Materia Medica of the Local Health Traditions of Payyannur

Unnikrishnan E

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***Materia Medica* of the**
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E. Unnikrishnan

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1. Background of the Study

At the dawn of the 21st century, biologists and social scientists have identified the loss of biological diversity and erosion of traditional knowledge-system as issues of the gravest concern. Both biological diversity and traditional knowledge are inextricably interlinked like the two sides of a coin – and so, the loss of one leads to the erosion of the other. As village economies open up and markets get globalised, the local institutions, which supported traditional processes of livelihood, are breaking down. Ripples of these changes adversely affect the income, employment and cultural milieu of the communities. In this process the knowledge-base that has accumulated over generations also gets swept away into oblivion. This vanishing stock of knowledge is invaluable in many respects. It not only forms a locally available low input technology but also provides useful hints for future technological development. Appropriate interventions in the form of policy inputs, training, awareness generation, documentation etc. can, in most cases, revitalise local traditions. Local health traditions in the Indian villages are very good examples of this. Traditional health-care systems provide a spectrum of local variations such as Ayurveda, Unani, Siddha, folk health traditions etc. Kerala has a host of these traditions still playing a vital role in the local health-care sector. However, these systems have not yet been studied in depth. For various reasons, some of these streams are on the verge of disappearance. The present work is an attempt to study the status, problems and prospects of traditional health care systems in a selected region in the North Malabar.

Perspective

Kerala has a rich tradition of indigenous medicine and health care practices. Besides the classical Ayurveda, which is still popular all over India, a number of local health care systems such as *Marma Chikitsa*, *Kalari*, *Vishavaidyam* and other ethnic health care practices are

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Unnikrishnan. E is High School Assistant, Govt. High School, Bekur, Kasaragod.

prevalent here. Most of these systems of knowledge are unique and are often known only to a few individuals and communities**.** These systems of healing make use of many medicinal plants, which are endemic to the region. These systems play a crucial role in the health service sector in Kerala. But this stream of health care is on the verge of a major breakdown. The root cause of this crisis is mainly the loss of knowledge-base relating to raw drugs. The rate of knowledge erosion is even faster than the rate of resource erosion. In the absence of required raw materials in the right quantity and quality at the right time, these ancient sources of healing are slithering into oblivion.

The traditional health care systems, including Ayurveda, were transmitted from generation to generation by '*Gurukula'* mode of instruction. In most cases, the knowledge-base was kept strictly within the family circle. The apprentices lived with and learnt at the feet of the masters who maintained a conventional oral tradition. The disciples prepared the medicines, administered them and nursed the patients according to the instructions received from the masters. The texts were sacred, and most of the texts were learnt by heart. Only after long years of learning and experience could the apprentices become practitioners themselves. Knowledge and experience were transmitted gradually, but completely, at a pace determined by the master. The disciples did not attend any formal schools or undergo a specific, prescribed curriculum. Their claim to practice was dependent on the intimate knowledge which was passed on for many years by the Guru while he was treating each individual case to the disciple.

In Kerala, modern mode of instruction in ayurveda began with the establishment of an ayurveda school in 1889. A Department of Ayurveda was also established in the same year by the Government. Facilities for learning ayurveda existed at Thiruvananthapuram, Kottakkal, and Thrippoonithura even in earlier days. Titles awarded differed; in Thiruvananthapuram it was *Vaidyakalanidhi*; Thrippoonithura – *Ayurveda Siromani* and *Vaidyabhooshanam;* and at Kottakkal it was *Aryavaidyan*. In 1957 the then Health Minister, A.R. Menon, took initiative to streamline the subject content of Ayurvedic courses in the State. Following this, 'Diploma in Ayurveda' was awarded to those who completed the course. In 1973, when N.K. Balakrishnan was health minister, hereditary practitioners of Ayurveda were given chance to appear for an examination and on passing the examination they were awarded Diploma in Ayurvedic Medicine (DAM). Subsequently 'A' class registration was awarded to the DAM holders. As part of the streamlining of Ayurveda education at national level, a degree course was introduced. Admission to the course was later limited to those who had studied biology at pre-degree level. With this step, many who were genuinely interested in Ayurveda but who did not have formal education up to pre-degree level, were excluded. The last quarter of 20th century was a period when the very identity of traditional Ayurveda practitioners was seriously questioned. During the past three decades hereditary practitioners of Ayurveda were getting displaced by Ayurveda 'doctors' who had undergone a prescribed curriculum in an institution. This was literally the end of the traditional *Gurukula* mode of instruction in ayurveda in the State. Hereditary practitioners reacted to this derogation by sending their children for formal training in recognised Ayurveda colleges while imparting their traditional skills within the family. In Payyannur nearly 70 percent of the ayurveda 'doctors' belonging to the age group 40-50 are from traditional healer families. However,

among the children of these doctors, very few have chosen Ayurvedic practice as their profession.

Degree holders in ayurveda were given 'A' class registration, but no decision was taken about the case of hereditary practitioners. So, in the official records they were in effect portrayed as frauds practicing as medicine-men. Preparation of *Arishtams* and decoctions was brought within the limit of Abkari Act and L3 license was made compulsory to prepare them. Though it is necessary to have a valid license to manufacture Ayurvedic medicines, one can sell them without holding a license. The official non-recognition of traditional practitioners and the ambiguity about the preparation of machines have resulted in the fall of the local health traditions.

Gurukula tradition of instruction is extant in some families of hereditary practitioners. Here Ayurvedic instruction by a single master is given at the teacher's residence. However, there is no provision for giving registration to these apprentices. If this continues, folk medical practices of Kerala with all its material knowledge and acquired wisdom will soon sink into the oblivion.

As a form of folklore, folk medicine has many texts and textualism. No system of instruction based on a preset syllabus, instructors and cases can substitute the multiplicity of meanings and potentials for innovation that a folk practitioner enjoys. The concept of a community of stereotyped medical practitioners is a part of a monolith healthcare institution. Our local health care traditions open up avenues for choice in selecting treatment for diseases. Now they are rapidly disappearance in the quick-sands of modernity and development.

Objectives of the study

The major objectives of the study are the following:

1. To prepare a 'Materia Medica' – an inventory of raw drugs of plant, animal and mineral origin employed in the traditional health care sector in the selected region.
2. To assess the status of the raw drugs and knowledge-base associated with it.
3. To prepare an Essential Raw Drug List (ERD-list) for the traditional healing system of Payyannur.

Study area

Focus of the study is the raw drug market of Payyannur. Payyannur town and nearby Panchayats representing all the landscape elements and ecological features of the region were selected for studying the habitat requirements, resource catchments and market channels of the raw drugs. Three revenue villages that constitute the Payyannur Municipality viz. Payyannur, Vellur and Korom - were selected for intensive study. The Ezhimala hills and reserve forests of Pulingome–Vayakkara Panchayats also proved to be an important part of the raw drug catchment. Panchayats such as Ramanthali, Karivelloor-Peralam, Kankol-Alappadamba, Eramam-Kuttoor, Kunhimangalam, Cheruthazham, and Thrikkarippur formed a larger catchment of raw drugs for Payyannur market. Together these areas represent all

the significant features associated with low land, midland and high-land classification of the region.

Methods

The *materia medica*[1] , essentially, is a compendium of information on the herbal and non-herbal drugs, their collection, procurement, processing and administration in the traditional systems of health care. In other words, this compendium will provide an account of the material culture associated with these streams of knowledge base. This is expected to be a major documentation on vanishing health care traditions providing details of the existing prescriptions and practices. In the context of our eroding traditional knowledge-base this attempt gains importance.

The 'materia medica' is basically a synthesis of information from primary and secondary sources. Collation from primary sources is the main work done in the first phase of the study. A checklist of medicinal plants, drugs of animal and mineral origin was prepared from Ayurvedic texts and from folk texts and palm-leaf manuscripts collected from the local folk practitioners. Details of nearly 400 materials were thus collected from secondary sources including manuscripts and medical prescriptions, from Payyannur region.

Folk practitioners were visited for exclusive interactions and local raw drug markets were explored by detailed surveys and interviews. An open-ended questionnaire was employed in the interviews. Field trips were made to the various ecologically important locations (hotspots) which represented different landscape elements of Payyannur. Transect walks were undertaken to identify and to take stock of medicinal materials.

Local raw drug markets were visited once a week and a comparative study was made of the raw drug material collected from various shops of Payyannur. The materials collected from different sources were identified by reference to pertinent literature and by comparing with authentic specimens in the herbal gardens of Troppical Botanic Garden and Research Institute (TBGRI), Kottakal Arya Vaidyasala (AVS), etc. Photographs were taken and a herbarium of medicinal plants was maintained. Information on medicinal properties was collected from Ayurvedic and rural folk practitioners and this was supplemented with compilations from Ayurvedic texts. A draft inventory of the raw drugs was prepared soon after the completion of the study. This was modified by incorporating the suggestions of the traditional healers, para-taxonomists and scientists.

In summery the surveys focused on the following two aspects:

1 Knowledge associated with procurement, processing, prescription and practice of traditional medicine.
2 The availability, demand and source of medicinal raw drug materials.

Review of Literature

The history of medicine and usage of medicinal plants in India can be traced back to the

time of *Rigveda*.[2] The *Susrutha Samhitha*, written 3000 years ago, contains an exclusive and comprehensive chapter on therapeutics. Similarly, *Charakasamhita* written at about the same period provides a remarkable description of the materia medica of ancient Hindus. *Ashtaanga Hridayam* is another ancient classical Ayurvedic text[3].

Brihathrayi itself has a number of versions and interpretations. Kerala has a regional version of Ayurveda, apart from the classical tradition. This Kerala school of Ayurveda has unique medicines, practices, texts and raw drugs. Texts such as *Sahashrayogam* and *Sarvaroga chikitsaratnam* are popularly used by *vaidyas*[4] of Kerala in place of classical source books. A number of texts provide unique composition of medicines and are still in use. Most of these texts are in palm leaf-manuscripts and are in the possession of hereditary practitioners. A number of medicinal plants are mentioned in these folk texts as well as in classical texts. But many of them still remain to be properly identified.

The Europeans who arrived in India during the early period of colonisation initiated scientific and systematic study of plants of the region. Even before the publication of *Species Plantarum* by Linnaeus in 1753, several important books on Indian plants were published. This invited the attention of western scholars to the richness of the flora of south and south-east Asia (Manilal and Sivarajan, 1982)

In 1678 Henry Van Rheede began publishing in Amsterdam his monumental, 12 volume work *Hortus Indicus Malabaricus* – a detailed treatise on the economically important plants of Malabar. The book gained international acclaim as this formed the basis of nomenclature of Indian plants for Linnaeus. About 760 plants are described in this book with detailed illustrations. The texts of this book were written by Itty Achuthan (a folk practitioner from Shertalai) along with two Konkan Brahmins named Ranka Bhat and Vinayak Bhat. Manilal, *et al* (1988) provides a detailed interpretation of the book in the light of modern taxonomical insights. Missionaries from Europe also evinced keen interest in the traditional health practices. In 1881, Basel Mission, Mangalore published a book titled 'Five Hundred Indian Plants- their use in medicine and arts in Canarees' on medicinal and economic plants with vernacular names in Kannada, Tulu, Malayalam, and Konkani. The book describes a total of 523 plants and also provides scientific nomenclature and common names in English.

There are a large number of modern books on Indian medicinal plants. The monumental work of Kirtikar and Basu (1935) titled 'Medicinal Plants of India' gives information about Indian medicinal plants with detailed illustrations. Dutt (1979) provides information on commercial drugs of India.

The state departments and institutions have also taken up documentation of the medicinal plants. The Copuncil of Scientific and Research (CSIR) New Delhi published a glossary of the Indian Medicinal Plants (Chopra *et al*, 1956). The 'Wealth of India' series is another initiative of CSIR, which is an exhaustive compilation of information on the economic and medicinal importance of Indian flora, fauna and minerals (CSIR, 1976). Indian council of Agricultural Research (ICAR), New Delhi published a Dictionary of Economic Plants in India (Umrao Singh, 1964).

Among recent publications is 'A Compendium of Indian Medicinal Plants' prepared by Arya Vaidya Sala, Kottakal (Warrier, 1995), which gives us a complete account of medicinal plants used in the Ayurvedic system of medication in Kerala. Iyyankar, (1994) gives necessary details of raw drugs whose their synonyms, morphology, colour, surface, odour, taste, source and active constituents are described with sketches and photographs. Sivarajan and Indira Balachandran (1995) give interesting information on the materia medica of ayurveda and plant sources. 'Medicinal Plants of India' by C. K. N. Nair and N. Mohandas (1998) gives a checklist of medicinal plants with a short description of each plant. The book contains more than 700 colour plates which help us to identify our invaluable natural resources. 'Healing plants of Peninsular India' is a recently published book that compiles vernacular names in Indian languages and local uses with colourful illustrations (Parrotta, 2001).

All these studies deal with the qualitative aspects of medicinal plants and traditional healing system. Studies on the quantitative aspects of the raw drug availability and extraction are few in number. First of this kind was the report submitted to the Kerala government by a survey team headed by the Director, Indigenous Medicine for identifying the forest areas where the cultivation of medicinal plants could be undertaken on a scientific basis. The report provides a description on important medicinal plants and minor forest products of Kerala, and estimates the requirement of raw drugs. A list of Ayurvedic medicinal plants and their annual approximate requirements are also attached to this report (Govt. of Kerala, 1976). However, it is not clear from the report how the research team arrived at the estimated figures of raw drug requirements.

Report on a survey on the medicinal plants of Kerala forests, prepared by Kerala Forest Research Institute (KFRI) in 1985, provides a description of about 250 species of plants (Nambiar, *et al*, 1985*)*. Two recent research reports from KFRI discuss availability, collection, utilisation, marketing and ecology of the medicinal plants and other Non Wood Forest Products (NWFPs) from Kerala state. The studies relate to the products that are currently being extracted as well as those that have market potential. Nair (2000) provides details of 160 plants, their nomenclature, local name, description, ecology and distribution at global and state levels. Another study (Sasidharan and Muraleedharan, 2000) assessed the consumption of raw drugs, their sources of supply and dependency on forests by Ayurvedic drug industry in North Kerala. Tropical Botanic Garnden and Research Institute (TBGRI) had taken up a similar study in South Kerala. The study has identified 23 species of medicinal plants that are in short supply and has recommended measures for their sustainable harvesting (Pushpangadan *et al*, 1998).

2. Local Health Traditions of Payyannur: An overview

Local health tradition is rather a vague term largely used to distinguish ancient and culture-bound health care practices, which existed before the application of science to health matters as in the official modern scientific medicine or allopathy. Some frequently used synonyms for local health tradition are indigenous, un-orthodox, alternative, folk, ethno, fringe and unofficial medicine/healing. While discussing the legal aspects, Jan Stephan (1983) interpreted the term 'traditional medicine' in a broad sense as:

a. Formalised traditional systems of medicine such as Ayurveda, Unani, and traditional Chinese medicine

b. The practice of traditional healers as defined by an African expert group in 1976 in the following terms:

   "A traditional healer is a person who is recognised by the community in which he lives as competent to provide health care by using vegetable, animal and mineral substances and certain other methods based on the social, cultural, and religious background as well as on the knowledge attitudes, and beliefs that are prevalent in the community regarding physical, mental and social well being and the causation of disease and disability."

c. The practice of chiropractic,[5] naturopathy, osteopathy,[6] homoeopathy and even Christian Science (Jan Stephen, 1983).

The definition of Jan Stephan encompasses all streams of health care systems other than the modern medicine i.e. allopathy - as traditional system. Though Bannerman uses terms such as ethno, folk, alternative etc. as synonyms at micro level, in other contexts they denote different schools of health care practices (Bannerman *et al*, 1983). This is especially so in the Kerala context. This chapter intends to examine the scope and uniqueness of various health care traditions prevalent in the State.

Ayurveda, Siddha, and Unani are the three major streams of Indian health care traditions. Ayurveda and folk medicine are the two systems of health care in Payyannur which use natural products as raw drugs, available in the study area.[7]

Ayurveda is a scientifically codified and theoretically structured area of knowledge. The folk medicine on the other hand is a set of practices handed over from one generation to the next, most of which are unwritten or not codified. However in Kerala both the streams function as interconnected and mutually complementing systems of knowledge. The legacy of traditional health care in Payyannur is a result of the fusion of these two, mega and micro, streams of medicine. The present study uses the term 'local health traditions' to denote both these streams of medicines.

Ayurveda: The great tradition

Ayurveda is a way of life. This ancient science of life deals with the physical, mental and spiritual health of an individual, animals, birds, and even plants. The basic philosophy of Ayurveda is based on the theory of *Panchamaha bhootha* (i.e. theory of five elements). From this theory emerges the concept of controlling forces or *doshas*; i.e. *vata, pitta,* and *kapha* (motion, energy and inertia) which act on the tissues *(dhatus*) giving rise to various metabolic products i.e. *mala*. Every thing alive is controlled by these three forces or *thridoshas*. It is believed that good health results from the balance of three forces of *vata, pitta,* and *kapha* in harmony with one another.

The fundamental doctrines of Ayurveda encompass all sciences such as physical, chemical, biological and spiritual. Ayurveda has two major schools i.e. *Atreyas* and *Danwantharis*. The first one is the School of Physicians and the second one is the School of Surgeons (Danukar and Thatte 1996; Kurup, 1983).

Ayurveda has eight specialised branches as given below:

1. Kaya chikitsa (Internal medicine)
2. Salya tantra (Surgery)
3. Salakya tantra (Management of diseases of eye, nose and throat)
4. Kumarabritya (Paediatrics)
5. Bhuta vidya or Graha chikitsa (Psychological medicine)
6. Agata tantra (Toxicology)
7. Rasayana tantra (Geriatrics)
8. Vajikarana tantra(Science of Aphrodisiacs)

These categorisations of specialities testify Ayurveda as a theoretically founded field of science. Ayurveda must be considered a science by the most rigorous standards from the viewpoints of methodology, epistemology and sociology of science.

At present Kerala does not have this idealised version of *Brihatrayi*. Most Practitioners in Kerala refer to texts such as the *Sahasrayogam, Dharakalpam, Yogamrutham, Chikithsamanjari* that are written either in Malayalam or in *Manipravalam* (a mix of Malayalam and Sanskrit languages). These texts are also used for Ayurveda instruction.

The regional school of Ayurveda in Kerala has made significant contributions in the areas of therapeutic procedures and medicines. This includes *oushadha gana* (groups of raw drugs) such as *dasapushpam*, raw drugs such as *chethi veru* (roots of the *Ixora*) and *pacha puzhu* ('musk' of civet cat), processed drugs such as *kompanchadi, dhanwantharam, kasthuryadi*

vayu gulika etc. and the therapeutic procedures such as *navarakkizhi, dhara, pizhichil, talam, tala pothichil* etc.

Ayurveda in Kerala follows two traditions: the elitist and the subaltern. Both traditions are remnants of a rich legacy of ayurveda once prevalent in the period of *Buddhism* in South India. A caste-based society was yet to evolve at that time. The proponents of the first stream were *Ashtavaidyas* who trace their origin to Vedic lineage. *Ashta- vaidya* tradition prevailed in central Kerala and had followers in Payyannur also. Kunhaman Unithiri and Edakkanam Kesavan Vaidyar were trained under the Kuttanchery Moose who lived in the 19th century. Mekkat Unnikrishnan Namboothiri, disciple of Thaikkattu Moose is the last living member in this line. Expert medical practitioners of the *Thiyya* and *Ezhava* communities represent the second stream. They are also known for their knowledge of Sanskrit and legends. Itty Achuthan who prepared the text of *Hortus Indicus Malabaricus,* Uracheri Gurikkal who instructed Herman Gundart in the basics of Sanskrit, Uppot Kannan who wrote interpretation of *Yogamrutham* and Cholayil Kunjumami Vaidyar are some of the well known figures in the subaltern school of traditional medicine in Kerala.

The tradition of Ayurvedic knowledge in Payyannur is also connected with sacred groves. In the ritual dance *poorakkkali* performed in the sacred groves owned by the subaltern groups such as *maniyani* and *thiya* communities, a distinct session is called '*marathukali'*. This is an intellectual debate where various aspects of traditional philosophy such as *tharka, vyakarana, ayurveda, jyothisham, niruktham, vaiseshikam, yogam* etc. are discussed. *Panikkar* of those communities performs this role. This confirms that like upper classes, the *thiyas* of the North Kerala were also educated in Sanskrit.

According to a folk saying the *Ashatangahrudayam* of Alathur Nambi is ineffective north of Valapattanam River. A survey on the source books revealed that vernacular texts are more popular than the Sanskrit texts such as *Ashatangahridayam* among the traditional practitioners of *Ayurveda* (Table 2.1).

Folk medicine: The little tradition

Folk medicine is a kind of folklore promoted by a collective. Unlike Ayurveda this stream of health care does not claim any strictly codified theoretical foundations. Various forms of folklores can be categorised into three classes: artefacts, mentifacts, and sociofacts. Sociofacts include folk custom and professional folklore. Customs are traditional rituals embedded in the beliefs of people. These beliefs form the foundation of folk medicine; so folk medicine assumes the status of customs. The tools and drugs used for treatment form the part of folk material culture or artefacts. All the oral traditions and ritualistic arts etc. are mentifacts. In summery folk medicine is a folk epistemology that brings together all the diversity of folklore. Jaggi (1973) categorises the folk medicine as tribal medicine and rural medicine. Since the Payyannur area does not have any tribal group the folk medicine of the area constitutes only rural medicine.

Table 2.1 Number of Traditional Health Care Practitioners Following Various Texts in the Study Area

	Name of Source Book	Language	No. of *Vaidyas* Following This Text
1	Ashtangahrudayam	Sanskrit*	24
2	Susrutasamhita	Sanskrit	4
3	Charakasamhita	Sanskrit	4
4	Ashtangasamgraham	Sanskrit	2
5	Kasyapasamhita	Sanskrit	2
6	Sarngdarasamhita	Sanskrit*	3
7	Baishajyaratnavali	Sanskrit*	6
8	Chakradattam	Sanskrit*	8
9	Sahasrayogam	Malayalam	28
10	Jotsnika	Malayalam	4
11	Sarvarokachikitsaratnam	Malayalam	9
12	Yogamrutam	Malayalam	3
13	Yogaratnapradeepika	Malayalam	4
14	Asavarishtamanjari	Malayalam	3
15	Palm leaves, Manuscripts	Malayalam, Sanskrit	13
16	Oral instruction from Guru only		7

*A practitioner usually refer to more than one text; among practitioners Malayalam translations are popular than Sanskrit texts.

Scheduled caste population constitute nearly three percent of the total population in Payyannur. There are 647 SC families belonging to 8 communities such as *Pulaya, Malayan, Velan, Vannan, Pulluvan, Kuravan, Valluvan,* and *Chakliyan*. Among them, except for *Chaklia* community, all others have indigenous health care traditions. Among them *Vannan* community is known for their expertise in paediatrics. The women obstetricians of the *Malaya* community and the experts of the *Kuravar, Velan,* and *Pulluvar* communities in treatment of poisoning especially by snakebites are acclaimed far and wide. This tradition of ethno-medicine[8] is the most interesting facet of the health care tradition of the region.

Branches and specialisations of local health traditions, and diagnostic and treatment procedures

Indigenous health care traditions have two distinct ways of treatment – natural and super-natural. The natural stream is symptomatic whereas the super-natural stream is etiological. The symptomatic way is characterised by identification of the disease by direct symptoms and treatment by means of natural medicine. In Ayurveda this stream consists of three approaches such as *samanam* (cure), *sodhanam* (cleansing) and *salyam* (surgery). Natural stream of treatment is also known as '*Yukthi Vyaparyashraya Chikilsa'*.

The super-natural streams assign specific causes to diseases. However, the cause or etiology is conceived different from that of the modern medicine. In the folk belief the cause of a disease could be anything like wrath of god, evil spirits, sorcery, black eye, violation of taboos etc. In order to uproot the cause of the disease certain religious and ritualistic acts are performed. This approach is known as "*Daiva Vyapashraya Chikilsa*" in Ayurveda. This supernatural and spiritual healing is adopted mostly in the treatment of mental disorders and poisoning.

Due to the high degree of mixing up it is not easy to categorise traditional medical practices of Kerala into classical Ayurveda, Keraleeya Ayurveda, and folk medicine. In view of this complex situation, the attempt here is to briefly evaluate different streams of medical practices and to analyse the natural and supernatural elements related to them.

Home remedies

Home remedy is a set of insights in the health care acquired through experience and spread by practice. The practitioners are mainly aged women in the household. Knowledge is acquired through direct observation of the daily situations in which their elders applied it in and around the households. Home remedies are relatively simple preparations and are mostly single drug prescriptions. Here, magic and medicines act simultaneously. The combinations could be natural (only medicine), super-natural (only magic) and magico-medicinal (magic and medicine). The aged persons who have acquired special skills perform the magic. Here treatment is performed as a service without monetary compensation. Most of the home remedies are intended to solve health problems arising in the day to day life such as fever, head ache, tooth ache, cough, eye diseases, and constipation. Preparations of tooth cleaning materials, herbal shampoos, medicated oils, *nethranjanam* [9] etc. also are a concern of this branch of folk knowledge.

There is a tradition of having *Marunnu Kanji* (medicated rice-gruel) in Kerala households. This is taken during the month of *Karkatakam* (July-August). It is believed that one course of *Marunnu kanji* will provide one years' immunity against most common ailments. Consumption of *kanji* is still practiced in the households of Payyannur. Ingredients of the *kanji* are as follows: raw rice, bark of the drum stick tree, *Vitis quadrangularis*, *Desmodium*

triflorum, Phyllanthus amarus, Earva lanata, coriander, pulses such as green gram, horse gram, fenugreek etc. There is also the tradition of preparing *Marunnu Kanji* with the *Navara* variety of rice in place of ordinary raw rice.

'*Vevumarunnu'* is another home made medicine that is popular in Payyannur. The medicine is recommended for women who have given birth. The medicine is believed to be effective against anaemia, backache etc. It is a *lehyam* prepared by boiling 18 'bazaar medicines'[10] such as *sathakuppa, ayamodakam, ajali, uluva* etc. in *Thengin Pookkula Kashayam.* The *Vevumarunnu* is prepared and administered in the month of *Karkitakam* like *Marunnu Kanji*. Though generally the month of *Karkitakam* is considered as famine month with low economic resources, the raw drug market is active in this period of year due to the demand for raw materials for the above mentioned medicines. It is estimated that raw drug worth Rupees 2 lakhs is being sold in the month of *Karkitakam* in the Payyannur raw drug market exclusively for the *Vevumarunnu*.

Certain ritualistic acts done in the context of household also may be considered as home remedy. *Kudam pidikkal* is important among them. Senior women in the households supervise the act. The ritual is performed for treating indigestion of children. A tray filled with *Gurusi* [11] water is placed in front of the child with swollen belly. A wick is light up and placed over a stone kept in the *Gurusi* water. A mud pot is used for covering the wick as the wick shuts off water from the tray enters the pot. The child is administered ginger, chilly etc. accompanied by chanting. Here a simple scientific principle is enacted as a supernatural phenomenon to gain the confidence of the patient. The ginger and chilly are the actual medicines that are known to be appetisers that help quick digestion.

Thirambupidutham is a remedy for sprain on the back. Here also belief and medicine work complementarily. The patient and the assistant of the medicine man hold two plantain-sheaths on their hips.The medicine man pours an herbal extract over the sheath. The sheath starts bending. As both the sheaths meet they are cut with a sharp knife. It is believed that this will cure the sprain. The herbal extract is the actual medicine here. Formerly, there was a ritual called *Poyya edukkal* that was performed to ward off fever. In this the body from top to bottom is massaged and the fever is believed to be removed.

Experts in special areas (*Ekaroga Chikilsakar*)

In modern medicine and Ayurveda, specialisation is attained by gaining expertise in treating diseases pertaining to certain organs or age groups, whereas in the *Nattuchikilsa* specialisation is usually attained in treating certain specific types of diseases. These specialists would have inherited certain 'ultimate' medicines for just one disease. Most practitioners of this category consider treatment as a part-time profession only. For that matter, their service is mostly available free of cost. In Payyannur such practitioners treat diseases such as jaundice, boils (*kuru)* and erysipelas (*chop* or *karappan*). They are reputed to employ some of the most effective medicines and medicated oils. Most of these practices are not mentioned in the conventional Ayurvedic texts. Any number of examples

can be quoted: The most commonly used medicines in treating jaundice such as *Kinattil koova* (*Leginandra sp.*), *Kinattil thamara* (*Pistia sp*.) and *Kaithamula* (stilt roots of Screw pine-*Pandanus sp.*), *Vattappalam* (*Clerodendrum infortunatum*) that are used for opening and draining the boils are not mentioned in the conventional ayurvedic texts.

***Visha Chikitsa* (Remedy for poisons)**

Visha chikitsa tradition has two distinct branches in Kerala: one Dravidian and the other Aryan. Among these, the Dravidian tradition is believed to have originated from two legendary healers - Cherullippattar and Nanjunda Nathar. It was the Karatt Namboothiri who introduced an Aryan legacy in *vishachikilsa* to public by exposing the text-*jyotsnika.* Until then this text remained a monopoly of Brahmin practitioners (Menon, 1997). More than the classical ayurveda-*vishachikilsa*-texts such as *Agathathanthra* in source books, it is the Kerala texts of *visha chikilsa*, which is popular among the practitioners of Kerala.

Though *vishachikitsa* distinguishes poisons of animal and plant origin as *jamgama visham* and *sthavara visham* and deals with all subcategories in detail, the emphasis is on snake poison. There are two distinct streams in the vishachikilsa- *visha vaidyam* and *vishavidya:* the first one is natural and the latter is supernatural. Until the first half of the 20th century it was the supernatural stream that had prominence. Treatment of snakebites had assumed importance from very early times in Kerala where one would have frequent encounters with serpents. Services of traditional healers were necessary in remote localities were modern antivenin treatment had not reached. The importance and high social status enjoyed by the *visha vaidyan* is reflected in the local proverbs and sayings. Even now 20 percent of the traditional healers in Payyannur are specialists of *visha vaidyam*. A vast majority, to the tune of 80 percent, of the snake bite cases in the Payyannur area is treated at *Parassinikadavu Vishachikilsa Kendram*. Here a holistic approach is adopted, where modern antivenin based treatment and the practices of traditional *vishachikilsa* are combined. A traditional centre for treating natural poisoning still functions in the Kangol-Alappadamba – the neighbouring village of Payyannur.

Marmachikilsa

Kalaris constituted an indispensable part of the traditional village system and were training centres of martial arts. Popularity of the *kalarichikilsa* or *marmachikilsa was* due to *Kalari* tradition. Origin of the *marmachikilsa* was as a package of medication and physiotherapy to treat physical damages occurring during the practice of *Kalari*. Therefore main practitioners of this mode of treatment were mainly instructors of *kalari*. *Marmachikilsa* was especially popular among the communities such as *Maniyani, Thiya* etc. who were the soldiers and guards during the feudal period. Expertise in *kalari* was necessary for performing folk rituals such as *teyyam* and *poorakkali*. Special massaging oils are used for straightening out dislocated joints and for loosening damaged tendons and muscles by soft massage. Bone fractures are treated with green drugs and *marmagulika*. In a special massage called *chavitty thadaval*, the massager, hanging on a rope tied to the roof, applies pressure with his foot by stepping on the patient. This massage treatment

was indispensable for those who practice *Kalari* and perform *kathakali* - a classical dance form.

Now there is only one *kalari* in Payyannur. Chanthan Memorial Kalarisamgam at Annur is now actively functioning under the leadership of C.V.Narayana Gurukkal. *'Marma gulika'* made by Pullanjikkotte Gurukkal of Kandoth Kalari was famous. This *Kalari* was closed following the demise of Gurukkal. At present, the daughter of the Gurukkal is selling this home made medicine. Some of these *kalaris* have become temples. Some of the medicinal plants commonly used for treating bone and ailments related to muscles in Marmachikilsa are: *Odayar valli (Rhaphidophora sp.*) *Mukkannan Peruku (Allophyllus serratus), Uppiliam (Asystasia chelanoides), Elluketty (Lytsia sp.), Irachiketty (Hydyotis auricularia)* etc.

***Balavaidyam* (Paediatrics)**

Balavaidyas of north Kerala are mostly folk practitioners from *peruvannan* community. They are mostly consulted for treating ailments of children such as bronchitis, epilepsy, etc. One of the main components of the medicines used by these healers is medicated ghee prepared with rare and powerful medicinal plants. It is this branch of traditional medicine that makes maximum use of materials of animal origin such as: mother's milk, eggs of red ant, ant lion, earthworm etc. Some of the unique medicinal plants used by these traditional paediatricians are: *Pachilaperumal* (*Malaxis rheedi*), *Paramullu (Lepidagathis keralensis*), *Chethi* (*Ixora coccinia*) etc. *Kulachammi (Spirogyra sp.)* is an alga used as medicine in treating epilepsy. However, its therapeutic properties are not reported from any other region.

***Unmadachikilsa* (Psychiatry)**

In Payyannur this branch is a mix of Ayurveda and folk tradition. Psychiatry called as *grahachikilsa* in Ayurveda, is known as *kirikachikilsa* in the folk stream. Some texts in palm leave describe 18 different kinds of mental disorders. *Sankhupushpam (Clitorea turnates), Sarpagandhi (Rauwolfia serpentina)* etc. are the main medicines used in this treatment.

***Mattuchikilsa* (Animal husbandry)**

Ayurveda has a separate branch that deals with treating of animal diseases. This is known as *Mrugayurvedam*. In Payyannur this branch belongs to folk tradition. Most of the seasoned farmers knew medicines for the common ailments of their cattle. Until a few decades ago there used to be healers who specialised in treating ailments of household animals. But now there hardly exists anyone who practices this stream of therapy. Some of the medicinal plants used in the traditional animal husbandry are: *Kotasari* (*Cassia hirsuta*), *Thazhuthama* (*Borhaevia diffusa*), *Koval* (*Coccinia indica*) etc.

A stream of supernatural healing existed in the traditional animal husbandry. *Puzhuvilakku* is one among them. This is used for treating wounds on the cattle. In this, medicine is not

applied directly to the body of diseased animal; instead medicine is deposited in a pit identified as the position of wound on the sketch of the animal drawn with knife over a mud wall. The thick juice of the leaves binds the medicine to the pit. As the juice of the medicine dries up, worms drop dead from the wound of the cattle and the wound heals. The medicine leaves are collected in numbers five, seven and nine after circumambulation of the plant three times. This trick has been tried on human also with positive results. Kodakkattu Kannapperuvannan, the well known *theyyam* performer and folk healer, practices this healing technique even now.

***Peretuppu* (Midwifery)**

Peretuppu is a completely extinct traditional folk stream of midwifery, which is distinct from that of the 'care during pregnancy'-practiced by elderly women in the family. Traditionally women from Malaya community acted as midwives. There are many traditional midwives in Payyannur who have attended more than a thousand deliveries. These midwives knew certain medicines such as *Menthonni* (*Gloriosa superba*) and *Mayilosikha*, which are effective in dealing with complicated cases of delivery. Certain procedures using *Menthonni*, known as *lamgali prayogam*, produce surprising results by smoothening complicated deliveries. Such folk knowledge in obstetrics is now on the verge of extinction.

***Daiva Vyapasrayachikilsa* (Devotional treatment)**

Curing the ailments by pleasing god is the essence of this mode of treatment. The core procedure in this mode of treatment is making offerings and praising the deity by singing hymns. A combination of the two major streams - devotional and rational treatments – is some times practiced. These constitute the psychological interventions in folk medicine.

The concept of a cure deity is a unique feature of this tradition. Wrath of a deity is identified as the root cause of the disease and it is believed that the only cure for the ailment is pleasing the deity. Supernatural aetiology (folk aetiology) is attributed to all diseases and magico-religious remedies are employed in treating them.

Payyannur has a strong tradition of cure deity worship. *Cheerma* who is the goddess of small pox is the principal deity in most worship centres associated with sacred groves. The *Mariyamma* worshipped by Chakliya community also is a cure deity. Traditionally when small pox is reported in the village, oracle of the *Cheerma* visits each house to bless the devotees by giving them turmeric powder. This tradition continued in the villages of Payyannur until two decades back. That turmeric has anti-microbial properties is worth remembering here.

Another tradition associated with smallpox epidemic was the performance of the *Thee Chamundi Theyyam* – a folk ritual where the performers walk through a big heap of burning charcoal. The fire heap prepared prior to the performance was usually a big bonfire; the temperature of which was capable of sterilising the surrounding.

It is common that special offerings are promised by patients or their families to specific deities for recovery from ailments. In temples at Meenkulam and Muthukattu sacred grove, feeding the sacred fish is an offering observed for curing skin diseases.

Thoovakkadi is a kind of skin allergy. A mother goddess, *Thoovakkali* is believed to be the cure deity for this disease. The traditional solution for this disease is to offer tender coconut to the deity. *Thoovakkaran*, god of the Kottanachery *Kavu* at Vellur is also believed to be a cure deity of this skin disease. Broomstick made of *Choothu (Eriocolon sp.)* plant is the main offering here.

Infertility and skin diseases are attributed to the wrath of serpent gods. Half of the sacred groves in Kerala are centres of serpent worship. Karippal serpent grove is one of the famous groves in the vicinity of Payyannur. Childless couples conduct special prayers here.

Since these devotional remedies are carried out in temples, they can be called 'sacred medicines'. Sacred medicines indicate the holistic nature of the traditional ways of healing. Temples, customs and the rituals associated with them also have health implications. Some of these are consciously devised. The temple culture always had a hidden agenda of health associated with it. It was the Vedic schools associated with temples that promoted *Ashta Vaidya families*. Apart from supernatural ways of healing and emotional services, in some temples certain medicines are also administered. The medicine given as *prasadam* at Thiruvizha temple at Cherthala is believed to be an effective remedy against mental disorders, leprosy, dropsy etc. *Valiyenna* is medicated oil prepared at Sastha temple at Thakazhi using 84 bazaar medicines and 64 green herbs. This oil is believed to be a panacea for all kinds of illnesses. Such rational treatments carried out in the spiritual background are present in Payyannur also. Turmeric *prasadam* of the Cheemeni Mundya temple is believed to be a panacea by devotees. Turmeric is effective against a broad spectrum of microbes.

Thachumanthram is a curative ritual practiced in the domestic environment. It is practiced mainly to treat evil eye. Traditionally, magicians of Malaya community practice this. Main ritual of the Thachumanthram consists of fanning the whole body with twigs of *Nochi* (*Vitex negundo*). Some of the non-conventional treatment concepts such as Teliotherapeutics , Spiritual Healing, and Universal Life Energy are being hotly discussed now. Mikao Usuui known as the father of Reiki, a non-conventional mode of treatment which has become popular even in western countries, was inspired by certain Indian traditions and Buddhist sutras. In this context 'irrationality' in our primitive systems of supernatural treatments needs to be re-examined.

3. Collection, Processing, and Distribution of Raw Drugs

The history of raw drug sales in Payyannur is less than a hundred years old. The first shop was established by Narasimhan, a Konkan Brahmin, some 80 years ago. However, the tradition of ayurveda can be traced back to several centuries. Therefore, it can be guessed that a market channel for these medicines could have existed for many centuries. In order to trace this history, we should study the old trade relations of Payyannur with the east and the west coast.

Payyannurpattu - the ballad of Payyannur, believed to have been written in the13th century, provides evidences for the commercial relations of Payyannur with the east coast. This might have enabled the *Vaidyas* of Payyannur to procure raw drugs that were not available locally. Merchant groups such as *Kolanchiyar, Valanchiyar, Anchuvannam* and *Mani gramam* were also operating during this period. Kawwai, presently the 24th ward of the Payyannur municipality, was the headquarters of the northern most Taluk of the British Malabar. This was a preferred port until the beginning of the 20th century.

The migrating traditional healers and traders were instrumental in introducing many raw drugs that were not locally available. Local names of certain drugs such as *Seemakottam, Cheenappavu, Bilathikonjan, Arabikunthirikkam* etc. suggest their introduction from elsewhere. The prefixes in their names such as *seema, cheena, bilathi, arabi* etc. indicates the localities such as Himalayas, China and Middle East, suggestive of the trade relations that existed with these regions. A two-century old palm leaf manuscript collected as part of the present research work also deals with the medicines mentioned above. Before the establishment of the raw drug market at Payyannur, traditional medical practitioners purchased raw drugs from the Thalassery market which used to be the commercial centre of the British Malabar and fresh drugs from the Vatakara weekly market fair which is extant even now. At present there are eight raw drug markets in Payyannur; among them three shops also sell fresh herbal raw drugs. These raw drug markets have an approximate annual turnover worth Rupees 57 lakhs. This does not include sale of Ayurvedic medicines manufactured and marketed by companies.

Raw drug market of Payyannur is monopolised by Konkan Brahmins.[12] It might have been these Konkan traders who supplied local traders of Payyannur with raw drugs through centuries. Konkan traders might have arrived much before the arrival of the Portuguese in India

Market channels

Permanent market channels were formed as better transportation facilities developed. Products from Tamil Nadu, Himalayas, China and Seychelles Island are now sold in the raw drug market of Payyannur. The exact route of these products and other details of their market movements are not obvious. Before reaching the end user, each product passes through a number of agents and middlemen.

Raw drugs may be categorised into four types, based on their location of procurement

1. Locally collected drugs
2. Drugs procured from other regions of the State
3. Drugs procured from other states of India
4. Drugs procured from outside India

1. Locally collected drugs

Nearly 84 percent of the drugs used in Payyannur are locally available. Nevertheless, about 50 percent of the required drugs are procured from outside. Erosion of knowledge of the availability of raw drugs in the locality is the reason for this. Originally, the responsibility of collecting raw drugs and preparing medicines was vested with the family members of the patient. This was done under the supervision and advice of the physician who provided the list of raw drugs and quantity to be used and mode of preparation of the medicine. Locally known plant collectors were also engaged to procure rare and hard-to-get items. Now due to the erosion of knowledge-base, it is almost impossible to prepare a medicine without seeking the help of the professional plant collector or the raw drug merchant.

2. Drugs procured from other regions of the State

These are locally non-available or inadequately available drugs procured from other districts of Kerala. Most of these drugs are collected either from forestlands or from marginal lands by plant collectors including tribal people. They reach raw drug market of Payyannur through a network of drug collectors, traders, middlemen etc. In the Payyannur market the major chunk of the green drugs consisting of roots of herbs arrive from the Wednesday market fair at Badagara. Among the NWFPs collected from the Kerala forests by tribal people, 80 are raw drugs. The medicinal plants collected through the tribal co-operative societies are sold out through the apex body called 'Scheduled Caste and Tribal Development Co-Operative Federation'. However, this does not give a complete picture of the raw drugs procured from the forest because tribal societies procure only those medicinal plants that are included in the MFP list. The drugs that are not included in the MFP list are also collected and sold to traders (Sasidharan and Muralidharan, 2000).

3. Drugs procured from other States of India

It is from neighbouring States that some of the locally non-available drugs are brought to the markets in Kerala. One of the major catchments of such drugs is the Himalayas. These drugs, originally collected by hill tribes, reach the Delhi-Amruthsar markets from where they are distributed to different parts of the world. These drugs pass through the hands of local collectors and traders of national and regional markets before reaching the end user. No Information is available on these traders and the volume of the trade. Some of the locally available drugs such as *Jeevakam* (*Malaxis rheedii*) are alleged to be traded in national market before they reach local markets for sale.

4. Drugs procured from outside India

Aklarithenga (Kernel of *Lodacia maldivica*), *Cheenappavu* (*Smilax china*) *Thakkolam* (*Ilicium verum*) are some of the raw drugs procured from outside India. Some materials of animal origin also reach the local market from outside India e.g. *Amber gris*. See Table 3.1 for a list of exotic drugs and their original location.

Table 3.1 Some Exotic Drugs of Payyannur Raw Drug Market

Name of the raw drug	Trade name	Scientific name	Collected from
Athividayam	Atis	*Aconitum ferox*	Himalayas
Akilkaruka	Akarkara	*Anacyclus pyrethrum*	North Africa
Aklarithenga	Double coconut	*Lodacia maldivica*	Seychelles islands
Badam	badam	*Prunus amygdalus*	Himalayas
Caralam	Chir	*Pinus roxburghii*	Himalayas
Chinappavu	Chobechini	*Smilax china*	China, Japan
Devadaram	Deodar	*Cedrus deodara*	Himalayas
Erattimadhuram	Liquorice	*Glycyrriza glabra*	Garhwal, central Asia
Ilippapoovu	Mahua	*Madhuca latifola*	M.P., Orissa
Jatamanchi	Jatamansi	*Nardostachys jatamansi*	Sikkim, Himalayas
Kadurohini	Kutki	*Picrorhiza scrophulariflora*	Sikkim, Himalayas
Karkadashringi	Kakra	*Pistacia chinensis*	North East, Kashmir
Kiriyath	Chiretta	*Swertia chiretta*	Himalayas
Kottam	Kuth	*Saussarea lappa*	Chenab Basins
Kumkumappoovu	Kesar	*Crocus sativus*	Kashmir
Mahamedha	Mahamedha	*Polygonatum verticillatum*	Himalayas
Nanmukhappullu	Nanmukhappullu	*Actinopteris dichotoma*	Attappady
Peetharohini	Mamira Pellitory	*Coptis teeta*	South Europe Sikkim Himalayas
Salamishri	Salap	*Orchis latifolia*	Central Nepal
Sambrani	Salai	*Boswellia serrata*	M.P
Thakkolapputtil	Illicium	*Illicium verum*	S.China
Vayambu	Vacha	*Acorus calamus*	Sikkim Himalayas

Classification of the raw drugs

According to the *Charaka Samhitha* a raw drug or medicament is that substance which is the causal matter of a product, or, in other words, it is that on which the medicine's action and properties are dependent. A medicine is prepared from a raw drug. It is this preparation or purification or processing that converts a raw drug into a medicine. According to Vagbhata there is nothing in the universe that cannot be used as medicine (*Ashatanga Hrudayam soothrasthanam).*

Charaka has classified drug materials into three classes: *Jamgamam* (animal origin), *Oudbhidam* (plant origin) and *Parthivam* (Mineral origin). There exist more comprehensive classifications of the drug materials based on their pharmacognosy, morphology etc. However, for the present study on the raw drug market, the Charaka classification is found to be more relevant. The materials of plant origin are various plant parts such as leaves, flowers, seeds, fruits, roots, tubers, bark, heart wood, gums, resins etc. Materials of animal origin include animal parts such as teeth, horns, faecal matter, milk, secretions, shells etc. Materials of mineral origin constitute metals and minerals that are used as medicines.

More than 800 materials of plant origin obtained from 595 species are used as raw drugs in Payyannur. Ninety-five materials of animal origin obtained from 60 species of animals are also used as raw drugs. There are 40 different materials of mineral origin that find their way into the materia medica of Payyannur.

Based on the availability, raw materials of plant origin are classified into three groups: wild plants species, cultivated species, and exotics. There are 396 species of wild plants, 102 species of cultivated plants and 89 species of exotic plants among the raw drugs in the materia medica of Payyannur. 17.5 percent of the medicinal plants are commonly cultivated in the home gardens and 15 percent are exotic. 101 different raw drugs of animal origin are obtained from 61 species (include 35 different substances such as milk, urine, shell etc.). Among this, 90 percent is locally available. 90 percent of the drugs of mineral origin are brought in from other parts of the country or from abroad.

The raw drugs of plant origin may be classified into dry and green drugs. The dry drugs are locally referred as *Angadimarunnu* (bazaar medicine) or *Pettimarunnu.* Green drugs are also called *Parimarunnu* or *Pachamarunnu.*

From the point of view of accessibility, raw drugs can be categorised in to seven groups as below:

1. Green drugs sold in the market (G)
2. Green drugs that are not sold in the raw drug market but collected directly from immediate surroundings or from the vegetable market (C)
3. dry drugs procured from other regions (D)
4. Dry drugs that are locally collected (DL)
5. Semi-processed materials such as oil, powder, sago etc. (DP)
6. Substitutes for established raw drugs (S)
7. Adulterants (A)

Processing, storage and sale in raw drug market

Except a few items which are used as green drugs in fresh form, most of the drugs are dried before sale. Majority of the dry drugs arriving in the market are sun dried rhizomes and seeds. Some of the raw drugs are available in processed, semi processed and raw forms, in the market. For instance, turmeric rhizome is sold in the market in five different forms such as *Pacha manjal* (fresh rhizome), *varattu Manjal* (sliced and boiled form), *Unakka Manjal* (Sun dried), *Manjal podi* (Pulverised form) and as *sindooram* (turmeric powder blended with lime powder).

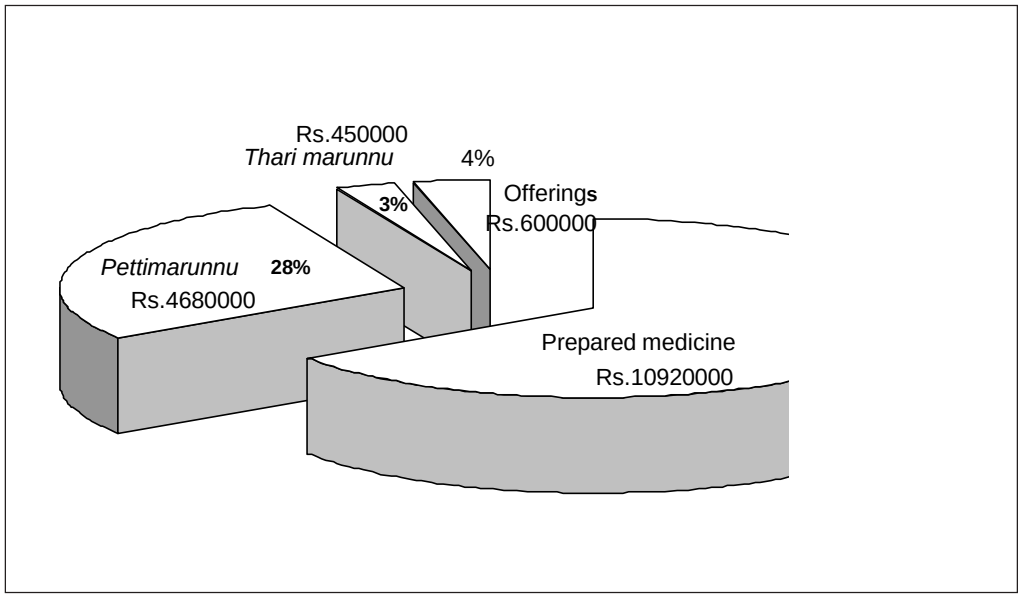
According to Parasuram (1981) nearly 50 percent of raw drugs are lost due to unscientific storage. Bio-deterioration of the stored seeds is common under tropical climatic conditions due to infestation of fungus and bacteria. Besides causing deterioration, fungus infestation also results in accumulation of aflatoxins that are extremely harmful to living tissues. Thus using seeds infested with microbes may not only reduce the quality and efficiency of medical preparations but may also be harmful (Mohanan *et al*, 1981). Most of the plant parts reaching the shops in fresh form will be dumped in the godown only to be infested with fungus. Raw drugs in such unhealthy conditions are very often sold in the market. Ayurvedic medicines, unlike that of the allopathic medicine, do not have any expiry period before which it has to be sold. So efficacy of most of the raw drugs sold today is doubtful.

Raw drug market of Payyannur follows certain traditions in sale of medicines which are different from that of the markets in other areas of the state. Metric measures and weights are not used. Instead old measures such as *Kazhanju*, *Palam* etc are still being followed. In other localities, each component of a prescription is packed separately and the customer needs to measure and apportion the drugs before preparation of the medicine, whereas in the markets of Kannur and Kasaragod districts, all the raw drugs are apportioned ready for preparation of the medicine and each dose is packed separately so that for a seven day course of *Kashayam* seven *Kashayappoti* (raw drug packet) will be given. Similarly, all bazaar medicines and fresh medicines are supplied to the customer in the ready-to-use form.

The process of apportioning raw drug is a job that demands high degree of concentration. A properly cut hard wood bole is used as a platform and a specially made heavy knife is used for cutting the dry plant parts placed over the platform. As each piece of drug has to pass through the medicine man's fingers, any wrong entry of raw drugs is easily identified and eliminated. The advantage of the system is provision for standardisation of quality and quantity of the drug packs. The disadvantage is that once different medicines are cut and pooled, it is difficult to detect whether an item has been substituted, or excluded from the list. In the olden days, the prevalence of a high degree of ethics in the traditional medical field prevented such occurrences. However, experience shows that this is no longer true in the case of Payyannur market.

There are 750 licensed and 1000 unregistered Ayurvedic medicine-manufacturing units in the state. Kannur alone has 29 small scale, 6 medium scale and 3 large-scale registered Ayurvedic medicine-manufacturing units. (Sasidharan and Muraleedharan, 2000). As in other fields, Ayurvedic ready-made preparatory medicines are also sold in large-scale. Annual turnover of ready-made medicines alone in the ten retail Ayurvedic pharmaceutical outlets is to the tune of rupees two crores. As was common in the past, very few practitioners continue to recommend home made *kashayas* or treat with their own medicines. Mohana Shenoy (50), a seasoned raw drug vendor in Payyannur recollects that most popular massage oils among the old generation of Payyannur were *asana vilwadi* and *asana eladi*. People prepared their own massage oil. For that purpose every day at least 30 packets of medicine-mixes of those oils were sold in those days. Now hardly anybody knows how to prepare *Vaira thailam*, and *Pancha moothrarishtam* - two highly effective medicines against epilepsy. There were a number of reliable plant collectors here. Therefore, it was possible to supply fresh green medicine to the customers. Today plant collectors have to be engaged exclusively for collecting specific medicines because of which the cost of medicine has increased. This happens because the plant collector usually demands a full days' wage even if the medicine collected is just a handful. Moreover, it is hard to find experienced raw drug collectors now-a-days. There are only two plant collectors who supply the requirements for Shenoy's shop now. Krishnan (55) who has been working as raw drug compounder in an important raw drug shop in Payyannur for the past 35 years states that most of the medicinal combinations that were commonly prescribed until three decades ago have now become very rare. This indicates the serious erosion of knowledge associated with the raw drugs and their use over time.

Fig. 3.1 Approximate annual turnover of Ayurvedic shops



Annual requirements and collection of the Raw Drugs

An attempt to quantify annual requirement of the medicinal plants at state level was made under the State initiative. The survey team constituted by the Kerala Government considered it necessary to find out and locate the forest areas in which cultivation of medicinal plants could be undertaken on a scientific basis. This team prepared a list of plants of medicinal value in Ayurveda and estimated their approximate annual requirements. For preparing the estimate, the report says "the total number of patients in the state as a whole is not available. Figures are available with reference to government Ayurveda hospitals. The doctor to patient ratio in government hospitals is considered applicable with reference to government ayurveda hospitals. The doctor patient ratio in government hospitals is applicable in case of private dispensaries as well. On this basis it is estimated that there will be 1,01,50,000 patients in Kerala resorting to ayurvedic treatment. The requirements of raw materials in Kerala are worked out on this basis. Unregistered physicians and self-treatment at home will not be covered by this estimate" (Government of Kerala, 1976). There are certain other studies, which deal with the annual requirements of medicinal plants. There is wide disparity among the figures given in various studies (see Table 3.2.)

Table 3.2 Approximate Annual Requirement of Selected Medicinal Plants (All figures in Tonnes)

Name of drug	**Annual approximate requirement** (based on various reports)			
	Govt. of Kerala (1976)	Nambiar (1986)	Aryavaidyan Journal (1992)	
Kurunthotti	18100	800	3000	
Sataveri	4670	125	2000	
Palmuthukku	2360	425		
Nellika	-	-	1500	
Neeli	-	-	400	
Chittamruth	10000	150	-	
Kuvalam	5900	65	-	

These studies also lack methodological rigour. There is no information as to how the researchers have arrived at the various estimates on the requirement of the medicinal plants. Recently Kerala Forest Research Institute (KFRI) and TBGRI have taken up studies for assessing the consumption of medicinal plants in North and South Kerala (Pushpangadan *et al*, 1998; Sasidharan and Muralidharan, 2000) [Table 3.3].

Table 3.3 Annual Consumption of Raw Drugs by the Medicine Manufacturing Units in Kannur (all figures in kg)

Name of raw drug	Consumption	Average
Kurunthotti	14591	384
Sataveri	9643	254
Nellika	12326	324
Adalodakam	5998	157
Kuvalam	5610	148
Chittamruth	11515	303

Source: Sasidharan and Muralidharan (2000)

Most researchers have pointed out the non-availability of data as a major hindrance in arriving at the estimates of quantity of raw drug traded at the national and international markets, their market share, economic value, etc. (Farensworth, 1988; Ved and Anjana, 1994). Farensworth observes: on a "… global basis it appears that the only consolidated source of information on the monetary value of medicinal plants entering in global commerce is that provided by the International Trade Centre (UNCTAD/GATT). The most recent compilation of data from this agency involving medicinal plants and their derivatives was published in 1982. However, this information must be considered as grossly incomplete. UNCTAD/GATT compiled data on species; a survey of world markets and 'Markets for selected essential oils and oleoresins". Since many species and essential oils have, in addition to food uses, medicinal applications the problem of analysis of the global importance of 'medicinal plants' becomes further complicated." (Farensworth, 1988). Difficulty in gathering data on the raw drug requirements on local level has been described by Sasidharan and Muraleedharan (2000): "Non-tribes gather medicinal plants from homesteads and forest areas and sell them to different traders. Further, some of the medicinal plants are obtained from outside the state. Thus gathering information on total quantity of medicinal plants collected from different sources directly is rather difficult".

Information on the requirement of raw drugs at the local level can only be collected by the continuous observation of the market and by sample surveys covering all the seasons. It will be difficult to obtain exact price, profit and quality of the material, as the trader will be reluctant to disclose trade secrets. Currently, nearly 60 percent of the locally used medicines are not produced locally. In order to find the annual requirement of the raw drugs it is necessary to find the quantity of local consumption of these medicines and then the total quantity of each constituent thus consumed locally. To achieve this goal it is necessary to find consumption of nearly 500 medicinal raw materials. Though theoretically possible, such a task in practice is nearly impossible to carry out. Therefore, the present study attempts only the quantification of diversity of raw drug materials.

4. Biodiversity Perspective of the *Materia Medica*

Biodiversity is the totality of the genes, species and ecosystems in a given region. It is the variety of life and its processes. Even a casual observation of the raw drug market will take one to the wonderful world of tropical biodiversity. It reflects not only the diversity of plants and animals but also the diversity of practices and the richness of traditional knowledge accumulated as a result of continuous interaction between man and nature. Drugs of plant origins arrive from a spectrum of habitats including mangroves, sacred groves, tropical forests, paddy fields, laterite hills etc. These include cultivated and wild plants. There are parasites, epiphytes, carnivorous plants, pteridophytes, thallophytes and gymnosperms belonging to about 125 families and 595 plants with a great difference in variety and type.

Biodiversity can be divided into three hierarchical categories as ecosystem diversity, species diversity and genetic diversity. One can observe high level of diversity in Payyannur at all the three levels.

An ecosystem consists of a community of plants, animals and inanimate substances such as air, soil, water, and minerals situated in their environment. Nearly ten distinct microhabitats can be identified among the localities from where the drugs are collected for the raw drug market of Payyannur. Conservation of the threatened species of medicinal biota can be effectively done only if these microhabitats are protected. Majority of species in the materia medica of Payyannur are indicator species of such microhabitats. A brief account of the microhabitats follows.

Paddy fields

Paddy fields are the most threatened habitats today. More than 75 percent of the land area of Payyannur was once paddy land. Paddy fields act as good natural flood reservoirs. Extensive paddy lands of *Puruvappadu*, *Annur vayal*, *Kanaram vayal*, *Eachilam vayal* etc have now given way to residential complexes and coconut groves. More than fifty varieties of rice were cultivated here. Among them varieties such as *Chennellu*, *Navara*, *Illichennellu* are known for their medicinal value.

Biodiversity of paddy lands has temporal and spatial dimensions. Paddy fields are a rare, ever changing and self-rejuvenating habitat that harbours different biota in monsoon and summer. Some medicinal herbs such as *Kayyanni* (*Eclipta alba*) *Manga Nari* (*Limnophylla* sp.), *Karingoovalam* (*Monochoria vaginalis*) etc. appear in the paddy land only in rainy season. *Thelkkata* (*Heliotropium keralensis*) appears only in summer. *Azhukanni* (*Drocera indica*), which was a common carnivorous plant in all paddy lands until 15 years ago, has now vanished completely from paddy fields. Paddy lands are the only habitat of water snails (*Pila* sp.) which are used as an effective remedy for fistula. Traditional medicine for burn was the fat of balloon frogs and bullfrogs (*Rana hexadactyla* and *R. tigrina* respectively) collected from paddy fields.

Ponds

Payyannur has more than 120 small and large ponds. Medicinal plants such as *Ambal, Thamara, Kula Chammi* etc grow in ponds. The mud ponds are richer in terms of biological diversity than stone walled ponds. Medicinal plants such as *Palmudhukku* (*Ipomea paniculata*) and *Chethi* (*Ixora coccinia*) grow on the banks of such ponds. The leech (*Hirudinaria*) that was found in the ponds and paddy fields was used for the *Rakthamoksham* in *Panchakarma*. Now leech has vanished from Payyannur forever.

Mangroves

In Payyannur, remnants of mangrove forests survive in localities such as Kappadu of Korom village, Chittarikkovval, Karamel, Kavvayi, etc. None of the traditional practitioners make use of the mangroves as a source of medicine. However, mangrove associates such as *Othalam* (*Cerbera odollam*), *Puzhamunja* (*Premna latifolia*), *Kaitha* (*Pandanus* sp.), *Adambu* (*Ipomoea biloba*) etc have medicinal value. *Samudrappazham* (*Bariingtonia racemosa*) is one of the locally endangered medicinal plants, which is also a mangrove associate.

Rivers and Streams

Major streams in the locality include; midland streams such as *Kanayi kanam* and *Muthiyalam kanam* and the man-made canals that drain the floodwaters from paddy lands to back waters. Vellur puzha is a tributary of Kawwayi River and originates from Theyyottu kavu. It forms the northern boundary of Payyannur. *Puranakittam* (Iron ore) is present in the banks of Vannathippuzha that forms the southeast boundary of the study area. Medicinal plants such as *Kaitha* (*Pandanaus sp.*), *Thiruthali* (*Ipomoea separia*) *Muthil* (*Centella asiatica*), *Neer koova* (*Lagenandra toxicaria*) etc. grow on the stream banks.

Backwaters

South-western part of Payyannur is a backwater area and the point of confluence of rivers Kawwayi, Ramapuram and Peruvamba. Medicinal biota such as *Malanjil* (eal fish), *Kakka* (clam) etc. grow in the backwaters.

Marshy shores (Kaippadu land)

Kaippadu lands were once localities of luxuriant mangrove growth. These areas were cleared for agricultural purposes and are being cultivated with paddy varieties that are resistant to salinity. Marshy shores inundated by saline water in summer and fresh water in monsoon are ideal habitats for *Brahmi* (*Bacopa monieri*), *Meenankanni* (*Lippia nudiflora*), *Neeraral* (*Marselia* sp.) etc.

Sacred Groves (Kavus)

These are patches of wilderness conserved owing to their perceived importance attached to a village deity. There are nearly 25 *kavus* in Payyannur. Several rare medicinal herbs grow in these groves. Largest among these groves is *Chamakkavu* of vellur. Rare medicinal plants such as *Eezhal* (*Embelia tjeramcottam*), *Kutaluchurukki* (*Morinda umbellataum*), *Ilippa* (*Madhuka longifolia*), *Vellappain (Vateria indica*) etc. are present in this sacred grove. In the *Kanayi kolichar Veeran Kottam* plants such as *Ankolam* (*Alangium salvifolium*), *Karimuthil* (*Geophila repens*), *Urithookki* (*Aristolochia indica*) etc are found. The rare orchid *Valiya Orilathamara* (*Nervelia araguana*) is found only in *poomalakkavu* of Kanayi. Two other species of *Nervelia, N.prianiana* and *N.infundibulifolia* are used in place of *Orilathamara* and they grow abundantly in Idayilakkattu kavu near Payyannur.

Laterite Hills

These are laterite hillocks in the midland - one of the richest habitats of medicinal plants. Half the land area of Korom village and the Eachilam Vayal hillock of the Vellur village are midland laterite hills. Hill slopes and valley bottoms have settlements with home gardens and plantations of cash crops whereas the hilltops are barren laterite caps except for grass growth. Medicinal plants such as *Chethy, Ekanayakam, Paramullu, Satavari, Kattuzhunnu, Kattupayar* etc grow in the small crevices on the hill slopes where soil is available. Large scale mechanised and unrestricted laterite mining is posing a great threat to these habitats today. The midland hill Ezhimala, where the Naval Academy is located, is one of the richest reserves of medicinal plants.

House and Homesteads

Payyannur is a densely populated locality. Until a few decades ago, most of the homesteads here had a diversity of crops growing in different canopy tiers, all of which have become monoculture plantings today. Coconut gardens and Areca gardens are ploughed every year and hence regeneration of most of the medicinal plants is effectively prevented. *Kuzhiyana* (Ant lion), *Atuppin kallu* (stone of the firewood stove) and *Illittakkari* (soot accumulated in the chimney) are some medicinal materials associated with houses.

Marginal Lands

Poramboke of road and railways are considered as marginal lands where plants such as *Purusha ratnam* (*Hybanthes enayesperma*), *sivakranthi* (*Evolvulus numularis*) etc. grow. Barks of *Avil* (*Holoptelia integrifolia*), *Eazhilam pala* (*Alstonia scholaris*), *Dandappala* (*Wrightia tinctoria*) are collected mainly from the trees on the roadsides. There is a *Somarachi* tree (*Croton oblongifolium*) growing at Perumba near KSRTC bus stand in Payyannur. Many plants normally growing in Tamil Nadu and Andhra Pradesh are seen

growing in Payyannur, seeds of which could have been disseminated by means of rail and road transportation. Exotic species such as *vellantharam* (*Dichrostachys cinerea*) and *Phoenix* are seen growing on roadsides in Payyannur. Febrifuge capability of the roadside weed, *Parthenium,* is well known.

Forest trees and sea as source of raw drugs

Forest and sea form two major sources of raw drugs to the Payyannur market. These two habitats are not present within the boundaries of Payyannur municipality. Moreover, excepting *kadal nak* (Bone of cuttlefish) no other raw drug of marine origin is procured locally. Ramanthali and Thrikkarippur beaches are the nearest seashores. *Eattachappu* is a plant growing on the beach known to be an effective medicine against fish poison and swellings.

Major forest types in the districts are west coast tropical evergreen forest, west coast semi evergreen forest and southern Indian moist deciduous forest. Most of the species found in moist deciduous forests are found in the laterite scrub forest, a retrogressed type, and on the midland laterite hills in and around Payyannur.

According to a report published by KFRI, 44.94 percent of the raw drugs consumed by the pharmaceutical industries of Kerala are collected from forestland (Sasidharan and Muralidharan, 2000). However, only a small amount of medicinal plants is collected from the forests of Kannur and Kasaragod Districts. Cooperatives, such as Tribal Cooperative Society, are also absent here. "Kannur having less area under forests and hence only a few items of NWFPs are collected from here. *Kunthirikkam* is a major item collected from here followed by *Chinikai*. Kannavam Tribal Service Cooperative Society organises the collection of NWFPs in Kannur district. The Society has 80 families as members and about 80 persons are associated with the collection of these products" (KFRI, 1992a). The quantity of NWFP collected in Kasaragod district is comparatively low. Total quantity of NWFPs collected from the district during 1996-97 was 23,608 kg while it was 37,151 kg during 1997-98 and 34,440 kg in 1998-99. The collection charge paid to the tribals increased from Rs. 1,86,150 in 1996-97 to Rs. 2,74,575 in 1997-98 and Rs. 3,02,417 in 1998-99. The collection is managed by Panathady Panchayat Scheduled Tribe Service Co-op Society located Balanthodu (KFRI, 1999b). See Table.4.1 in the following page.

Apart from this, in the unorganised sector, raw drugs are being collected from Pulingome forests (Thalipparamba forest range). Raw drugs of forest origin arrive at Payyannur market mainly from Pulingome forests. People belonging to Cherava community procure this. Main items collected from Pulingome forests are *Chitteenth* (*Angiopteris evecta*), *Perum kurumba* (*Chonemorpha fragranse*), *Maramanjal* (*Coscinium fenestratum*) and *Kallurvanchi* (*Rourea aquatica*).

Table 4.1 Raw Drugs Collected From Kannur and Kasargod Districts

		1996-1997		1997-1998		1998-1999	
Drug	District	Kg.	Rs.	kg	Rs	kg	Rs.
Cheenikai	Kannur	68835	6995575	69059	414357	6657	48598
	Kasaragod	11838	115730	30865	185170	30597	183558
Kakkumkai	Kannur	5375	22163	5538	27369	4417	21321
	Kasaragod	6800	36350	0	0	0	0
Maramanjal	Kannur	2000	17355	1183	10801	554	4986
	Kasaragod	0	0	5082	50820	2205	22055
Urinjikai	Kannur	1209	6113	1756	9758	11	55
	Kasaragod	0	0	384	2307	330	16500
Kunthirikkam.I	Kannur	323	12042	178	7120	84	3396
	Kasaragod	95	3420	200	11000	2238	91627
Kunthirikkam.II	Kannur	947	18198	2165	38633	354	10525
	Kasaragod	550	14500	503	22635	0	0
Kunthirikkam.III	Kannur	2587	33726	1511	19746	4685	75346
Kunthirikkam.IV	Kannur	467	4670	133	990	1098	8788
Kunthirikkam. Vella.	Kannur	147	3670	0	0	44	924
Kunthirikkam.Sp.	Kasaragod	0	0	0	0	70	3500
Kurunthootti. Unakka	Kasaragod	1700	11900	0	0	0	0
Pachottitholi	Kasaragod.	0	0	384	2307	330	16500
Kazhanjikuru	Kannur	9	131	95	575	31	462
Kudampuli	Kannur	0	0	0	0	242	185187
Hony	Kannur	0	0	02	41	174	7852
Pathiri	Kannur	5	666	275	15521	82	5674
Total	Kannur	81904	818309	81925	548973	18433	206114
	Kasaragod	23608	186150	37151	274575	35440	302417

Source:K.F.R.I (1999a),K.F.R.I.(1999b)

Species diversity

A species is a group of organism genetically so similar that they can interbreed and produce fertile offspring. The most commonly discussed level of biodiversity is at the species level. Species diversity is commonly measured in terms of total number of species occurring in the specific geographical area. More than five species of plants from each genus such as *Ficus*, *Phyllanthus*, *Sida*, *Solanum*, *Curcuma*, and *Piper* are used as medicine in the study locality (Table 4.2.).

Table 4.2 Species Diversity in Medicinal Plants

No.	Genetic Name	No. of sps.	Locally available
1	*Ficus*	7	7
2	*Piper*	6	4
3	*Solanum*	6	6
4	*Phyllanthus*	6	4
5	*Sida*	6	6
6	*Curcuma*	6	6
7	*Cassia*	5	4
8	*Vigna*	5	5
9	*Ipomoea*	5	5
10	*Sacharum*	4	4
11	*Syzygium*	4	4
12	*Ocimum*	4	4
13	*Cinnamomum*	3	2
13	*Nervelia*	3	3
14	*Hebanaria*	3	1
15	*Cissus*	3	3
16	*Oryza*	2	2
17	*Premna*	2	2
18	*Zingiber*	2	2
19	*Merremia*	2	2
20	*Kampheria*	2	2

Genetic diversity

Genetic diversity refers to the genetic variations occurring within a single species population. Ayurveda and folk medicine attach particular importance to the genetic variations. For example, these practitioners differentiate individuals of a population solely based on a few distinctions such as difference in size and colour. Twenty five species exhibit genetic variation in various aspects such as height, colour of flower and stem, seeds, size of fruits, shape of leaves etc. (Table 4.3.)

Table 4.3 Genetic / Morphological Diversity in Medicinal Plants of Payyannur

No.	Local Name	Botanical Name	No. of Forms	Variety, Sub sp., Ecotype
1	Kunni	*Abrus precatorius*	2	Seeds - red, white
2	Kuvalam	*Aegle marmelos*	2	Size of fruits, leaves
3	Vasala	*Basela alba*	2	Var.alba,var.rubra
4	Kumbalam	*Benincasa hispida*	2	Kumbalam, Nei Kumbalam
5	Erikku	*Calotropis gigantia*	2	Flowers: purple, white
6	Nitya-kalyani	*Catharanthus roseus*	3	Flowers: rose, white
7	Shamku-pushpam	*Clitoria turnatea*	2	Flowers:White, blue
8	Tengu	*Cocos nucifera*	2	Nadan, Chentengu
9	Vellari	*Cucumis sativus*	2	Chenthengu
10	*Manikoova*	*Curcuma oligantha*	2	Var.oligantha, var.lutea
11	Ummam	*Datura metal*	2	Flowers: blue, white
12	Tirutali	*Ipomoea sepieria*	2	Leaves: plain, with brownish patch
13	Adampu	*Ipomoea pescaprae*	2	Flowers: red, white
14	Mavu	*Mangifera indica*	20	Puliyan, Olore Kadukkachi, etc.
15	Prasarini	*Merremia tridendata*	2	Var.tridentate, var.hastate
16	Vazha	*Musa paradisica*	3	Kadali, Mannan, Nendran
17	Tamara	*Nelumbo nucifera*	2	Flowers: white, red
18	Nellu	*Oryza sativa*	3	Navara (black and golden glumed) Chennellu, Undanellu
19	Kaita	*Pandanus odaratissimus*	2	Totumunda, Chakamunda
20	Vettila	*Piper betle*	3	Karpoorakodi, Pancholi, Pandalkodi
21	Tippali	*Piper longum*	2	Tippali, Kattutipali
22	Amruthu	*Tinospora cordifolia*	2	Chittamruth, Pothamruthu
23	Utiram	*Urena lobatum*	2	Var.lobatum, var.sinuatum
24	Nochi	*Vitex negundo*	2	Var.negundo, var.purpurascens
25	Nochil	*Vitex trifolia*	2	Var.subtrisecta, Var.simplicifolia

Genetic diversity/ variations are also apparent among certain animal species that is of medicinal importance. This variation is a decisive factor, in the case of the raw drugs of animal origin. In some instances milk for some prescriptions has to be collected specifically from black cow. Ward and Conner (1906) mention black cattle of the country (Kavvayi) as; "black cattle of the country is very diminutive animal mostly confined to the low country". From late 1960's itself cross breeding of cattle stock began in Payyannur. Local breeds began to completely vanish from the locality following the inception of Integrated Dairy Development Project in 1984. Six diary farms and one milk-chilling unit are functioning today at Korom, Vellur and Payyannur villages. More than 24 million litres of milk, being processed here annually, mainly come from cross bred cattle. Pure line local breeds have become almost untraceable, especially the black cattle described by Ward and Conner. Population of buffalo and goat is also declining.

Agro-biodiversity in *Materia Medica*

Almost 18 percent of the medicinal plants in Payyannur are cultivated for food, medicine and ornamental purposes. Though a lion's share of them is natural species of the Western Ghat region, their distribution in the wild habitats is poor. Vast majority belong to 'extinct in the wild' category in the IUCN list[13]. *Campheri*a forms a very good example for this. The genus *Campheria* is completely absent in the wild habitats but two species of *Campheria* viz. *C. galanga* (*Kacholam*) and *C.rotunda* (*Chengazhineer kizhangu*) are considered as extremely valuable medicines and are procured from homesteads. Though Spices such as cardamom, pepper, ginger and curcuma are originally from the forests of the western ghats, now their natural occurrence as wild plants is rare. Medicinal plants such as *Munja* (*Premna integrifolia*) C*hethikkoduveli* (*Plumbago indica*) *karinochi* (*Vitex negundo var. purpurascens*) *Nanthyar Vattom* (*Tabernamontana divaricata*) and *Sankhu Pushpam* (*Clitoria ternata*) do not now have natural occurrence in the western ghats. These might have become extinct in the wild when the lowland forests were converted into agricultural lands. Some of the critical drug materials of the Kerala school of Ayurveda are actually not native of Kerala. For instance, consider the cases of *Koovalam* (*Aegle marmelos*) and *Arayal* (*Ficus religiosa*). The original distribution of *Koovalam* is in the eastern ghats and central India whereas that of *Arayal* is Eastern Himalayas and South East Asia. The original localities of distribution of some of the widely used medicines in Payyannur will be interesting to note: *Dadimam* (*Punica granatum*) is from Iran; *jathi* (*Myristica fragrans*) is from Indonesia; *Pera* (*Psidium gujava*) is from Tropical America; *Cherunarakam* (*Citrus lemon*) is from South East Asia; *Murik* (*Erythrina indica*) is from Coromandel coast and the *Akathi* (*Sesbania grandiflora*) is from tropical Asia. Betel leaves, an indispensable ingredient of various rituals and the medicinal preparations, have more than three varieties here. Betel leaf is native of Andaman. *Arootha* (*Ruta graveolens*) is used in the treatment of epilepsy and asthma in the folk medicine. This plant is a native of the Mediterranean region. Some plants such as *Somalatha* (*Sarcostemma acidum*), *Changalam Paranda* (*Cissus quadrangularis*), *Panikkorkka* (*Coleus aromaticus*) and *Neermaruthu* (*Terminalia arjuna*) that commonly do not occur on the western slopes of the western ghats are being cultivated here.

Major crops of Kerala are coconut and rice. Both have varieties that are medicinally important. Among the rice varieties *Navara, Jeerakasala Chennellu*, *Illichennellu* etc. have proven medicinal property. There are two varieties of *Navara* rice: black glumed and golden-yellow glumed. Traditional healers of Payyannur in the past used the latter variety for medicinal purposes but now black variety is also sold in the raw drug market.

According to traditions of health care, food itself is considered as medicine. Hippocrates, father of modern medicine has said, "Thy food is thy medicine – thy medicine is thy food" (Varma, 1981).

Medicinal properties of most food grains and vegetables were recognised by authors of classical Ayurvedic texts centuries ago. Some of the *prakaranas* of these texts make critical analysis of the nature of various food materials and their effects on the body. There is mention of *Sookam* (grains) *Simbi* (legumes) and *Sakam* (leafy) vegetables. Negative and positive effects of certain food items such as ash gourd (Benincasa hispida), bitter gourd, snake gourd, sponge gourd, bottle gourd, egg plant, cucumber, amaranthus, Indian spinach (*Basella alba*) drum stick tree, *Sesbania*, various legumes etc. are described in Ayurvedic source books. According to *Ashtangahrudaya* "ash gourd is the best among climbing crops". Ash gourd that forms the major ingredient of *Kooshmanda rasayana* is represented in two varieties here.

Cucumber has more than two varieties here. *Kanivellari* a golden coloured variety is used as medicine and also as an offering material (*kani*) for *vishu*. A particular advantage of the cucumber is its thick rind that allows storing for a considerably long period, up to one year, without any special arrangement.The ashy hair of the ash gourd is used as an antiseptic by locals on cuts and wounds. We have already forgotten the utility of certain plant parts that are mentioned as edible in classical texts of Ayurveda. For instance Ashatangahrudayam identifies *Jevanthi* (*Holestemma adakodien*) as an extremely good leafy vegetable but this is not being used as vegetable any more.

Kerala, before being cleared for human settlements, was covered mostly by west coast tropical evergreen forests. Most of the agricultural and medicinal crops are domesticated varieties from these forests. Most of the indigenous agricultural varieties today are actually surviving representatives of plants that have become extinct in the wild following habitat loss and are purposefully conserved in the croplands owing to their utility value. According to a categorisation of IUCN most of the agricultural varieties belong to the category- 'extinct in the wild'. Villagers of the Vellur and Korom villages even today consume nearly 40 species of plants. These plants form the foundations of the food security that would prove crucial in deciding our sustenance in future (Table 4.4).

Table 4.4 List of Edible Medicinal Plants

No.	Local Name	Botanical Name	Part Used	Habitat
1	Ponnam kanni	*Alternanthera sessilis*	Whole plant	Paddy field
2	Kattuchena	*Amorphophallus palonifolius var. palonifolius*	Tender stem	Midland laterite
3	Ayini	*Artocarpus hirsutus*	Fruit, Seed	Homestead
4	Ondonpuli	*Artocarpus lakoocha*	Fruit	Homestead
5	Sataveri	*Asparagus racemosus*	Tuberous root	Midland laterite
6	Mula	*Bambusa arundinacea*	Young shoot, Grain	Homestead
7	Tazhutama	*Boerhaavia diffusa*	Whole plant	Marginal land
8	Ana Pana	*Caryota urens*	Sago	Sacred grove
9	Thakara	*Cassia tora*	Leaf	Marginal land
10	Muthil	*Centella asiatica*	Whole plant	Paddy field
11	Kurichulli	*Cosmostigma racemosa*	Leaf	Midland laterite
12	Thakaram (Omanathal)	*Cryptocoryne spiralis*	Tender stem	Wet land
13	Manga Inchi	*Curcuma amada*	Rhizome	Homestead
14	Inthu	*Cycas circinalis*	Seed	Homestead
15	Cherukadaladi	*Cyathula prostrata*	Whole plant	Homestead
16	Murikku	*Erythrina varigata*	Leaf	Homestead
17	Akhori	*Flacourtia indica*	Fruit	Midland laterite
18	Thuvakai	*Gnetum ula*	Seed	Sacred grove
19	Cheri Pazham	*Grewia microcos*	Fruit	Sacred grove
20	Nannari	*Hemidesmus indicus*	Root	Midland laterite
21	Payicham	*Hibisus furcatus*	Leaf	Home stead
22	Adapatiyan	*Holostemma adakodian*	Leaf	Midland laterite
23	Elanji	*Mimusops elengi*	Fruit	Sacred grove
24	Ampal	*Nymphaea nouchali*	Carpels	Pond, wet land

25	Puliyaral	*Oxalis corniculata*	Whole plant	Homestead
26	Kunnummanatti	*Perestrophe bicalyculata*	Whole plant	Marginal land
27	Mottampuli	*Physalis minima*	Fruit	Marginal land
28	Kozhuppa	*Portulaca oleracea*	Whole plant	Marginal land
29	Marathal	*Remusatia vivipara*	Leaf	Epiphyte in tree trunk
30	Munja	*Premna integrifolia*	Leaf	Homestead
31	Puvam	*Schlechera oleosa*	Fruit	Midland, Sacred grooves
32	Manithakkali	*Solanum nigrum*	Fruit, Leaf	Marginal land
33	Chunda	*Solanum sp.*	Fruit	Homestead
34	Ampazham	*Spondias pinnata*	Fruit	Homestead
35	Kurumkani	*Syzygium caryophyllatum*	Fruit	Midland laterite
36	Njavel	*Syzygium cumini*	Fruit	Home stead
37	Lantha	*Ziziphus mouritiana*	Fruit	Marginal land
38	Churikotta	*Ziziphus oenoplia*	Fruit	Midland laterite
39	Van Kotta	*Ziziphus gibbosa*	Fruit	Sacred grove

All ancient cultures survived by domesticating wild cereals. Sustainable development of the modern civilisation is also dependent on the conservation of the diversity of the biological world. Survival of an organism depends on the extent of its distribution. The greater the extent of distribution the greater will be the possibility of survival and vice versa. The distribution of most plant and animal species of the world is restricted only to certain bioclimatic zones. Rarely are they located in other habitats. This phenomenon is called endemism. Most of the medicinal species used in Payyannur are endemic to the western ghats (Table 4.5)

Genuses such as Hemidesmus and Molluva have only single species. If the *Hemidesmus indicus* is a rare endemic, its market substitute *Mahali* (*Decalepsis hamiltonii*) is a pan-Indian endemic that has become still rarer due to over exploitation (Nair 2000). *Nilamuchala* (*Gymnostaychyum febrifugum*) is a febrifuge and is also used as an antidote against viper bite. Its distribution is limited to Coorg, Brahmagiris and the foothills and plains of Kannur district.

Table 4.5 List of Endemic Medicinal Plants

No.	Botanical Name	Local Name	Local status	Habitat
1	*Artocarpus heterophyllus*	Plavu	Common	Homestead
2	*Artocarpus hirsutus*	Anjili	Common	Homestead
3	*Aporusa lyndleyana*	Vetti (Eachil)	Rare	Laterite
4	*Holigarna arnotiana*	Cheru	Common	River side
5	*Vateria indica*	Vella pain	Rare	Sacred grove
6	*Hydnocarpus alpina*	Marotti	Rare	Riverside
7	*Myristica malabarica*	Pasupasi	Very rare	Sacred grove
8	*Memecylon malabaricum*	Kuvachecki	Common	Laterite
9	*Hemidesmus indicum*	Nannari	Rare	Laterite
10	*Moullava spicata*	Moullava	Rare	Laterite
11	*Naravelia zeylanica*	Sutravalli	Rare	Sacred grove
12	*Myxopyrum serratulum*	Chaturamulla	Very rare	River side
13	*Ervatamia heyniana*	Kundalappala	Common	Sacred grove
14	*Calamus rotang*	Vallichural	Rare	Sacred grove
15	*Syzygium travancuricum*	Vatamkolli	Critically endangered	River side
16	*Lepidagathis keralensis*	Telkada	Common	Laterite
17	*Gymnostachyum febrifugum*	Nilamuchala	Rare	Sacred grove
18	*Begonia canarana*	Kal tamara	Critically endangered	Laterite
19	*Nervelia prianiana*	Orila tamara	Very rare	Sacred grove
20	*Nervelia infundibifolia*	Orila tamara	Very rare	Sacred grove
21	*Kaempferia rotunda*	Chengazhineer	Extinct in wild	Homestead
22	*Geophila repense*	Karimuthil	Very rare	Sacred grove

Indonesia is the place of origin of nutmeg (*Myristica fragrans*). The endemic tree *Myristica malabarica* shares many similarities with nutmeg. Aril of the later is available in the Payyannur market in the name '*pasupasi'* and the same has very good demand in the Indian market and is known as *Rampatri* and Bombay mace (Ved&Anjana, 1999). Rampatri is also used as an adulterant in Nutmeg. In Payyannur a few sacred groves have this tree surviving in them (Unnikrishnan, 1995a).

The plant *Lepidagathis keralensis* was first collected from Madaipara near Payyannur by a botanist from Calicut University (Madhusoodanan and Singh, 1992). But it was being used for a long time as medicine by local healers, especially the folk paediatricians from *Vannan* community who named the plant as *Paramullu.* The plant that was used as '*Vrischikkali'* for centuries by the healers of Payyannur was locally known as '*Thekkida'*. It was only in 1982 that this plant was identified and named as *Heliotropium keralensis* (Manilal and Sivarajan, 1982).

The tree *Syzigium travancoricum* which was believed to be extinct due to over exploitation for timber was rediscovered in 1981. Presently this rare tree species is found surviving in the fresh water swamps of some sacred groves near Payyannur. Local healers use the bark and leaves of this tree as V*atham kolli* (Unnikrishnan, 1995b). Tribes of Wayanadu use the same drug as *Kollinjaval* (Anilkumar, 2000). These examples show that the folk knowledge of some plants is years ahead of the modern scientific knowledge.

The species prioritisation exercise in India is being conducted based on the IUCN criteria by various agencies. IUCN has established conservation categories as extinct, extinct in wild, critically endangered, endangered, vulnerable, low risk, insufficiently known and not listed (IUCN, 1994). Botanical Survey of India and Zoological Survey of India have come up with various red data lists for plants and animals. Recently the Conservation Assessment and Management Plan (CAMP) workshop of the biodiversity conservation prioritisation project also attempted species prioritisation in many taxa using the revised IUCN criteria (Pramod and Gadgil, 2000).

Chances of extinction due to habitat destruction are highest among the endemics. Western ghat endemics such as *Begonia canarana* and *Syzygium travancoricum* and Himalayan endemics such as *Coptis teeta*, *Aconitum ferox, Inula racemosa, Picrorrhiza kurrova* etc. are listed in the red data book. These species supply some of the materials in high demand in the Payyannur drug market.

The Foundation for Revitalisation of Local Health Tradition (FRLHT), Bangalore has so far assessed the conservation status of 139 medicinal plants of south India, following the revised IUCN criteria and CAMP process. Of these four were listed as extinct, 17(12.8%) as critically endangered, 33 (24.8%) as endangered and 49 (36.8%) as vulnerable. 74.4% of the medicinal plants assessed in South India are threatened.

More than 50% of the source animals providing the raw drugs of animal origin are protected under Wildlife Protection Act of 1972. Reptiles such as *udumbu* (monitor lizard) and python come under schedule I of the Act. However, these are being hunted for food and medicine in the study area. Wild animals such as rhinoceros, gaur, Nilgiri languor, musk deer, civet cat etc. are protected by law. Moreover they are of restricted distribution.

Extinction could also take place in knowledge-base. All entries in the *Hortus Malabaricus* were the medicines used by folk practitioners some three centuries ago. Only less than half the medicines mentioned in this book are in use now. Among those in use, some are

of doubtful identity. The plant mentioned as '*Molluva'* in *Hortus Malabaricus* is only now identified as the small thorny shrub that bears red spikes seen growing on the rocky hillocks of midlands known to the botanical world as *Mollava spicata*. Some of the unidentified ingredients seen in the *yogas* mentioned in palm leaf manuscripts were identified and located during the present study. They are *Thruthuva*, bark of *Kanalmaram*, Flower of *Karichil*, Flower of *Njeral*, *Adukku Vazhaver*, *Thel mani*, etc. A collective disappearance of valuable traditional knowledge is taking place now amidst reports of accelerated rate of species extinction. Some of the extinct species are yet to be identified in relation to the medical texts and manuscripts.

Biological curiosities in *Materia Medica*

Some drug sources are biological curiosities. Bishop beans (*Entada scandens*) is the biggest legume in the world, a pod that grows to about two meters in length. The seed of the bean is called '*Kakkumkai'* locally. In folk healing tradition, paste of that seed is used for treating petrifaction of male breast muscles at teenage. '*Aklarithenga'* (*Lodoicia maldivica*) is the biggest nut which has a diameter of 1.2 meters and more than 10 Kgs in weight. Endosperm of this is used as medicine for curing diabetes mellitus in Unani and Ayurveda. One kilogram of its kernel costs 12000 to 20000 rupees in the Payyannur market. This could be the most precious raw drug in the market. One coconut costs approximately Rs. 25000. This huge and precious coconut is the native of Seychelles Island

Drosiera and Utricularia are two carnivorous herbs. Drosiera is known as '*azhukanni'* in Siddha medicine and is used in various preparations. This plant is used as medicine in homeopathy also. *Drosiera indica* is commonly found growing on the midland laterite plateaux. Drosiera is not used by folk practitioners of Payyannur.

Utricularia shares the habitat of Drosiera. The blue-black colour of its flower reminds one of lord Krishna. So its name in vernacular language is *krishnapuvu*. The plant is used for preparing certain hair oils.

Folk practitioners of Payyannur use two native Gymnosperm species – *Gnetum ula* and *Cycas circinalis* - as medicine. *Devatharam* (*Cedrus deodara*) is probably the largest and tallest tree in India. *Ceralam* (*Pinus roxbughii*) *Thalis* (*Abies webbina*) are Himalayan conifers used in Ayurvedic medicine.

Non-flowering plants belonging to the groups such as algae, fungi, Pteridophyte etc. are also used as medicines. Non-flowering plants account for 3 % of all plant species in the materia medica. *Plathadi* (*Ganoderma s*p.) a *Polyporus* mycelium growing on jack trees are used as curatives in treating mumps.

Nilamanga (*Sclerotium sp.*) is a puffball that is obtained from the foundations of old houses when they are dismantled. *Athuranthala* is obtained from termitaria. It is a colony of fungus tended by the white-ant colony. *Nilamanga is* a curative for stomach ailments and *Athuranthala* is used in treatment of epilepsy. A type of fungus grown in black tea is used

in treating bronchial asthma effectively. Kulachammi (*Spyrogyra*) is used in treating certain kinds of epilepsy. A list of Pteridophytes used as medicine in Payyannur is provided in Table 4.6.

Table 4.6 Pteridophytes (Ferns) Used as Raw Drugs

No.	Local Name	Botanical name	Family
1	Parotti	Drynaria quarcifolium	POLYPODIACEAE
2	Niraral	Marsilia minuta	MARSILEACEAE
3	Garudapacha	Salaginella reserecta	SALAGINELLACEAE
4	Pattichevi	Hemionitis arifolia	HEMINITIDACEAE
5	Putramchari	Adiantum caudatum	ADIANTACEAE
6	Poutramchari	Chilanthus tenuifolia	SINOPTERIDACEAE
7	Kutirakulamban Chittintu	Aangiopteris evecta	ANGIOPTERIDACEAE
8	Poluvalli(Naipalli)	Lygodium flexuosum	SCHIZEACEAE
9	Mayoora sikha (Nanmukhappullu)	Actiniopteris dichotoma	ACTINIOPTERIDACEAE

Conservation prioritisation of local drug sources

Fifty-nine Indian medicinal plants that require urgent conservation measures are short-listed by Biodiversity Conservation Prioritisation Project (BCCP). Seventeen Species from these are widely distributed in the study area. *Curculigo orchioides*, *Gloriosa superba*, *Heliotropium keralensis* and *Syzygium travencoricum* are some plants among them. The first mentioned plant - Curculigo is a common weed in midland hills and also an essential drug for Ayurveda. But *Curculigo* is not collected locally from its immediate surroundings. In the raw drug market, it is a dry drug procured from other regions. Hence possibly it is abundantly available elsewhere. However, laterite and sand minings are threatening the local availability of *Curculigo*. *Heliotropium keralensis* is an endemic species which is very common during summer in the fields along the coastal lands of Payyannur. This shows that we should necessarily know the geographical range of the distribution of medicinal plants locally, globally and the biotic factors which influence the existence of the drug plants to conserve them.

IUCN categories are not completely applicable for assessing the status of drug plants/ animals in the study locality. A locally endangered biota may be very commonly present in the national or international scenario and vice versa. According to the prioritisation list, *Gloriosa superba* is an endangered plant. But it is very commonly seen in Payyannur. The biota distributed in the study locality is broadly categorized on the basis of occurrence as common, rare and extinct in wild. 40percent of local plants and 65 percent of animal drug sources are rare and are locally endangered.

Table 4.7 indicates that a variety of animal groups supply the raw drugs for the local health tradition.

Table 4.7 Diversity of Raw Drugs Belonging to the Animal Kingdom

Animal Groups	No. Of Species
Mammals	23
Birds	5
Reptiles	5
Amphibians	1
Arachnidae	1
Fish	1
Mollusks	7
Insects	11
Corals	3
Annelidae	2
Non-insect Arthropod	2
TOTAL	61

Institutional mechanisms for conservation

A debate of considerable significance pertains to the ownership of knowledge related to biodiversity. The United Nations Convention on Biodiversity concluded that wherever the utilisation of the knowledge, innovations and practices of local and indigenous communities leads to benefits, such benefits should be equitably shared with the holders of such knowledge, innovations and practices.

It was two Kani guides who transferred the indigenous knowledge about *Arogyappacha* that it is capable of providing a sudden flush of energy and strength. The Kani-TBGRI deal in Kerala on *Arogyappacha* was the first step for equal benefit sharing on traditional knowledge. Unfortunately this endeavour, that should have formed a model, invited controversies. Government agencies such as KIRTHADS's and State Forest Department have criticised commercialisation of the traditional knowledge. Some Kani settlements also disagreed with these benefit-sharing mechanisms in the deal. KIRTHADS view on the issue was that the only way to sustain tribal medicine is by preserving its original form and premises; otherwise it is open to misuse as a convenient resource base for other systems of medicine. Forest Department was afraid of pressure from other outside commercial interests that may cause rapid depletion of the resource base. Kanis are no longer a single cohesive unit or community. All these factors contributed to the failure of this experiment. Like Kanis, most tribes of Kerala have already lost their traditional institutions. Village communities of Payyannur also do not have any community-based collectives. All critical

issues connected with Kani-TBGRI experiment are relevant in most analogous situations involving rural communities of Kerala. The question here is whether it is ethical for a person to transfer community information for his personal benefit.

Only a small group of Kanis refer *Trichopus* as *Arogyapacha*; majority of them know it only as *Chathankizhangu*. But the difference in name does not make any change with in its use. This project's materia medica of Payyannur also takes into account these differences in names and the similarities in use of raw drugs. *Thottia siluquosa*, which is known as *Kodasar*i in Payyannur, is known by different names in different localities: it is known as *Kurukonthi* among Kanis, *vishappacha* among Mudugas in Attappady, *Kattukarppooram* in Wayanadu, and *Alpam* among village healers of Tiruvananthapuram. It is used as a remedy against snakebite in all localities. When this medicine is commercialised by making use of the traditional knowledge of any one tribe, will sharing of benefit take place in its complete sense among all the other tribes who share this knowledge?

Studies show that most of the tribal medicines are being used either in the same way or in a different manner by codified systems of health care such as Ayurveda (Madhavan Kutty, 1989; Vijayan *et al*, 1993; Unnikrishnan, 1995b). Tribal medicines of Attappady such as *Palai kizhangu*, *Neervekku*, *Sippitty ottu*, *Cherandai*, *Kevre*, and *Nikaty* are the same as what established medicines of Ayurveda use such as *Jeevanthi*, *Satavari*, *Koduveli*, *punarnava*, *Edampirivalampiri*, and *Pata*.

Following the signing of GATT treaty, multinational monopoly interests are working out strategies for appropriating the traditional knowledge and for obtaining monopoly rights over the biological materials. Possibilities of bio-piracy are all time high on the knowledge base of local health traditions. The ideas of community biodiversity register and other documentation strategies are considered as possible ways of defence in this regard. This strategy seeks to document knowledge of occurrence, practices of propagation, sustainable harvesting and conservation, economics of biodiversity resources that reside within India's local communities (Gadgil, 1996)

Biodiversity registry of Pattuvam was dedicated to the Panchayat in April 1997. With this the people of Pattuvam have declared their exclusive right over the biodiversity of the village. By doing so, the people of the Panchayat have become a model for the rest of the world. Following the path of Pattuvam, similar biodiversity registries have been prepared in Panchayats such as Kangol-Alappadambu and Kalyasseri. The registry of Pattuvam accompanied by the declaration of right over the resources is a "closed registry." Registries without such provisions of exclusion may prove to be useful databases for multinational interest groups. UN Convention on Biodiversity offers protection only to that knowledge which is kept secret. So biodiversity registries can themselves become tools of bio-piracy, if outsiders could bribe local people to reveal the secret knowledge about each entry in the register.

5. Controversy Regarding Identification of Raw Drugs

Vedic dictums and Ayurvedic source books give essential morphology and characteristics of raw drugs. *Charakasamhita* describes about 1800 raw drugs and *Sushrutasamhita* provides details of 573 drugs. In the era of the great gurus who acquired knowledge directly from nature - the golden age of Ayurveda – it was free from controversy and there was no misidentification of raw drug. Controversy regarding identification of raw drug might have been a serious problem during the 10^{th} to 13^{th} centuries. Unlike the source books such as *Brihatrayi*, the Ayurvedic texts, mainly the *Nighandus* written during the middle ages, were only compendiums of Ayurvedic preparations. Authors of such compendiums shared an apprehension regarding identification of raw drugs. The author of *Dhanwandari nighandu* advises the healers to approach the shepherds for correct identification of raw drugs. The controversy snowballed by the time of Bavamishra, the author of *Bavaprakasam*. He recommended substitution of unavailable drugs with available ones. In between the period between Brihatrayi and Bhavaprakasa, we see not only the erosion of knowledge on raw drugs but also the erosion of practical knowledge about them. [# As long as there is no commonly accepted mode of classification of any data, there would always be controversies about identification of items in the data set, especially when there is a big time gap. The problem here is not in the erosion of knowledge-base. It is in the inability to evolve a commonly accepted set of classification. I feel that any recommendation to substitute unavailable material with available material, provided it does not affect the efficacy, is advancement in knowledge – not erosion of practical knowledge! Ed.]

Most medicinal plants have synonyms; and, at the same time, there are many instances of different species being referred to by a single name. This is the root cause for the controversy over the identity of the raw drugs. A number of examples may be quoted to illustrate this. The Sanskrit name *Shyama* indicates twenty-five different species of plants including *Tinospora, Hemidesmus, Ichornia* and turmeric. *Sahachara* is a green drug mentioned in ancient treatises which is effectively used in the treatment of rheumatism. But in Kerala nearly twenty different species of plants are used as *Sahachara*. There are three different species –*Barleria montanum, Calacanthus dalzelliana* and *Nilgirianthus ciliatus* that are referred to as *Sahachara*. The names in regional languages are also confusing. There are four different plant species, *Syzygium travacoricum, Crinum asiaticum, Justicia gendarussa* and *Aphanamixis polystachya*, which are used as *Vatamkolli*. More than three species of *Hedyotis* are used as *Parpitakappullu*. *Parushakam* or *Chittinthu* which is an ingredient in *Drakshadi kashayam*. *Phoenix pusilla* is known as *Chittinthu* in South Kerala. But in Payyannur, a fern *Angiospteris evecta* is used as *Chittinthu*. *Cinnamomum* fruits are given as *Elavalukam* in the study area; while a plant belonging to the family Apiaceae, *Heraclium rengens* is considered as the *Elavalukam* in Thiruvananthapuram market. *Heraclium rengens* is being used in Payyannur markets, not as *Elavalukam* but *Chittelam*, the famous drug in *Elayugma (*Ela twins*) i.e. Chittelam* and *Perelam*. The terrestrial orchid *Malaxis rheedii* and an unidentified bazaar medicine imported from Amritsar market are used as *Jeevakam* of *Ashtavargam*.

According to the market sources of Kerala, *Tippali* has five types: *Cheru Tippali, Valiya Tippali, China Tippali, Jala Tippali* and *Athi Tippali*. The first three drugs are Species of pepper (genus *Piper)*. Two different plants *Balenophora fungusa* - a terrestrial root parasite and *Raphidophora pertusa* – an epiphytic climber are used as *AthiTippali* in North Kerala by various physicians. *Phyla nudiflora*–a semi aquatic plant is mentioned as *Jalatippali* in various materia medica. But in the study locality the same plant is referred to as *Meenamkanni* whereas, in Central Kerala, another plant *Scoparia dulsis* is known as *Meenamkanni*. In Kannur, *Scoparia* is called *Kallurukki,* but *Kallurukki* is not *Scroparia* but *Pouzolzia zeylanica* in other parts of Kerala. *Pashanabhedi* is the Sanskrit equivalent of the Malayalam name *Kallurukki.* Ayurveda and siddha practitioners of Kerala use three different species of plants *Earva lanata, Decalepsis arayalpatra* and *Rotula aquatica* as *Pashanabhedi.* In North India, it is *Colious aromaticus* which is called *Pashanabhedi*.

Causes for the controversy

Identification of the raw drugs mentioned in the Sanskrit source books, or their substitutes with similar properties in the immediate vicinity where it was practiced, was the most significant act that helped Ayurveda to spread its roots on the highly heterogeneous Indian soil. Most vernacular languages attained capability for handling traditional Ayurvedic knowledge. Some centuries ago, Ayurvedic practitioners were forced to use material names in vernacular languages as the local markets as also patients required prescriptions in local languages. The local practitioners developed expertise on raw drug materials mainly by referring to the Brihatrayi interpretations prepared by Sanskrit scholars who hardly had any exposure to actual practice of Ayurveda. So, for the same material there were different names in the different languages and their dialects. Even within a single local dialect, variations in names can be observed now. For instance, two different plants – *Hugonia* and *Capparis* - are used as *karthotti* in Payyannur. *Karthotti* is a major ingredient in the *Kottam Chukkadi Thailam*, which is one of the most widely used massage oil in the State.

Manufacturing and distribution of drugs are not confined to the local level. The pharmaceutical industry has now a wide distribution network covering the national and international markets. From the foregoing description about the confusion surrounding the identity of the ingredients, one can easily guess the gravity of controversy which arose when the Delhi made ayurvedic combinations were marketed in the South Indian markets.

The plants *Centella asiatica* and *Evolvulus alsinoides* are used in North India as Brahmi and Sankhupushpi respectively. However, for Ayurvedic practitioners of Kerala, *Brahmi* and *Sankhupushpi* are *Bacopa monnieri* and *Clitorea turnatea* respectively. The *Centella* and *Evolvulus* are known by different names in Kerala – as *Muthil* and *Vishnukranthi.*

The controversy over the raw drugs was aggravated by the migration of medical practitioners. Most of the available interpretations of the source texts in Ayurveda are prepared by experts from South Kerala. The names of the raw drugs thus used in these books were mostly unfamiliar to the practitioners of North Kerala (see Table 5.1). There were folk and Ayurvedic medical practitioners among new settlers who migrated to the

north from Central Travancore in 1940s and 50s. In the post-independence period government established a large number of ayurvedic hospitals. Most of the physicians appointed were from South Kerala. The prescriptions by these physicians were in vernacular names used in South Kerala. This resulted in large scale mixing of the names of the raw drug materials. This mixing up of drug names turned out to be beneficial in the sense that it helped standardisation of the drug names.

Table 5.1 Difference in Local Name

Botanical name	Vernacular name	Region
Alangium salvifolium	Ankolam	Payyannur
	Azhinjil	South Kerala
Alpinia galanga	Chittaratha	Payyannur
	Kolinchi	Trivandrum
Alstonia scholaris	Ezhilam pala	Payyannur
	Poliyanthara pala	Kasaragod
Aristolochia indica	Uri tuki	Payyannur
	Eswaramooli,Garudakkodi	South Kerala
	Karalayam	Trissur
Asystasia chelanoides	Uppiliyam	Payyannur
	Maittal	Kasaragod
Bridelia scandens	Cherunichal	Payyannur
	Cherupanachi	South Kerala
	Kanji kottam	Trichur
Desmodium triquatrum	Adakkapannal	Payyannur
	Choppan orila	Trichur
Stereospermum colais	Kariya	Payyannur (Some practitioners)
	Pathiri	Standard name
Helicteres isora	Kayyula	Payyannur
	Edampiri valampiri	Standard name
	Kevra	Attappadi
Mimosa pudica	Thoduladi	Payyannur
	Thottavadi	Standard name
Pavetta indica	Kametta	Payyannur

	Pavetta	Standard name
Pongamia pinnata	Pongu	Payyannur
	Ungu	Standard name
Rauvolfia serpentina	Chuvanna amalpori	Payyannur
	Sarpagandhi	Standard name
Sida cordata	Nilapparuthi	Kasaragod
	Valli kurunthotti	Payyannur
Thespesia populnea	Chentamari	Payyannur
	Poovarasu	Standard name
Wrightia tinctoria	Inchipala	Payyannur
	Dantapala	Standard name

Two other factors that aggravated the controversy are adulteration and substitution. The material used as a substitute or adulterant in due course of time is mistaken for the genuine/ actual raw drug. Thus the real drug is also mistaken for adulterant.

Substitution

A number of raw drugs mentioned in the source texts were not always readily available in Kerala. To substitute for these, the practitioners of Kerala used alternative materials that which, according to them had similar action and medicinal quality. Bhavamishra, an authority in Ayurveda, who lived in the 16th century, had justified the use of certain substitutes when minor ingredients of preparations were unavailable. However, he had forbidden the substitution of major ingredients. These directions are not closely followed while preparing medicines by most market oriented manufacturing units. These units prefer substitution especially when the substitute is cheaper than the prescribed drug, even when the latter is available. "Nonavailability of genuine drugs, mistaken identity, indiscriminate naming, biased interpretation of Sanskrit names, lack of expertise in identifying raw drugs and increasing price are the main reasons for substitution and perhaps adulteration. A recent trend noticed is sale of different qualities of the same drug due to the absence of standardisation" (Sasidharan and Muraleedaran, 2000).

Three factors were considered for correct identification of a raw drug in our study.

1. Whether it has been referred in proclaimed materia medica and source texts of Ayurveda
2. Wide acceptance in Kerala.
3. Whether it has all attributes mentioned in the source book.

The third factor has not been adopted completely in this study for want of clinical expertise. *Ashtavarga*, the famous group of medicament, which has rejuvenation and aphrodisiac

potential, is substituted with multiple doses of local drugs *Sataveri, Vidari, Aswagandha* and *Nilappana* since they also have the same properties. Some substitutes have got established through decades of experience of practitioners. Our work, Materia Medica of Payyannur, also accommodates such unique substitutes even though they are not mentioned in classical texts. (See Table 5.2)

Table 5.2 Substitutes of Raw Drugs Used In Payyannur.

Name of raw drug	Drug widely used	Drug used in Payyannur
Riddhi	*Hebanaria edgeworthi*	*Atylosia scarabaeoides* (Kuttumuthira)
Vriddhi	*Hebenaria intermedia*	*Vigna pilosa* (Kattupayar)
Sariba (*Nannari)*	*Hemidesmus indicus*	*Decalepsis hamiltonii*
Pushkaramoola	*Inula racemosa*	*Graptophyllum Sp.*
Takaram	*Valeriana jatamansi*	*Cryptocoryne spiralis*
Marikunni (Vriddhadaraka)	*Argyreia nervosa*	*Bouhinia Sp.*

Adulteration

At present there are no mechanism and machinery to implement quality control in dry raw drug and Ayurvedic preparatory medicines. Adulteration is prevalent in Ayurvedic preparation as well as in raw drug sales. Any use of substitute that is not recommended, any deletion of recommended ingredients and any variation in quantity of an ingredient other than the recommended one are all considered as adulteration.In some *lehyas* such as *Chyavanaprasam* addition of extra quantities of molasses and arrowroot powder is done to increase taste and weight. This is also a form of adulteration.

In the case of raw drugs, substitution of materials that do not have any equivalent or desirable medicinal properties is the common form of adulteration. Adulteration is carried out while collecting, storing, and distributing the raw drugs. Lack of material knowledge in all these stages may also cause unintentional adulteration of raw drugs. A list of adulterants commonly used is given in Table 5.3 below.

High cost of the original drug also leads to substitution or adulteration. *Vamsalochana* (Bamboo manna) is a rare raw drug derived from the bamboos that are in bloom. But only synthetic manna is now available in the Payyannur markets. “There may be ten to twenty times higher prices of natural manna in comparison to the artificial or the synthetic manna. Synthetic one comprises of hard rocky crystals while the natural bamboo manna dissolves in the mouth immediately” (Koushik and Dhiman, 2000).

Table 5.3 List of Commonly Used Adulterants

Drugs		Adulterants
Chappangam	*Caesalpinia sappan*	Rajamalli Caesalpinia p*ulcherrima*
Chittamruth	*Tinospora cordifolia*	Kattamruthu Tinospora malabarica
Kanchavu	*Cannabis sativus*	Dry leaves of cajanus
Gorochanam	Gall stone of cow	Turmeric powder
Kuvalam-root	*Eagle marmelos*	Kattunarakam Atlantia bengalensis
Asokam –bark	*Saraca asoca*	Aranamaram Polyalthia loogifolia Nagamara tholi Musua nagasserium
Cheruvazhutina var.Insanum	*Solanum melongena*	Brinjal root
Velutha chunda		Any Solanum sp.
Naikurna parippu	*Mucuna pruriens*	Mucuna hirsute, Mucuna gigantia
Navara		Other varieties of paddy
Pacha karpooram	Natural camphor	Synthetic camphor
Mulam karpooram	Bamboo manna	Synthetic manna
Chinapavu	*Smilax china*	Rhyzome of Four-O'clock plant
Puranakittam	Iron ore	Iron powder
Kattikombu	Horn of Gaur	Horn of buffalo
Kuvanuru	Arrowroot powder	Maize powder
Verukin puzhu	Anal secretion from civet	Palayankodan variety of Banana
Vanthen	Honey	Molasses
Cheruthen	Honey from Small bee	Vanthen

The real arrowroot (*Koovanuru*) had been processed from *Kuva* (Curcuma angustifolia) collected from marginal lands by Kidarans, an artisan community of North Kerala. The biggest Kidara settlement is in Mathil-Alapadambu panchayath, in the neighbourhood of Payyannur. But now not a single household is engaged in arrowroot making. *Kuvanuru* now available in market is actually the powder of maize.

Puranakittam is a raw drug of mineral origin; the technology associated with its purification

is adopted from the folk technology of iron preparation. A number of *Uthalas* (furnaces) functioned in Payyannur until a century ago. *Puranakittam* used to be collected from those abandoned *Uthalas*. Presently, *Puranakittam* is abundant in the banks of river Vannathipuzha towards the eastern end of Payyannur. However, *Rakupodi* (Iron powder) obtained from lathe work-shops is being widely used as substitute of *Puranakittam*.

6. Sustainable Harvesting: Problems and prospects

Classical source books of Ayurveda clearly specify the preferred place and time for collecting raw drugs. The most preferred locality according to *Ashatangahrudayam* is the place that is well-watered, open land with sweet water, alluvial soil, and grass growth of *Kusha* and *Rohisha*. It further describes the places unsuitable for collection of raw drugs: cemetery, platform built around *Peepal* tree, public road, slaughter house, temple, public meeting places, flower garden, anthill etc. Collection of plants damaged by worm, poison, knife, sun, fire, water etc. is discouraged. The plant should have been nourished by shade, water and sunlight. There is difference in opinion about the seasons for collection of drug material (Table 6.1.).

Table 6.1 Seasons for Drug Collection

Part Used	**Seasons**	
Source	**Charakasamhita**	**Rajanighantu**
Twigs	Monsoon, Spring	—
Leaves	Monsoon, Spring	Summer
Roots	*Sisira*	—
Barks	Autumn (*Sarath*)	—
Rhizomes	*Sarath*	Winter (*Hemantham*)
Latex	*Sarath*	—
Flowers	Flowering seasons	Spring
Fruits	Flowering seasons	Spring

It will be seen that the autumn season is recommended for collection of rhizomes. As far as the Himalayan herbs are concerned, good quality and minimal moisture content is assured in autumn. However, now-a-days, such as *Jatamansi*, are harvested in summer. For traditional drug collectors this makes perfect sense as a full rhizome could be easily pulled out of the soil in summer. The soil disturbed in this process would get washed away in the following monsoon thus causing soil erosion and damage to the fragile Himalayan ecology. Besides, medicines collected from the Himalayas during summer months have more chances of getting damaged by moisture and fungus. Nearly 20 drugs arriving in the raw drug market of Payyannur are from the Himalayas. But in Kerala where seasons are less pronounced and the rainy season lasts about five months, such stipulations are not valid. Most annual herbs, especially those in which the root portion forms the drug material, are collected mostly during the rainy season. Here also wet soil makes pulling out these roots easy as in the case of rhizome harvesting in Himalayan environment. The drug collection procedures tend to cause similar ecological problems by precipitating soil degradation.

At Payyannur rhizomes such as *Satavari*', *Adapathyan*, *Nannari*, *Palmuduk*, *Kattupayar* etc are collected in rainy season. Vegetative portions of these rhizomes above ground dry up in summer and grow again in rainy season. Maximum collections of these rhizomes are done in the months of June-July. They are harvested before they bloom and bear seeds. Some of the harvesting methods adopted endanger the survival of the plants. For example, branches of gooseberry trees are chopped for harvesting fruits. In case of *cheevakkai*, a big bon-fire is maintained under the climber to facilitate early harvesting of the pods. Extensive debarking is done in the *Canarium strictum* trees for collecting black dammar.

Some of the conventional harvesting methods are intended for ensuring sustainability. For example ,in the case of *Koovalam* and *Orila*, their roots running northwards are preferred for medicine. This restriction is intended to avoid total uprooting of the plants. Specification of the localities from where collections of plants are banned helps in conserving them in those localities. Collection of plants from temple precincts is discouraged to enable their use for devotional purposes, and planted herbs in gardens. Total removal and ring bark removal etc. were not practiced while collecting barks of trees. There were remedial measures such as plastering the area from where bark was removed with cow dung and mud if extra quantity of bark was to be collected from a tree. Traditional medicine collectors used to replant herbs after they collected roots of *munja*, *koduveli* etc and *Satavari* and tubers of *Palmuduk*. These ethical practices have become non-existent now.

Unlike most plants, the rate of reproduction among animals is slow. So, the issue of sustainability assumes special importance when it comes to the harvesting of materials of animal origin. Most drugs of animal origin are obtained from endangered animals. Moreover collections of most of these drugs are done at the expense of the life of these animals. 56 percent (45 out of 80) of the materials of animal origin arriving in the Payyannur market can be collected only by killing the source animals. For example horns, tusks, antlers of the animals such as rhinoceros, elephants, python, wild boar, black buck, sambar and musk from musk deer are collected by killing these animals. *Verukin puzhu* or secretion from the anal gland of the Civet cat is a valuable medicine. In the past Small Indian civet cat was reared for this material. But enforcement of wild life protection act discouraged rearing of these animals. As this medicine is scarce now, testicles of civet cat are used as a substitute obviously by killing them. Poachers supply this substitute in the market. A medicine-yielding cousin of this animal, the Malabar large spotted civet cat, is feared to have become extinct due to poaching. There is no guarantee that the same fate will not befall its lesser cousin.

Kasturi or musk is a critical ingredient of the *Kasthuryadi Vayu Gulika*, which is an important preparation in Kerala tradition. *Kasthuri* is collected by killing the musk deer - an endangered species. Only 15-20 grams of kasturi is obtained from a deer. Disappearance of *Kasturi* from Kerala market is almost complete by now. (However, *kasthuryadi* tablets are prepared even now.) However, as *Kasturi* is not an essential drug, its scarcity will not affect the local health care systems. But scarcity of *verukin puzhu* has adversely affected the treatment

of epilepsy.

Loss of habitats is the main reason for shortage of medicinal plants. The habitat of most rare medicinal plants was the homestead. These plants became rare when most homesteads were converted to monoculture of coconut or areca nut. As tilling becomes frequent, survival of medicinal plants is impossible in these plantations.

Out of the 111 non-wood forest products recorded from Kerala, 80 are raw drugs. Unscientific mode of collection has endangered the survival of some of the source plants of these drugs. Some creative measures have already been taken to achieve sustainable harvesting. Non-timber forest management order is one such step. As per this order *Vana Samrakshamna Samithies* (forest protection committees) will be formed to monitor collection of MFP. According to this order, each tribal hamlet will have its own local NWFP processing unit and a store at range level. Once the streamlining of collection of MFP through VSS is completed, it is expected that better collection procedures involving local value addition and efficient marketing could be arranged (G.O (Rt.) No. 40/2001/F8 WLD (G) Dept. dated 2.2.2001.)

According to Charaka, materials used as medicine should have some essential qualities such as *Bahutha* (abandance), *Yogyatha* (aptness) *Bahukalpam* (variety of application) and *Sambat* (effectiveness). Most materials used today do not possess all these qualities; some qualities may be lacking while others are present. In such conditions sustainable harvesting becomes difficult. A treatment package needs to be developed where only materials that posses all the four qualities could be used. Experts in the field already have mooted such proposals. According to a famous Ayurveda physician Raghavan Thirumulpadu, "most of the preparations used now were originally prescribed at a time when the raw materials were available in abundance. The need of the hour is to develop new combinations with minimum number of available materials". Use of tincture and powder of drugs for treatment has to be encouraged. According to the chief physician of *Gona Sasthaya Kendra* , Ayurvedic Division, Dr. M.R. Vijayan, most common ailments can be treated with less than 50 drugs. He has developed a method for substituting leaf extract in place of roots and bark of the plants so that the issue of sustainability while harvesting bark and root is taken care of (Dr. M. R. Vijayan's personal communication.) Such alternative processes are a route to sustainability. It is in this context that an essential drug list from the perspective of local health tradition assumes importance.

An essential drug list for the local healing traditions in Payyannur

Unlike the lists for modern medicine, essential drug list for the local health tradition does not include manufactured drugs. Instead the list would contain those raw drugs that are either used directly in treating an ailment or as a crucial ingredient of any preparatory medicine. This list would essentially reflect the interests of the healer and patient rather than those of a pharmaceutical company. A raw material considered important by a

manufacturer might not be a necessary ingredient from the viewpoints of the healer and patient. So a different criterion has to be developed for identifying essential drugs. This criterion should also take into account the influence of the pharmaceutical industry on the drug market and the needs of raw drug materials by local health traditions other than Ayurveda. Such a criterion is spelt out in the paragraphs below dealing with the procedures for selecting raw drugs for inclusion in the list. A list of this kind is necessary for facilitating activities such as medicinal plant cultivation and their sustainable harvesting and marketing. It could ensure involvement of local bodies which could initiate steps for standardisation of raw drug materials. The present attempt to prepare an essential drug list for Payyannur is carried out taking into account these limitations and possibilities.[14]

The essential raw drug list of Payyannur contains two parts - part A and part B. Part A consists of a list of raw drugs selected on the basis of their importance measured in terms of:

a. Their appearance in prescriptions of healers and
b. Their appearance in products that are in high demand.

Part B consists of another list of raw drugs selected on the basis of their importance measured in terms of:

a. Uniqueness of application and specificity of drug due to its non-substitutability
b. Its indispensability for practicing in certain areas of specialisation

Procedure for selecting raw drugs to include in Part A of the Essential Drugs List

1. Largest sold medicated oils and medicinal decoction in the Payyannur branch of two important Ayurvedic pharmaceutical companies in Kerala were identified.[1]
2. A list of most essential Ayurvedic oils and decoctions were collected from 10 Ayurveda doctors and 20 folk healers.
3. Most frequently required medicines were identified by ranking the products with high volume of sales on the basis of number of prescriptions.
4. A list of raw drugs was prepared by examining the ingredients of these top-ranking products.

Procedure for selecting raw drugs to include in Part B of the essential drug list

1. Existing specialised branches of medicine and key practitioners of those branches belonging to conventional Ayurveda and folk traditions were identified.
2. Names of drugs, which were most indispensable and yet which were required infrequently and whose demand was less than the commercially sold species, were collected.
3. The drugs that are repeated most frequently in the texts of specialised branches of Ayurveda and folk medicine were collected.

Box.6.1

Collection and Utilisation of Raw Drugs – Rough Rules for Sustainability

1. All materials should be collected without causing any damage to the source plant

   a. Roots of the plants should be collected only after the seeds have attained maturity.

   b. Girdling and total removal of bark should be discouraged. Fresh collection of bark should not be performed till the fully covered by fresh bark.

   c. Plants that have vegetative propagation should be collected in rainy season. After harvesting roots and tubers, the remaining portion of the plant should be replanted immediately.

2. The practitioners and patients must attempt to reduce use of raw drugs of animal origin because harvesting them is unsustainable. They must be encouraged to use plant substitutes for such materials.

3. Some trees should be exclusively maintained as seed trees. Such trees and plants can be identified in the sacred groves and protected. Their seeds can be collected subject to restrictions and can be used for regeneration of the species.

4. Encouragement should be given to the use of raw drug materials which possess qualities such as abundance, aptness, effectiveness and wide variety of applications.

5. Domestication of wild plants and the cultivation of medicinal plants that are consumed in large quantities are possible strategies for ensuring sustainability. Generating incentives for local communities for setting up micro-enterprises for producing value added primary health care products might help ensure sustainability. Village women and farmers should be trained in propagation methods and post-harvest technologies such as drying, sorting, pulverising etc. Similar programmes for training drug collectors and sellers on sustainable extraction, identification and storage of materials should be conducted.

Table 6.2 Essential Raw Drug List –Part.A

List of Ingredients in Top Ten Prepared Medicines

			Name of medicines and											**No. of prescriptions.**
			Rasnerandadikashayam											13
			Pindatailam											9
			Gulgulutiktakam											8
			Balarishtam											10
			Danwandaramkashayam											12
			Abhayarishtam											13
			DanwandaramTailam											10
			Saraswatarishtam											9
			Kottamchukkadi											11
			Asanavillwadi											8
No.	**Raw drug**	**Bot.Name**	**Sanskrit name**	**R 13**	**G 8**	**D 12**	**DT 10**	**K 11**	**P 9**	**B 10**	**A 13**	**S 9**	**As 8**	**Total**
1	Chukku	*Zingiber officianalis*	Sundi	*	*			*			*	*	*	6
2	Chittamrutu	*Tinospora cordifolia*	Amruth	*	*							*	*	4
3	Kuruntotti	*Sida rhombifolia*	Bala	*		*				*			*	4
4	Devataram	*Cedrus deodara*	Daru	*	*	*		*						4
5	Satakuppa	*Anethum graveolenlens*	Satapushpa		*	*						*	*	4
7	Tatiri	*Woodfordia fruticosa*	dataki							*	*	*		3
8	Sataveri	*Asparagus racemosa*	Sataveri	*		*						*		3
9	Chittaratha	*Alpinia culcurata*	Rasna	*	*			*						3
10	Manjatti	*Rubia cordifolia*	Manjishta		*	*			*					3

No.	Raw drug	Bot.Name	Sanskrit name	R 13	G 8	D 12	DT 10	K 11	P 9	B 10	A 13	S 9	As 8	Total
1	Chukku	*Zingiber officianalis*	Sundi	*	*			*			*	*	*	6
2	Chittamrutu	*Tinospora cordifolia*	Amruth	*	*							*	*	4
3	Kuruntotti	*Sida rhombifolia*	Bala	*		*				*			*	4
11	Amukkuram	*Withania somnifera*	Aswagandha			*				*		*		3
12	Kadukka	*Terminalia chebula*	Abhaya			*					*		*	3
13	Elathari	*Elettaria cardamomum*	Ela			*				*		*		3
14	Tannika	*Terminalia bellarica*	Vibhitaka			*						*	*	3
15	Vayambu	*Acorus calamus*	Vacha		*			*			*			3
16	Njerinjil	*Tribulus terristes*	Aswadamshtra		*					*	*			3
17	Eratti maduram	*Glycyrrhiza glabra*	yashti			*							*	2
18	Palmutukku	*Ipomoea mouritiana*	Vidari			*						*		2
19	Adalodakam	*Justecia adathoda*	Adarusha	*	*									2
20	Vizhalari	*Embelia ribes*	Vidanga		*						*			2
21	Kuvalam	*Aegle marmelous*	Bilwa			*							*	2
22	Kattu mulaku	*Piper sp.*	Chavyam		*						*			2
23	Ati vidayam	*Aconitm heterophyllum*	Ativisha	*	*									2
24	Nellikka	*Emblica officianalis*	Datri			*							*	2
25	Grambu	*Syzygium aromaticum*								*		*		2
26	Karinkurinji	*Barleria montanum*	Sahachara	*										1
27	Kodithuva	*Tragia invalucrata*	Duralabha	*										1

No.	Raw drug	Bot.Name	Sanskrit name	R 13	G 8	D 12	DT 10	K 11	P 9	B 10	A 13	S 9	As 8	Total
28	Kaippan padavalam	*Trichosanthus anguina*	Patola		*									1
29	Muthanga	*Cyperus rotundus*	Mustha	*										1
30	Cheru vazhutana	*Solanum melongena*	Brihati			*								1
31	Ven vazhutana	*SolanumSp.*	Brihati			*								1
32	Veppin patta	*Azadirachta indica*	Nimpa		*									1
33	Prasarani	*Merrimia tridantata*	Prasarani							*				1
34	Ramacham	*Vettiviria zizanoides*	Useera							*				1
35	Brahmi	*Bacopa monnieri*	Brahmi									*		1
36	Medha	*Polygonatum cirrhifolium*	Medha			*							1	
37	Mahamedha	*Poligonatum verticillatum*	Mahamedha			*								1
38	Kakoli	*Fritelleria roylei*	Kakoli			*								1
39	Ksheera kakoli	*Lilium polyphyllum*	Ksheerakakoli			*								1
40	Chandanam	*Santalum album*	Chandana			*								1
41	Naruneendi	*Hemidesmus indicus*	Sariba			*								1
42	Takaram	*Cryptocoryne spiralis* *Valeriana jatamansi*	Tagara			*								1
43	Uluva	*Trigonella foenum-graecum*	Kalanusari			*								1
44	Karakil	*Aquilaria agalocha*	Agaru			*								1
45	Muringa tholi	*Moringa olifera*	Sigru					*						1
46	Tazhutama	*Boarhavia diffusa*	Punarnava					*						1
47	Narumpasa	*?*	Vararasa					*						1

No.	Raw drug	Bot.Name	Sanskrit name	R 13	G 8	D 12	DT 10	K 11	P 9	B 10	A 13	S 9	As 8	Total
48	Kattuzhunnu	*Vigna radiata Ssp.sublobata*	Mashaparni					*						1
49	Kattu payar	*Vigna pilosa*	Supyaparni					*						1
50	Elavangam	*Cinnamomumsps.*	Lavangam					*						1
51	Pachila	*Pogostemon paniculatum*	Patram					*						1
52	Mundiri	*Vitis viniferrra*	Draksha								*			1
53	Ilippa	*Madhuca latifolia*	Madhuka								*			1
54	Kothambalari	*Coryandrum sativum*	Danyakam								*			1
55	Kattu vellari	*Cucumis sp.*	Indravallari								*			1
56	Elavin pasa	*Bombax malabarica*	Salmali								*			1
57	Nagadanti	*Baliospermummontanum*	Danti								*			1
58	Adapatiyan	*Holostemma adakodian*	Jeevanthi							*				1
59	Arenukam		Arenuka							*				1
60	Trikolpa konna	*Operculna turpethum*	Trivid									*		1
61	Tippali	*Piper longum*	Pipali									*		1
62	Veluthulli	*Allium sativum*	Lasuna					*						1
63	Karthotti	*Capparissp.* *Hugonia mystax*						*						1
64	Kaduku	*Brassica nigra*	Sarshapam					*						1
65	Puliyila	*Tamarindus indicus*	Cinch					*						1
66	Chenchallyam	*Canarium strictum*							*					1
67	Venga katal	*Pterocarpus marsupium*	Asanam										*	1
68	Jeerakam	*Cuminum cyminum*	Jeeraka		*									1
69	Vayalchulli	*Hygrophilaouriculata*	Kokikaksha	*										1
70	Kumbil	*Gmelina arborea*	Karmarya			*								1

? marks denotes Species with unknown identity

Table 6.3 Essential Raw Drug List –Part- B

List of Drugs Exclusively Used By Folk Practitioners

No.	Local name	Botanical Name	Main use
1	Sarpagandhi	*Rawolfia serpentina*	Snake poisoning
2	Kurumulaku	*Piper nigrum*	
3	Karalayam	*Aristalochia indicum*	
4	Anachuvati	*Elephantopus scaber*	Sprains, Bone setting
5	Maithal(Uppiliyam)	*Asystacia chelanoides*	
6	Tumba	*Leucas aspera*	Home remedy
7	Tulasi	*Ocimum tenuiflorum*	
8	Manjal	*Curcuma longum*	
9	Mukkutti	*Biophytum reinwardtii*	Gynacology
10	Tengin pookula	*Cocus nucifera*	
11	Cheru kadaladi	*Cyathula prostrata*	
12	Vallippala	*Tylophora*	Astma
13	Mavintalir	*Mangifera indica*	Aruchi
14	Kattuchena	*Amorphophallus sylvaticus*	Piles, Fistula
15	Avil	*Holoptelia integrifolia*	
16	Kudakappala	*Holarrhena antidysenterica*	
17	Nandiyarvattam	*Ervatamia diverica*	Eye diseases
18	Poovamkuruntila	*Vernonia cineria*	
19	Ekanayakam	*Salacia reticulate*	Diabetics
20	Kizharnelli	*Phyllanthus amarus*	Jaundice
21	Neerkoova	*Leginandra toxicaria*	
22	Kayyanni	*Eclipta alba*	
23	Kaita mula	*Pandanus odorottissimus*	
24	Kazhanjikuru	*Caesalpinia bounduc*	Hernia, Hydrosile
26	Uzhinja	*Cardiospermum helicacabum*	
26	Muyalchevi	*Emelia sonchifolia*	Tonsilites
27	Chethi	*Ixora coccinia*	Dermatopathy, Skin diseases

28	Malam takara	*Cassia alata*	
39	Navara	*Oryssa sativum var.*	Muscle empowerment
30	Parpidakam	*Hedyotis sp.*	Febrifuge
31	Naikurna	*Mucuna prurience*	Aphrodisiac
32	Kallurvanchi	*Rotala aquatica*	Antilithic
33	Kallurikki	*Scoparia dulsis*	
34	Cherula	*Earva lanata*	
35	Nila amari	*Indigofera tinctoria*	Alexipharmic, Poison
36	Ummatham	*Datura metal*	Arthritis

7. Expanding Horizons

Potential of medicinal plants in other alternative systems

So far we have discussed the possibilities and issues related to the compilation of a materia medica of the local Ayurveda and folk medicine health traditions of Payyannur. These two traditions mainly depend on the natural raw drug materials of Payyannur. However, other streams such as homeopathy, unani and naturopathy also depend on the locally available natural materials

Homoeopathy

Homoeopathy is the science of therapeutics based on Nature's Law of Cure, i.e., a drug producing disturbances in a comparatively healthy body is capable of relieving or entirely obliterating similar disturbances in the sick person. Samuel Hahnemann, a German physician, discovered this law and created a materia medica for its practical application. Homeopathy administered the doctrine of single remedy; the medicine is used singly or in combination. As in Ayurveda, the sources of the remedies used in Homoeopathy are from the three kingdoms of nature – vegetable, animal and mineral. Jan Stephan who defined traditional medicine has considered homeopathy also to be part of traditional medicine.

The neem bark, known as margosa bark, is the best known medicinal ingredient used in homeopathic treatment of a number of ailments, especially those of the eyes and skin. Fresh leaf juice of peepal tree mixed with an equal part of alcohol is very effective for treating haemorrhages and menorrhagia. An alkaloid obtained from the bark and seeds of *Strychnos nuxvomica*, Brucinum (C23 H26N2O4) is used against head ache and paralysis. The red powder obtained from trilobed capsules of kamala tree (*Mallotus philipensis*) is a well known homeopathic medicine for treating tapeworm infection. Neela amari (*Indigofera tinctoria*) is used as remedy for epilepsy and diarhoea. Food materials such as onion (*Allium sepa*) and asafoetida, raw drugs such as *Cannabis sativus,* and *Inula racemosus* are homeopathic remedies. Different species of Eupatorium, *Artemesia, Passiflora, Breyonia, Asclepias, Lobelia, Berberis, Lycopodium, Agaricus, Ailanthus* are used as medicine both in homeopathy and Ayurveda.

Homeopathic materia medica includes some materials of animal origin, which are also used in folk medicine. *Lac canninum (*Dog's milk) is used for treating diphtheria in homeopathy. Local health tradition of Payyannur has not used dog's milk as a remedy but its scat, which is known by a secret name *Mukkoottu kizhangu,* is used as a prophylactic against cholera and as a purgative to cure poisoning due to Glory Lilly (*Glories superba*). Bone of cuttle fish is known as *Samudra Phenum* in classical ayurveda and *kadalnaku* in folk medicine. It is used in several preparations in local health care tradition. Homeopathy uses sepia - the ink of cuttlefish which is ejected when threatened by enemies as an excellent remedy for menstrual and menopausal problems. It uses musk gland of the musk deer -

Moschus - for treating hysteria. Ayurveda and folk medicine also use the same substance in treating mental disorder and indigestion.

Table.7.1. Comparison of Drug Sources in Homoeopathy and Ayurveda / Folk Medicines

No	Source	Material used in Homoeopathy	Material used in Ayurveda/ Folk medicine
1	Spider	Poison	Silk
2	Honey bee	Tincture made from honey bee	Honey, Wax
3	Musk deer	Musk (Moschus)	Musk
4	Dog	Milk (Lac Caninum)	Dung
5	Cobra	Poison	Cuticle
6	Cuttle Fish	Sepia-Inky secretion of the cuttle fish	Shell
7	Sponge	Tincture made from sponge	——-

Calcarea carbonica is an important homeopathic medicine, which is made from the powdered translucent inner layer of oyster shells. This is used for treating different disorders relating to bones and teeth. Ayurveda also uses oyster shells (*Muthu chippi)* as the main source of calcium carbonate to treat various disorders in bones and teeth. Antimony, sulphur, mercury and aurum are mineral substances used both in Ayurveda and homeopathy.

Naturopathy

In nature cure plants with high nutritional value are used as medicine. The choice of medicine is based on the Vedic dictum. According to the Yajurveda,
"*Annam hi bhuthanam jyestam thasmat sarvaushadam muchyatae*"[15]
meaning food stands senior-most to all living beings and hence it is the supreme medicine. A list of plants used in naturopathy is given in Table 7.2.

Potentials of medicinal plants in modern medicine

The chemical basis of 40 percent of all the allopathic medicines used globally is alkaloids or glycosides present in the tropical plants or are imitations of them. Alkaloids of plant origin are extracted from plants that constitute merely two percent of the plant diversity in the world. We are yet to understand the chemical worthiness of a vast majority of the plants species. Out of 2,50,000 flowering plants occurring in the world only 50,000 plants are screened for their medicinal properties. Most wonder medicines in allopathy were 'discovered' by making use of folk pharmacognosy. The *Digitalin* and *Digitoxin* – two medicines widely used for treating epilepsy and cardiac disorders are extracted from fox

glove plant (*Digitalis purpurea*). This discovery was based on information obtained by Dr. William Withering from a lady folk healer of England.

Table 7.2. Medicinal Plants Used in Nature Cure

No.	Local name	Botanical name	Use
1	Kutakan	*Centella asiatica*	Child hood ailments
2	Muringa	*Moringa olifera*	Asthma(with ash gourd juice)
3	Cherula	*Aerva lanata*	Kidney ailments
4	Tazhutama	*Boarhavia diffusa*	Peptic ulcers, Piles, Blood pressure, Epilepsy
5	Muthanga	*Cyperus rotundus*	Juice of grass is highly health-promoting. Roots: childhood ailments
6	Tumba	*Leucas aspera*	Leave juice: Acidity, Ulcers
7	Kariveppila	*Murraya Koenigi*	Stomach ailments
8	Manithakkali	*Solanum nigrum*	Autolysins tumors
9	Malli	*Coriandrum sativum*	Rashes, Pimples in skin, Decolorisation
10	Karuka	*Cynadon dectalon*	Juice: Nervous troubles, Regain memory power
11	Kuvalam	*Aegle marmelos*	Leaves: Diabetes

Source: Varma (1981)

Table 7.3 Materia Medica of Payyannur: Potential in Modern Medicine

No.	Botanical Name	Local Name	Drug/Active constituents	Clinical use	Distribution in study area
1	*Adhatoda vasica*	Adalodakam	peganine	oxytocic	Hedge plant, common
2	*Agave sp.*	Eroppakaita	Steroidal hormones	Antiarthritic, hormonal	Hedge plant
3	*Anamirta cocculus*	Polla kai	Picrotoxin	Analeptic	Wild, common
4	*Andrographis paniculatus*	Nilaveppu	Andrographolide	Bacillary dysentery	Cultivated and wild, common
5	*Areca catechu*	Adakka	Arecoline	Antihelminth	Cultivated, common
6	*Azadirachta indica*	Veppu	Azadirachtin	Insecticide	Cultivated, common
7	*Berberis aristata*	Maramanjal	Berberine	Anti-hepatic toxic, non specific diarhoea	Bazaar medicine
8	*Boswellia serrata*	Sambrani	Beta-boswellic acid	Anti inflammatory	Bazaar medicine
9	*Capsicum annum*	Mulaku	Capsicum oleoresin		Cultivated, common
10	*Capsicum frutescens*	Kantari mulaku	Capsicum oleoresin		Cultivated, common
11	*Carica papaya*	Papaya	Chymopapain	Proteletic	Cultivated, common
12	*Catharanthus roseus*	Nityakallyani	Vinblastine Vincristine	Anti cancer	Cultivated as Ornamental, common
13	*Centella asiatica*	Muthil	Asiaticoside	Vulnerary	Wild, common
14	*Cinnamomum camphora*	karpooram	Camphor	Rubefacient	Bazaar medicine
15	*Cinnamomum zeylanicum*	Karappa	Eugenol		Bazaar medicine
16	*Coffia arabica*	Kappi	Coffeoine	CNS stimulant	Cultivated,

17	*Commiphora mukaul*	Gulgulu	Guggul saponines	Hypolipidaemic	Bazaar medicine
18	*Coscinium fenestratum*	Maramanjal	Berberine	Anti-hepate toxic, Non specific diarrhoea	Wild, endangered
19	*Curcumc longa*	Manjal	Curcumin	Choleratic	Cultivated, common
20	*Datura metal*	Ummam	Scopolamine, tropine alkaloids	Sedative	Wild, rare
21	*Dioscorea spp.*	Kachil/nuran	Diosgenin	Contraseptive	Cultivated, wild
22	*Glycyrrhiza glabra*	Erattimaduram	Glycyrrhizin	Expectorant, demulscent	Bazaar medicine
23	*Gossipiumherbaceum*	Paruthi	Gossypol	Contraceptive	Cultivated as hedge plant
24	*Papaver somniferum*	Aveen, karuppu	Morphine, papaverine	Muscle relaxant	Not available in open market
25	*Plantago ovata*	Isabgul	Seed husk	Laxative, Purgative	Provision shop
26	*Psoralea corrylifolia*	Karkokil	Psoralin	Leucoderma	Bazaar medicine
27	*Rauvofia serpentina*	Sarpagandhi	Reserpine, rescinnamine	Antihypertensive, tranquilliser	Wild
28	*Ricinus communis*	Avanakku	Castor oil	Laxative	As a weed
29	*Strychnos nuxvomica*	Kanjiram	Strychnine	CNS stimulant	wild

In 1835 aspirin was extracted from medow sweet (*Filipendula ulmaria*), a plant commonly used by European folk practitioners for treating fever, flu and rheumatism. Steroids such as Cortisone and *Diosegeni*n were discovered from wild *Diascorias* of the North American Native Indians. Cinchona, the source of *Quinine,* is a febrifuge used by South American tribes. Researches on the medicinal properties of rosy periwinkle were prompted by information that Jamaican tribes used it for treating diabetes.

Some medicinal plants of Indian origin are also being used globally. *Rauvolfia* is such an Indian plant. Serpent root of *Rauvolfia* has been widely used in India as an antidote to insect and snake bites, as a febrifuge and as a sedative. R.J.Vakil noticed its action against hypertension and found that it has a marked hypertensive action (Chopraw.*et.al.1956*). *Sarpagandhi* contains 24 alkaloids including *Reserpine*, *Deserpidine* and, *Rescinnamine* which are now widely used as ahypotensives and tranquillisers. Senna leaves (*Cassia angustifolia*) are used as a laxative in Ayurvedic preparations. *Sennasoids*, the *glycoside* derived from senna is used as a purgative in modern medicine.

Some essential oils and terpene derived from medicinal plants are identically used in Ayurveda and modern medicine. Cinnamon leaf oil is used as a source of *Eugenol* and *Isoengenol* and oil of *Cinnamomum comphora* is a source of natural camphor. Many pharmaceutical preparations in the markets, such as cough syrups, pain balms etc., have natural essential oils as their active ingredients. Mints and basils are basic ingredients of dental care products (Maiti, 2000).

About 3000 antibiotics including Penicillin, Cyclosporin and Tetracycline are derived from micro-organisms and fungi. Modern health care system looks at biodiversity for discovering remedies of killer diseases such as AIDS. The hope of the future depends on the knowledge handed over from one generation to another, as in Ayurveda and folk medicine. The new world order, which bestows monopoly rights even on the life forms, has begun to threaten the very existence of traditional knowledge embedded in folk medicines. The medicinal quality of turmeric and neem, which were patented in US, were a common legacy that symbolise the thousands of years of Indian health care experience. But now multinationals attempt to steal that knowledge and make it their monopoly. As bio-piracy becomes the rule of the time and the transparency of the UN Convention on Biodiversity is clouded, we will have to face the challenge of legally protecting our genetic wealth. It is in the midst of such worries that the need for a Biodiversity Law which prevents bio-piracy, ensures equity to the owners of the knowledge, protects biodiversity of both agricultural and wild medicinal plants and which is free from loopholes, becomes most pertinent.

8. Conclusions

It is evident from the study that most of the raw drugs brought in from outside for sale in Payyannur drug market are actually locally available. However, this fact has escaped the attention of practitioners and vendors indicating their ignorance of local field conditions and the ecology of the materials they handle. This situation closely resembles the circumstances that led to the preparation of legendary work on the flora of Malabar –The *Hortus Indicus Malabaricus*. This first documentation of the floral wealth of Malabar was done by the Dutch. Originally the medicinal preparations for the ailments of Dutch soldiers in India were imported from Europe. It was the realisation that most of those drugs and their ingredients were available locally which made Van Rheede compile the book.

Local health traditions of Payyannur have two distinctive strands –the first one is the codified conventional system of Ayurveda and the second stream is the uncodified folk health care system. Both have two streams of treatment - subclassified here as 'rational' - which is based on medicines - and 'devotional' - which is mainly based on spiritual healing.

The codified stream of traditional healing system has evolved out of the classical Ayurvedic system to form a distinctive Kerala school. The Payyannur branch of this school of ayurveda refers mainly to source books written in Malayalam such as *Sahasrayoga* instead of original Sanskrit *Brihatrayi* and the like. They also use certain unique raw drugs or endemic combination of raw drugs like *Dasapushapam*, *Kombanchathi* etc. Drugs used by this school include local substitutes of the raw drugs for certain ingredients. Presently, the rational stream of healing has gained prominence and the devotional stream plays only a relatively insignificant role in the treatment of ailments.

The uncodified folk stream of health care tradition encompasses a variety of practices. Both the rational and the devotional streams play important roles in this system of healing. The knowledge-base for this system is mostly inherited, though certain rare procedures are preserved in written form. The folk medicine is enriched by the health care techniques of ethnic communities such as *Vannan* and *Malayan*. Most of the devotional procedures of healing are related to sacred groves and *theyyam* worship. Some of the devotional procedures that have become extinct such as *Thachu manthram* resemble, to some extent, the new streams of alternative medicines such as *Reiki*. This highlights the fact that devotional procedures of healing may still have their own importance.

Originally both the streams of healthcare traditions had a high degree of dependence on the local raw drug market. But now the Ayurveda stream has ceased to depend exclusively on the local raw drug market. It is the demand from practitioners of folk medicine and their patients that sustains the raw drug markets today.

The numbers of patients and practitioners who prepare their own medicines have now become negligibly small. Most of them depend on company prepared medicines. It is

estimated that the total annual sale of Ayurvedic preparatory medicines in the shops in Payyannur at present is approximately worth two crore rupees, whereas the annual sale figure of raw drug is less than Rs. 60 lakhs.

Raw drug market of Payyannur is less than a hundred years old. Products from Tamil nadu, Himalayas, China and Seychelles Island arrive in the raw drug market of Payyannur. More than 735 materials of plant-origin obtained from 587 species, 95 materials of animal-origin obtained from 60 species of animals and 39 different materials of mineral-origin are used as raw drugs in Payyannur.

It is the diversity of the landscape elements and presence of diverse habitats such as wetlands, forests, grasslands, streams, paddy fields, etc. in Kerala that is reflected in the surprisingly rich biological diversity in the raw drug market. It is extremely significant to note that the traditional health care system and associated raw drug market of Payyannur is a classical example for sustenance of knowledge and biological diversity founded on cultural practices.

Sources of most raw drugs of biological origin have been identified to be belonging to vulnerable and threatened categories. However, current conservation/survival status of some of these species is yet to be assessed. The first step in sorting out a strategy for the conservation and sustainable utilisation of the species is the conservation-prioritisation of raw drugs. The essential raw drug list prepared as part of the present study is an initiative in this direction. A list of this kind is necessary for facilitating activities such as cultivation of medicinal plants, their sustainable harvesting as well as their marketing. The involvement of local bodies for their preservation must be ensured. Steps must be initiated for standardisation of raw drug materials. The present attempt to prepare an essential drug list for Payyannur is carried out realising the limitations of such a study and the possibilities of its use and improvement.

Medicinal plant collectors, who were seasoned and experienced individuals who could recognise, locate and collect medicinal plants acted as a vital link between the natural habitats of plants and the drug market. In other words 'they bear a resource map in their mind'. Till recently a number of medicinal plant collectors were active in Payyannur for meeting the market demand of medicinal plants. Now the situation has turned grave. At present, the green drug stores of Payyannur depend exclusively on less than five plant collectors. The implications of the erosion of this knowledge-base associated with the vanishing tribe of medicinal plant collectors are unfathomable. Nearly half of the fresh herbal drug species that used to be sold two decades ago in Payyannur are no longer sold now. As a result, some of the famous *Yogas* or medicinal compositions have also disappeared. The present attempts to conserve medicinal plants and to revitalise local health traditions are limited to cultivation of medicinal plants and to documentation of medicinal preparations. But these attempts are not only incomplete but also inadequate. The more important activity required would be to conserve the knowledge-base at the field level. But such conservation attempts are not forthcoming. Consequently, now the erosion of knowledge-base is much faster than the erosion of the material base.

Notes

1 The Concise Oxford Dictionary (1990) provides following definition for materia medica: *materia medica* /mtr medk/ *n. phr. pl.* M17. [mod.L tr. Gk *hule iatrike* healing material.] The remedial substances used in the practice of medicine; (treated as *sing.*) the branch of medicine that deals with their origins and properties.

2 The period of *Rigveda* is assigned as 4500-1600 B.C

3 Three Major source books of classical ayurveda such as Charaka samhita, Susruta samhita and Astanga hrudayam are together called *Brihathrayi*.

4 Traditional practitioners of ayurveda or folk medicine.

5 The word Chiropractic originated from two Greek words *Kheir* which means 'hand' and *praktikos* which means 'practical'. It is used to relieve pain by manipulation and to correct any problems that are present in joints and muscles especially in the spine. No medicine is used in this system.

6 This practice was originated by an American doctor named Andrew Still (1828-1917). This therapy aims to pinpoint and treat that is of a mechanical nature. The body's frame, activities and movements depend on it.

7 Though there are practitioners of unani who are mainly Muslims their prescriptions and practices are not much different from that of ayurveda and folk medicine. So this study does not consider unani as a distinct health care practice of Payyannur. Popularity of siddha is limited to the southern districts of the State, which is proximate to Tamil Nadu, the place of origin of siddha. Some researchers consider siddha as a branch of ayurveda.

8 Ethnomedicine is the medical system of the primates which has evolved in their own cultural milieu and recognized as the method of diagnosis and treatment which may include natural or supernatural elements. It includes all the body of beliefs, therapeutic practices including the pharmacopoeia which they use for curing diseases even if they attribute the cause of natural or super- natural forces (Hughes,1968)

9 Collyrium - An oily home made pasty kohl used as eye make-up and as eye ointment.

10 These medicines are usually bought at the raw drug at the bazaar so usually referred as *Angadi Marunnu* which literally means Bazaar medicine. *Angadi Marunnu* are usually dried plant and animal parts and minerals including honey. The fresh herbal medicines needed for the preparation of medicines are usually collected locally. So they were not sold in the traditional raw drug stores. However, now fresh herbal medicines are also being sold in the stores. This indicates the erosion of the popular knowledge-base on the medicinal herbs that generated a market demand for these fresh herbal medicines.

11 *Gurusi* is a solution of turmeric in the milk of lime with a characteristic, natural, blood red colour. In folk rituals - especially in demon worship, incantation and blood cults - this is taken for blood and blood sacrifices.

12 Their connection with traditional health care is not accidental. It was two Konkan Brahmins namely Appu Bhatt and Vinayaka Bhatt who helped the Dutch Governor Van Rheed in preparation of *Hortus Indicus Malabaricus* (Manilal *et al*, 1988).

13 World Conservation Union (formerly International Union for Conservation of Nature and Natural Resources –IUCN) is responsible for the publication of the Red Data Book, which provides the conservation and survivorship information of the plant and animal species world wide. Species are graded and categorized into groups such as threatened, endangered, critically endangered, extinct etc.

14 All the raw drugs listed in the ERD list are available in the raw drug Market of Payyannur. Roughly 10 percentage of the materials listed do not have any market value in India in general and the other raw drug markets of Kerala in particular. Locations of collection of many raw drugs reaching the market from other regions are also not clear. Botanical identity of certain materials such as *Narum Pasa*, *Arenukam* etc. could not be established.

15 Varma (1981)

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