Man has always leaned on plants for food, medicine and a variety of other products since the origin of the human race. More than 2500 species of medicinal plants are used by the tribal communities of this country. The present study was carried out to find out the floristic wealth and ethnomedicobotany of Sirumalai Hills and also to carry out phytochemical and antimicrobial activities of selected ethnomedicinal plants.

Sirumalai Hills is located in the tropical forest region of Southern Peninsular India and is constituted of different types of forest communities. Phytogeographically these forests are rich, not only with high species diversity but also with several palaeoendemic species which are botanically a ‘relict’ of an ancient and unique vegetation (Champion and Seth, 1968).

The climatic differences mainly influence the floristic pattern of the forest. In Sirumalai Hills. Most of the months are dry (February–August) and only during the winter season there is rainfall. The summer temperature rises well above 38°C and the minimum winter temperature rarely goes below 20°C, but
the foothills of Sirumalai Hills never go below 25°C (Fig. 2). Similar conditions were reported from the Alagar Hills near Sirumalai Hills (Rajan et al., 1996).

The geology and the soil types of Sirumalai Hills are closely related to Paini Hills (Matthew, 1999) and that might be due to close relationship between the land pattern. The eastern edge of the Paini Hills is also a part of the Eastern Ghats, having most of both the Eastern and the Western Ghats elements (Mani, 1974).

Sirumalai Hills was bypassed when the flora of British India was being written (Hooker, 1895). After the Hookers exploration, several species of the plants were collected from the Sirumalai Hills and reported (Gamble and Fischer, 1957). A series of botanical collections began in the later half of the century. Pallithanam (1956) collected 3000 plant species from Sirumalai Hills and his specimens are deposited in Rapinet Herbarium at Trichirapalli. Recently Pallithanam's work has been edited and published under the title of Pocket Flora of the Sirumalai Hills by Mattew (2001). A few studies are available on the vegetation and floristic nature of Sirumalai Hills (Karuppusamy et al., 1999).

The four different forest types observed in Sirumalai Hills (Fig. 3) are directly related to the vegetation characteristics of the Palani Hills (Bir and Chatha, 1988). The effect of small altitudinal changes on the species in the forests is not well documented. In the Sirumalai Hills, the forest types demonstrate different types of vegetative community which change with the increase in the elevation. These changes could probably be due to the edaphic
factors and the influence of strong winds, especially around the exposed areas. Some tree species such as *Acacia planiferons* Wight & Am., *Albizia amara* Boivin. and *Holoptelea integrifolia* Planch, are common only in the thorny forests. Many species like *Dalbergia lanceolaria* L.f., *D. rubiginosa* Roxb., *Anogeissus latifolia* (DC.) Bedd., *Butea monosperma* (Lam.) Taub., *Cochlospermum religiosum* (L) Alston., *Pterocarpus marsupium* Roxb., *Semicarpus anacardium* L. and *Terminalia chebula* Retz. have a more disjunct distribution within the dry deciduous and mixed deciduous forests. In mixed deciduous forest, the floor is dominated by grass community and it has been subjected to seasonal fires. Sometimes, it was thought that the fires stimulated the lush growth of grasses such as *Aristida setacea* Retz., *Dichanthium aristatum* (Poir.) Hubbard and *Themeda cymbaria* Hack (Bharucha and Shankaranarayan, 1958). Species like *Alseodaphne semecarpifolia* Nees., *kmoora canarana* Hiern., *Elaeocarpus tuberculatus* Roxb., *Dimocarpus longan* Lour., *Meliosma pinnata* (Roxb.) Maxim, and *Symlocos cochin chinensis* Lour, were located in the sholas because their optimal habitats occur at higher elevations.

Even though the higher elevations of Sirumaiai forest are highly disturbed, its biodiversity is largely threatened due to fragmentation of climax forest. Though shola forests are restricted to a much smaller area at the higher elevations, they are the preferred sites for cardamom, arecanut and coffee plantations. Further, these forests in the Sirumaiai Hills serve as watershed areas for many small dams like Sathiyyar dam and Mavur dam. The preservation
of these forests is crucial not only for maintaining the biodiversity, but also for meeting the basic needs of the human population in the plains.

One third of the South Indian plant diversity occurs in this region (Table 2). The maximum floristic diversity in Acanthaceae, Asteraceae, Asclepiadaceae, Caesalpiniaceae, Cyperaceae, Fabaceae, Euphorbiaceae, Rubiaceae and Poaceae, noted in this region. Over 120 species of legumes and 90 species of grasses mainly occur in these forests, belfs. This has been supported by previous studies on different phytogeographical zones of India by Arora and Nayar (1994).

The distribution pattern of the endemic plants in the Sirunnalai Hills is somewhat different from that of other parts of the Eastern Ghats. This region is isolated geographically from the Eastern Ghats and very close to the Palani Hills on the Western side and the Alagar Hills on the Eastern side (Man, 1974 and Mathur, 1984). The discontinuous land pattern of this region might have contributed to the accumulation of different types of peninsular endemic species (Table 3). About 11 plant species and their locality in Sirumaiai Hills were noted in the Flora of the Presidency of Madras (Gamble, 1957). The Western Ghats endemic species Lobelia nicotianifolia Roth. is distributed in the high altitude valleys of Sirumalai Hills. Myristica dactyloides Gaertn. is a typical Western Ghat endemic species with sparse distribution in the sholas of this area. Its distribution in the Eastern Ghats of Sirumalai Hills is surprising and indicative of the distinctive gene pool in this area. A similar type of floristics...
plant wealth were observed in the Eastern Ghats of the Kolli Hills (Mali and Nandini, 2001).

A vast number of plant species have been received as natural local heritage. The hormonal relationship between nature and human beings since the development of conization can be observed still undiluted in the tribal areas where modern technology has no. penetrated so far. Several of the Indian tribals still depend on wild plants even for their mere existence and the cultural bond has developed to such an extent that one becomes inseparable from the other (Ghose, 1999).

From Srumaai Hills a large number of medicinal plants are being collected for export and for local use by the hill tribes. Sirumala, Gymnema (S. sylvestre R.Br.) is a famous exported medicinal plant. Approximately 13 tonnes of dried leaves are collected from this region every year for export (Karuppusamy et al., 2000b). The medicinal plant resources study of Sirumalai Hills is supported by the study of SiwaliKs and Oon valley of The Himaayas (Parhar and B.swas, 1998). A present a large number of Indian medicinal plants are endangered due to either overexcitation or anthropogenic pressure (Chande, et al., 1996). The area-wise rational utilization including authentic identification, scientific collection, grading, processing, storage, marketing, characterization, education and extension of medicinal plants are for conservation. Immediate attention and help is needed to protect, conserve and develop such vital national resources.
Simmalai Hills is serving as a habitat for a rich diversity of medicinal plants for a long time (Table 4). Some rare medicinal plants used by the local people of Simmalai Hills are already reported (Karuppusamy and Kumuthakalavalli, 1998). Many of them have become rare and endangered species, i.e. *Lobelia nicotianifolia* Roth, and *Mucuna pruriens* DC. due to over-exploitation in their natural habitats. In general genetic erosion is enormously high among the medicinal plants. Wild forms of coffee, *Coffee wightiana* Roxb. and edaphic species of *Musa paradisiaca* L. abound here. The present study highlights the richness of diversity both in crop plants (Table 5) and the wild biodiversity.

Of the 427 tribal communities distributed all over India, the *Paliyansare* found on various hills of Tamil Nadu in small settlements, especially along the Western Ghats. Only a very small isolated population reside in the Eastern Ghats of Sirumalai Hills (Thurston and Rangachari, 1946). In a note on the *Paliyans* of Madura District, Rev. Tracy (1906) writes as follows: "I went to their village at the foot of the Periyar Hills and can testify to their being the most abject, hopeless and unpromising specimens of humanity that I have ever seen. There were in a little settlement, which was situated in a lovely spot. A stream of pure water was flowing within a few feet of their houses, and yet they were as foul and filthy in their personal appearance as if they are mere animals, and very unclean ones. Rich and luxuriant crop of rank reeds was all around them, and with a little exertion on their part, might have been abundantly irrigated, and produced continuous crops of grains. Yet they lived entirely on nuts, roots, and
various kinds of gum that they gathered in the forest on the slopes of the hills above their settlement. Their huts were built entirely of grass, and consisted of only one room each, and that open at the ends."

The Paliyans are described in the Gazetteer of Madura District, as a 'very backward caste, who reside in small scattered parties amid the jungles of upper Palnis and Sirumalais. They speak Tamil with a peculiar intonation, which renders it scarcely intelligible. They are much less civilized, but do not eat beef, and consequently carry no pollution. They sometimes build themselves grass huts, but often they live on platforms up in the trees, in caves, or under rocks. Their clothes are of the scantiest and the dirtiest. They live upon roots (Yam) leaves and honey. They cook the roots by putting them into a pit in the ground, heaping wood upon them, and lighting it. The fire is usually kept burning all night as a protection against wild beasts, and it is often the only sign of the presence of them in a jungle, for they are shy folk, who avoid other people' (Francis, 1906).

The Paliyans are nomadic and seminomadic tribes in the Western and the Eastern Ghats of Tamil Nadu. They are living in scattered families in the thick forest plateau of Sirumalai Hills (Thurston and Rangachari, 1946 and Sampathkumar, 1991) (Table 6). From these evidences it is clear that the Paliyans are not settled permanently. Other tribal groups of Tamil Nadu have made permanent settlements, i.e. irulas, Kanikkars, Kotas, Todas, Kadas, Malasars, Kurumbars, and Paniyars (Abraham, 1996; Hosagoudar and Henry, 1996b; Ignacimuthu et al., 1998).
The *Paliyans* are hard working people and they spend all their time in search of food from the natural forest (Tables 7 and 8). They rely mostly on the tubers of *Dioscorea* and honey. These food items give more calorific value and good health to their body. Their physical standards and the defence system of the body are well adapted to the fluctuations of the environment and habitat due to the presence of more calory value in wild plants. This is supported by Gopalan *et al.*, (1976). The socio-cultural activities of the *Paliyans* are similar to the *Soligas* of Andhra Pradesh (Hosagoudar and Henry, 1996a).

Usually the tribal communities do not like to communicate with the other human societies in the forest. The *Paliyans* are also a very shy type and they do not volunteer information regarding their myths, rituals and traditional practices. The same has been observed among the *Ongesoi* Andaman and Nicobar (Das, 2000).

Ethnomedicobotany deals with the relationship between human societies and plants. It has been recognised as a multidisciplinary science comprising many interesting and useful aspects of plants and their importance, realised chiefly in respect of varied economic uses of plants prevailing among the primitive human societies. The importance of gathering information on medicinal plants is to initiate their proper scientific management and exploitation for the economic development of the area. Real progress in this field can only be achieved through intensive interdisciplinary work involving botanists, pharmacognists, phytochemists, sociologists, nutritionists and physicians of
various systems of medicine such as allopathy, homeopathy, siddha, ayurveda, and unani.

During ethnobotanical studies in certain parts of India, interesting observations were made on plants largely collected or grown for food, medicine, fibres, dyes etc. (Jain, 1964 and 1965, Jain and Borthakur, 1980), Ban on digging certain species before a certain time, taboos about the use of certain plants for food or for house building and faith in the sacred or divine nature of certain trees are some such observations. The present study shows that a very rich medicobotanical lore still survives among these tribal societies (Table 9), but there is no systematic documentation. This is particularly true of the immense variety of medicinal, edible and other uses to which plants of tropical ecosystems are put to by the local people (Jain, 1992).

The tribal communities directly depend upon local vegetation for all their basic necessities. A few species of plants are invariably used by the tribal populations all over India. The species of *Rauvolfia* and *Andrographis* are being used as antidote for snakebite by almost all the tribes. Scheduled tribal groups of Tamil Nadu such as *Kadar, Malayan, Irular, Todar, Kotar, Badagar* and *Kurumbar* invariably use *Andrographis paniculata* Wall, ex Nees. for snakebite (Alagesabooopathi and Balu, 1997). The cross-cultural similarities in ethnomedicinal usage were prominent with more than 100 ethnomedicinal corelations already reported (Jain, 1991) and such species are *Aegle marmelos* (L) Correa., *Abras precatorius* L, *Allium cepa* L, *Achyranthes aspera* L,
Asparagus racemosus Willd., Celastrus paniculata Raman., Curcuma longa L, Curculigo orchioides Gaertn., Cyperus rotundus L, Jatropha curcas L, Justicia adhatoda L, Leucas aspera Link, and Ocimum basilicum L. Chenopodium ambrosioides L. is used as laxative and as antihelminthic agent in Jammu province (Kapur and Singh, 1996), against fever in Kamataka (Hosagoudar and Henry, 1996a) and as antiparasitic among the tribals of 19 other countries (Barrett and Kiefer, 1996). Hemidesmus indicus R.Br, is used to treat headache in Uttar Pradesh (Khanna et al., 1996b) and for spermatorrhoea (Singh and Prakash, 1996) and as antidote in Andhra Pradesh (Reddy et al., 1996).

There were a number of ethnobotanical investigations and the reports are available for northern, eastern and western India but the reports from south India, particularly Tamil Nadu, is meagre. Sirumalai Paliyans have vast knowledge of medicinal plants and their uses similar to the other tribes of India but there is no proper record about the ethnomedicinal practices of the Paliyans of Sirumalai Hills. In the present study 110 medicinal plants with 115 medicinal formulations and 21 various utility groups have been observed from the Paliyans (Table 10). The utility based classification of ethnomedicine as suggested by Maheshwari (1996) and Vokou et al., (1993) was prepared with slight modifications. Most of the medicines are derived from the higher plants and only a very few lower plants have been used for medicinal purpose.

The information obtained from the Paliyan tribe for each plant was compared with the information so far recorded in pertinent literature on economic

The *Paliyans* of Sirumalai Hills use 14 plant species for the treatment of wounds and skin diseases. The use of these plants has been in the ethnobotanical review of medicinal plants used for the skin diseases and related problems in Northern India also (Begum and Nath, 2000).

In the present study it was observed that the *Paliyans* use *Asparagus racemosus* Willd. to cure kidney related problems and the same same has been used by the *Meitei* community in Manipur to cure various sex related diseases (Huidrom, 1996). The *Paliyans* use *Typhophorazeylanica* Dcne. to cure asthma and related bronchial diseases and similar reports have been observed from the *Kanikkars* of Tamil Nadu (Prasad et al., 1996). Some of the Orchidaceae members like *Habenaria* and *Eulophia* are found to be used for various ailments by the *Palyians* and the same report is supported by earlier studies in Kerala (Sureshkumar et al., 1995) and the lower foothill tracts of Dindigul District of Tamil Nadu (Karuppusamy and Kumuthakalavalli, 1999b).
The *Patiyans* of Tirunelveli Hills of the Western Ghats use *Acnyranthes aspera* L. and *Aristolochia Mica* L. to cure various poisonous bites (Thangadura,, 1998) The same report was obtained from the various tribes of the Kolli Hills (Ranjithakan, *et at.* 1992) and from the Yanadiso, Naliamalai Hills (Reddy *et at.* 1996) In the present study also it was observed that the *Patiyans* of Sirumalai Hills use *Acnyranthes aspera* L. and *Aristolochia Mica* L. and a few other species such as *Atseodaphne semecarpifolia* Nee., *Atstonia venenata* R.Br., *Andrographis tineata* Wall ex Nees , *Barter. pnonitis* L. *Cryptolepis oucnananii* Roem. Schult and *Strycnnos potatorum* L.f. for curing pcsonous bites.

The *Pagans* of Sirumalai Hill, use *Ptutntaaao zeylanioa* L. for antiferti.y and abort.on that the same report was rece.ved from the tribals of Orissa (Murty *et al.*, 1987). *Baderia prionitis* L. used as antidote for snake bite in the present study is used to cure cough among the *Cnencnusc* Andhra Pradesh (Balaji Rao *et at.*, 1995). *Baselta aioa* L. leaves used to cure constipation in the present study is also used by the tribals of Bihar (Pandey, 1998).

Although ethnobotanica, correlations were prominent, these correlations were not exclusive. The majority of ethnomedicina, plants from Sirumalai Hill, had a, least one medical appl.cation not previously reported, i.e. *Execum peduncutatun*, L . *CynsnCun, caitiatatum* Buch-Ham., *Harris lonoicomu* Lindl. *testis toemissima* Cogn., *Hemecyto otneltatum* Bum..! *Tarenna asiatica* Kuntz. and *Theriophonum fischeri* Sivads
The present phytochemical study confirmed that several tribal medicinal plants are a rich source of alkaloids (9 species), flavonoides (12 species) and terpenoids (12 species). The other phytochemicals observed are phenolic acids, phenols, flavones, tannins, lignins, triterpinoids and saponins (Tables 12-15). A few medicinal plants reported in the present study were explored for their phytochemical characteristics by Bhakuni (1984). Venkataraju (1996) also conducted similar study on the plants used by the Cenchus tribes of Andhra Pradesh and found that a number of plants are having phytochemicals such as alkaloids, flavonoids and terpenoids. Some previous evidences supported the present screening and they are: alkaloid source of Andrographis (Chandler and Hooper, 1979) and Alstonia (Keawpradub and Houghton, 1997), flavonoid source of Clerodendrum (Das et al., 1996) and essential oil source of Pimpinella (Kubeczka, 1997) triterpenoids of Combretum (Rogers, 1988) and Gardenia (Adelakum et al., 1997)

In the present study 9 species of Asclepiadaceae were found to be used as tribal medicines and they serve as a rich source of different useful pytochemicals. The Indian Asclepiads shows the presence of novel glycosides in Caralluma, four cardiac glycosides like buchanin, cryptonoside B, C and D in Crptolepis buchananil Roem. & Schultes, gymnemic acid in Gymnema sylvestre R.Br., nine types of glycosides from Hemidesmus ind/cus (L.) R.Br., two novel pregnanes in Sarcostemma and fourteen alkaloids in Tylophora indica (Burm.f) Merr. (Deepak, 1995). Recently Nagarajan et ai, (2001) have indicated the
presence of volatile oil composition as an active principle from the roots of *Hemidesmus indicus* (L.) R.Br.

An Apocynaceae member *Alstonia venenata* R.Br, is reported to be used as antidote and the plant contains alkaloids. The same has been observed in the present study also. It is evidenced that the allied species *A. scholoris* (L) R.Br, and *A. macrophylla* L are a rich source of indole alkaloids (Keawpradub and Houghton, 1997).

The small number of useful advances made in the field of herbal medicines seems very insignificant and the studies carried out represent only a minute fraction of the botanical drugs used by various ancient systems to cure or to mitigate diseases. However, the number is sufficient to show that many of the familiar plant drugs have useful properties, which are still to be discovered. The present phytochemical analysis showed the presence of biologically active compounds such as alkaloids, phenols and tannins in the extracts (Fig. 8). These organic compounds have been known to possess potential antimicrobial action. Many disinfectants used in clinics such as lysol, cresol and dettol contain phenols as their active ingredient. In addition, tannins have been shown to form irreversible complexes with proline rich proteins which inhibit the cell wall synthesis in bacteria (Hagerman and Butler, 1981).

The choice of sample for the extraction was dictated by the informants who indicated which plant part was the most useful in their preparations. A new
useful isoflavone was isolated from the roots of *Asparagus racemosus* Willd. based on the traditional knowledge (Saxena and Chourasia, 2001).

The quantity of phytochemicals available in the plants can vary with seasons, the part of the plant and the type of the soil (Anand and Nityanand, 1984). The phytochemical screening carried out in the present study shows that plants such as *Alstonia venenata* R.Br. (Apocynaceae), *Combretum albidum* G.Don. (Combretaceae) and *Lobelia nicotianifolia* Roth. (Lobeliaceae) carry several phytochemicals with antimicrobial property. It is worthwhile carrying out further detailed phytochemical analyses of these plants which may provide a cure for several microbial diseases.

The results of the present study may serve as a guide to help others to select plants with antimicrobial activity for further work. It is thus reasonable to identify locally available plants or plant extracts that could be used as a new tool for mankind to fight against human ailments. These natural products will not only provide clues to a synthesis of new structural types of antimicrobial and antifungal chemicals that are relatively safe to man and his environment but can also help to replace the expensive and limited supply of synthetic chemicals.

The antimicrobial activity of ethnomedicinal plant extracts observed in the present study indicates a clear correlation with their chemical composition. The phytochemical analyses showed the presence of biologically active constituents such as alkaloids, phenols, flavonoids, flavones, saponins, lignins, terpenoids
and triterpenoids (Fig. 8). These compounds may have been responsible for the antimicrobial activities observed in the present study.

The different extracts of the different plants showed various grades of antimicrobial effect against the test organisms, viz. Bacillus subtilis, Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa and Candida albicans (Tables 16-19). The ethanol extract showed a larger active spectrum than the other extracts against the test organism. Its bioactivity may be attributed to the presence of a large number of phytochemicals extracted from the ethnomedicinal plants. Ethanol appears to extract more number of bioactive compounds from the plants. The results are justified by the study of Gopal et al., (1992).

Antimicrobial activity of Achyranthes bidentata Blume. has been attributed to the presence of flavonoids compounds in its roots (Valsaraj et al., 1996). Aswal et al., (1996) have confirmed the antimicrobial activity of Asparagus root extracts. Kavitha et al., (2000) detected the antifungal activity of Asparagus racemosus Willd. extract against several health risk causing fungi. The same type of effect has been observed in the present study also. The activity of saponin fraction of the plant against varieties of fungi such as Candida, Crytococcus, Trichophyton, Microsporum and Epidermophyton has been reported by Shimoyamada et al., (1990).

Champagne et al., (1992) have reported that Glycosmis pentaphylla (Retz.) DC. contains limonoids and essential oils which show activity against a
range of bacterial and fungal strains. Kumar et ai, (1987) observed the antifungal activity of *Andrographis paniculata* but they did not observe any antibacterial activity in this species. The antifungal activity of *Hemidesmus indicus* R.Br, was studied by Hiremath et ai., (1997). The results of these studies support the present study.

The antimicrobial activity of *Dichrostachys cinerea* Wight & Am. was already tested and it was found effective against all the bacteria tested by Eisa et ai, (2000), but, in the present study, this plant extract was found effective only against Gram negative bacteria. Such variation could have been due to some edaphic or habitat differences which have an impact on the chemical constituents.

A few earlier studies have already confirmed the biological and clinical potential of certain tribal medicinal plants. *Chenopodium ambrosioides* L was used by the Paliyans as antihelminthic agent and has already been confirmed for its antihelminthic effects by Butz and lande (1937), Feroz et at., (1982) and Kliks, (1985).

Differences in bioactivity exemplified by differences in microbial growth inhibition among the various tissues on plants and within different solvent extract systems (polar and non-polar) on the same plant, suggest that a number of plant constituents may be extracted and involved in antimicrobial activity. For example experiments carried out in the present study using ethnoiic extracts of *Alstonia venenata* R.Br., *Combretum albidum* G.Don, and *Lobelia nicotianifolia*
Roth, against *Candida albicans* showed a positive effect on this fungus, whereas the water extracts of these plant species completely lacked this activity. A similar observation was reported by Rabe and Staden (1997) on the water and the methanol extracts from South African plant species and antifungal activity of Argentine folk medicine (Perez and Suaree, 1977), who found that most of the antibacterial activity observed was only in the methanol extracts. Traditionally plant extracts are prepared mostly with water as infusions, decoctions and poultice. Therefore it would seem unlikely that the traditional healer is able to extract those compounds which are responsible for activity in the solvent extracts.

The fact that crude extracts of these ethnomedicinal plants produced a zone of inhibition against selected microorganisms indicates the presence of potent antimicrobial activity which can be developed. Although both the water and the other solvent extracts (ethanol, petroleum ether and hexane) of most of the plants produced inhibitory action against the selected bacteria and fungus (Fig. 9), the latter exerted more inhibitory principles as shown by the ethanolic extracts of most of the plant species and the same has been justified by few other studies (Gopal *et al.*, 1992 and Bhaduria and Kumar, 1999). The present study also suggests that ethanol would be a better solvent to extract the antimicrobial principles from the dry powders of plant materials.

The antimicrobial activity observed in the study of bark extracts from *Gmelina asiatica* L provides some scientific basis for the utilization of this plant
by the Sirumalai tribes for the treatment of skin diseases. The general microbial inhibitory activity validates the traditional use of these plants against microbial diseases. The antimicrobial property of *Argyreia cymosa* Sweet, *Buchanania lanzan* Spreng., *Didymocarpus gambleanus* Fisch and *Scutellaria violacea* Heyne ex Benth. appears to have justified their use for the treatment of wounds (especially those with bacterial infection) by the *Paliyans* of Sirumalai Hills. Although the tested plant extracts have potential antimicrobial constituents, further phytochemical and pharmacological studies will be necessary to isolate the active constituents and to evaluate the antimicrobial activity against a wide range of microorganisms.

Much of the research on the biological activities of higher plant extracts is based on traditional knowledge which has motivated the desire to find useful compounds for medicinal applications. As a result, bioassay designs and choice of bioassay species has varied tremendously, which complicates any attempt to find overall patterns in the relationship between chemical structure and their biological activity. If pharmacological activity is supported by clinical trials, new medicines are possible. Such medicines may be equally or more efficacious, but are often more toxic and always more expensive than the original plant resources. A legitimate place for integrated use of medicinal plant in some health care systems of the world may, perhaps, exist.
MEDICINAL PLANTS-NEED FOR CONSERVATION

Next to food for sustaining life, man depends on plants for health as well as for fighting diseases. With the development of Ayurveda some 3000 years ago, studies have been made on the identification of plants for their medicinal value, their quality, uses and remedies for specific diseases. There are about 25 million species of plants identified on a world-wide basis for their medicinal value, out of which 20,000 plants have been documented and only 5,000 species have been phytochemically studied. The herbal scenario in India is bestowed with overwhelmingly rich natural resources, diverse ecological conditions and a long practice of tradition forming systems consistent with their ethnic diversity and ancient civilization. Out of the 2,000 species identified 1,100 species are used in different medicinal systems and of these, 600-700 species are used in drug, pharmaceutical, cosmetic and aroma chemical industries of our country (Agarwal, 1997 and Prakash, 1998). About 55 species of plants or plant products are exported to foreign countries, of which 26 species are highly endangered (Jain, 1980). About 80 percent of the raw materials of medicinal plants are collected mainly from the forests of our country. Out of the total Indian medicinal plants about 80 percent are used in ayurveda, 46 percent are used in Unani, 33 percent are used in allopathy and 28 percent are used in local folklore system of medicine (Jain, 1991). It has an appreciable share in the economy of the rural farmers and tribes.
DEFORESTATION AND OVER-EXPLOITATION OF MEDICINAL FLORA

In recent times, continuous and indiscriminate collection and deforestation activities from diverse ecosystems, coupled with destruction of natural habitats has resulted in irreplacable loss of valuable genetic diversity. Satellite imagery has revealed that the country is losing on an average of 1.3 million hectares of forests per year (MoEF, 1994). As a result, a number of medicinal plants have also become vulnerable to extinction. The problem is further aggravated because the bulk of plant raw materials are still collected from the wild much before the onset of their seed setting, through untrained and unskilled labourers to earn their livelihood in response to the over-increasing demand and export potential. Thus the problem is posing a great challenge to the survival of this traditional health care system.

High value species are naturally the most threatened of the lot. For instance, in Sirumalai Hills, Gymnema sylvestre R.Br., which grows mostly in the foothill tracts, is now in great demand globally due to its anti-diabetic properties. A few species are collected by local tribes, largely for trade purpose, of the species Mucuna pruriens DC, Caesalpinia crista L. and Ziziphus xylopyrus Willd. The seeds are the medicinal part, and the collection of the seeds in large quantity results in the dwindling of the plant species (Karuppusamy etal., 2000c).
In the *Red Data Book of India* out of 45,000 plants species, 1,000 species including many medicinal plants are reported to be threatened with extinction. Of these, 14 medicinal plant species are endangered or are under immediate danger of loss while 55 are vulnerable, mainly due to indiscriminate collection as well as excessive trade for commercial purpose. The Foundation for Revitalization of Local Health Traditions (FRLHT), Bangalore, currently engaged in medicinal plant conservation programmes in Kerala, Karnataka and Tamil Nadu, has listed 74 South Indian medicinal plant species under the rare, endangered and threatened category and marked for priority conservation action in Southern Penninsular India. Sirumalai Hills has some threatened and endangered medicinal plants such as *Myristica dactyloides* Gaertn., *Lobelia nicotianifolia* Roth, and *Entada pursaetha* DC. which are included in the Red Data list.

Due to indiscriminate forest felling, increase in population and rapid forest denudation only a few forest pockets are left undisturbed and amongst them are the sacred groves. People are scared to exploit these sacred groves because of the religious beliefs. The role of faith in preservation of sacred forests and individual species like sacred basil (*Ocimum* sp.) and peepul (*Ficus* sp.) has already been emphasized (Jain, 1987). In the sacred groves of Sirumalai Hills more than 10 species of *Ficus* have been identified. Sacred groves are usually virgin forest areas where certain deities are believed to reside and these forest ecosystems are protected from all kinds of damage and
preserved in almost natural state (Jain, 1992). Such preserved forests have been found to have several rare and endangered taxa (Vartak and Gadgil, 1981; Boojh and Ramakrishnan, 1982; Ramakrishnan, 1985a and Usharani and Gupta, 1999). There is an urgent need for undertaking extensive studies on their nomadic life and to prevent extinction of some tribals and their culture through the aggressive interpretation of modern civilization. There is every possibility that valuable data on ethnobotany will be lost in near future.

Thus, the present scenario shows a great threat to the continuing availability of the target species, particularly of those whose roots or seeds happen to contain the desired chemicals or which take a long time to generate and are endemic to particular areas. We may now be losing species that we do not even know but which could, perhaps in future, yield better medicines. Furthermore, indigenous populations and their knowledge are under a threat of destruction.

TRADITIONAL PRACTICES-NEED FOR REVITALIZATION

There is a great challenge to the survival of traditional life support systems of medicine, particularly for meeting the primary health care needs of the tribal people who have no access to modern medicine. They rely on the medicinal plants for the cure of all ailments. The tribal people have acquired practical knowledge about the ecosystem functions, interdependence of floristic and faunastic species, reproduction, growth productivity and the ecological relationship between human society and their environment, both living and the
non-living For example, tribal faiths have helped in the conservation of many species. These are of ethnobotanical significance as well as of value in indigenous flora and fauna. Thus, the "bal, loca, or folk health traditions, which are self-reliant in nature, socially and environmentally closer to the masses, are rooted deep in the community's traditions and knowledge systems. In these practices the material, knowledge, experts and the patient all are derived from the locality itself, while in the organised systems of medicine, practitioners are becoming dependent on pharmaceutical preparations (Gupta et al. 1997)

Yet, it is being felt that the scientific component must be strengthened for revival and revitalization of traditional/herbal remedies focusing on quality control of plant derived products by using modern techniques. A recent status-report on ethnobotanical investigations has revealed that out of 7,500 wild species used by the tribals in India for medicinal purposes, about 950 are found to be new claims and worthy of attention for scientific validation (Shah 1977 and Kumar et al., 2002)

BENEFIT SHARING WITH TRIBAL PEOPLE

With the involvement of traditional health workers, developmental field groups and forest departments could work on the conservation and propagation of local medicinal flora and document the rapidly disappearing knowledge in this area, ensuring active participation of the people as beneficiaries as well as guards to avoided exploitation by middleman, for the sustainable utilization of such precious germplasm based on protection, production and participatory approach.
The need of the hour is to ensure that dwelling indigenous people whose knowledge was the basis on which the drug was discovered, should get maximum benefits. According to an FAO report (1993) on the current threats to the world's biodiversity, "the world market value of medicine derived from plants used in traditional systems exceeds 43 billions; less than 0.01 percent of the profits have gone to the indigenous people who led researchers to them."

This underscores the need to protect the tribal people's interest, regularising germplasm collection, export and evolving appropriate measures for protecting the rights of the communities/tribal groups who have acted as custodians of the precious germplasm resources, conservation traditions and folk knowledge of local ecology for many centuries. Further, population stabilization becomes the most urgent necessity to achieve health for all in view of linkages between poverty, population growth and the environment. In this context, the role of traditional plant based system needs to be evaluated.

FUTURE THRUST

The above account synthesizes the available information on ethnomedicobotanica, resources of Sirumala, Hills. In view of the large scale dependence of the tribes of Sirumalai Hill, on the local plan, resources and their potential to support the economic development of the area, it is imperative to save and maintain the extant diversity in local plant, resources. The national concern with biodiversity issue may address the following objectives:
• Concentrated efforts are needed to document the indigenous knowledge held by the native communities. An areawise database needs to be established.

• Diversity in natural habitats needs to be assessed for demarcating areas for *in situ* conservation.

• Genetic erosion is alarming, particularly in respect of medicinal plants. Overexploitation of natural populations of several plants is a matter of serious concern. So it is essential to safeguard the diversity of endangered species.

• Sustainable utilization of resources would require persistent efforts by local communities to maintain community gardens.

• Stress needs to be given to on-farm conservation of land races in areas of distribution of native diversity held by local community.

• Complementary conservation strategies need to be implemented apart from conventional *in situ* and *ex situ* (seed, gene bank) approaches. This would involve *in vitro* and cryopreservation, pollen preservation and field bank management.

• National database on collections of the raw materials and their evaluation is required for better utilization of the resources.

To promote these activities an integrated, inter-institutional linkage is necessary. Above all, public awareness involving community participation will catalyze the conservation and sustainable use of wild biodiversity.
RECOMMENDATIONS

The following recommendations have been suggested for the conservation strategy of medicinal plants in Sirumalai Hills.

• Prevention of the disappearance of plants due to massive deforestation.

• Establishment of botanical gardens with more collections of rare medicinal plants.

• The application of known and effective agro-industrial technologies for cultivation and processing of medicinal plants and the manufacture of herbal medicines.

• The establishment of large scale networks for the distribution of seeds and seedlings for the quick propagation of medicinally useful plants in the tribal areas of Sirumalai Hills.

• Home gardening of life saving species should be encouraged.

• Tribals should be motivated by giving frequent training programmes on conservation of medicinal plants.

• Herbarium should be maintained at Panchayat level and systematic documentation should be carried out for easy identification.

• Effective steps should be taken to establish database centres on medicinal plants and plant products at regional or national level to facilitate the exchange of information on health and environment.
* Efforts should be made to effect industrial use of medicinal plants and local technological skills.

*: it is suggested that the Government can start tribal based societies for selling their products to outsiders in a really profitable manner.

* If tribal medicines are included in the syllabus for rural schools, much can be achieved.

* Up-to-date research in this field is also essential. Some wonders may result from it in the near future.