CHAPTER - I

GENERAL INTRODUCTION

HISTORY AND IMPORTANCE
Research, which is a window on the past and mirror of present is an activity in the quest for knowledge and is a link between matter & thoughts, leading to innovation and discovery both in the realms of ideas and practice. But it may be noted that although research is not just futuristic but provides the essential futuristic perspectives. Needless to mention that no discipline or significant activity can sustain itself without research and this holds good as much to Ayurveda and Siddha as to any other branch of knowledge.

Drug research which is an important dimension of research in Ayurveda is necessary for maintenance and reinforcement of drugs and their standardisation. Without drug research proper and reliable standardisation and cross experiment of the ability of various drugs will be hard to accomplish, which not only helps in the identification of traditional or time-tested herbs but also in the discovery and applications of new species, and the formulation of new compounds.

The welfare of mankind is served by the species that share the earth along with him. The plant kingdom has always been man's principle source to meet his necessities and amenities of life like primary requirement of food, medicinal and industrial raw materials. The use of plants for the alleviation of human suffering is as ancient as civilization
itself. In all ages, people throughout the world have attempted to utilize the flora and fauna of their respective regions for the relief of ailments. The present system of medicine owes much to the past knowledge which has been passed down by our ancestors for remedies developed by different civilizations in different periods of history. It is a well known fact that nature alone knows what is in its store. Therefore, man is busy finding which plant can cure which ailment.

The conception, gestation, birth, growth, death, maturity, diseases and decay are the the secrets and inexorable laws of nature. Primitive man in different ages had very little knowledge of medicinal plants and knowledge has been derived as a result of trial and error, which was mainly based on speculation and superstition. This led people to believe that disease was due to the presence of evil spirits in the body which could be thrown out only by the use of poisonous disagreeable substances calculated to make the body an unpleasant plan in which to remain. The knowledge regarding the source and use of various products suitable for the purpose was locally restricted to the medicineman of the tribes.

The natural sources are a common heritage, which we shared with the past generation and our future generation will be inheriting these resources from us. The early human beings subsisted on the natural means of subsistence i.e. edible plants and hunting of animals, without much of
processing. The more primitive the society the higher is its dependence on its immediate environment.

India presents extreme variety in its meteorological and climatic conditions, its topographical features as well as fauna and flora. The country as a whole is in fact an epitome of almost all the climates, seasons and soil of the world, receptive to all types of vegetation including plants containing active medicinal principles. Three fourth of the drugs used in the pharmacopoeias of different countries grow here in a state of nature and others can be cultivated. It is for these reasons that the Indian medicinal plants have drawn the attention of scientists all over the world.

A very sensitive area of enquiry in Ayurveda comprises mainly, a survey of Medical history, (Ayurveda and Siddha), documentation, systematic study, their critical examination and finally the interpretation of ancient texts and an understanding and evaluation of modern pathophysiological concepts and other theoretical and applied studies.

Strange are the ways in which the drugs are discovered. The therapeutic hints from remote mists of time and the primitive as well as folk medical lore even today, as in the past, holds the key of the treasure of medicinal knowledge. A plant used to make a particular tea in West-Indies, was supposedly useful in diabetes turned out to be *vinca rosea* and further investigations carried out suggested
the possibility of its importance in the treatment of Leukaemia. Coupling of scientific observations with added interdisciplinary studies to folk use of plants brought out new and newer drugs heralding a herbomedical renaissance.

Thus, due to the obvious reasons of easy availability of number of plants growing around, the very initial experiments of their medicinal uses were conducted. The records about the use of medicinal plants in India can be traced back to the ancient civilizations of pre-Rigvedic times. The earliest written record on sporadic mention of plants was made in Rigveda (4500-1600 B.C.). Later, in the Arthavaveda, it is seen that plants have also been used as charms and amulets for the cure of various diseases. The real foundation of the ancient medicinal science was, however, laid probably between 2500 and 900 B.C., with the development of the science of Ayurveda.

After the Vedas, there is no information on the development of this science in India for a period of about 1000 years (Jain, 1985). Then came the two most important works on Indian system of medicine, the works of Charak and Susruta, namely, the "Charak-Samhita" (1000-800 B.C.) and "Susruta-Samhita" (800-700 B.C.). Susruta-Samhita deals with about 700 drugs, some of these were not indigenous to India. A large number of plants have been mentioned for their medicinal properties and uses in the ayurvedic literature including "Nighantus" (2735 B.C.). These plants were described by their local or common names. With the passing
of time, more and more plants found entry into native medicine, taking the number of Indian medicinal herbs to about 1500. Later during the Buddhist period, considerable progress was made and medicinal plants were cultivated under the direction of highly qualified specialists such as Bhikshu Atreyà, Patanjali, Nagarjun, Madhavakar, Chakradatta, Sarangadhar, Sankara and Bangasen (500-100 B.C.), who expanded the vegetable materia-Medica of Hindus. Contacts with Greece and Rome and later with Arabia and Persia, contributed to the enrichment of the Indian Materia Medica and large number of vegetable and other products came into use for the treatment of diseases (Chopra et al. 1956).

The systematic study of Indian medicinal plants was first started in the early part of the nineteenth century. John Fleming's "Catalogue of Indian Medicinal Plants and Drugs" was published in 1810. It was followed by Ainslie's "Materia Medica of Hindoostan" (1813, 1828) and Roxburgh's "Flora indica" (1920-1924) respectively. In 1841, a book by O'shaughnessy's "The Bengal Dispensatory and Pharmacopoeia" was published. Another "Pharmacopoeia of India" was published by Waring (1868), which ushered in new epoch towards the understanding of indigenous medicinal plants. Dutta's "Materia Medica of the Hindus" (1877), Dymock's "Vegetable Materia Medica of Western India" (1883) and contributions by Khory (1887), and Dey (1896) are valuable works relating to "The Medicinal products indigenous to India".
The two comprehensive works "Pharmacographia India" by Dymock, et al. appeared during 1889-1893 and "Dictionary of Economic products of India" by George Watt (1889-1896) are the most valuable contributions of the 19th century. "Indian Materia Medica" (Nadkarni, 1926), compiled much information about Medicinal plants from Ayurvedic Materia Medica and other sources. Kirtikar and Basu's "Indian Medicinal Plants" (1935) compiled enormous information in 4 volumes.

Simultaneously, valuable works were published, e.g. Indigenous Drugs of India (Chopra, 1933), Indian Pharmaceutical codex (Mukerji, 1953), "Monographs on Pharmacognosy of Root and Rhizome Drugs and Pharmacognosy of leaf Drugs" (Chopra R.N. and Chopra I.C., 1955), and Chopra's "Indigenous Drugs of India" (Chopra et al. 1958) could be considered as significant landmarks of the present century. A revised edition of Nadkarni's work has recently been published (two volumes) by his son (Nadkarni, 1976). "Wealth of India" Published in eleven volumes (Anonymous, 1948-76) under the auspices of the council of scientific and Industrial Research, is a fine example of our attainments after independence. More recent works like Medicinal Plants of India (Satyavati et al. 1976), and Cultivation and Utilization of Medicinal Plants (Atal and Kapur, 1982), Medicinal Plants (Jain, 1985) and a large number of research papers have added to the Wealth of literature on Indian Medicinal Plants.
The knowledge of drugs goes back to prehistoric times and plants have held a leading place as a source of drugs. There are many plants which were used in ancient times and are still being used today.

The study of drugs and drug plants has developed into modern Pharmacognosy (Pharmacognosy = drugs and gnosis = to know) which deals with the knowledge of history, Botany (including properties and methods of preparation of drugs), prevention and commerce of crude drugs. Herbalism has always been the important branch of medicine for centuries in all parts of the world.

"Ethnobotany" a branch of science, deals with the study of the past and present interrelations of primitive or aboriginal human societies with the ambient vegetation. The earliest use of the term ethnobotany was made by Harshberger in 1896 to indicate plants used by aborigines. Earlier, Powers (1873-75) had used the term "aboriginal botany" to refer to a study of all forms of the vegetable world which the aborigines used for medicine, food, textile, fabrics, ornaments etc. Subsequent workers like Schultes (1941, 1960), Faulks (1958), Richard (1978), De (1968) and others have used the term to include the relationship between primitive societies and their plant surroundings in the widest sense. "Aboriginal Botany" was in 1916 that Robbins, Harrington and Freire-Marreco promulgated the broad definition of the term ethnobotany which went beyond mere
identification and cataloguing of plants used by primitive peoples and attributed to this discipline, a study and evaluation of the knowledge of all phases of plant life amongst primitive societies and of the effect of the vegetal environment upon the life, customs, beliefs and history of the people of such societies, the term ethnobotany has often been considered synonymous with traditional medicine or with economic Botany. The Ethnobotany has today come to denote the entire realm of direct relationship between plants and man.

The early origin of traditional medicine must have their roots in ethnobotanical folklore, but today, traditional medicine incorporates several well organised and distinct system of diagnosis and cure. In India alone, three traditional system of medicine namely 'Ayurveda', 'Unani' and 'Siddha' are distinguished. There are Tibetan and Chinese Traditional System. Further ethnobotany not only deals with medicine but it covers the whole gamut of man's activity of farming, hunting, home and social life, food habits, religious beliefs and ceremonies, traditional medicines, entertainments and so on-in all of which can be discussed a strong presence of ayivan surroundings. Ethnobotany must have been the first knowledge which the prehistoric man had acquired by sheer necessity, intuition, keen observation and experimentation. Commerce of modified plant products by man primarily is economic botany.
The tribal people and ethnic races throughout the world have developed their own cultures, customs, religious rites, taboos, totems, legends and myths, Folk tales and Songs, witch-craft, foods, medical practices etc. Numerous wild and cultivated plants play a very important and vital role among these cultures and this interrelationship has evolved over generations of experience and practice. These studies have, therefore, also been used in tracing human and plant migrations, Origin, dispersal and domestication of cultivated plants in linguistic analyses in archa-ecological identifications, agricultural techniques and agronomy, horticulture, pharmacopoeia etc.

In due course of time, with the development of modern societies these "Wonderherbs" have been forgotten by a majority of the people but still this knowledge is survived with the so called 'Tribals' or 'Aboriginals'. The system of medicine practised by the primitive 'Folk healers', 'Medicine men' and 'Old Villagers', has been called as the 'Folklore medicine' or 'Traditional medicine'. Usually folkloric information comes from persons who have had no formal training or apprenticeship in recognised system of medicine. Folk medicine has its own diagnostic tools. In villages 'Medicine Men' or 'Vaidyas' know these plants which are used in different diseases.

The Ethnobotany of medicinal plants is known as 'Ethno-medicine'. The importance, scope and implications of Ethnomedicine have been expanding throughout the world
with a very fast rate. The ethnomedicinal studies have shown their relevance in search for new herbal drug for human health.

Recently, the term ethnobotany has rightly been applied by Jain (1987) to natural & direct relationships with plants of any people, at any level of antiquity, pricetiveness or acculturation and even to the most sophisticated of gentlemen or women of the letter associate only particular plants with festivals or offer flowers or fruits to their God or deities recall the paradise flower, plants of Bible, Ramayana, worship of Basil or Lakshmi, the Goddess of prosperity of Lotus.

Man's life has always been intimately connected with plants around him. There is practically no human activity in which plants don't play a direct or indirect role. Therefore, in the widest sense, Ethnobotany has a linkage with almost every other science or field of knowledge.

The linkages of Ethnobotany with fifteen important disciplines suggested by Manilal (1989) are, Food & nutrition, Defense and Survival, Sociology and Cultures, Religion, Medicine, Art and Literature, Mythology, Archaeology, Anthropology, Forestry and Agriculture, Economics, Language, History & Politics, Ecology & Conservation etc.

A rich plant lore has been passed on by word of mouth and by tradition from generation to generation in
different parts of the world. The development of this science of the human cultural ecology has proceeded independently in various countries and various field surveys have been carried out amongst primitive and tribal populations in several parts of the world. Schultes (1962, 1963, a,b) narrated the role of ethnobotany in search of new drug yielding plants. Turner and Bell (1971) worked on the ethnobotany of the coast salish Indians of vancouver Islands. Barrau (1958, 1961) published the information related with the subsistence agriculture in Honolulu. Vidal (1959, 1960, 1961, a, b, 1962) Gupta (1963), contributed a series of papers on the uses of various plants in France. Hartwell (1967-1971) provided a large compilation of antitumour plants, from old texts and local folk medicines from all over the world.

In India, the diversified ethnic culture distributed along a vast area and the old history of rituals and observance related to the plant world provide a fruitful ground for ethnobotanical investigations. A number of folk medicines preserved with the tribals and rural people living in deep virgin forests, offer considerable scope for such studies. According to Chakravarty (1975), a large number of indigenous herbal drugs are used as family cures all over India, especially by the rural folks. These plants with recorded medicinal properties may include more than two thousand species. Thus, considering the importance of ethnobotanical investigations, a number of ethnobotanical surveys have been carried out in different parts of the

The considerable amount of work has been done on medico-botanical aspects (Shah, 1979) but exclusive ethnobotanical researches are very scanty and sporadic. Sharma (1968-69) enlisted 248 botanical drugs which are mentioned mainly in Arthavaveda and Rigveda. Singh and Chuenkar (1972) published a glossary of such medicinal plants, which have been mentioned in Charak Samhita, Sushutra samhita and Ashtanga Hridayam. Sharma (1971, 1972, 1973) reviewed the Nighantus and other treatises and listed the plants mentioned therein.

The central council for Research in Indian Medicine and Homeopathy Conducted several medicobotanical survey in some important ethnic & tribal regions of the country. Raghunathan recorded various medicinal plants used by Nicobaris (1976a) and by herbal doctors in Ladakh (1976b) and From Six tribal Communities of the Nilgiris (1976c).

In India, several ethnobotanical surveys were carried out by various workers in different parts of the country and a number of valuable data on the use of
indigenous medicinal plants were recorded the important contributions in the subject are given below:

Ethnobotanical studies in Gondhamardan hills of Orissa resulted in the recording of folk-medicinal uses for nearly 200 species (Brahmam & Saxena, 1990). A scrutiny of the important published literature (Ambasta et al. 1986; Anonymous, 1948-76; Bal, 1942; Chopra et al. 1956, 1968; Panigrahi, 1963; Jain, 1964, 1965 a,b; 1967 b; 1970-71; Pal and Banerjee, 1971; Raichaudhury et al. 1975; Saxena & Dutta 1975; Saxena A.P. 1978; Mudgal & Pal 1980; Paul and Mudgal, 1985) revealed that the uses of about 77 species are new or interesting findings of the recent researches. The mention may be made of the intensive work carried out in various other parts of the country. In Orissa, information about medicinal plants and their uses have been recorded by Rath (1981), Saxena et al. (1981), Trivedi et al. (1982) and Das and Mishra (1987). Pal (1981) enumerated about 25 plant species used for the treatment of various diseases of domestic animals by the tribals (Munda, Oran, Santhal, Lodh, Kondh, Bhumij, Ho and Mech) of Bihar, Orissa and West Bengal.

The Himachal Pradesh and north-western U.P. have also been surveyed for the plants used in folk medicines. The collections were made by Ahluwalia (1952) in Kangra, Gupta (1960, 1962) in Garhwal, Shah and Joshi (1971) in Kumaon hills, Banerji (1955) in east Nepal, Biswas (1958) and Rao (1961) in the eastern Himalayas. The sub-Himalayan Terai
region has the largest concentration of tribal people in the state. A number of workers (Joshi et al. 1982; Kalakoti and Pangtey, 1984) have worked on the herbal folk medicine of the different regions of the state; however, the interesting and important work on the tribes of terai region has been done by Maheshwari et al. (1980, 1981). Gupta et al. (1980) explored ladakh from ethnobotanical point of view and collected about 800 plants species including 250 folk medicinal plants used by the tribals, local inhabitants and Amchis. Uniyal and Malhotra (1981) recorded about 70 species of plants used by local inhabitants of Garhwal (Pauri) for various purposes. The work has also been done by Atkinson (1882) in the Himalayas region, Bodding (1925 and 1927) with the Santhals; Shah and Joshi (1971) for kumaon region of India, Uniyal et al. (1973) in Lahul spiti, forest division of Himachal Pradesh. Virendra Singh (1994) reported some ethnomedicinal plants used in the treatment of worm infestation from Kashmir Himalaya.

In Arunachal Pradesh, Tiwari et al. (1980a) collected the information on the tribal medicine for the treatment of about 15 common ailments from district siang. Dam and Hajra (1981) reported 76 species of plants used by Monpas a tribal population of kameng district for their food and medicines etc.

The ethnobotanical surveys in Western India were carried out by Bhandari (1974), Bedi (1978), Bennet (1978), Ghate and Vartak (1984), Joshi et al. (1980) recorded
medicinal uses of about 82 plant species by the tribals of Dangs in Dangs district of Gujrat. Patel et al. (1981) collected the folklore data from vaidas, farmers and villagers of Bhavnagar District (Gujrat) and reported 82 important medicinal plants having laxative properties. Kakrani & Saluja (1994) reported some medicinal plants used as analgesic, anti-inflammatory, antirheumatic, antirheumatic in rural regions of Kutch district.

The eastern India, Chaudhuri and Pal (1978) reported uses of about 25 plants for medicinal purpose by lodhe of Midnapore district (West Bengal). In the other states of eastern India, the important contributions on the ethnobotany have been made by Bhattacharjee et al. (1980), Jain and Borthakur (1980), Chandra (1989) and Bennet (1983).

In Maharashtra, Majumdar et al. (1978), Kamble and Pradhan (1980), Rao (1981 a,b), Saxena and Vyas (1983) and Vartak and Ghate (1990) have also made ethnobotanical observations on various aspects. Vartak et al. (1981) reported 26 wild medicinal plants used by tribal communities to cure human ailments from western Maharashtra and Goa.

In South India, Abraham (1981) worked out the Ethnobotany of certain tribes (Todas, kotas & Irulas) of Nilgiris and reported about 35 plant species being used for various medicinal purposes.

In Karnataka, Razi and Subramaniam (1978) and Yoganarasimhan et al. (1982) have studied a good number of medicinal plants.

The collections were made by Painuli & Maheshwari (1994), Dwarakan et al. (1994) have worked on the unreported medicinal uses of plants from kolli hills, Salem district of Tamil Nadu.

Important folklore claims on medicines and treatment were recorded by Tiwari et al. (1980b), in district of Kamrup of Assam which lies in the North-Eastern region of the country.

In Haryana folk medicines have been studied by Lal and Yadav (1983).

Medicinal plants of Anadaman and Nicobar islands have been studied by Thothathri (1974). Srivastava & Mehrotra (1992) worked on a new term ethno-oceanobiology, a new sub-discipline of ethno-biology and deals with the uses of some marine plants by tribals of Andaman and Nicobar Islands.

The total number of scheduled tribes in India is 583, of which about 60-70 are inhabited in different district of
Madhya-Pradesh. More than 50% of the total tribal population of India lives in M.P. at various places. They form about one-fourth of the population of the state and in certain parts, such as in Mandla, Bastar and Balaghat districts, the tribals constitute even three-fourths of the population. Surprisingly however, only a few ethnobotanical investigations have been carried out in this vast tribal rich state of the country. Mention may be made of the work of Jain (1962, 1963, 1963a,b,c, 1965a,b); with the tribals of Bastar. Lot of work has been done on the vegetation and floristic studies in different districts (Pandeya, 1950-50; maheshwari, 1963 and 1983a, 1966; Jain, 1968; Kaushik, 1973; Mishra, 1984; Sahu 1991), Sahu (1982, 1983), Mishra and Sahu (1984); Oommachan and Masih (1987, 1991) and Shah and Singh (1990). Some folk medicines or remedies practised by tribals of Bastar have been discussed by Hemadari and Rao (1989). Some important contributions with reference to ethnobotanical aspects have also been made by Shukla and Oommachan (1984), Oommachan et al. (1989, 1990), Shrivastava (1985) in Jabalpur, Khan et al. (1982) in Bhopal; Maheshwari et al. (1986) on Bhil tribes of Jhabua District; Maheshwari and Dwivedi (1988), Rai (1985, 1988) in Chhindwara district; Roys and Rao (1957) and Kaufmann (1961) on Maria Gonds of Bastar. The ethnology of Gonds has been studied by Elwin (1947, 1950) and Grigson (1949) and Jain et al. (1973) contributed papers about the ethnobotany of the state. Similar ethnobotanical surveys have been carried out [Jain, 1988a; Jain 1981b; 1986; 1988; Jain et al. 1984 and 1989].
Barks of plants of family leguminosae used as source of medicine by Khan et al (1994). Ethnobotanical study carried out in the rural area of Marena district of M.P. deals with the traditional use of indigenous herbal medicines against various diseases (Sikaswar & Kaushik, 1992). Jain & De Filipps (1991) have briefly described about 1850 species of Indian medicinal plants.

Bundelkhand region of Sagar district of M.P., India is rich in medicinal plants and inhabited by various tribes and other people secluded from urbanisation and from impact of modern technological development provide good scope for such studies. Only a few preliminary reports on ethnobotanical aspects of this region are available (Saxena and Vyas, 1981; Sahu et al. 1983; Bhalla et al. 1982 and Sahu 1982; Dixit 1993; Malaiya, 1992; Jain 1991; Dixit 1994). Hence a survey of some selected localities was carried out for the collection of plants and the information regarding the use of medicinal plants was obtained by personal interviews with the tribal people, old men of villages, other local inhabitants, vaidyas, indigenous doctors and from the available literature.

Present day researches or investigations have been necessitated due to rapid depletion of natural resources on one hand and the dwindling traditional ethnic culture on the other hand.
The practical knowledge of medicinal uses of plants may be obtained either by a through survey of literature and/or by field studies among primitive people. Obviously on account of its great fundamental and applied importance, the study of plants and their uses with the help of tribal people is now receiving much attention from botanists and other research workers throughout the world. A number of organisations are turning "Back to nature", particularly towards the study of "traditional medical-lore". Traditional medical-lore is that which stood revages of time and has evolved out of the rich experiences of sages, Saints, Savants and Scholars. The term aboriginal or primitive refers to the indigenous people of the region with little or no technological development, no written languages, having a distinct culture of their own and living in small and economically isolated groups (Jain 1987b).

During the last two decades work on ethnobotany has been carried out by various institutions such as National Botanical Research Institute, Lucknow (NBRI), National Bureau of Plant Genetic Researches, Delhi (NBPGR), Central Council for Research in Ayurveda and Siddha, Lucknow (CCRAS), Central Drug Research Institute, Lucknow (CDRI), Central Institute for Medicinal and Aromatic Plants, Lucknow (CIMAP) and different Universities and Laboratories which are also actively engaged and contributing much in this field. Ethnobiological studies made in joint collaboration of National Botanical Research Institute, Botanical Survey
of India with other laboratories, have been analysed and summarised in annual report (Anonymous, 1984) of "All India co-ordinated Research Project on Ethnobiology". In 1981 the society of Indian Ethnobotanists was established with a view to keep this branch alive. Two seminars on recent Researches in Ethnobotany and Human Welfare first in 1981 and Second in 1982 were also conducted in India through this society.

It is however, being increasingly realized that such ethnobotanical studies would be more meaningful if the data so obtained are subjected to detailed experimental evaluation. In consultation plant chemists & pharmacologists for various analytical studies; these attempts are also likely to yield more valuable natural drugs, including various chemotherapeutic agents.

Phytochemistry has not only enriched modern medicine but has also provided valuable lead for drug designing. The medicinal properties of plants depend upon the presence of active principles. The isolation of active principles which possess the physiological and pharmacological activity from the medicinal plants and their successful utilization to alleviate human suffering have encouraged researchers to continue the investigation for finding out the new drugs from natural sources.

It is also being increasingly realized that the antibiotic drugs of microbial origin, inspite of being
extremely valuable cause the growing fear of emergence of resistant strains of pathogenic micro-organisms, allergic reaction and many side effects. Thus the importance of natural antimicrobial agents from higher plants is gaining increased recognition from modern scientists. The higher plants now represent the most potentially useful area for newer avenue of approach in the search for more efficacious "antibiotics". Obviously, therefore, a number of workers have carried out screening of Indian medicinal plants for their antibiotic activity (Joshi and Magar, 1952; Bhatnagar et al. 1961; Dhar et al. 1968; Bhakuni et al. 1969).

As such, with a view to further elucidating the importance of ethnomedicinal plants of the selected places of Sagar district, in vitro evaluation for their antimicrobial activity should be considered appropriate and desirable.

Thus based on the above mentioned background the present work, entitled "Studies on antimicrobial activity of some Indian traditional remedies" was undertaken, in which attention has been focussed mainly on the following aspects:

1. Survey of various localities of Sagar and Shahdol districts of M.P. for collection of information about the medicinal plants used particularly for the treatment of gastrointestinal infections based on personal interview with the local inhabitants including tribals of the area under study and by available literature.
(2) Collection, identification and preservation of the authentic plant samples.

(3) 'In vitro' antimicrobial studies of some selected medicinal plants extracts for their antibacterial and antifungal activity against certain pathogenic bacteria & fungi.

(4) Phytochemical analysis of most effective plant samples and their broad spectrum antibacterial activity.