs in the modern pharmacopoeia are derived from plants. Around 75 percent of the global population and more than 80 per cent of the people in South Asia rely on medicinal plants for their primary health care needs (Nickel and Sennhauser, 2003). 75 to 80 per cent of people in the developing world depend on traditional medicines derived from plants, insects and animal produces with an estimated value of about US $ 35 to 40 billion (Chandrashekar, 2000). The total value of the traditional medicinal products worldwide is estimated to be as large as that of modern medicines-about US $ 80-90 billion (Karki, 2000).

Over 7500 species of plants are estimated to be used by 4365 ethnic communities for human and veterinary health care in India (Rajasekharan and Ganeshan, 2002). The World Health Organization (WHO) has listed over 21,000 plant species used around the
world for medicinal purposes. In India, about 2,500 plant species belonging to more than 1000 genera are being used in indigenous systems of medicine. India is tenth among the plant rich countries of the world and fourth among the Asian countries. The Eastern Ghats and Western Ghats harbours about 5,332 endemic species of higher plants (Lokesha and Vasudeva, 1997). Twenty-five global hot spots have been identified so far, of which the Western Ghats and Eastern Himalayas are located in India are of significance (Myers et al., 2000).

Macro analysis of the distribution shows that medicinal plants are distributed in diverse habitats, with around 70% of the resource are found in the Indian subcontinent spread over Western and eastern Ghats, the Vindhyas, Chotta Nagpur plateau, Aravallis, the Terai region in the foothills of the Himalayas and the northeast. Less than 30% of the medicinal plants are found in the temperate forest and higher altitudes (Balasingh et al., 2000; Rajasekharan and Ganeshan, 2002). Micro-ecological studies show that larger percentages of medicinal plants are occurring in dry and moist deciduous forest as compared to the evergreen or temperate forests (Balasingh et al., 2000; Rajasekharan and Ganeshan, 2002).

Even in this day of increasing spread of allopathic medicines, there are hundreds of millions of people in India who are dependent on biodiversity for their health needs. It is a tradition that is of remarkable contemporary relevance for ensuring health security to the teeming millions. The Indian system of medicine has identified 1,500 medicinal plants of which 500 are commonly used (Agrawal and Raju, 2006). It is estimated that there are over 7800 medicinal drug-manufacturing units in India, which consume about 2000 tones of herbs annually (Ramakrishnappa, 2003).

There are estimated to be around 25,000 effective plant-based formulations, used in folk medicine and known to rural communities in India. In spite of widespread use of herbal
remedies, scientific data about their safety and efficacy are lacking in most cases plus reporting of adverse drug events is currently limited. To worsen the scenario, in the Indian systems of medicine, most practitioners formulate and dispense their own recipes which are available without prescriptions. The same require proper documentation and research. The lack of available clinical data for many herbal products serves as a barrier for post marketing safety assessment of herbal products (Chavez et. al., 2006).

The northeastern region is one of the richest biodiversity zone in the Indian sub-continent with high endemism. It is a rich region of ethnobiocultures. The actual forest cover is also high despite the ongoing practice of ethnoagriculture. The unique richness of ethnoculturo-biodiversity is a great challenge to the scientist to explore the region (Lalramnghinglova, 2000).

The state of Mizoram receives little attention so far as the survey of medicinal plant is concerned. The ethno medicinal knowledge of the tribes of Mizoram has descended through generations since time immemorial; Lalramnghinglova and Jha (1997), Lalramnghinglova (1996), Lalramnghinglova and Jha (1999) and Lalnundanga (2000) have conducted ethno botanical survey of Mizoram. Nevertheless, no effort has been made on the survey of medicinal plants of Eastern Himalayan Montane forest of Mizoram and there is no proper documentation with regards to judicious utilization and management. There is, therefore, a need for documentation of the valuable traditional knowledge about medicinal plants and domestication of economically important medicinal plants of Eastern Himalayan Montane Forest of Mizoram for the purpose of decreasing pressure over natural resources, conservation, education and research in the development of new drugs.
The present study is carried out with the following objectives:

- To survey and document the Traditional Knowledge System (TKS).
- Collection and identification of indigenous medicinal plants and preservation of voucher specimens in the herbarium for future reference.
- Screening of economically important medicinal plant species.
- To determine ecological status by measuring various micro-climatic variability around important medicinal plants.
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