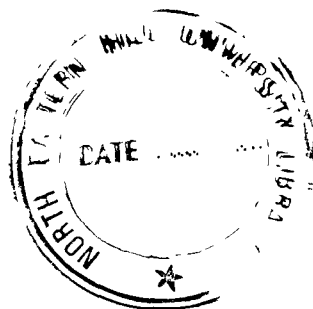


**ETHNOBOTANICAL STUDIES IN KHASI HILLS,
MEGHALAYA**



**BY
SIERRA REBECCA HYNNIEWTA
DEPARTMENT OF BOTANY
NORTH EASTERN HILL UNIVERSITY**

**ABSTRACT OF THESIS SUBMITTED
IN FULFILLMENT OF THE DEGREE OF
DOCTOR OF PHILOSOPHY IN BOTANY**

**DEPARTMENT OF BOTANY
NORTH EASTERN HILL UNIVERSITY
SHILLONG, MEGHALAYA, INDIA**

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ABSTRACT

A discussion of human life on this planet would not be complete without a look at the role of plants. Gathering jungle fruits and tubers, or hunting animals for food by the earliest man on this earth was the birth of ethnobotany and ethnozoology. The term Ethnobotany is defined as “the study of human evaluation and manipulation of plant materials, substances and phenomenon including relevant concepts in primitive and unlettered societies”. It is also defined as “all studies (concerning plants), which describe local people’s interaction with the surrounding natural vegetation”.

Meghalaya, a small state situated in the North Eastern part of India, lying between 25°05’ N and 26°10’ N Latitudes and 89°47’ E and 92°47’ E Longitudes is the home of three major tribes, viz. the *Khasis*, *Jaintias* and *Garos*. Numerous wild and cultivated plants play a very important and vital role in the life of the tribes. Their interrelationship with plants has evolved over generation of experience and practices.

The research work is undertaken to develop a comprehensive account on the ethnobotanical important plants of the region, like medicinal plants, supplementary foods, wild fruits, vegetables, plants used in socio-religious ceremonies, in the making of musical instruments and to document plants related to different clans and strategies adopted by the clans for their conservation. The present work especially aims at focusing light on the hidden indigenous knowledge of traditional medicines of the Khasis in Meghalaya. Thus three districts of Meghalaya viz. East Khasi Hills, West Khasi Hills and Ri Bhoi Districts were chosen to be explored ethnobotanically. From East Khasi

Hills District altogether 13 villages or study sites have been covered. In West Khasi Hills District 7 villages or study sites have been covered and in Ri Bhoi District 6 villages or study sites have been covered.

Ethnobiological knowledge system is a very cost effective means of locating alternative food sources and useful compounds/drugs were developed after getting the lead from ethnobotanical investigations. Due to this reason there lies the need for thorough Ethnobotanical investigation in each district of Meghalaya. The work was undertaken to compare and evaluate the ethnobotanical data, for bringing significant medicinal plants for further study for isolating and identifying their active principles.

Field surveys were conducted in all the three districts covering altogether 13 villages to study the way of living of the people, their beliefs, customs, practices, interaction with nature and most importantly their perception of plants. Interview procedures are both open ended, and semi structured and structured. Informant selection ranges from random sampling to purposive sampling. Questionnaire and Case Studies were done to derive true and first hand data from the informants. Ten tribal weekly markets were visited for observing marketplace interactions. Collection of data from the traditional priests, village headmen and elder village folks regarding the uses of plants for socio-religious ceremonies, clan plants and folk plant classification. Attending to local festivals, socio-religious ceremonies like Marriage, Naming and Death ceremonies. Local musicians were interviewed on the plants used for making the instruments. Private and state museums, exhibitions and workshops were visited for the same purpose. Voucher specimens of all the plants documented have been collected for future

reference. The collected specimens were identified from herbarium of the Botanical Survey of India, Eastern circle, Shillong and also Herbarium of the Department of Botany, NEHU, Shillong. Identification and also confirmation of the identified specimens was done by consultation of various regional and state floras.

Analytical tools used in quantification and data verification are:

- a) Informant Agreement ratio (Trotter and Logan, 1986).
- b) Preference ranking (Martin 1995)
- c) Relative Reliability Index (Khan, 2001)

Ethnobotanical information on 293 species represented by 208 genera spread across 95 families which includes Dicotyledons, Monocotyledons, Gymnosperm, Pteridophytes, Lichen, have been documented. The dominant families being Asteraceae, Rutaceae, Zingiberaceae and Poaceae. A total of 181 plant species of ethnomedicinal importance represented by 150 genera and belonging to 81 families of the plant kingdom and have been documented to be used by the traditional healers and village folks in the three districts of Meghalaya. The Dicotyledons has the highest number of recorded species which is 132 while the lowest is shared by Lichens and Gymnosperms with 1 each. The family Asteraceae has the highest number of members with 17 species and Zingiberaceae with 10 species recorded. The other 79 families are represented by numbers ranging from 1-6 species. The genera with highest number of species documented are *Curcuma* (5 species) and *Symplocos* (4 species). The 181 species serve as remedy for treatment of 73 different diseases and ailments. The species with the highest number of medicinal uses documented are *Acorus calamus* (19), *Curcuma*

aeruginosa (12), *Zingiber montanum* (10). The different methods of preparation are in the form of infusion, decoction, steaming or inhaling of vapours, boiled, paste, juice extract which is taken orally, applied topically, fomentation, herbal hot water bath. The work presents the age-old belief of the Khasis in a type of germ that infects the infants and newborns known as '*U N̄iangsohpet*' which causes Infantile diarrhoea and Neonatal jaundice.

In the CASE I study conducted among the 165 patients who come to consult 11 traditional medicine men it was observed that the number of ailments recorded is 47 with each patient coming with more than one complaint. The highest number of patients is observed to be for Infantile diarrhoea, Stomach and gastric problems, Menstrual problems, Urinary problems and Bodyache. In the CASE II study out of the 295 students who filled up the questionnaires, 207 of them revealed that they or their family have faith in medicinal plants and have consulted a traditional medicine man at one point of time in their life. In the CASE III study of 20 respondents of Laitlyngkot village it was observed that *Centella asiatica* which is effective against anaemia, blood dysentery, diarrhoea etc. has the highest score as the most commonly used home remedy from among 10 plant species selected.

Application of Relative Reliability Index to the ethnomedicinal claims documented, it was seen that 53 species have the highest reliability of 1.07, 35 species with RRI of 1.04, 30 species with 1.00, 50 species with RRI of 0.95 and only 13 species with lowest reliability of 0.9. The IAR or consensus values range from 0-1 with 14 indications having the highest levels of IAR. These high levels are those indications

having a value of IAR greater than the mean value (0.67) plus the standard deviation (0.3) or 0.97.

The medicinal uses of 169 plants have been documented for the first time or additional uses have been documented. The medicinal uses of the five species of Pteridophytes and one species of lichen documented have been reported for the first time in Meghalaya.

The present work provides first hand information on the herbal remedies practiced by the rural folks of Meghalaya. This report incorporates the mode of application and dosage of these herbal drugs, which is obtained with great difficulty because in many cases these medicine men are reluctant to share their knowledge.

A total of 142 plant species of wild and less known cultivated edible plants have been recorded from the study area, out of these 66 plant species belonging 31 families of the plant kingdom and represented by 49 genera have been documented as marketable edibles while 76 plant species belonging 39 families of the plant kingdom and represented by 59 genera have not yet come into the market but many have a potential to be marketable. Out of the 142 plant species collected, 46 of them have been reported to have medicinal properties also. Efforts have been made to demarcate the marketable and non marketable edible plants together with their monthly availability in the market and market price, their value added products, which will prove useful to find ways to improve the economic returns from these edible plants. In CASE II study all the 295 students brought specimens of cultivated and wild edible plants. Each family consumes 15-20 types of wild edibles annually and about 4-5 times a week.

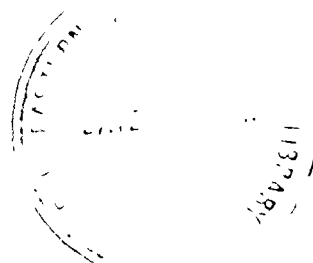
Altogether 11 plant species belonging to 10 genera under 7 families which include dicotyledons, monocotyledons and gymnosperms have been documented to be used in the making of 17 musical instruments which include percussion instruments, wind instruments, string instruments. There are 33 clans documented which are forbidden from consuming or using in any form 21 plant species under 20 genera belonging to 14 families. Recording the various indigenous strategies of the Khasis, will help in a long way in conservation of biodiversity. The local communities in Meghalaya have the treasure troves of accumulated knowledge and wisdom particularly about the biological resources around them. Such information has immense value to the biodiversity managers, planners and scientist alike.

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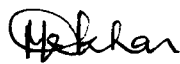
DECLARATION

I, Sierra Rebecca Hynniewta, hereby declare that the subject matter of this thesis entitled "*Ethnobotanical studies in Khasi Hills, Meghalaya*" is the record of work done by me, that the contents of this thesis did not form basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/ Institute.

This is being submitted to the North Eastern Hill University, Shillong for the award of the degree of Doctor of Philosophy in Botany.



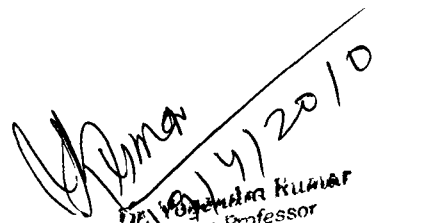
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Sierra. R. Hynniewta

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ABBREVIATIONS USED

Coll. no.	Collection Number
EKH.	East Khasi Hills District
Fig.	Figure
Fl.	Flora
FBI	Flora of British India
FI	Flora of India
FA	Flora of Assam
FJ	Flora of Jowai
FN	Flora of Nongpoh
FFM	Forest flora of Meghalaya
FFAM	Fern and Fern Allies of Meghalaya
LN	Local name
RB	Ri Bhoi District
WKH	West Khasi Hills District

CHAPTER I

INTRODUCTION

INTRODUCTION

The term 'ethnobotany' was coined by Dr. John William Harshberger in 1895, at a lecture in Philadelphia, for which he defined it as "the study of plants used by primitive and aboriginal people". In 1896, Harshberger published the term under the heading "Some New Ideas" and suggested "ethnobotany" be a field which elucidates the "cultural position of the tribes who used the plants for food, shelter or clothing" (Harshberger, 1896). The term "ethnobotany" is derived from two Greek syllables "Othnikos" or "Ethnos" meaning nation or race and "Botanikos" or "Botane" means plants. Thus etymologically the term "ethnobotany" refers to the study of plants used by race(s), villagers etc.

Though the term "ethnobotany" was coined until 1895, the history of the field begins long before that and practical interests in ethnobotany go back to the beginning of civilization when people relied more on plants as a way of survival. A discussion of human life on this planet would not be complete without a look at the role of plants. Gathering jungle fruits and tubers, or hunting animals for food by the earliest man on this earth was the birth of ethnobotany and ethnozoology. Perhaps as early as the Neanderthal man, plants were believed to have healing powers but, as no mode of recording events existed in prehistoric times, there are no data on the methods of treatment practiced in that period (Jain, 1968). The earliest recorded uses of plants are found in Babylon circa 1770 BC in the Code of Hammurabi and in ancient Egypt circa 1550 BC. In 77 AD, the Greek surgeon Dioscorides published 'De Materia Medica'

which was a catalogue of about 600 plants in the Mediterranean. It included illustrations and information on the plants used by the Greeks especially for medicinal purposes.

Ethnobotany is an interdisciplinary science, which includes aspects of both sciences and humanities. Therefore it serves as a gateway to many disciplines. Robbins *et. al.*, (1916) suggested that “the science of ethnobotany should include the investigation and evaluation of the knowledge of all phases of life amongst primitive societies and the effects of the vegetal environment upon the life, customs, beliefs and history of these tribal people”. Twenty five years later, Jones (1941) put forward a more concise definition of ethnobotany as “the study of the interrelationship of primitive man and plants”.

In the start of the 20th century, the field of ethnobotany experienced a shift from the raw compilation of data to a greater methodological and conceptual reorientation. This is also the beginning of academic ethnobotany. The founding father of this discipline is Richard Evan Schultes. Since then considerable attention has been focused not only on how plants are used, but also on how they are perceived and managed, and on the reciprocal relationships between human societies and the plants on which they depend. According to Schultes (1962), ethnobotany is “the study of human evaluation and manipulation of plant materials, substances and phenomenon including relevant concepts in primitive and unlettered societies”. Today the field of ethnobotany demands a variety of skills: botanical training for identification and preservation of plant specimens; anthropological training to understand the cultural concepts and the perception of plants; linguistic training to transcribe local terms. While taxonomists give

emphasis on plants and their habitat, the ethnobotanist in addition to these aspects record the relationship of these plant communities with local population.

Ford (1980) regarded ethnobotany as “the totality of the people with plants in a culture and the direct interaction by the people with plants”. Ethnobotany is also defined as “all studies which describe local people’s interaction with the surrounding natural vegetation” (Martin, 1995). Ethnobotany deals with the study of total natural and traditional interrelationships between man and plants or man’s domesticated animals (Jain, 2001). The term implies an explanation on local people’s perspective on culture and scientific knowledge. (Pushpangdan and Kumar, 2005).

Traditional Botanical Knowledge (TBK) is defined as the total botanical knowledge held by any non-industrial community and incorporates all utilitarian, ecological and cognitive aspects of both plant use and vegetation management (Cotton, 1996). The tribal people and ethnic races throughout the world have developed their own culture, customs, cults, religious rites, taboos, legends and myths, folk tales and songs, foods, medicinal practices, etc. Numerous wild and cultivated plants play an important and vital role among these cultures. They use plants for medicine, construction of huts, for nutrition, fuel, poisoning the arrows, musical instruments, in magico-religious beliefs, cultural functions. Plants are indispensable to ritual and religion, provide devotional ambience and they symbolize the connection with gods and spirits as seen from the reports of Shah (2006) on *Nardostachys jatamansi*, Jha & Goel (2006), on *Vetiveria zizanioides*. This interrelationship has evolved over generation of experience and practices. Fosberg (1948) mentions that another important phase of ethnobotany

which can help in tracing relationships and migration of peoples is the study of various techniques of using plants and plant materials, styles of weaving, and plaiting fibres, of tying knots in cordage, of building houses, of making canoes and even of preparation of foods which are usually quite distinctive and show evolutionary change and cultural diffusion patterns. According to Jain (2005) Ethnobotanical Knowledge (EK) is the wisdom developed by any human society over many generations for proper utilization and conservation of the plant wealth around them. The application of this wisdom in their day to day activities, lifestyle, vocation etc. can be said to be Ethnobotanical practices, (EP).

Newmaster *et al.*, (2006) gave another aspect of traditional knowledge which is the classification of living things viz. folk classification and ethnotaxonomy. Classification systems and taxonomies are part of indigenous local knowledge, and the mechanisms of classification and identification for plants and animals in indigenous communities are triggered by the perceived morphological, utilitarian/ cultural, ecological and experiential affinities between organisms. Since the mid 1950s a distinct branch of Ethnobotanical study-that of cognitive ethnobotany has evolved which uses symbolic, socio-cultural or ethnotaxonomic analyses, to explore how plants are perceived by traditional people (Cotton, 1996).

Recently the realization that the aboriginal knowledge of plant properties is of both academic and practical value has matured. Various investigators in sundry fields have recognized the need to save native plant lore before it is entombed with the culture that gave its birth (Bruhn and Holmstedt, 1982). The works of R. E. Schultes, J. Ammal,

and S. K. Jain are of vital importance for they not only gave direction and widened the subject but they also played a catalytic role in starting several ethnobotanical studies.

In 1982, The Society of Ethnobotanists was established in India under the Chairmanship of Dr. S. K Jain, the legendary ethnobotanist often referred to as 'Father of India Ethnobotany'. The publication of a journal *Ethnobotany* started in 1989, under the society's banner to disseminate original research reviews, and articles on ethnobotany of various tribes, including ethno-medicine, ethno-chemistry, ethno-pharmacology, ethno-taxonomy and ethnopharmacognosy. In 1994 the IV International Congress of Ethnobiology was held at Lucknow, India. These activities ultimately culminated in the establishment of an autonomous Institute of Ethnobiology in Lucknow, in 1995, the first year of the International Decade for the World's Indigenous People.

The Agenda 21 of the Rio Earth Summit held in 1992 stated that *indigenous people and their community and other local communities have a vital role in environment management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interest and enable their effective participation in the achievement of sustainable development.*

The IV International Congress of Ethnobotany was held at Istanbul-Turkey in 2005 under the central theme "Ethnobotany: At the Junction of the Continents and the Disciplines". There is a close correlation between the destruction of forests and other ecosystems and the decrease of biological diversity as well as cultural loss. Many ethnobotanists ventured to far away places to catalogue all the plants used by indigenous

people in their everyday lives before their ecosystems were converted to cattle ranges, oil fields or monoculture plantations. Traditional knowledge is being lost throughout the whole world because urbanities are moving to areas historically inhabited by indigenous people, for e.g. building of shopping malls, retirement complexes, golf courses and other amenities that replace the native vegetation. Indigenous people are being forced to move from their long inhabited lands to give room for tourism development and to new ownership of land and so have no other choice if they want to continue with their rural lifestyles and cultures but to move to more pristine forested areas including protected lands. Also due to increase in literacy percentage, urbanization, deforestation, migration of rural people to urban areas for seeking off jobs, their very knowledge with respect to plant wealth is disappearing at alarming rate.

Indigenous tribes, lacking a written tradition, transfer tribal knowledge through oral communication. The present generation learns from its elders who learned from the tribal elders before them. In this oral tradition words themselves are more than just a tool for communication of knowledge. A vast knowledge on medicinal plants exists as oral among the folklore and traditional medicine men of India, where a large number of potent medicinal herbs are found growing wild. Also a large number of folk medicines remained endemic to certain regions in our country. The medicine man is often regarded as the first botanical professional in human history but his traditional skills are doomed to get lost even faster than the plant themselves. That is why ethnobotanists compare the death of a shaman to the loss of a national library and invest much effort in assembling this knowledge as written accounts.

According to Rao (1996) there is an urgent need to inventorise and record all ethnobiological information among the diverse ethnic communities before this traditional knowledge is completely lost. Alcorn (1984) emphasized that once a species gets known as a resource in any cultural group, the impact of this knowledge on expansion, distribution, threats to that species, and in cases even its extinction, play great role. The medicinal plants in particular have received the attention of scientists from chemical, pharmacological and clinical angles in India and abroad.

According to WHO estimate approximately 80% population in developing countries depend on traditional medicine for primary health care, a major portion of these involves the use of medicinal plants (Bennerman *et al.*, 1983). Farnsworth and Soejarto (1991) estimated that worldwide 50,000 plants are used in traditional medicines. The world trade on herbal medicine is now estimated at US\$ 70 billion with an annual growth rate of 75% (Gera *et al.*, 2003).

Ethnobotany is important in drug research. Recent advances in technology have made natural drug prospecting a viable solution to the search for new cures for diseases. Taking clues from folk uses followed by critical scientific evaluation have given to the world newer resources not only to fight diseases but also to other aspects of health care system. In view of fast growing demand for the medicinal plants for the use in Pharmaceuticals, Nutraceuticals, Cosmatologicals, Dietary Supplements etc. both at National and International level, implementation of the projects and the schemes meant for cultivation, collection, awareness, commercial supply of the medicinal plants for

generation of income and employment while ensuring conservation of endemic and threatened species through the sustainable use is the urgent need of the hour.

Ethnobiobiodiversity is a concept complementary to agro-biodiversity. About 7000 wild plants were collected and cultivated since agriculture began about 12,000 years ago. Today only 15 plant species supply 90 % of world food (Lal and Lal, 2004). It means we have lost or ignored the wild species diversity, which existed in the past and are over-exploiting the current species used in food production. Ethnobotanical studies help in revealing numerous germplasm stock of indigenous cultivated plants which may have potentialities of utilization by plant breeders for hybridization programme.

“Ethnobotany, the science of survival” this is a declaration from The Kaua’i Declaration (Raven and Prance, 2007). A group of 44 people from ethnobotany and Ethnobotanical associated disciplines participated in at Ethnobotanical Summit at the National Tropical Botanical Garden in Kaua’i on 27th March, 2007. Considering the grave environmental crises facing the world today, the loss of biodiversity and the loss of culture the group decided to issue a statement to stress the importance of ethnobotany for providing some of the solutions towards more sustainable living.

In India, there are 68 million people belonging to 227 ethnic groups and comprising 573 tribal communities derived from six racial stocks viz. Negroid, Proto-Australoid, Mongoloid, Mediterranean, West Breachy and Nordic exists in different part of the country (Pushpgandhan, 1994). Nearly 80% people in India and the developing countries of the world are depending on forest resources for meeting their health needs, they live close in the vicinity of forests and have managed and conserved the

biodiversity of their localities since long time. India is one of the world's 12 megadiversity centres and divided into 20 agro-eco zones (Prakash and Singh, 2001). It comprises 2.5% of total world's area and 8% of recorded global floral species. India is a store house of 45000 plant species out of which 17000 are flowering plants and 60% endemic flora in a variety of climatic conditions and landscapes (Chatterjee, 1940). According to Arora, (1991) of the 45000 plant species found in India, 9,500 are ethnobotanically important. Of these 7,500 species are used for indigenous health practices, 3900 plant species are used by tribals as food (out of which 145 species comprise of root and tubers, 521 leafy vegetables, 101 species of bulbs and flowers, 647 species of fruits), 525 species are used for fiber, 400 species as fodder, 300 species are used as insecticides and pesticides, 300 species are used for extraction of gum, resins, dyes and perfume. The Department of Indian System of Medicine & Homeopathy, Ministry of Health & Family Welfare, Govt. of India, has identified 1500 medicinal plants of which 500 are commonly used in the preparation of herbal drugs. It has been estimated that the total export of medicinal plants from wild Indian sources has increased from about Rs. 220 million in 1974-1975 to Rs.5000 million in 1980 (Chatterjee, 1980). WHO has given average annual growth rate of export of medicinal plants between 1996-97 to 2000-01 was 8.9% and it is increasing. According to Joshi *et al.*, (2004) the medicinal plant related trade in India is estimated to be approximately US\$ 1 billion/ year.

Himalayan regions are particularly rich in biodiversity due to varied geographical, physiographical, topographical, climatic and ecological zones within the

region. The North-east region of India is one of the mega-biodiversity centre and a hotspot (Myer *et al.*, 2000.) It comprises of eight states viz Meghalaya, Manipur, Nagaland, Assam, Mizoram, Tripura, Arunachal Pradesh, Sikkim. It comprises 7.7% of India's total geographical area supporting 50% (ca 8000 species) of the country's total flora (Rao, 1994) of which 31.58% (2526 species) endemic (Nayar, 1996). North-east region has 4 biosphere reserves, 48 sanctuaries, 14 national parks and 2 world heritage sites. With more than 150 tribes speaking as many languages, this region is a melting pot of variegated cultural mosaic of people and races and ethnic tapestry of many hues and shades. The importance of Ethnobotanical work in North East India has already been emphasised but keeping the large number of tribes that exists in the region, very few tribes have been touched upon in relation to Ethnobotanical studies. The North Eastern region has still remained unexplored because of various reasons particularly difficult terrain, poor communication, hostility of the inhabitants and insurgency conditions in the region.

Meghalaya a small state in North-east India is one of the richest states of India in terms of vegetation and flora. This is due to the large variation in the altitude, topographical features, soil characteristics and climatic factors which has favoured the growth and luxuriance of rich flora here. The state has immense scope of ethnobotanical studies due to the diverse cultures and richness in plants having Ethnobotanical value. The forests of Meghalaya are rich in biodiversity and endowed with rare species of orchids and medicinal plants. Therefore it is interesting to record the traditional wisdom about plant wealth in this region as much of this knowledge is being lost as traditional

culture gradually disappears. Thus there is urgency for documentation of Ethnobotanical knowledge in Meghalaya.

Ethnobotanical studies in Meghalaya though conducted in earlier years are very brief in the form of paper publications only and district wise ethnobotanical research work has been done only in Jaintia Hills district of Meghalaya by Samati, (2007). The survey, collection and evaluation still remain sporadic and most of the areas and plants still remain unexplored. Keeping this in mind three districts of Meghalaya viz. East Khasi Hills, West Khasi Hills and Ri Bhoi Districts were chosen to be explored ethnobotanically. Due to poor transportation and medical facilities in the rural areas, the rural folks in Meghalaya to a great extent still hold on to their traditional faith in local medicine men and wild herbal plants. Modern medicinal facilities are scanty and could not reach these inaccessible areas inspite of government's best efforts. Therefore, there is a need to record the traditional wisdom about plant wealth of the people, though at present there is a steady decline in human expertise capable of recognizing various medicinal plants.

Moreover in most of the earlier works on ethnobotany traditional healers in the districts have not been interviewed personally to document the primary ethnomedicinal knowledge stored in them which is self acquired or have been inherited from their forefathers. Hence, there is a need to collect the primary data from them before the knowledge die along with them. If efforts are made in this direction, it is possible that we may discover plants not documented earlier which can cure dreaded diseases like cancer and various other ailments in general. Ethnobotanical studies will help to

compare and evaluate the ethnobotanical data for locating significant medicinal plants for further phytochemical studies and clinical trials, for economic uplift of the folk, conservation of biodiversity and eventually for welfare of society in general.

The indigenous people of Meghalaya also use many wild plant species as supplementary food, fruits, fibres, brooms, fuel, timber, packaging, handicrafts, basketry, magico religious beliefs, socio cultural functions, building materials, dyes and others. They have deep respect for nature and greatly value the plants of importance to them.

By using plants or their products we can do away with the side effects of synthetic medicines, get additional required nutrients from low cost wild fruits, vegetables and find a solution to environmental problems like water, soil, land pollution and depletion of natural resources. The future of ethnobotany lies not simply in adding to the observational foundation, but rather in using the knowledge base to effectively address the current concerns of humankind (Bates, 2001).

CHAPTER II
REVIEW
OF LITERATURE

REVIEW OF LITERATURE

Schultes (1960), in his paper mentions about the ancient Ethnobotanical works like those of the Sumerian ideograms, dating back to 4000 BC which refer to plant uses. The Ebers Papyrus written in Egypt about 1500BC is a rich Ethnobotanical manuscript. The oldest Chinese source seems to be Erh-ya, a book on nature studies written in 300 BC, other ancient Chinese sources are in the book of Poems, the Svu-ching of 1000BC and Ben-tsao and early herbal dating from 1250 AD.

Throughout recent decades the scope of ethnobotany has become extremely broad. Pertinent publications may appear not only in those journals which are specifically dedicated to ethnobiological research, (eg. *Ethnobotany*, *Indian Journal of Traditional Knowledge*, *Journal of ethnobiology*, *Ethnobiology and Ethnomedicine*, *Journal of Ethnopharmacology* etc.) but also in a whole range of publication from different academic disciplines including anthropology, botany, archeology, palaeobotany, phytochemistry and conservation biology (e.g. *Economic Botany*, *Indian Forester*, *Phytomorphology*, *Tribe*, *Folklore* etc).

The well known ethnobotanist, Dr. Richard Evans Schultes of Harvard University had to spend almost 12 years among the tribals of northwest Amazon before he could publish his valuable Ethnobotanical accounts (Schultes, 1960, 1962, 1963). Turner and Bell (1971) worked on the ethnobotany of the Coast Salish Indians of Vancouver Island. Hu (1976) studied the five species of *Panax* native to China which are used in medicine. Wilson and Mariam (1979) studied the ethnobotany in Central Tigre, Ethiopian Plateau.

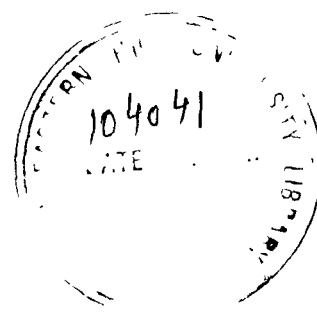
Morgan (1981) worked on the ethnobotany of Turkana, Kenya, out of 222 species documented, 143 had one or more domestic use by the people and 193 species were eaten by the livestock they keep. Dunn (1983) recorded the ethnobotany of the aboriginal inhabitants at Coquille in Jefferson Parish, Louisiana. Similarly Rodin (1985) worked on the ethnobotany of Kwanyama Ovambos. In their work on *Carludovica palmata* in Amazonian Ecuador, Bennett and Alarson (1992) found that hats made from this plant are world famous. Bundles of *C.palmata* leaves are used for thatching. Informants claim that *C.palmata* roots last from two to more than 20 years. Lentz (1993) on the study of the Paya of Honduras provided scientific names for 68 plants used for medicine, 40 used for food, 23 as sources of wood, 8 for beverages, 7 used in artifact manufacture and 10 used in other ways.

Cotton (1996) has dealt on the subject 'Ethnobotany' in detail giving an account of the history and development of Ethnobotanical study, Traditional Botanical Knowledge, Methodology in Ethnobotanical study, Traditional Plant Use and Management, Applied Ethnobotany etc. Widjaja (1998) gave a description of the various plants used in the Funeral Ceremony of the Toranjanese. Various herbs are used for spicing and perfuming the water to be used in bathing and smearing the body or pouring into the mouth of the deceased. Leaves of *Citrus hystrix*, young leaves of *Cocos nucifera* and *Musa paradisiaca*, culms of *Dendrocalamus asper*, *Psidium guajava*, *Gymnostoma sumatrana*, wood of *Elmerrilia celebica*, and *Artocarpus heterophylla*, *Piper betle*, *Areca catechu* and dried leaves of *Dianella ensifolia* are used. Aizhong *et al.*, (1999) worked on the plant worship of the Yi people in China.

Studies conducted in Ethiopia by Esser *et al.*, (2003) on the plant *Phytolacca dodecandra* showed that its berries offer a readily available molluscicide to control schistosomiasis. Lapofsky (2003) studied the ethnobotany of cultivated plants of the Maohi of the Society Islands. He described 47 taxa and many more varieties, which the Maohi relied in food. Huai & Zhang (2006) recorded the ethnobotanical uses of 67 species of exotic weeds in China. Weckerly *et al.*, (2006) documented 136 wild plant species used by the Shuhi in Southwest China.

Thomas *et al.*, (2007) described some Ethnobotanical field methods. Farfan *et al.*, (2007) recorded a total of 213 useful plants and 31 species of edible mushrooms. This is the first report on Mazahua knowledge and classification of plants and mushrooms and the role of these resources in local economy in the Monarch Butterfly Biosphere Reserve in Mexico. Christensen *et al.*, (2008) collected a total of 228 species of wild fungi confirmed to be used for food in Nepal. The first systematic study of Rama of South eastern Nicaragua (Coe, 2008) brought to light about 249 species in 190 genera and 78 species, which are useful as food plants, medicines, fuel, construction, crafts, dye, fibre, fuel etc.

Newmaster *et al.*, (2006) described the different categories in ethnobiological classification such as linguistic, hierarchical, utilitarian, morphological, ecological, spiritual, behavioural and sensory perception category. The manual on Ethnobotanical methodology by Martin (2008) contain methodologies useful for working with local communities to learn about their knowledge and uses of the plant world.



In India, a brief reference to the curative properties of some 99 herbs in the Rigveda estimated between 3500 and 1800 BC seem to be the earliest records of use of plants in medicine. A more detailed account is available in the Atharva Veda which deals with 288 medicinal plants. After the Vedas, there is no information on the development of this science in India for a period of about 1,000 years. Then appeared the two most important works on Indian System of medicine, the works of Charak and Susruta viz. the Charak Samhita and Susruta Samhita.

The history of ethnobotanical study in India is about four centuries old when Garcia (1563) published his 'Os coloquis' giving an account of the indigenous medicinal plants in India, but without using the term ethnobotany. Organised ethnobotanical studies in India were initiated by Ammal (1955) followed by Jain and his associates who carried out ethnobotanical studies among the tribes of Central India, Madhya Pradesh (Jain 1963, 1964a, 1965a, 1965c, 1981a, 1981b 1987, 1991, 2005). Several other papers were published on different aspects of ethnobotany of the entire state of Madhya Pradesh by workers like Sahu (1982), Maheshwari (1996), Jain and Patole (2001), Tirkey (2004). Study on the clans of Sor tribals of Madhya Pradesh (Jain, 1992) revealed that 12 clans have been named after plants. Sahu and Sahu (2002) surveyed the Bastar district of Madhya Pradesh and observed that certain clans of the tribals are directly or indirectly related with plants or their products. A total of 15 clan related plants and faith attached to plants have been recorded.

Maheshwari and Singh (1984) contributed to the ethnobotany of Bhoja tribe of Uttar Pradesh. Singh *et al.*, (1989) gave an account of ethnomedicinal uses of ferns in

Uttar Pradesh. Badoni (1990) contributed to the ethnobotanical study of Pinswari community, Uttar Pradesh and documented 108 plants. Trivedi (2002) wrote on the ethnomedicinal uses of Pteridophytes.

Joshi (1981, 1982, 1983) did ethnobotanical studies on the Bhills of Rajasthan. Jain *et al.*, (2004) during ethnobotanical survey reported 53 plants belonging to 33 families used by tribals of southern Rajasthan to cure sexual diseases and for family planning.

Ethnobotanical use of plants by aboriginal tribes of Ratan Mahal, Gujarat was done by Bedi (1978). The work by Patel *et al.*, (2006) deals with 31 plant species used by rural people of north Gujarat in ritual ceremonies. Out of these 27 species belong to dicots and 4 to monocots under 27 genera.

Srivastava and Rout (1994) listed 18 angiospermic plants belonging to 18 genera under 12 families employed in the treatment of Paediatric diseases in Orissa. Mohanti and Rout (2001) highlighted 15 folklores of Orissa concerning indigenous rice germplasm and traditional cultivation methods. Dash *et al.*, (2008) documented ethnomedicinal use of 20 species of orchids in Orissa.

Bhargava (1983) worked on the ethnobotany of Onge Tribe of Andaman and Nicobar Island. Kulkarni and Kumbhojkar (1996) listed 51 plant species employed for pest control in Western Maharashtra. Sharma and Singh (2001) listed the edible plants in Dadra, Nagar Haveli and Daman.

Aswal and Goel (1989) listed the less known medicinal plants of Western Himalayas. Pandey and Pande (1999), Pande *et al.*, (2000) and Mehta *et al.*, (2006) in

their work studied the ethnobotany of Kumaun Himalaya. Bisht and Pundu (2008) recorded 67 wild medicinal plants of Jaunsar-Bawar region of Western Himalayas. Koul *et al.*, (1982) listed 20 wild plants used as vegetable substitutes and beverages in Kashmir. Lall and Yadav (1983) worked on the folk medicines of Kurukshetra district in Haryana.

In India, lichens have been used as traditional remedies for various ailments (Lal 1988; Salkani and Upreti 1992; Lal and Upreti 1995; Negi and Kareem 1996; Upreti *et al.*, 2005).

A total of 98 medicinal preparations involving 69 species of plants used by Siddis of Uttara Kannada district, of Karnataka were recorded by Bhandary *et al.*, (1995). Study conducted by Pramod *et al.*, (2003) on the plants related to magico religious belief of Kurichya of Wayanad district in Kerela revealed the use of 40 species belonging to 34 genera and 27 families. Among these 23 species are used for religious functions, 19 for agricultural ceremonies, 7 for function related with life cycle, 7 for ritual healing techniques and magical treatments and 8 species are related with sacred or supernatural beliefs. Hema *et al.*, (2006) documented 15 taxa belonging to Amaranthaceae and Araceae which are edible in Kuruma and Paniya tribes in Wayanad district of Kerela. Ayyanar *et al.*, (2008) studied the traditional healing of Paliyars in Southern India.

Atkinson (1982) has described the edible plant species occurring in India. Pal (2000) contributed a chapter on Ethnobotany in India. A total of 25 plant beverages used in traditional medicine in India have been listed by Kumar and Rao (2001). Singh *et al.*,

(2004) worked on the traditional uses of *Piper longum* in India. Gautam (2004) gave the less known uses of *Hibiscus sabdariffa* L. in India.

The books with the word ethnobotany or tribal medicine in the title represent almost all regions of India from the north (Sood *et al.*, 2001 on North west Himalayas) to south (Rama Rao and Henry, 1996 on Andhra Pradesh), from west (Singh and Pandey, 1998 on Rajasthan) to east (Sakhlani and Jain, 1994) and many other parts of northern (Maheshwari *et al.*, 1981), central (Varghese and Hembrom, 2000) and peninsular India (Vedavathy *et al.*, 1997). Several other books on Indian ethnobotany have been brought out by Jain (1981, 1987a, 1989a); Jain *et al.*, (1984). One comprehensive Dictionary (Jain, 1991) summarized the information published till 1990 on over 2500 plants, and another Dictionary (Jain and Srivastava, 1999) deals with about 900 ethnoveterinary plants.

The review of Indian Ethnobotanical literature covering approximately the period 1982-2000 was done by Jain and Srivastava (2001). They mentioned that during this period, about 1250 publications have appeared on ethnobotany in India and closely related topics. These include over 30 books and 25 theses. Papers have been published in about 100 journals in India and abroad. Some 250 persons mostly plant taxonomists have been writing on Ethnobotanical themes. Work has been published on over 125 ethnic groups and 275 papers relate to specific ethnic groups. About 150 papers deal with ethnomedicines for over 60 diseases, ailments and injuries figure in titles of papers. About 30 papers have been published on ethnoveterinary plants.

Reviewing the literature available on ethnobotanical studies conducted specially in the North–Eastern part of India, it is obvious that there are doctoral theses though a few in number and the ethnobotanical studies on some of its parts. Borthakur (1980) elaborated the regional perspective of ethnobotanical studies in Mikir Hills (Assam), Sinha (1986) on Manipur, Sapu (1991) on Mokokchung and Tuengsang districts of Nagaland and Ethnobotany of Jaintia Hills (Samati, 2007).

Arora (1981) gave a list of 300 native food plant species of Northeastern tribals. Islam (1996) noted the ethnobotany of some underground parts of plants of North-Eastern India. Tripathi and Goel (2001) studied the Ethnobotanical use of 43 taxa of Zingibers in North- Eastern India. Dutta and Dutta (2005) in their paper gave an overview on the potential of Ethnobotanical studies in North East India.

An ethnobotanical study on food plants of Mizoram was done by Lalramnghinglova, (1999, 2002). Bhardwaj and Gakhar (2003) gave the usage of wild plants by the native people of Mizoram for the cure of dysentery.

Devi (1989) also contributed to ethnobiological studies of Manipur Valley with reference to Museological aspects. Singh *et al.*, (2003) studied 25 plants belonging to 13 families ranging from mushrooms to higher angiospermic plants, used by the traditional Meitei singers of Manipur to enhance vocalism. Sharma *et al.*, (2003) recorded 2153 species of edible fruits of Manipur. Jain *et al.*, (2007) worked on the aquatic and semi aquatic plants used as herbal remedies by the people living in the wetlands of Manipur.

Medicinal flora of Lohit District with special reference to ethnobotany (Bhuyan, 1989), ethnobotany of wild edible plants (Haridasan *et al.*, 1990), ethnobotany of Nishis,

Karbis, Kacharis and Chakma (Maikhuri and Ramakrishnan, 1992) and on the edible mushrooms of East Siang district of Arunachal Pradesh (Das, 2001) are important contributions in the field of ethnobotany in Arunachal Pradesh. An ethnobotanical study was conducted by Singh *et al.*, (2007) on the traditional foods of Monpa tribe of West Kameng. Sarmah, *et al.*, (2008) documented 63 medicinal plant species used by Chakmas of Arunachal Pradesh.

Deb (1968) has reported on medicinal plants while, Singh *et al.*, (1999) gave an account of 37 wild edible plants used by the Tripuri tribe of Tripura state. Wild plants used and sold in markets of Sikkim have been documented by Bennet (1983), Hajra and Chakraborty (1982) respectively. Hussain and Hore (2007) worked on the collection and conservation of major medicinal plants of Darjeeling and Sikkim Himalayas.

Some good publications have appeared on ethnobotany of Assam during the last two decades by Borthakur (1976, 1996); Baruah and Sarma (1984, 1987); Sarma *et al.*, (2001). Food adjunct, beverages and masticatories used by Karbis have been studied by (Borthakur, 1997). Borthakur (1998, 1999) also studied on the house gardens of Assam. Gogoi & Borthakur (2001) recorded 69 herbal recipes for 27 ailments involving 68 plant species prevalent among the Bodo tribe inhabiting Kamrup district of Assam. An account of the folklore medicinal uses of 71 plant species used among the Tai Ahoms, one of the ethnic groups predominant in Assam is reported by Dutta and Nath (2003). Barua *et al.*, (2003) documented 58 plant species used as folk medicine among the Rajbanshis of Assam.

A list of medicinal plants of Nagaland have been given by Rao and Jamir (1982a, 1982b), medico-botany used by Ao Naga tribe by Jamir (1989), fifty medicinal plants used by Zeliangs of Nagaland have been reported by Jamir and Rao (1990). Ethnobotanical folk practices and beliefs of the Ao-Nagas have been reported by Sapu & Yogendra (1996). Mao (2003) worked on the symbolic uses and superstitions in botanical folklore about Mao Naga tribe of Manipur. Five plants with symbolic uses and six plants with superstition beliefs in the Mao Naga tribes have been listed. Traditional fermented foods of the Naga tribes of North east India were reported by Mao and Odyuo, (2007).

Joseph and Kharkongor (1981) brought forward two papers based on the Ethnobotanical studies of the Khasis and Jaintia tribes of Meghalaya. One paper deals with over 100 plants of Ethnobotanical importance used as medicines, subsidiary food, making implements and musical instruments, religious ceremonies etc. The other paper presents an enumeration of 100 species of plants belonging to 81 genera and 46 families having medicinal virtues. Rao (1981) gave a list of 33 medicinal plants belonging to 27 families used by Khasis and Garos. The work of Hajra (1981) on nature conservation in Khasi folk beliefs and taboos deals with the religious beliefs of the tribe that helps in the preservation of forests in their natural condition. Shanpru and Vasudeva (1981) investigated the Garos and reported 25 plant species used by them for food, 24 for medicine, 5 for fish poison, 7 for fibres, 3 for dyes, 4 for magico-religious beliefs and 10 for miscellaneous purposes. Kumar *et al.*, (1987) recorded 74 species used by the Khasi and Jaintia tribes. Rao *et al.*, (1989) worked on the Ethnobotany of some weeds of Khasi

and Garo Hills of Meghalaya. The paper deals with the ethnobotany of 65 taxa belonging to 26 families of angiosperms. Maikhuri and Gangwar (1993) recorded a total of 105 plants used by Khasis and Garos of Meghalaya. Jain *et al.*, (1977) made a survey of the edible plants in the bazaars of Meghalaya. Choudhury and Neogi (2003) reported on the ethnobotany of Khasi and Chakma tribes of North-east India. In the paper 37 such taxa belonging to 34 genera and 15 families have been discussed. Samati (2004) reported 55 taxa of kitchen garden plants of Pnar tribe in Jaintia Hills. Fourteen wild edible berries, fruits, roots and nuts consumed by the Khasi tribe of Meghalaya were identified and analyzed for their nutrient content (Murugkar and Subbulakshmi, 2005). Ahmed and Borthakur (2005) documented a total of 577 species of plants belonging to 375 genera under 146 families used by the Hynniewtreps of Meghalaya as edibles, plant masticatories, ethnoiatrical plants etc. Baruah *et al.*, (2006) recorded 45 ethnomedicinal plants used by the Khasi tribe of Cachar district, Assam. Kayang (2007) documented 110 wild growing plants, which are eaten by the local people of Meghalaya.

CHAPTER III

AIMS AND OBJECTIVES

AIMS AND OBJECTIVES

The objectives of the present research are as follows:-

- 1) To develop a comprehensive account on the ethnobotanically important plants of Khasi Hills, Meghalaya.
- 2) To record the indigenous use of plants relating to health problems, supplementary foods, wild fruits, vegetables, including the plants used in socio-religious ceremonies and in the making of musical instruments.
- 3) To document plants related to different clans and strategies adopted by the clans for their conservation.

CHAPTER IV

MATERIALS AND

METHODS

A) STUDY AREA

B) METHODOLOGY

STUDY AREA

Location and demography

'MEGHALAYA', literally meaning 'the abode of clouds', is one of the eight sister states of the North Eastern region of India. Meghalaya was once part of greater Assam and its state capital Shillong was the capital of undivided Assam and was a favourite place for British administrators. Meghalaya was created as an autonomous state within the state of Assam on 2nd April, 1970. It was declared a state of Indian Union on January 21st, 1972. Meghalaya a hilly strip in the eastern part of the country about 300 km long (East-West) and 100 km wide (North-South) and with a total area of 22,429 km²(0.7% of country) lies between 25°05' and 26°10' N Latitudes and 89°47' and 92°47' E Longitudes. Meghalaya is bounded on the north and east by the state of Assam and on the west partly by Assam and partly by Bangladesh. The entire southern boundary (international boundary) of the state is formed by Bangladesh.

Meghalaya consists of seven administrative districts namely, **(Fig. 1) East Khasi Hills** (Headquarter-Shillong), **West Khasi Hills** (Headquarter-Nongstoin), Jaintia hills (Headquarter-Jowai), **Ri Bhoi** (Headquarter-Nongpoh), East Garo Hills (Headquarter-Williamnagar), West Garo Hills (Headquarter-Tura) and South Garo Hills (Headquarter-Baghmara) and predominantly the home of three major tribes viz. the Khasis, Jaintias and Garos. Though they belong to the same land, the tribes have different origin which reflects even in their language and culture. While the Khasis and Jaintias have identical origin as they are linguistically and socially linked in the larger group of Mon-Khmers who sociolinguists believe are supposed to have migrated from South- East Asia. The

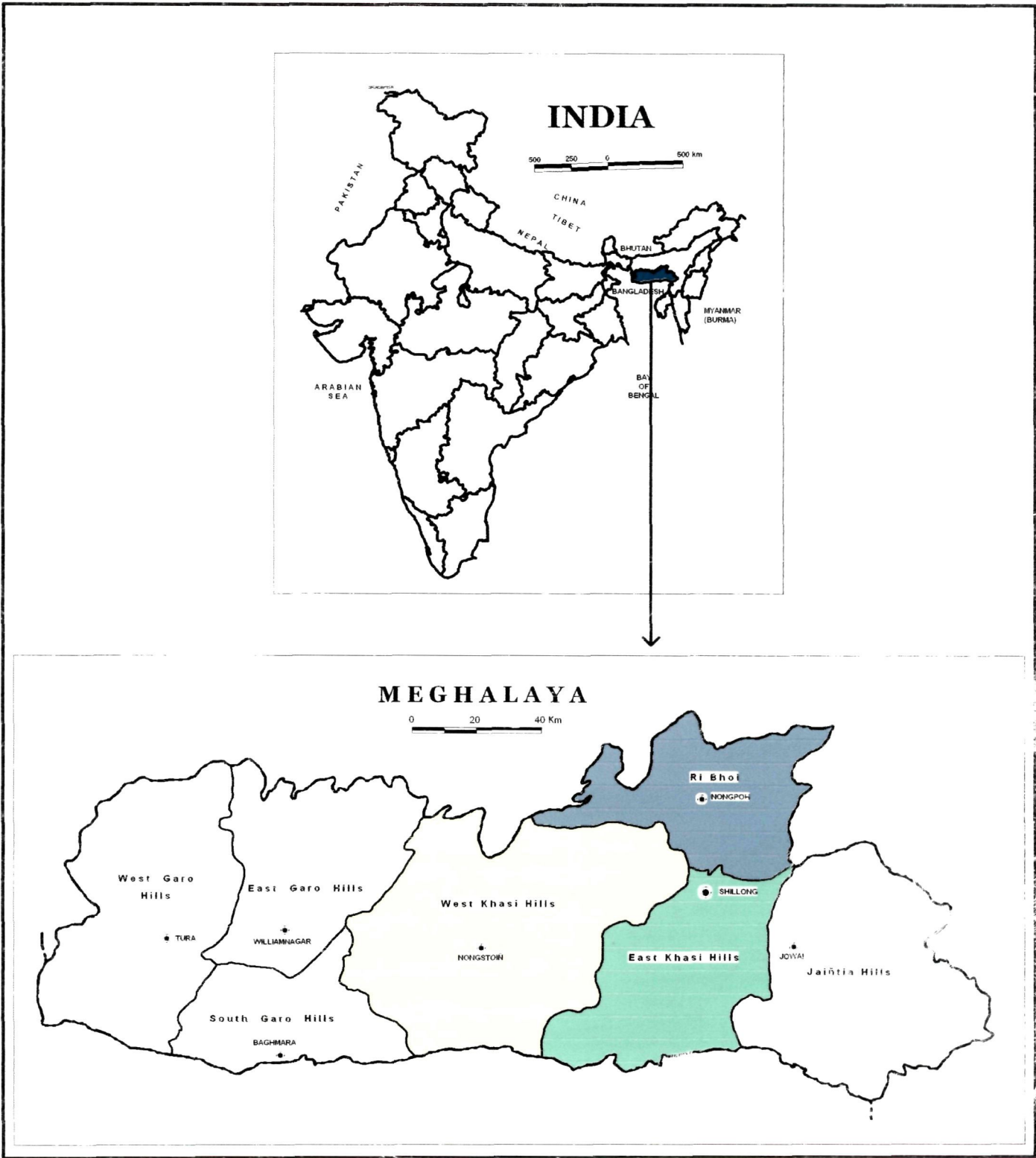


Fig. 1: Location Map of Meghalaya showing all the seven districts (with East Khasi hills, West Khasi hills and Ri Bhoi districts in coloured shade as STUDY AREA).

Garos on the other hand are a branch of the Tibeto-Burman Bodos who are believed to have had their original place somewhere in Tibet (Joshi, 2004).

The indigenous Khasi inhabitants or The Hynniewtreps include- (a) Khyntiam of the central Khasi plateau; (b) Pnar or Synteng of the Jaintia Hills; (c) War on the southern extremity; and (d) Bhoi on the north. The different groups of Garos or Achiks are the Ambeng, Atong, Akawe, Matchi, Chibok, Ruga, Dual, Chisuk, Gara-Ganching and Kotchu. Other tribes like the Mikir, Koch, Bodo, Hmar, Hajong, Rabha, Miri etc. are also present in some pockets of the state. The non-tribals residing in Meghalaya mainly include Bengalees, Assamese, Marwaris, Nepalis and others.

According to the year 2001 census the population of Meghalaya is 23, 18, 822 (approx 23.06 lakhs), the overall average density of population in the state is 103 persons/ sq.km (Census of India, 2001) and around 80.4% of the population of the state live in rural areas (**Table 1**). The tribal population makes up about 85% of the population, while the non tribal population accounted for only 15%. In terms of tribal composition the state has three distinct regions namely, Khasi Hills, Jaintia Hills and Garo Hills. The literacy percentage of the State is shown in **Table 2**. and Land use pattern is given in **Table 3**.

The Khasi Hills District was divided into two districts, viz the East Khasi Hills District and the West Khasi Hills District on 28th October 1976. On June 4th, 1992, East Khasi Hills District was further divided into two administrative districts the East Khasi Hills District and Ri-Bhoi District.

EAST KHASI HILLS district occupies an area of 2820 sq. km and it lies between 25°07' and 25°41' N Latitude and 91°21' and 92°09' East Longitude bounded by Ri Bhoi district on the north, Karbi Anglong district on the north-east, Jaintia Hills district on the east, Bangladesh on the south and West Khasi Hills district on the west. **(Fig. 2)** The headquarter of the district, Shillong which is also the capital city of the State, is connected to Guwahati and Silchar by NH 44 of 103 km and 240 km respectively. The nearest rail head and airport are situated at Guwahati. There is an airstrip suitable for small aircraft at Umroi which is 35 km from Shillong.

WEST KHASI HILLS district is presently the largest district of Meghalaya. It occupies an area of 5247 sq km and has a population of 294,115. The district has borders with East Khasi Hills and Ri Bhoi on the East, East Garo Hills on the west and touches South Garo Hills on the Southwest. It has a long border with Assam on the North and international border with Bangladesh on the South. **(Fig. 3)** The people inhabiting the district are also known as 'Maram'.

RI BHOI district lies between 90°15' E to 91°16'E longitude and 25°40'N to 25°21' N latitude and occupies an area of 2376 sq km. It is bounded on the North by Kamrup District and on the East by Jaintia Hills and Karbi Anglong District of Assam and on the West by West Khasi Hills District and East Khasi Hills District. **(Fig. 4)** The people inhabiting the district are also known as 'Bhoi'.

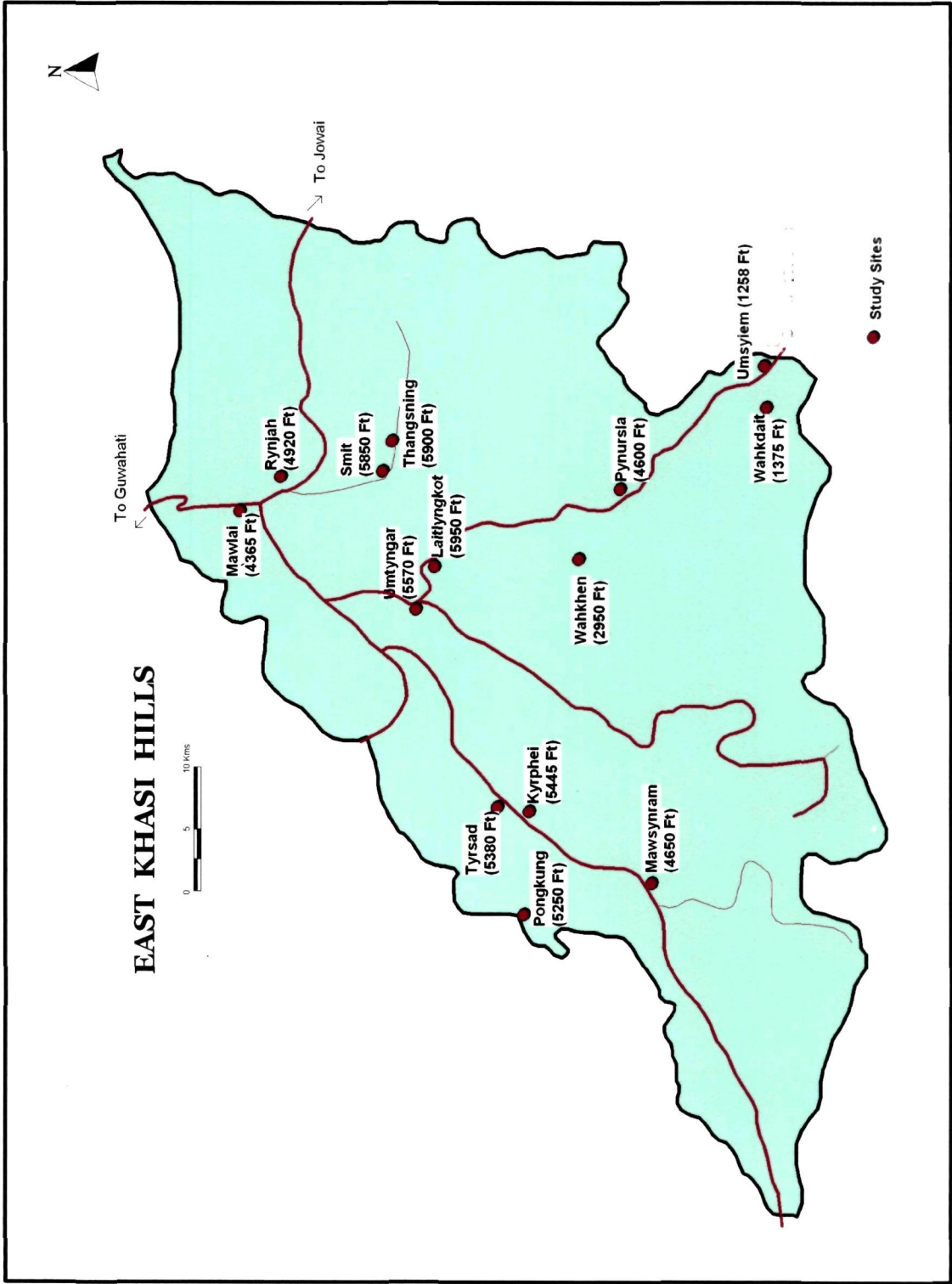


Fig 2: District Map of East Khasi hills showing study sites

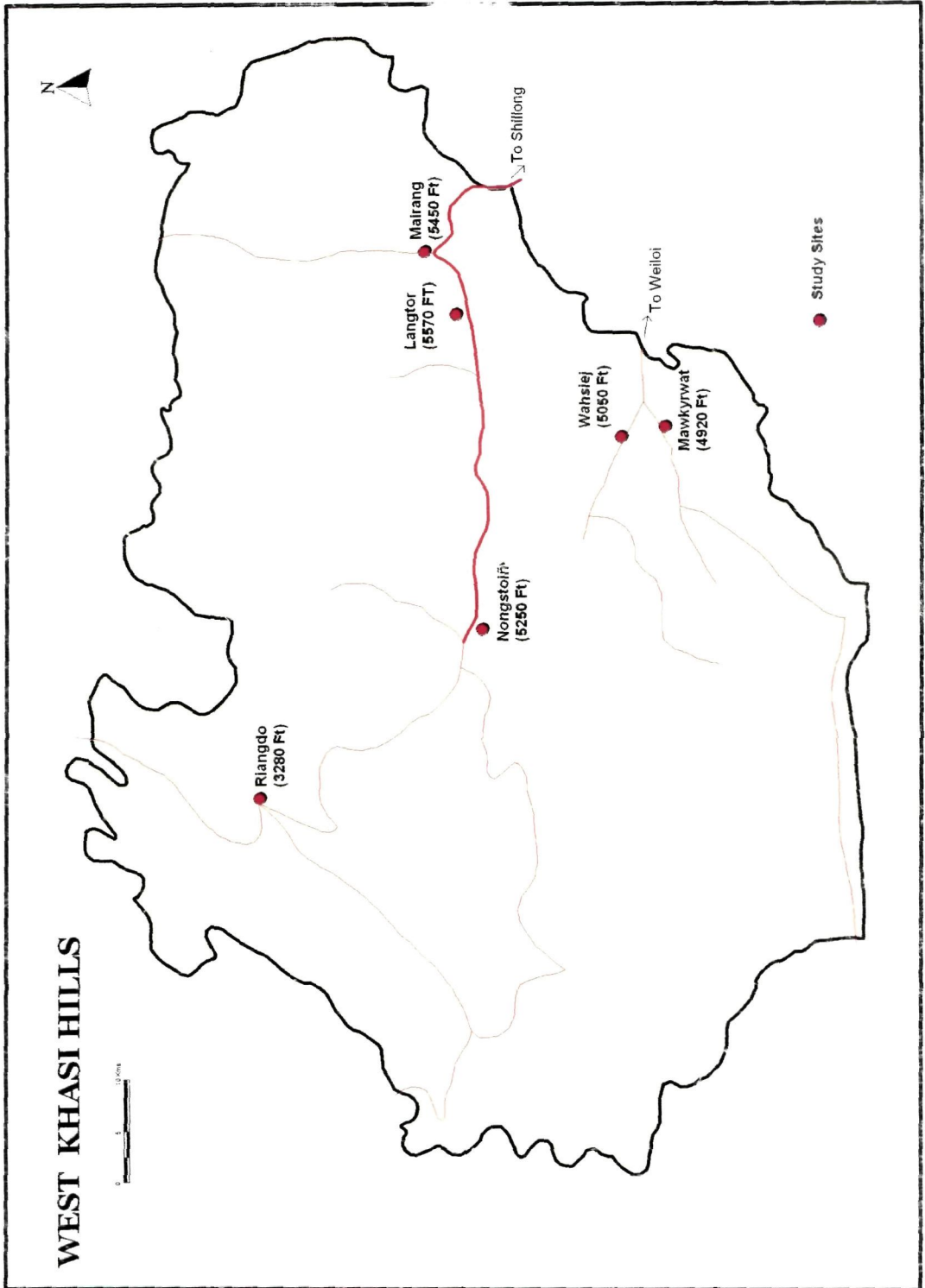


Fig. 3: District Map of West Khasi hills showing study sites

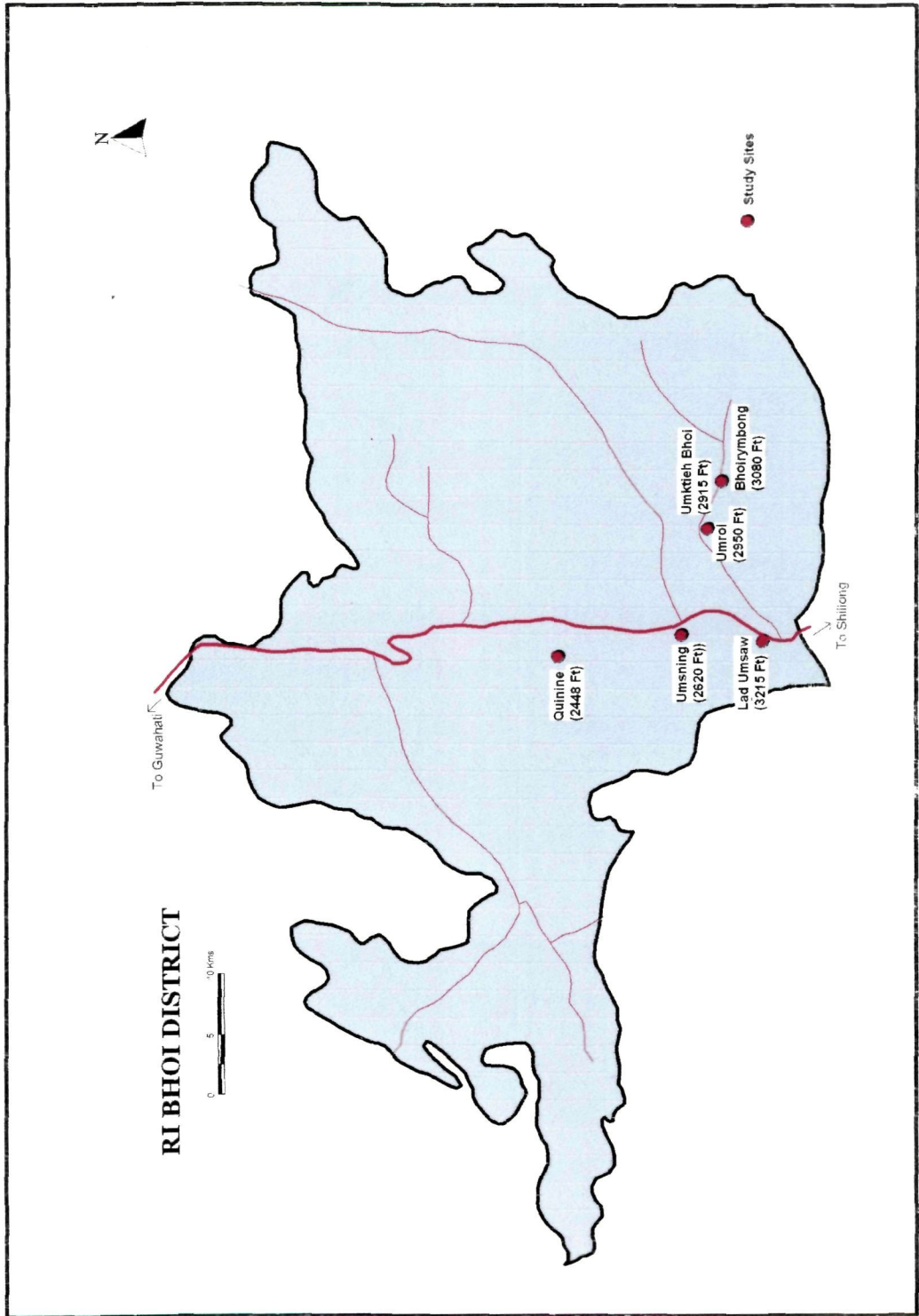


Fig. 4: District Map of Ri Bhoi showing study sites

Table 1: Meghalaya district wise (study area in bold) area, population, number of villages, towns, (Source: Census of India, 2001).

District	Area (sq. km) 2001	Rural Population (2001)	Urban Population (2001)	Total Population (2001)	Villages (including uninhabited) 2001	No. of Towns 2001
East Khasi Hills	2820	383175	277748	660923	962	8
West Khasi Hills	5247	261451	34598	296049	943	2
Ri Bhoi	2376	179610	13180	192790	570	1
Meghalaya	22429	1864711	454111	2318822	6026	16

Table 2: Percentage of literacy, 2001(Source: Census of India, 2001), number of hospitals, dispensaries. (Source: Directorate of Health Services, Meghalaya)

District	Male	Female	Total	No. of hospitals (2005-2006)	No. of dispensaries (2005-2006)
East Khasi Hills	77.3	74.8	76.1	4	5
West Khasi Hills	66.5	63.7	65.1	1	-
Ri Bhoi	68.8	62.4	65.7	1	2
Meghalaya	65.4	59.6	62.6	8	13

Table 3: Land use pattern in Meghalaya (Source: Land Use statistics, Ministry of Agriculture, Govt. of India, 2005).

Land Use	Area in '000 Hectares	Percentage
Total geographic area	2,243	
Reporting area for land utilization	2,227	100.00
Forests	951	42.70
Not available for cultivation	223	10.01
Permanent pastures and other grazing lands	0	0.00
Land under misc. tree crops & groves	155	6.96
Culturable wasteland	441	19.80
Fallow lands other than current fallows	162	7.27
Current Fallows	65	2.92
Net area sown	230	10.33

Physiography

Except the narrow belts in the northern and the western parts, the state of Meghalaya is a plateau. It is known as the Meghalaya Plateau or the Shillong Plateau. The height of the plateau varies from 150m Above Sea Level, ASL to 1961 ASL. The plateau is characterized by great diversities in relief. Highly dissected and irregular terrain on the northern and western side and steep and regular slopes on the southern side mark it. In the north the boundary of the plateau is not well defined because of the presence of broken hills ranges in that part.

The western part of the Meghalaya plateau i.e. the Garo Hills is a highly dissected area with an average height of about 600m ASL. The important physiographic features in this part are the Tura range, the Maheshkhola-Adaguri range and the Simsang valley.

The Central and eastern part of the plateau i.e. the Khasi and Jaintia Hills is a true plateau with its old topography and flat skyline. On the basis of physiographic characteristics we may divide it into three distinct units- a) the northern undulating hills b) the central upland zone and c) the southern plateau.

The northern hills with their peaks varying in height between 170-820m gradually slope towards the Brahmaputra valley from the sub-montane region of the Central Plateau. In this portion there are two peneplained surfaces-one stretches from Nongpoh to Byrnihat and the other from Jorabat to Khanapara. Above the altitude of 400m most of the hills are flat-topped. This area is also known as Ri Bhoi area.

The central upland zone running from west to east is the most important physiographic unit of the plateau. It occupies more than one-third of the central and eastern Meghalaya. Its outer boundary is formed by the contour of 1500m. This portion of the plateau consists mostly of rolling uplands intersected by rivers and dotted with rounded hills made of softer rocks. It contains remnant of seven peneplained surfaces (erosional surfaces) which are located at different altitudes. The highest point of the central upland zone is the Shillong Peak (1961m) located to the south of Shillong. Towards west of Shillong there is a hill range called Diengiei which rises to a height of 1823m.

The southern face of the plateau includes the steepest parts of the region. It is known as Ri-War. Its northern fringe area has a typical granitic topography with rounded hills and shallow valleys. In the southern parts there lies a vast structural platform built up of gently dipping cretaceous sandstones on the edge of which is located the magnificent Mawsmai waterfalls. This structural platform stands as an escarpment and its surface has been deeply eroded by the agents and processes of fluvial erosion resulting from heavy rainfall.

It is also worth mentioning that although the eastern part of the Meghalaya plateau i.e. the Jaintia Hills forms a contiguous part of the Central Meghalaya with similar physiographic divisions as the northern hills, the Central Jowai upland and the southern escarpment but it is relatively lower with an average height ranging upto 1200m.

Geology and soil

The geological formations of the Meghalaya Plateau is similar to the rock formations of the peninsular plateau and regarded as a part of the Peninsula that has been cut off by the intervening spread of the Ganges and Brahmaputra alluvium.

Meghalaya has five geological formations. These are:

a) The Archaean Gneissic Complex occupies the central and northern parts of Meghalaya. The rocks are predominantly composed of para and ortho-gneisses, migmatites and meta-sedimentary bands. They comprise mainly biotite- gneiss, quartzite and schist.

b) The Shillong Group of Rocks overlies the Gneissic Complex with an unconformity. The rocks comprise quartzite, usually friable with subordinate phyllites, sandstone, quartz-sericite schist, conglomerate etc. The group of rocks are exposed in the Central and eastern parts of the Meghalaya Plateau.

c) The Lower Gondwana Rocks of Western Garo Hills consists of pebble bed, sandstone and carbonaceous shale.

d) The Sylhet Traps are exposed in a narrow belt and extend in the east-west direction along the southern border and the Khasi Hills. They overlie the eroded Precambrian basement and are themselves overlain by the Upper Cretaceous-Eocene Sediments. The Sylhet Traps consist mainly of basalt and rhyolites.

e) The Cretaceous- Tertiary Sediments occupy the southern part of the state. These sediments are very thick and extensive and are considered to be the continuation of the Cretaceous- Tertiary Sediments of the Bengal plains. The major rocks in the group

include sandstone, shale and limestone. The formations are divided into three groups- i) the Khasi Group which is further divided into the Jadukata, the bottom conglomerate and the Mahadev formations ii) the Jaintia Group which is divisible into the Longpar, the Shella and the Kopili formations and iii) the Garo Group having the Simsang, Baghmara and Chengapara formations.

Climate

The climate of Meghalaya is determined by the altitude of the land surface. The alternating low and high pressure over the north-western part of India, the Bay of Bengal and the warm and moist wind coming from the south or the south-west have significant role to play in modifying the climate of the state.

There are four seasons in Meghalaya- cold season, hot season, rainy season and cool season. The cold season begins in December and continues up to the last part of February. During this season the mean minimum temperature comes down to 3.6°C. The hot season includes the months of March and April. The period of rainy season is from May to September. The cool season spreads over October and November.

The altitude is the main factor which controls distribution of temperature in Meghalaya. The western part of Meghalaya which is relatively lower in height, has a fairly high temperature during the period from February to October. April is the hottest month when the mean maximum temperature is 33°C and the minimum is 22°C. January is the coldest month and records the mean maximum of 24°C and the mean minimum is 12°C.

In Central and Eastern Meghalaya, the Central uplands have a moderate climate due to greater height but the foothills in the southern part and the sub-montane areas in the north and the east are warm and humid. The Shillong area in the central uplands has very cold nights during winter. During this season the temperature comes down to 17°C and the mean maximum temperature never exceeds 24°C in December and January. The mean minimum temperatures are 7.7°C and 7.1°C respectively. In the Cherrapunjee-Mawsynram area which lies in the southern part of the state, the mean maximum temperature of 23°C is recorded in the month of August and the minimum of 6.1°C in December.

Meghalaya receives most of its rainfall from the south-west monsoon winds. The total annual rainfall in the western part of the state is 418 cm. About 80% of the rainfall occurs during the period from April to September. The amount of rainfall decreases from south to north because the moisture bearing south-west monsoon winds first strike the southern hills and bring heavy rainfall but in the north which falls in the rain-shadow area, the rainfall is relatively less. The average annual rainfall in the south-west is about 400cm, in the central part between 300 and 400 cm and in the north between 250-300cm.

The average annual rainfall in Central and Eastern Meghalaya is 879cm. More than 75% of the rainfall occurs during the period of six months i.e. from April to September. Winter is almost dry with 6cm of rainfall in three months i.e. from December to February. The rainfall decreases from south to north. This is because the

high hill ranges of the Central Uplands with east-west alignments exert a rain- shadow effect on the areas to the north. The result is that the rainfall in Cherrapunjee which is located in the extreme south is as high as 1142 cm. Due to the rain- shadow effect, Mawsynram a village located about 16km west of Cherapunjee, receives the highest rainfall in the world the amount being 1392cm.

The climate of the East Khasi Hills district ranges from temperate in the plateau region to the warmer tropical and sub-tropical pockets on the Northern and Southern regions. The whole of the district is influenced by the south-west monsoon which begins generally from May and continues till September. The weather is humid for the major portion of the year except for the relatively dry spell usually between December and March (**Table: 4, 5 & 6**).

The climate in West Khasi Hills ranges from tropical as experienced in the southern parts bordering Bangladesh and some areas bordering East Garo Hills to Subtropical as experienced in some places bordering Assam, East Garo Hills and some areas of the southern parts of the district and temperate as experienced in the higher altitudes of the district. During winter months the higher altitudes experience very low temperatures as low as -10°C and summer temperature goes up to 45°C in areas bordering Assam and Bangladesh. The rainfall ranges from 2220 to 4050mm. The winters are dry and cold while the summers are wet and hot. The climate of the district in the areas bordering Assam is hot and humid during summer and the average temperature is about 30°C , whereas the areas near East Khasi Hills are cold during winter and pleasant during summer.

Table 4: Meteorological monthly data for Shillong (East Khasi Hills) for the years 2005-2008
(Source: India Meteorological Dept, Shillong).

Month	Temperature (Max/Min)				Rel Humidity (%) (Morning/Evening)				Rainfall (mm)			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
Jan	14.4 5.6	16.5 06.1	15.0 05.5	15.1 6.5	61 86	54 89	60 88	63 80	012.5	00.0	000.0	033.9
Feb	18.2 8.8	23.6 10.6	15.5 06.7	15.2 9 20.6	55 76	60 75	60 74	60 70	004.8	004. 1	004.0	004.9
Mar	21.2 1.8	23.1 15.0	20.8 09.9	20.6 11.4	61 69	47 39	60 80	67 82	130.4	012. 4	000.0	066.7
Apr	23.3 7.9	26.8 14.1	23.1 13.5	26.1 14.3	65 73	66 74	65 72	63 93	319.7	104. 9	066.5	072.5
May	22.7 14.8	21.0 15.4	23.8 16.5	25.6 18.0	74 78	88 83	80 83	69 69	228.1	030. 0	0.050	135.5
Jun	24.8 17.2	24.5 17.4	23.5 17.3	23.8 17.4	81 85	85 90	84 90	84 86	299.0	281. 5	564.5	314.6
Jul	23.9 17.5	24.9 18.5	23.0 18.8	25.6 17.7	85 88	83 80	88 80	89 93	316.5	132. 1	816.3	359.2
Aug	24.2 18.1	25.0 18.0	24.3 16.2	23.5 17.6	86 88	81 98	90 91	89 81	338.7	159. 3	054.7	313.7
Sept	25.3 17.8	25.0 16.7	23.1 17.2	21.4 16.0	73 86	81 98	91 96	82 95	178.3	226. 9	453.3	238.5
Oct	21.2 14.6	21.8 13.9	21.6 14.4	18.1 12.4	75 92	61 87	55 90	91 92	230.8	000. 0	776.4	002.7
Nov	18.3 09.9	15.4 06.4	19.6 11.1	19.9 09.1	69 93	60 93	64 90	56 85	004.8	000. 0	169.3	000.0
Dec	17.0 07.5	14.0 06.6	15.8 06.9	14.8 06.4	55 93	61 95	89 98	78 98	004.1	001. 1	000.0	002.0

Table 5: Meteorological monthly data for Cherrapunjee (East Khasi Hills) for the years 2005-2008 (Source: Regional Meteorological Centre, Guwahati).

Month	Temperature (Max/Min)				Rel Humidity (%) (Morning)				Rainfall (mm)			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
Jan	16.1 7.2	17.9 7.3	16.7 6.8	20.0 4.4	58	57	56	67	005.9	000.0	000.0	047.9
Feb	18.4 9.6	20.1 11.7	16.8 8.9	23.1 4.1	59	71	67	59	026.6	237.8	131.4	054.4
Mar	20.3 13.3	22.8 13.5	21.0 11.9	23.8 7.7	76	61	55	73	523.6	075.4	021.6	570.3
Apr	22.8 15.2	22.7 15.0	22.0 14.7	27.3 12	69	77	80	72	560.2	908.4	800.3	509.3
May	22.4 16.1	23.5 16.9	23.9 17.8	25.8 12.9	82	81	83	77	624.8	2119.8	1081. 8	400.7
Jun	23.8 18.5	23.2 18.3	23.0 18.2	22.6 18.1	90	93	92	94	2204. 7	2310.2	2651. 0	2092. 6
Jul	22.8 18.6	23.5 19.2	22.1 18.7	22.2 18.7	94	92	94	95	2343. 1	1341.5	4138. 8	3615. 8
Aug	22.7 18.9	24.8 19.2	23.9 18.9	22.4 18.7	97	84	89	95	2662. 2	698.8	973.6	2966. 4
Sept	25.1 19.3	24.0 18.1	23.6 18.6	24.4 18.3	79	86	82	85	314.3	985.7	1956. 0	789.3
Oct	23.1 16.4	24.7 16.3	23.1 15.9	23.6 16.0	72	67	75	68 83	489.8	20.5	727.8	368.3
Nov	20.5 11.6	20.4 12.6	21.3 12.5	21.6 11.7	63	68	62	47 76	000.0	26.5	218.0	0.0
Dec	19.0 9.3	17.8 9.0	17.8 8.3	18.2 9.7	63	66	55	65 82		007.4	000.0	0.0

Table 6: Meteorological monthly data for Barapani (Ri Bhoi District) for the years 2005-2008
(Source: Regional Meteorological Centre, Guwahati).

Month	Temperature (Max/Min)				Rel Humidity (%) (Morning)				Rainfall (mm)			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
Jan	20.5 4.9	21.9 4.2	20.6 3.7	20.3 6.6	74	90	91	84	21.1	0.0	0.0	30.0
Feb	23.9 7.4	25.0 7.5	20.4 7.0	20.8 4.6	63	75	84	75	2.1	2.0	107.1	3.8
Mar	26.5 11.0	27.3 8.5	25.0 6.9	25.5 11.3	70	56	63	74	155. 6	6.6	17.0	64.1
Apr	28.4 13.8	27.8 14.8	27.3 14.3	27.6 14.4	75	70	72	68	80.3	148.5	233.1	64.8
May	21.7 16.1	28.0 17.3	29.2 18.2	28.9 16.8	76	74	75	72	348. 5	289.6	274.6	230.6
Jun	30.0 19.7	28.3 19.5	28.6 20.0	28.3 20.4	81	84	82	81	198. 8	184.4	467.9	220.5
Jul	29.3 20.6	30.1 20.7	28.1 21.1	28.7 21.4	81	78	85	84	250. 3	128.3	518.2	235.0
Aug	29.6 20.6	30.1 20.0	29.6 20.9	28.5 21.1	85	77	80	87	276. 9	237.8	230.9	329.5
Sept	29.9 19.2	28.1 18.8	28.5 19.6	29.2 19.5	82	82	81	80	328. 6	298.2	490.3	283.2
Oct	26.9 15.9	27.3 14.5	26.8 16.1	27.0 16.2	78	80	84	80	271. 7	126.8	273.9	210.5
Nov	24.1 10.0	23.9 10.7	24.8 11.6	24.8 9.8	85	83	84	75	16.4	38.6	159.2	6.1
Dec	22.7 5.8	21.6 6.6	21.7 6.9	22.7 8.7	87	88	87	89	3.5	16.0	1.0	10.6

General account of forest types in Meghalaya

Due to favourable environmental factors, physiographical features, geographical location, biotic influence, human interaction, etc. the vegetation of the state is very rich and diverse. The forests of Meghalaya can broadly grouped based on altitudinal difference, rainfall and dominant species as tropical, subtropical and temperate types. These could be further divided into types and subtypes depending upon the locality factors. Though the vegetation is intact in many pockets, a large portion of it is disturbed and resulted in secondary types.

Tropical forests: These forests are met within areas up to an elevation of 900 m and with an average rainfall of about 200 cm. they are more important from economic point of view and are the source of many of our useful plants yielding timber, fuel, fodder, medicine, aromatics and other non timber forest produce.

The major types of forest met with under this group of forest are Tropical evergreen forest, Tropical semi-evergreen forest, and Moist deciduous forest.

Tropical Evergreen Forests: These forests usually occur in high rainfall areas as well as near catchment areas. The trees exhibit clear zonation with dense and impenetrable herbaceous undergrowth. The top canopy is composed of mighty trees like *Mesua ferrea*, *Castonopsis indica*, *Dysoxylum gobara*, *Sapium baccatum*, *Terminalia citrina*, *Elaeocarpus floribundus*, *Syzygium* spp. etc. Some of the lofty emergent trees are often deciduous in nature and belong to *Firmiana colorata*, *Pterygota alata*, *Tetrameles nudiflora*.

The second storey which is almost obscure is composed of trees like *Garcinia paniculata*, *Syzygium operculatum*, *Premna bracteata*, *Sarcosperma griffithii*, *Ficus racemosa*, *Heritiera macrophylla*, *Saraca asoka*, *Sterculia roxburghii*, *S. hamiltonii*, *Mangifera sylvatica*, *Antidesma acuminata*, *Syzygium nervosum*, *Sarcosperma griffithii*, *Turpinia pomifera*, *Heritiera macrophylla*, *Ostodes paniculata*, *Knema linifolia*, *Chisocheton paniculatus*.

Smaller trees of the third storey consists of *Oreocnide integrifolia*, *Ficus lamponga*, *F. clavata*, *Antidesma bunius*, *Ixora subsessilis*, *Brassiopsis glomerata*, *Premna barbata*, *Goniothalamus simonsii* etc.

The shrub layer where, where present is usually of a gregarious nature and comprise of *Dracaena elliptica*, *Leea edgeworthii*, *Phlogacanthus thyrsiflorus*, *Ardisia thomsonii* etc. The climbers and lianas form a characteristic species composition of these forests. To mention a few *Hodgsonia macrocarpa*, *Beaumontia grandiflora*, *Combretum roxburghii* etc. A few climbers like *Thunbergia grandiflora*, *Adenia trilobata*, *Solena heterophylla*, *Desmos longiflorus* etc. associated with lianas give the forest margins and openings a closed cascade like appearance.

Epiphytes are not very frequent, the high reaches of the lofty trees are often blanketed by a lush growth of epiphytic orchids like *Pholidota imbricata*, *Dendrobium* spp, *Hoya parasitica*.

Tropical Semi -Evergreen Forests: This category of forests occupy the north eastern and Northern slopes of the state, typically upto elevation of 1200m, where annual rainfall is 150-200 cm with a comparatively cooler winter. The number of species here are fewer than the evergreen zone. There are also a few species in the forests which are deciduous in nature, such as *Careya arborea*, *Dillenia pentagyna* and *Callicarpa arborea*. This is also a treasure house of economically important species.

The top canopy includes *Eleocarpus floribundus*, *Dillenia pentagyna*, *D. indica*, *Hovenia acerba*, *Ehretia acuminata*, *Lithocarpus fenestratus* while the second storey is composed of *Micromelum integerrimum*, *Garcinia lancifolia*, *Symplocos paniculata*, *Rhus acuminata*, *Dalbergia assamica*, *Bridelia monoica*, *Ficus hirta* etc. Shrubs include *Randia griffithii*, *Boehmeria sidaefolia*, *Ardisia thomsonii*, *Clerodendron bracteatum*,

along with perennial herbs like *Costus speciosus*, *Curcuma zedoria*, *Hedyotis* spp, etc. are very common

Tropical Moist and Dry Deciduous Forests: This is a very prominent vegetation of Meghalaya covering larger areas in, the east and west Garo hills, Ri-Bhoi, etc. The annual rainfall in this forest belt is slightly lower than the previous vegetation areas with below 150 cm. These forests are characterized by seasonal leaf shedding and profuse flowering. This type of forests occurs where and at comparatively low elevations. Important trees like *Shorea robusta*, *Tectona grandis*, *Terminalia myriocarpa*, *Sterculia villosa*, *Lagerstroemia parviflora*, *Morus laevigatus*, *Gmelina arborea* occur both as natural an as plantations. *Schima wallichii*, *Erythrina stricta*, *Tetrameles nudiflora*, *Salmalia malabarica*, *Terminalia bellirica* etc. are also in abundance.

A distinct second storey can usually be observed in these forests and this zone is composed of *Aporusa roxburghii*, *Croton joufra*, *Careya arborea*, *Rhus javanica*, *Micromelum integerrimum*, *Bridelia retusa*. The shrubby layer is often gregarious and forms an impenetrable thicket during rainy season with profuse growth of stragglers and spreading shrubs interwoven by slender annual climbers. The main component of this layer is *Phlogacanthus thyrsiflorus*, *Flemingia macrophylla*, *Holarrhena antidysenterica*, *Costus speciosus*, *Glycosmis arborea*, *Stachytarpheta* and *Eupatorium* (mostly near open areas).

Lianas are fewer but scandent shrubs like *Bridelia stipularis*, *Combretum roxburghii*, *Mussaendra glabra*, *Hiptage benghalensis*, *Aspidopteris elliptica* are

frequent. However lianas like *Spatholobus roxburghii*, *Phanera nervosa*, *Entada purseatha*, etc make their way high up to the canopy. Massive growth of epiphytic orchids like *Pholidota imbricata*, *Dendrobium moschatum*, *D. nobile* which come to bloom during rainy season and *Papilionanthe teres* which densely infect trees giving them a pink mosaic appearance during summer. Chain like growth of *Hoya lanceolate* or *Dischidia nummularia* are also encountered. Ferns like *Microsorium* spp. and *Pteris* spp. are also found. The undergrowth of these forests varies from locality to locality. During dry period (December- April) much of the undergrowth is killed by man made forest fires. Only the hardier species such as *Eupatorium* spp., *Lantana camara*, etc. manage to thrive.

Temperate Forests: The temperate forests occupy the higher elevations about 1000m, mostly along the southern slope of Khasi and Jaintia hills. The rainfall here is very high (200-500cm) with a severe winter during November- March.

These climatic climax forests are usually found in isolated pockets along valleys, slopes, rivers and streams. The tree species in general show bushy and stunted habit. They form a dense canopy with the main components like *Lithocarpus fenestratus*, *Castanopsis kurzii*, *Quercus griffithii*, *Schima khasiana*, *Myrica esculenta*, *Symplocos glomerata*, *Syzygium tetragonum*, *Ficus nemoralis*, *Elaeocarpus prunifolius*, *E. acuminata*, *Mangleitia insignis*, *Exbucklandia populnea*, *Engelhardtia spicata*.

A well developed impenetrable shrub layer can be seen in these forests, and this layer includes *Mahonia pycnophylla*, *Daphne papyracea*, *Symplocos paniculata*, *S. chinensis*, *Camellia caudata*, *Lyonia ovalifolia* etc. In open places and along streams,

particularly during rainy season, a well marked herbaceous layer comes up which, include mostly annuals like *Houttuynia cordata*, *Adenostemma lavenia*, *Begonia palmata*, *B. rubrovenia*, *Impatiens* spp., *Disporum* spp. These forests are exceptionally rich in epiphytic flora. The fern flora includes *Asplenium nidus*, *A. normale*, *Polypodium argutum*, *Lepisorus* spp., *Pyrrosia* spp. and fern allies like *Lycopodium* spp. The epiphytic orchids include *Coelogyne punctata*, *Pleione precox*, and *Dendrobium* spp. *Agapetes obovata*, *A. verticillata*, *Vaccinium devonianum*, *Raphidophora decursiva*, *Hoya* spp. are also quite abundant in these forests. Climbers are less frequent but those seen include *Kadsura heteroclita*, *Hedera nepalensis*, *Codonopsis javanica*, *Holboelia latifolia*, *Clematis loureriana* etc.

Sub Tropical Pine Forests: The pine forests in Meghalaya are confined to the Central Uplands of Khasi and Jaintia Hills in a narrow belt showing an east-west direction. The altitudinal range is from 900 -1500 m. The pine forests unlike the tropical forest are less complex in structure and comparatively poorer in respect of species richness when seen with tropical types. *Pinus kesiya* is the principal species often forming pure strands. The pine forests of Meghalaya are however not a climax type, but are of secondary nature and is in a stage of succession termination. These pine forests are interspersed by a few broad-leaved trees such as *Schima wallichii*, *Erythrina arborescence*, *Myrica esculenta*, *Lyonia ovalifolia*, *Gaultheria fragrantissima*, *Ageratina adenophora*, *Rhus* spp. are common shrubs in these forest. During rainy season there is a profuse herbaceous undergrowth of *Anemone rivularis*, *Ranunculus cantonensis*, *Potentilla fulgens*, *Artemisia nilagirica*. *Eupatorium adenophorum* and *E.*

riparium form the only undergrowth in certain places in these pine forests. *Aeginetia indica*, a curious member of Orobanchaceae makes its appearance in some forests among pine litters during August to October. Moderately shaded areas and slopes support grass- legume associations which are subjected to grazing. The common legumes are *Indigofera dosua*, *Desmodium heterocarpon*, *Smithia blanda* etc. These are associated with *Sporobolus fertilis*, *Paspalum dilatatum*, *Eragrostis nigra*, *Panicum* spp. etc. Several terrestrial ferns form gregarious patches like *Dicranopteris linearis*, *Pteridium aquilinum* etc. Epiphytic ferns like *Lepisorus excavate*, *Pleopeltis kashyapii* are also noticed in pines.

Grasslands: Grasslands of Meghalaya are not a climax type but are only as a result of removal of original forest cover. The rolling grasslands covering large areas can be seen throughout the Shillong Plateau, around Riango, Weilo, Mawsynram, Cherrapunjee, Shillong- Jowai.

The dominant grasses in the grasslands are *Saccharum spontaneum*, *S. arundinaceum*, *Thysanolaena maxima*, *Chrysopogon aciculatus*, *Panicum khasianum*, *P. atrosanguineum*, *Setaria glauca*, *S. palmaefolia*, *Imperata cylindrica*, *Paspalum dilatatum*, *Arundinella bengalensis* etc. These grasses are associated with sedges like *Mariscus sumatrensis*, *Fimbristylis dichotoma*, *Cyperus zollingeri*, *C. tuberosus* and Eriocaulaceae members such as *Eriocaulon cristatum*, *E. brownianum* etc. A few scattered trees belonging to *Emblica officinalis*, *Schima wallichii*, *Engelhardtia spicata* etc. are also noticed in certain places in these grasslands.

These grasslands also support other dicotyledonous species like *Eriosema chinensis*, *Polygonum bistorta*, *Trifolium repens*, *Centella asiatica*, *Sonchus asper*, *Osbeckia stellata*, *Impatiens chinensis* and ferns like *Pteridium aquilinum*, *Dicranopteris linearis*, *Lycopodium* sp. etc.

Forest Resources

According to the State of Forest Report (2005) the recorded forest area of the State is 9,496 km², which is 42.34% of the State's geographic area and 1.23% of the Country's Forest area. Reserved Forests constitute 11.71%, Protected Forests, 0.13% and Unclassed Forests, 88.16%. The control of unclassified forests rests with Autonomous District Councils of Khasi Hills, Jaintia Hills and Garo Hills.

Forest Cover

The forest cover of the State, based on satellite data of November to December 2004 and January 2005, is 16,988 km², which is 75.74% of its geographical area. Very dense forest accounts for 338 km², moderately dense forest is 6,808 km², and open forest 9,842 km². An increase of 63 km² of forest cover has been estimated in the present assessment as compared to the previous assessment based on satellite data of November 2002 and January to February 2003. The change matrix reveals that there has been an increase of 73 km² in very dense forest and 22 km² in moderately dense forest, which has been partly offset by a decrease of 32 km² in open forest. District-wise forest cover is given in **Table 7**.

Table 7: District –wise forest cover of Meghalaya (Source: State of Forest Report, 2005. Forest Survey of India).

(area in km²)

District	Geographic area	Very dense forest	Moderately dense forest	Open forest	Total	Scrub
East Garo Hills	2,603	46	668	1,535	2,249	14
East Khasi Hills	2,820	0	817	1,019	1,836	80
Jaintia	3,819	101	973	1,152	2,226	11
Ri Bhoi	2,376	128	773	1,098	1,999	1
South Garo hills	1,849	25	731	919	1,675	0
West Garo Hills	3,715	0	884	2,090	2,974	23
West Khasi hills	5,247	38	1,962	2,029	4,029	52
Total	22,429	338	6,808	9,842	16,988	181

Protected areas

Meghalaya has 2 National Parks and 3 Wildlife Sanctuaries covering an area of 30,168 km². Nokrek Biosphere Reserve is also located in the State.

Joint Forest Management

Joint Forest Management began in the state in 2003. There are 73 JFM committees managing 4000 hectares of Forest Area as on March, 2005. All the families involved in JFM belong to Scheduled Tribes.

Religion

The indigenous religion of the Khasis is called ‘Ka Niam Khasi’. The Khasis believe in one Supreme God whom they call ‘U Blei Nongbuh Nongthaw or U Blei Nongpynlong’ (Planner and Creator). The Deity is also addressed as ‘Ka Blei’

(Goddess) perhaps not surprising in the matrilineal society of the Khasis. Still another name by which God is known is Ka 'Leilongkur' (God of the Clan) who looks after the well being of the clan as a whole. Minor deities include 'U Lei Long Ing' who is the household deity and 'U Ryngkew U Basa' and 'U Phan U Kyrpad' venerate as village deities. The Khasis venerate spirits of their ancestors. These dead ancestors were the founding female ancestress of their kur (Ka Iawbei), founding father of the kur (U Thawlang), and the elder brother (U Suidnia) of Ka Iawbei. It is they who protect their descendants as long as they lead good lives and after death it is the hope of everyone to be able to join them in the house of God. The world in which the Khasi live is called 'Ka Pyrthei Shong Basa' and the Khasis believe that after death, the soul of the dead man can reach 'Ka Dwar U Blei' only with the help of the rituals performed in accordance with 'Ka Niam iap' by the kinsmen of the deceased. Evil spirits are believed to be responsible for several kinds of diseases like malaria and cholera. To perform socio religious ceremonies or religious functions the service of the priests called 'U Lyngdoh' are sought, but in case of illness those of 'U Nongknia' (sacrifice) or 'U Nongshat Nongkhein' are looked for.

This indigenous religion is not only the religion of the entire population of the Khasis today. About a century and a half ago came the influence of Christianity in the Khasi Hills. Today, we find the Khasi population in sizeable numbers following different denominations of Christian religion. Roman Catholics and Presbyterian are the two major most popular denominations.

Dress

The Khasis have their own traditional dress. The men wear a sleeveless coat called ka Jymphong. In ancient days they wore a cloth round their waist which reached above the knees this is known as Shympiari. The elderly men put on a Jainpong usually of white colour known as Jainboh. When they go out the men wear a shawl known as Ryndia.

The normal Khasi women's dress consist of a garment called ka Jympien or Jainpien which is tied round the waist and come down below the knee. Over this is covered the Jainsem which is hanged loosely from the shoulders down and is kept in position by knotting over the shoulders. Another garment called the Tapmohkhlieh is worn over the head and shoulder. The next garment is the Jainkup which is worn over the shoulders like the cloak. On occasions they wear the expensive Muga, Dhara Jainsem and Ryndia stem.

The Khasis are fond of jewellery. Generally ornaments of gold like earrings or finger rings studded with precious stones are worn. The women are especially partial to gold and coral bead necklaces. The beads are round and large and are usually unornamented. The gold bead is not solid but a hollow sphere filled with lac.

Festivals

The people of Meghalaya observe some important festivals throughout the year. These celebrations usually take the form of dances, when people can forget the drudgery of life. Many of these festivals have religious associations but a few of the celebrations

are plainly secular. The Khasis and Pnars have religious festivals as well as secular celebrations.

A very important and elaborate festival among the Khasis is the Shad Nongkrem (Nongkrem dance) held annually at Smit the capital of the Khyrim Syiemship near Shillong. This is held in the month of November. For five days, this festival gives thanks to the Lord Almighty for a good harvest and the participants pray for peace and prosperity for the community. The Queen (Ka Syiem Sad) is the custodian of rites and rituals. An important part of this festival is Pomblang (decapitation of goats), at which goats offered by subjects of the Syiem of Khyrim are sacrificed and offerings are made to God and to the ancestor and ancestress of the ruling clan to the first uncle and to the deity of Shillong Peak asking their blessings for a bumper harvest. Religious part of the festival precedes dances, in which unmarried girls in very fine costumes bedecked with gold and silver crowns on which they place yellow flowers dance within a circle moving barefoot in the dust. The mens' dancing is naturally more vigorous and energetic. They hold a sword in their right hand and usually a white Yak hair whisk in their left hand, keeping time to the changing beats of drums and the brassy sounds of the cymbals with playing of the flutes and pipes.

Ka Sad Suk Mynsiem (dance of the joyful heart) - an expression of thanksgiving for the blessings of prosperity that the people have enjoyed during the year that has gone is celebrated in April at Weiking grounds in Shillong but takes place at Raid and Hima village level also. This dance lasts for three days and is performed in relation to the agricultural cycle (i.e. before sowing and after harvesting). Performance of dance before

sowing season highlights relationship between men and earth. The dance is ritualistic and symbolic of the timeless fertility cult-the women as receptacles of seeds and bearers of fruit and the men as cultivators, who provide the seeds and protect and nurse them till the crop is harvested. The male and female dancers (Unmarried) dressed in ceremonial attire, dance separately in two circles-the female dancers occupying the inner circle. A band of musicians playing drums, flute, cymbals, etc. position themselves in a corner outside the arena. Young virgins keep their eyes downcast and dance with minimum body movement, arms loose from the shoulders, body straight. Forward and backward and sideways they dance, toes bent in a clasp movement as if to grip the ground. The men in sharp contrast do an energetic, swift and galloping movement around the outer circle, slowing down and speeding up with the rhythm of drums. At a change of beat they stop and resume and they move clockwise and anticlockwise, always assuming a posture of protecting the women within the inner circle. As a matter of ritual prescription, the dance ceremony should come to an end with sunset.

Among the Pnars the most celebrated religious festival is the Beh-dien Khlam. It is the most important festival in the socio-economic life of the Jaintias and the focus is on praying for property and good health of the people and on invoking divine blessings for a bountiful harvest. The festival is observed by non-Christians who believe in the traditional faith of Niamtre. A week before the festival begins, a pig is sacrificed to Thunder (Knia Pyrthat). The Wasan or priests ring chew chew, a brass bell, along the main road of the town till the forest begins. The main feature of the festival is the making of the Dien Khlam and Khnong, which are rounded, polished and tall trunks of

trees, felled in a preserved forest. Pine trees are never used. After letting them lie in the woods for a couple of nights, the trunks are brought to the town with great fanfare and playing of drums and pipes, there is also much dancing and yelling. Later these trunks are erected in each locality and even in front of individual homes. On the fourth day young men led by priests carry bamboo sticks and visit each home, where the roof is beaten to chase away evil spirits to the accompaniment of drums, cymbals and chanting in Pnar. The erected Khnong is pulled down broken and discarded. The group is offered home brewed rice beer by the lady of the house. The youth of each locality try out their artistic skills by erecting coloured Rots about 30-40 feet tall structures built of bamboo, coloured paper and tinsel. In the afternoon of the fourth day, Rots are carried in procession towards the Aitnar site. At the end of the festival football game is played with a wooden ball.

A very important festival among the Garos is the Wangala a harvest festival held in honour of Saljong, the Sun God of fertility. This marks the end of a period of toil, which brings good yield of the fields. Wangala is celebrated in October. The Nokma of the village takes the responsibility to see that all arrangements are in order. Rituals in his house and in the individual fields precede the feasting. A large quantity of food and rice-beer must be prepared well ahead. The climax of the celebrations is the colourful Wangala dance in which men and women take part in their best clothes. Lines are formed by males and females separately and to the rhythmic beat of the drums and gongs and blowing of buffalo horns by the males, both groups shuffle forward in parallel

lines. There is a noticeable sense of rhythm in the participants, young and old, and the vigorous dance leaves a lasting impression upon the beholder.

METHODOLOGY

Three districts of Meghalaya viz. East Khasi Hills, West Khasi Hills, and Ri Bhoi are selected as the study area for conducting detailed ethnobotanical research and gathering information keeping in mind the above mentioned objectives. A total of 85 field trips have been taken for the research work.

Ethnobotanical methodology given by Cotton (1996) was followed during collection of information for the research work. A combination of qualitative and quantitative methods was taken to ensure the collection of data which are both accurate and complete. Any Ethnobotanical enquiry into the traditional botanical knowledge (TBK) of extant peoples is dependent on the effective application of a number of key anthropological and botanical methodologies as shown below.

1) FIELD METHODS

The successful collection of data requires a close and sustained observation of a people which was achieved by long term participation in local customs and daily life, studies carried out in a few weeks or months can be very misleading. The research methods used do not compromise either the physical or spiritual well being of any member of the host community. A preliminary survey was conducted in all the three districts in order to be acquainted with the way of living of the people, their beliefs, customs, practices, interaction with nature and most importantly their perception of plants.

From East Khasi Hills District altogether 13 villages or study sites have been covered. These include 1) Smit 2) Thangsning 3) Laitlyngkot 4) Umtyngar 5) Pynursla 6) Wahkhen 7) Wahkdait 8) Umsyiem 9) Tyrsad 10) Kyrphei 11) Mawsynram 12) Mawlai 13) Rynjah.

In West Khasi Hills District 7 villages or study sites have been covered. They are 1) Mairang 2) Langtor 3) Nongstoin 4) Riangdo 5) Pongkung 6) Mawkyrwat 7) Wahsiej.

In Ri Bhoi District 6 villages or study sites have been covered. They are 1) Lad umsaw 2) Umktieh Bhoi 3) Umroi 4) Bhoirybong 5) Umsning 6) Quinine. **(Plate, 1&2)**

a) Interviews and discussion

Interview procedures are both open ended and semi structured which are used in qualitative data collection or structured which are used for quantitative analyses following Martin (1995).

Open ended interviews are essentially casual conversations. Semi-structured interviews pose questions requiring short answers only. These may be either dichotomous- requiring a yes/no or true/false response, multiple choice where a limited range of answers are possible or of a fill in the blank nature, each type possessing its own particular attributes and limitations.

Structured interviews are in the form of interview schedule and questionnaires which are a series of predetermined questions. A questionnaire is used when gathering comparable information from a broad range of literate informants. The respondent has to fill in the questionnaire alone, which implies that there is little or no contact with the

researcher. Different types of questionnaires were prepared and distributed so as to meet the needs of the research work undertaken. An interview schedule is a set of questions, usually written on a prepared form that guides interviews with literate or non-literate individuals. These forms are used in face to face interactions with informants, implying some degree of personal rapport. The interviewing process is conducted very carefully. The cases of diseases are presented without using medical terminology. Terms such as herpes, hepatitis or parasites are not necessarily understood by the local healers. The focus is on common signs and symptoms that are easily recognized.

Interview schedule

- 1) Name of informant, age, gender, designation, history of their practice (in case of medicine men)
- 2) Name of village
- 3) Faith in plants/traditional knowledge
- 4) Usage of plants: Yes/No
- 5) An account of the plants used for various purposes
 - a) Vernacular name
 - b) Name of ethnic community using the plant
 - c) Uses of the plant, flowering season, morphology
 - d) Parts used
 - e) Methods of preparation
 - f) Ailment for which used, dose, duration of treatment, possible side effects
 - g) Threat status
 - h) Conservation initiatives
 - i) Plants i) exotic and recent entrant or ii) indigenous or exotic but old entrant
 - j) Claim corroborated i) by actual beneficiaries ii) not by actual beneficiaries
 - k) Claim i) complete ii) incomplete
 - l) Description of the plant

b) Selection of participants, elicitation and recording of data

Informant selection ranges from random sampling which provides a representation cross section of the information held by a community to purposive sampling which was done by the identification of local specialists or key informants

such as village elders, traditional healers, musicians, priests etc. In random sampling it is ensured that the methods take account of sociological variables such as age, gender, occupation, education etc. to ensure that the data collected are not biased in favour of any one social group (Maikuri and Gangwar, 1993). The purposive sampling was done following Tongco, (2007), here the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. The informants are people who had been living in the research area for many years.

Collection of ethnomedicinal data was done only from the most widely known and reliable traditional medicine men (or *Nong ai dawai kynbat* as they are called locally) of many villages who have been practicing for many years at their homes or in the weekly markets. (PLATE 3&4). Altogether 32 well known local medicine men have been consulted but only 26 of them were willing to share their knowledge and their consent was received as shown.

TO WHOM IT MAY CONCERN

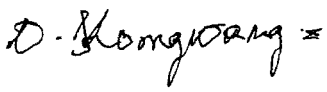
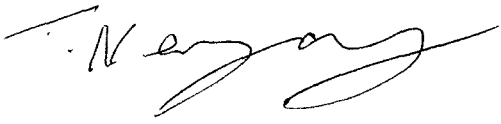
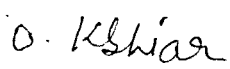
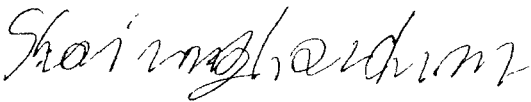
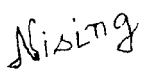
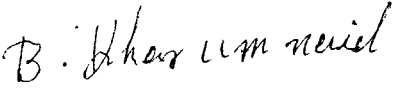
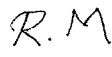
This is to certify that I have extended help to Mrs. Sierra Rebecca Hynniewta, Centre for Advanced Studies in Botany, North Eastern Hill University, Shillong, during her research work on the traditional medicinal uses of plants in Meghalaya. The information given by me is original and true to the best of my knowledge and represents the local traditional knowledge. I have no objection if the same is used for the well being of mankind.

Thank you

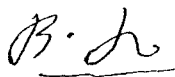
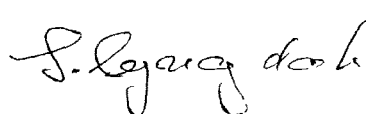
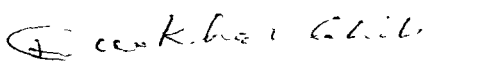
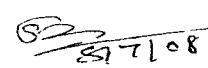
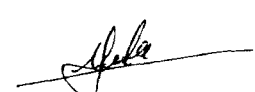
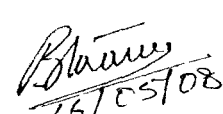
Da kane nga pynshisha ba nga la ai jingiarap ia I Kong Sierra Rebecca Hynniewta, Centre for Advanced Studies in Botany, North Eastern Hill University, Shillong, ha ka jingwad bniah jong i shaphang ka jingpyndonkam ha ka rukom tynrai ia ki kynbat dawai ha Meghalaya. Ka jingtip ba nga la ai ka long kaba paka, bad ba shisha katkum ka jingsngewthuh jong nga bad ka pynpaw ia ka jingtip kaba tynrai. Ngam don jingkhang lada pyndonkam ia kine na ka bynta ka jingbha jong u paid bynriew.

Khublei Shibun

Name of the medicinal practitioners consulted during the research work.

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- 2) Mr. T. Nengnong
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- 3) Mr. Olin Kshiar
Wahkdait
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- 4) Mr. S. Lyndem
Swor
East Khasi Hills, Meghalaya

- 5) Mr Nising Khongjirem
Wahkhen, Pynursla
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- 6) Mr. Bringstone Kharumnoid
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- 7) Mr. Romash Marbaniang
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- 8) Mrs. Esther Syiem
Madauriting, Shillong
East Khasi Hills, Meghalaya *Em Syiem .*
10.5.08
- 9) Mr. Khain Kharsyntiew *Khain*
Bhoirymbong
Ri Bhoi District, Meghalaya
- 10) Mr. Esra Sylliang
Lad Umroi,
Ri Bhoi District, Meghalaya *E. Sylliang .*
- 11) Mr Phran Nongsiej
Umsning/
Ri Bhoi District, Meghalaya *Phran*
- 12) Mr. Aior Kurbah
Umroi Mawit/ Umsning
Ri Bhoi District, Meghalaya *Aior, Kurbah*
- 13) Mr. D. Khyriem
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- 15) Mr. Bransley Langrin 
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- 16) Mr. S. Lyngdoh
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- 17) Mr. D. W. Kharbhih 
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- 18) Mrs. I. Myllemngap
 Nongkynrih
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- 19) Mr. S. B. Roy Snaitang
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- 20) Mrs. Saian Jala
 Lad Umsaw
 Ri Bhoi District, Meghalaya 
- 21) Mr. Boss. L. Myrthong
 Nongstoin
 West Khasi Hills, Meghalaya 

22) Mr. Dhongsing Lyngdoh Nongbri
Thangsning
East Khasi Hills, Meghalaya

D S Nongbri

23) Mr. B. Lyngdoh
Umsning
Ri Bhoi District, Meghalaya

Bah sit B Syim Sad

24) Mrs. Rosilian Lyngdoh
Wahsiej, Mawkyrwat
West Khasi Hills

R L Lyngdoh

25) Mr. T. Kurbah
Shillong
East Khasi Hills, Meghalaya

T Kurbah

26) Mr. J. Malai
Bhoirymbong
Ri Bhoi District, Meghalaya

They have been interviewed following the above mentioned interviewing techniques. Visits to the sites with these local healers proved beneficial for collection of specimens mostly medicinal plants. Random collection of ethnomedicinal data from aged village folks, farmers, cow herd boys, shepherds, masons, educated and uneducated youths, housewives and children was done because they encounter with plants everyday **(PLATE 5, A, B, E& F)**.

Case Studies were done to derive true and first hand original primary data from the informants.

CASE I study

In order to verify the claim given by the traditional healers, interviewing each and every patient who come to consult each local traditional healer will not be possible as it is time and energy consuming, so a sample of at least 15 patients who come to consult each local traditional healer have been selected for interview and for filling up of Questionnaire- A. Altogether 165 patients, 84 females and 71 males who come to consult 11 traditional medicine men have been sampled **(PLATE 5, C& D)**. The age of the patients ranges from 1 week to 60 years. For infants their parents or guardians who brought them to the local medicine men have been interviewed.

Questionnaire- A

- 1) Kyrteŋ u nong ai dawai bad jaka sah / Name of medicine man and address
- 2) Kyrteŋ nongpang bad jaka sah / Name of patient and address
- 3) Rta / Age
- 4) Kynthei / Shynrang Female / Male
- 5) Jingpang / Ailment
- 6) Jingbatai / Description / Symptoms
- 7) Katno bilor ka dawai bad katno ka bam por ban koit / Dosage and time taken for full recovery
- 8) Jingsoi / Signature

CASE II study

Entering and interviewing each and every household in all the villages of the study area is a long process and a tedious task because each house is located very far away from the other with poor transportation and no motorable roads. So in order to reach and expand our work to as many households as possible, questionnaires (Questionnaire-B) on knowledge and use of wild medicinal, edible plants, clan plants were distributed to the school students of class IX or X in each school (PLATE 3, G) . Each student was asked to consult their family in filling up of the questionnaire. Altogether 295 students belonging to 13 secondary schools located in different villages of the three districts which are far apart from each other have been covered. The

distributed questionnaires were collected back after a gap of one week in which each student was asked to bring the completely filled up questionnaires along with specimens of edible or medicinal plants which they and their family use or consume and the plants in which the clans, to which they belong, are forbidden from using.

Questionnaire-B

- 1) Kyrteᅡg, skul bad jaka sah / Name, school and home address

- 2) Rta / Age

- 3) Shynrang / Kynthei Male / Female

- 4) Maphi ne ki bahaiᅡg jong phi ki lah ju leit shim dawai kynbat ne em? Lada hoioiᅡ, mynno, haei, na bynta ki jingpang aiu bad uei u nongai dawai? Have you or your family ever consulted a local herbal medicineman? If yes, when, where, for what ailment and what is the name of the medicineman consulted?

- 5) Ki jingᅡgeit ha ki kynbat dawai / Faith in herbal plants

- 6) Ki jingbatai ia ki kynbat dawai ba phi ju pyndonkam na ka bynta ki jingpang / Medicinal plants that you or your family use for various ailments with brief description

- 7) Ki kynbat dawai ba la wanrah nuksa / Medicinal plants brought as specimens

- 8) Ki jhur khlaw ne soh khlaw ba ju bam / Wild edible vegetables and fruits consumed

- 9) Ki jhur khlaw ne soh khlaw ba la wanrah nuksa / Wild edible vegetables and fruits brought as specimens

- 10) Ka kur ne jait Khasi ba sang ban bam ia uno uno u jingthung / Khasi clan

Observing marketplace interactions was done following Martin (2008). Many villages in the study area have a separate market day, which is held only once or twice a week, and these tribal markets were visited frequently to study and collect the marketable wild fruits, wild vegetables and indigenous plant products sold there. The different local weekly markets visited are- 1) Iew Pynursla 2) Iew Dawki 3) Iew Laitlyngkot 4) Iew Smit 5) Iew Mawsynram 6) Iew Mawkyrwat 7) Iew Nongstoin 8) Iew Umsning 9) Iew Umroi and 10) Iewduh. **(PLATE 18, C)** Fresh plants sold at the beginning of the day are collected and vendors are engaged in conversations before the market reaches its peak activity. A bustling market place at midday provided opportunity to observe the great diversity of consumers and vendors displaying their goods of Ethnobotanical interest. After observing the range of products offered for sale and how others shop in the market, the plant products are purchased for making of voucher and bottle specimens. The vendors of these products have been interviewed regarding the local name, mode of usage, availability including the cost of these.

Collection of non marketable wild fruits, wild vegetables, and plant products including their local names and mode of usage have been met by studying the home gardens maintained by the women folks and their children at their backyards and by visits to the forest, grasslands and fields with the village folks, children and shepherds. **(PLATE 23, D)** Efforts have been made to exclude the common uses of the well known plants, especially crop plants and other cultigens. Few medicinal and many wild fruit plants were tried personally.

Importance has also been laid on the collection of data from the traditional priests, village headman and elder village folks regarding the uses of plants for socio-religious ceremonies, clan plants. Attending to festivals like 'Ka Shad Suk Mynsiem' and 'Ka Shad Nongkrem', socio-religious ceremonies like Marriage and Naming ceremonies, burial ground. Local musicians who make various wooden musical instruments were interviewed on how and from which plant they make the instruments. Some aged local musicians and also young experts in the field of local music were consulted (**PLATE 26, B, C, D & E**). Private museums, state museums, exhibitions and workshops were also visited for the same purpose.

In addition to questionnaires, field notebooks and notes taken during all the interviews proved useful. All information gathered was documented using photographic techniques. Voucher specimens of all the plants and ethnobotanical artifacts have been collected for future reference. Many medicinal plant specimens collected have been introduced in the Botanical Garden of NEHU with proper name plates attached (**PLATE 11, D-F**).

c) Verification

The Ethnobotanical data collected was verified in different localities of each village. The Ethnomedicinal data provided by the local healers was verified by going to them after a gap of one week or so after the previous visit and asking them about the uses of the same plant species which they have revealed in the previous visit. If the same use is told by them even in the second and third visit also then their claim is taken to be

correct otherwise it is discarded. To confirm the information it was again rechecked with other herbalists. Repeated queries were also made to get the data verified and confirmed.

2) BOTANICAL METHODS

a) Preparation of herbarium specimens

Plant specimens were collected for the preparation of voucher specimens (as mentioned above). For this standard method for making herbaria was done following Jain and Rao (1976). All protected or otherwise endangered species have been treated with particular caution. Plant collections were carefully planned in order to produce the maximum information while minimizing detrimental aspects such as habitat disturbance or over harvesting of particular species. Collection included samples of all the plant organs and at all stages of development, intact examples of reproductive structures etc. Wild fruits and inflorescence of Zingiberaceae have been preserved in formalin as bottle specimens.

b) Identification of the specimens

The collected specimens were identified from herbarium of the Botanical Survey of India, Eastern circle, Shillong and also Herbarium of the Department of Botany, NEHU, Shillong. Identification and also confirmation of the identified specimens was done by consultation of various regional and state floras like Flora of British India Vol 1-7 (Hooker, 1872-1897), Flora of Assam Vol 1-5 (Kanjilal *et al.*, 1934-1940), Forest Flora of Meghalaya Vol 1&2 (Haridasan and Rao, 1985 & 1987), Flora of Jowai Vol 1&2 (Balakrishnan, 1981-1983), Flora of Nongpoh (Joseph, 1980), Flora of India Vol 1-

13, Fern and Fern Allies of Meghalaya (Baishya & Rao, 1982) and books like Indian Trees (Brandis, 1987) Zingiberaceae and Costaceae of South India (Sabu, 2006) and publications of Rao and Verma (1972), Tripathy and Singh (2006). The accepted names were updated according to Name Changes in Flowering Plants of India and Adjacent Regions (Bennet, 1987) and from Databases viz. the Plant Names Project (1999) *International Plant Names Index*, IPNI (www.ipni.org/links.html#current), Catalogue of Life: 2008, 2009 Annual Checklist Species 2000 (www.catalogueoflife.org/annualchecklist/2008/search.php) and *Integrated Taxonomic Information System*, ITIS (www.itis.gov/servlet). The standard method of citing authors' name was done following Brummit and Powell (1992). If formal identification was not possible then certain species required the attention of specialist taxonomists.

3) ANALYTICAL TOOLS IN QUANTIFICATION AND DATA VERIFICATION

In addition to formal interviewing techniques which can lead themselves to numerical analysis, some analytical tools was used, allowing both the quantification and cross verification of Ethnobotanical data.

a) Informant Agreement ratio (Trotter and Logan, 1986).

Trotter and Logan Trotter and Logan provide a simple formula for calculating the informant agreement ratio. It is:

$$IAR = \frac{n_{ur} - n_i}{n_{ur} - 1}$$

where n_{ur} is the number of mentions in each usage set (or indication), and n_i is the number of taxa represented in each usage set. **(Table 9)**

b) Preference ranking (Martin 1995)

This method allows the calculation of a numerical index which will give an estimate of factors such as the cultural significance or scarcity of a given plant species. In **CASE III** study each informant was asked to arrange a group of plants (10 plant species) according to a given criterion such as personal preference or perceived importance (as a home remedy for common ailments). Each item is then assigned a value with the most important ranking highest while the least important is assigned a value of 1. Data from 20 respondents of Laitlyngkot village was collected to produce an overall ranking value. **(Table 10)**

c) Reliability of data (Khan 2001)

Generally it has been customary to record the claims or folklores without giving any indication of their relative reliability. In an attempt to fill this lacuna, an index was proposed by Khan (2001) to express the reliability of Ethnobotanical data as a single numerical value. **(Table 11)** To calculate Relative Reliability Index (RRI), every claim/information is assigned a value ranging from 01-04 in each of the five sets of criteria listed as A, B, C, D, and E.

(A) (i) Claim obtained from only one informant at one locality

only in whole study area----- 01

(ii) Claim obtained from one informant at each of several

localities of the study area----- 02

(iii) Same claim obtained from 2-3 informants -----	02
(iv) Same claim obtained from 4-6 informants -----	03
(v) Same claim obtained from 7-10 informants -----	04
(B) Claim localized -----	01
Claim widespread -----	02
(C) Plant species exotic and a recent entrant in the study area -----	01
Plant species indigenous or exotic but an old entrant in the study area--	02
(D) Claim not corroborated by actual beneficiaries -----	01
Claim corroborated by actual beneficiaries -----	02
(E) Claim incomplete -----	01
Claim complete -----	02

Relative Reliability Index is expressed as logarithm of fraction of '1'.

Thus, Relative Reliability Index (RRI) = $\log [1/ (a+b+c+d+e)]$

Where a, b, c, d, e are the values assigned to a claim in sets of criteria

mentioned above. Value of RRI varies from 0.69 (lowest reliability) to

1.1(highest reliability).

CHAPTER V (1)
DETAIL OF PLANTS
DOCUMENTED

MEDICINAL PLANTS

The study of traditional knowledge and practices about herbal remedies is known as 'Ethnomedicobotany' (Jain, 2001). In India the coverage of rural population by modern health system varies between different regions from 3-30% (Darshan, 1992). Thus for some 4-5 hundred million people, traditional medicine is the only alternative.

As per the report of the State Level Planning Committee, the state of Meghalaya has 850 species of medicinal plants, 377 of which are used by 70-88% of the state's population for primary health care needs. According to Central Institute of Medicinal and Aromatic Plants, Bangalore, 74 of such medicinal and aromatic plants are of tremendous potential to cater to peoples various needed plant based medicines.

The medicinal plants recorded during the present work are listed below in alphabetical order by botanical names, followed by family name, collection number, place of collection local/vernacular name (LN), brief description and use(s).

1) *Acorus calamus* L., Sp. Pl. 324. 1753; FBI 6:555. 1893; FJ 2:563. 1983. (Araceae).

Coll. no. E104. Thangsning, EKH.

LN: **Bet/Waitlam/Rynniaw/Bat bhut**

Description: An aromatic marsh herb, rhizome creeping, leaves distichous, ensiform, peduncle leaf like, spathe the ensiform continuation of the peduncle, spadix sessile, cylindric, flowering upwards. (**PLATE 6, A**)

Parts used: Leaves and rhizome.

Preparation and application: Leaves are finely ground to a paste and boiled in water, one cup of that solution is taken daily for treatment of paralysis. The rhizome is also boiled in water and the water fomented on the body of the paralytic patient.

Rhizome and leaves are boiled in water and the juice is taken orally as well as applied on the body locally for the treatment of cancer, cough, rheumatism, body swellings, epilepsy, and ailments due to evil eye and as antidote for snake bites.

The rhizome is dried in the sun made into powder and then boiled in water. This solution when taken orally helps in expelling gases from the stomach (carminative) and reduce gripping pain, promotes menstrual flow, reduces or eliminates fever (febrifuge), calms nervous excitement, cures asthma, headache, diarrhoea and chronic dysentery, gives the body tone and vitality, promotes the removal of mucous secretion from the bronchial tubes, acts against fungal skin diseases and scabies. Also see (4).

Uses reported in literature:

Meghalaya (Khasi & Jaintia): Juice of the root taken for malaria; roots are boiled and the solution taken for headache and giddiness; mixture of roots and powdered animal bone is sprinkled on patients trapped in witchcraft (Kharkongor and Joseph, 1981). Rhizome with rhizome of *Costus speciosus* applied for leprosy (Rao, 1981b). Roots used in fever and malaria (Baruah *et al.*, 2006).

Assam (Bodos): Decoction of crushed rhizome of *Acorus calamus*, leaves and roots of *Achyranthes aspera* and cloves of *Allium sativum* is given for malaria (Gogoi and Borthakur, 2001).

Manipur: Rhizome extract is given in cough, stomach ulcer, fever, biliousness. The essential oil extracted from rhizome is applied to cure bleeding piles. Dried rhizome pieces are worn along with neck chain to cure whooping cough of children (Jain *et al.*, 2007).

Darjeeling & Sikkim Himalayas: Rhizome used for treatment of epilepsy and other mental ailments, intermittent fever, chronic diarrhoea, asthma, cough, sore throat, colic pains and as a brain tonic (Hussain and Hore, 2007).

Solan (Himachal Pradesh): Rhizomes are dried and ground to powder mixed with mustard oil and massaged over aching joints (Verma and Chauhan, 2006).

2) *Adenia trilobata* (Roxb.) Engl., in Bot. Jahrb. 14:376. 1891; FJ 1:209. 1981.

Modecca trilobata Roxb. Fl Ind. 3:133. 1832; FBI 2:602. 1879. (Passifloraceae)

Coll. no. E268. Wahkdait, EKH.

LN: **Sohmynthar**

Description: Large climbers, leaves palmately 3 or rarely 5-lobed, cordate at base, flowers white, in axillary cymes, terminating in a tendril, fruits oblong,

Parts used: Leaf

Preparation and application: Juice of leaves applied over the body to relieve bodyache.

Uses reported in literature:

Arunachal: Leaf on snake bite. (Nath and Bordoloi, 1989).

3) *Ageratina adenophora* (Spr) King & Rob., in Phytologia 20: 204. 1970.

Eupatorium adenophorum Spreng., Syst 3:420, 1826; FFM 2:522. 1987. (Asteraceae).

Coll. no. E. 411. Thangsning, EKH.

LN: **Langtana/ Kynbat aeroplane/ Sla tana iong**

Description: Much branched undershrubs or herbs, leaves ovate-triangular, acute or acuminate, heads in dense corymbs, florets white.

Parts used: Leaves.

Preparation and application: To stop blood dysentery five young apical leaves of *Ageratina adenophora* and few leaves of *Mentha spicata* L. is made into a paste and taken with water. Leaf paste is applied locally for cuts and wounds, burns, also taken orally to stop blood vomiting. Also see (123).

Uses reported in literature:

Khasi & Jaintia: The leaves when boiled and taken cure severe stomachaches; leaf paste for cuts and injuries (Joseph and Kharkongor, 1981).

Uttaranchal: Paste mixed with mustard oil is useful for ulcer (Uniyal and Shiva, 2005).

4) *Ageratum conyzoides* L., Sp. Pl. 839.1753; FBI 3:243. 1881; FJ 1:258. 1981; FFM 1:516. 1985. (Asteraceae).

Coll. no. E103. Umtyngar, EKH.

LN: **Kynbat myngai/ bat nongrim**

Description: An annual erect herb, leaves opposite, heads small in dense terminal corymbs, ray florets pale blue in colour.

Parts used: Whole plant

Preparation and application: Leaf paste is applied on cuts and wounds (antiseptic).

Whole plant together with fruits of *Piper peepuloides* and rhizome of *Acorus calamus* L., are ground and the content is taken orally for treatment of cancer and ulcer.

Uses reported in literature:

Khasi & Jaintia: Leaf paste for cuts and injuries. (Joseph and Kharkongor, 1981).

5) *Aleuritopteris subdimorpha* (C. B. Clarke & Baker) Fraser-Jenk., Fern Gaz 18(5):223.2009. (Sinopteridaceae).

Cheilanthes longipes (Ching & S. K. Wu) R. D. Dixit & Bal Krishna

Coll. no. E171. Laitlyngkot, EKH.

LN: **Tyrkhang lieh**

Description: Ferns, frond lanceolate, stipe shorter than the frond, glabrous, with many lanceolate white margined scales.

Parts used: Frond

Preparation and application: Paste of fronds is applied over boils for quick healing.

6) *Aloe vera* L., Sp. Pl. 1:320.1753. (Aloaceae)

Coll. no. E396. Nongstoin, WKH.

LN: **Jatyngkieh**

Description: Herbaceous, short stemmed succulent plant, spreading by offsets, leaves are thick fleshy, green to grey green, serrated and has small white teeth, flowers are produced on a spike, each flower pendulous, with a yellow tubular corolla.

Parts used: Leaves

Preparation and application: Leaf paste is applied for healing wounds, fresh cuts, burns, eczema and for softening the skin (emollient). Leaf paste when taken orally is antibacterial, promotes menstrual flow, acts as good laxative, checks the growth of tumors and enlargement of spleen and liver and cures jaundice.

Uses reported in literature:

Madhya Pradesh: Bulbs are used in the form of vegetable curries during winter season to cure obesity (Jadhav, 2006).

7) *Allium sativum* L., Sp. Pl. 296. 1753; FBI 6:337. 1892. (Liliaceae).

Coll. no. E089. Laitlyngkot, EKH.

LN: Rynsun

Description: Foetid scapigerous herbs, leaves flat, scape slender, spathes long beaked, heads bearing bulbils and white flowers.

Parts used: Bulbs

Preparation and application: Bulbs are fried in mustard oil and the oil is used for massaging newborns and also given orally for cough. Raw bulb is taken with hot milk to relieve cough or chewed for mouth sores.

Uses reported in literature:

Bundi (Rajasthan): Bulb paste mixed with vinegar is applied on the affected area of mad dog bite (Shekhawat and Batra, 2006).

8) *Allium tuberosum* Rottl. ex Spreng., Syst. 2:38. 1825; FBI 6:343. 1892. (Liliaceae).

Coll. no. E102. Umtyngar, EKH.

LN: **Jyllang**

Description: Foetid scapigerous herbs, leaves erect narrow, bulbs white elongate, cylindrical, with white fleshy root fibres, pedicels much longer than the small pink stellate flowers.

Parts used: Leaves and bulbs.

Preparation and application: Leaf decoction is given in urinary troubles and is a good diuretic. Bulbs are taken raw to cure anaemia, for purification of blood and to prevent occurrence of any skin diseases in the body.

9) *Amaranthus tricolor* L., Sp. Pl. 989. 1753; Baker in Fl. of Malesiana- Series I 4:77.

Amaranthus gangeticus L.; Moq. in DC. Prodr. xiii. 2:261; FBI 4:719.1885.

(Amaranthaceae).

Coll. no. E119. Nongstoin, WKH.

LN: **Jada basaw**

Description: Erect herbs, glabrous, pink or bright red, leaves variable, from linear-lanceolate to rounded oval, clusters crowded in the lower axils and forming a long terminal spike, bracts awned.

Parts used: Roots

Preparation and application: To check irregular menses the root is boiled in water and the juice is taken.

10) *Anaphalis adnata* DC., Prodr. 6:274. 1838; FJ 1:276. 1981; FBI 3:282. 1881; FFM 2:517 (Asteraceae).

Coll. no. E242. Thangsning, EKH.

LN: **Tiew riem**

Description: A stout herb with perennial rootstock, leaves oblong to elliptic or oblanceolate, acute or obtuse, densely wholly, heads subglobose, in dense terminal clusters, involucre bracts white opaque.

Parts used: Leaves

Preparation and application: Leaf paste applied to heal boils. For curing urinary tract infection and dissolution of kidney stones leaves are ground and the juice is applied over the stomach. Clean juice of the leaves is extracted and used as eye drop.

Uses reported in literature:

Khasi & Jaintia: Leaf for haemotoma (Kharkongor and Joseph, 1981).

11) *Anemone rivularis* Ham., in DC. Syst. i. 211; FBI 1:9. 1872. (Ranunculaceae).

Coll. no. E326. Tyrsad, EKH.

LN: **Tieweit niang**

Description: Herbs, rootstock stout woody, radical leaves 3-partite, segments lobed and serrate, cyme compound, flowers white.

Parts used: Leaves

Preparation and application: Leaves are rubbed in between fingers and inhaled for relieve from sinusitis.

12) *Areca catechu* L., Sp. Pl. 1189. 1753; FBI 6:405. 1892. 1892. (Arecaceae).

Coll. no. E148.Umsyiem, EKH.

LN: **Kwai**

Description: Trunk tall solitary, leaves pinnate, fruit ovoid, smooth, orange or scarlet in colour.

Parts used: Fruit (Nut)

Preparation and application: Nut chewed with *Piper betel* L., then mixed with little lime and applied to cuts, it acts as haemostat.

13) *Argyria hookeri* Clarke, FBI 4:185. 1883; FA 3:342. 1939. (Convolvulaceae).

Coll. no. E 218. Bhoirybong, RB.

LN: **Dieng Langsyng**

Description: Large climbers, young parts silky, leaves ovate, ovate-orbicular, base cordate, cymes corymbose, flowers pink, purplish, fruits depressed globose, bright orange.

Parts used: Fruits

Preparation and application: Fruits ground to a fine paste and applied locally for boils.

14) *Artemisia indica* Willd., Sp. Pl. 3:1846; FI 12:27. 1995. (Asteraceae).

Artemisia vulgaris auct non L. FBI 3:325. 1881.

Coll. no. E141. Mawlai, EKH.

LN: **Jaiaw**

Description: Tall aromatic under shrub, pubescent or tomentose, stem leafy paniculately branched, leaves 1-2 pinnatipartite white tomentose beneath, heads ovoid or subglobose.

Parts used: Leaves

Preparation and application: Leaves are rubbed in between fingers and inhaled for relieve from sinusitis.

Uses reported in literature:

Meghalaya (Khasi and Jaintia): For headache fresh leaves are are pounded with roots of *Capparis assamica*. Extract is applied on forehead in headache and put into nose to stop bleeding (Maikhuri and Gangwar, 1993).

Arunachal (Mompa): Leaf for sores (Dam and Hajra, 1981).

Assam: Leaf for nervous and spasmodic affections, leaf and floral shoot for asthma (Karnick *et al.*, 1981).

Nagaland: Leaf juice is applied on skin allergy and for itching (Jamir and Rao, 1990).

15) *Asparagus racemosus* Willd., Sp. Pl. 2:152. 1799; FBI 6:316. 1892; FJ 2:539. 1983.

(Asparagaceae).

Coll. no. E258. Nongstoin, WKH; E266. Wahkdait, EKH.

LN: **Shiah jaker**

Description: Climbing undershrub, rootstock stout tuberous, stems climbing, cladodes 2-3 together, acute, falcate, pedicels solitary or paired, perianth white, berries red.

Parts used: Root

Preparation and application: The juice of the root is taken orally for promoting appetite (appetiser), giving tone to the stomach, increasing the secretion of milk in lactating mothers (lactagogue), checking tumour growth, congestion of the liver and for cure of epilepsy, nightblindness and inflammation, and as a sex tonic.

Uses reported in literature:

Meghalaya (Khasi & Garo): For fever extract of root is consumed orally (Maikhuri and Gangwar, 1993).

Assam: Root for stomach disorder. (Hajra and Baishya, 1981). Root for urinary trouble. (Baruah and Sarma, 1984).

Orissa: Roots are boiled and eaten as tonic and aphrodisiac (Pandey and Rout, 2006).

Rajasthan: Root powder is taken orally in colic, dysentery, acidity, tuberculosis, leucorrhoea, anorexia and peptic ulcers. Tubers for rheumatoid arthritis (Katewa and Galav, 2005).

16) *Begonia roxburghii* A. DC., Prodr. 15(1): 398. 1864; FBI 2:635. 1879.

(Begoniaceae).

Coll. no. E55. Bhoirymbong, RB.

LN: **Jajew jylwang/ jajewla**

Description: An erect succulent herb, stem and leaves pubescent when young, leaves broadly ovate; peduncles axillary, divided into dichotomous cymes, flowers light pink, monoecious. **(PLATE 6, B)**

Parts used: Leaves, stem, tuber.

Preparation and application: Leaves are boiled in water and the water is used for bathing persons with measles for quick relieve. The stem or leaves are boiled in a little amount of water, when cooled the juice is very effective as an eye drop for eye infection when there is itching of the eyes. Tuber paste is taken in diarrhoea and dysentery.

Uses reported in literature:

Meghalaya (Khasi & Jaintia): The tubers with fruits of *Solena heterophylla* Lour. are boiled and solution taken to relieve fever (Kharkongor and Joseph, 1981).

Meghalaya (Khasi and Garo): Rootstock crushed and taken in bile dysentery (R.R. Rao, 1981).

17) *Belamcanda chinensis* (L.) DC., in Redoute. Lil. 3: t. 121. 1805; FBI 6:277. 1892.

(Iridaceae).

Coll. no. E136. Umsyiem, EKH.

LN: **Kynbat phlang phiang**

Description: Short lived herbaceous perennial, rootstock creeping, stem erect, leaves flat ensiform, inflorescence branched, sheaths membranous, flowers pedicelled, in branched spikes, typically orange spotted with red. (PLATE 6, C)

Parts used: Root

Preparation and application: Pieces of root taken for lowering fever (febrifuge).

18) *Bergenia ciliata* (Haw.) Sternb., Rev. Saxifr. suppl 2:2. 1831.

Bergenia ligulata (Wall.) Engl., FA 2:233.(Saxifragaceae)

Coll. no. E 412. Bhoiryabong, RB.

LN: **Pyrnon/ Tiew japang**

Description: A herb with a stout perennial creeping rootstock, leaves simple, orbicular to broadly obovate, ciliate, often pinkish beneath, flowers white or pink, in corymbose scapes.

Parts used: Leaves

Preparation and application: Leaf paste is applied over the body for paralysis, rheumatism, injuries and bone fractures.

Uses reported in literature:

Nagaland: Root for liver complaints and tuberculosis, stem and leaf on cuts and wounds. (Megoneitso and Rao, 1983).

Uttaranchal : Root extract is used for the treatment of kidney stone, diabetes and heart problem. Root paste used for swelling and body pain (Uniyal and Shiva, 2005).

19) *Bidens pilosa* L. var. *minor* (Blume) Sherff., in Field Mus. Nat. Hist. (Chicago) Bot. ser. 16:421.1937; FJ 1:257. 1981; FBI 3:309. 1881. (Asteraceae).

Coll. no. E389. Mawlai, EKH.

LN: **Soh byrthit**

Description: Branched herbs, leaves opposite, ternate; leaflets ovate, heads in terminal panicles, ray florets white, disc florets yellowish, apical awn on achenes.

Parts used: Leaves

Preparation and application: Leaves ground and the juice is taken against gastric disorders.

Uses reported in literature:

Meghalaya (Khasi and Jaintia): Leaf of *Bidens pilosa* with leaf of *Drymaria diandra* as antidote for snakebite. (Kharkongor and Joseph, 1981).

20) *Brunella vulgaris* L., FBI 4:670. 1885. (Lamiaceae).

Coll. no. E12. Umtyngar, EKH.

LN: **Jahynwet**

Description: Perennial herbs, stem quadrangular, erect, leaves petioled ovate, whorls in dense heads, flowers lipped, purple.

Parts used: Leaves

Preparation and application: Tender leaf paste is applied on cuts and wounds for quick healing. Leaves taken raw for cure of blood dysentery.

21) *Buddleja asiatica* Lour., Fl. Cochinch. 72. 1790; FBI 4:82. 1883; FA 3:312. 1939; FJ 2:321. 1983. (Loganiaceae).

Coll. no. E254. Umktieh, RB.

LN: **Duma khynnah**

Description: Shrubs, leaves oblong to ovate-lanceolate, densely woolly beneath, flowers white, sessile or subsessile in cymose clusters on the rachis of spiciform panicles.

Parts used: Whole plant

Preparation and application: Whole plant paste mixed with water is given orally and also sprayed over the body of mentally disturbed patients.

Uses reported in literature:

Arunachal: Leaf applied on inflammation. (Jain and Dam, 1979). Bark extract is drunk for treatment of fever and sinus problem (Sarmah, *et al.*, 2008).

22) *Calendula officinalis* L., Sp. Pl. 2:921.1753. (Asteraceae)

Coll. no. E413. Umktieh, RB.

LN: **Tiew mongor**

Description: Annual or perennial herbaceous plants, leaves and flowers with aroma, leaves oblong-ovate, inflorescence head, ray florets reddish yellow.

Parts used: Leaves and flowers.

Preparation and application: Leaf paste applied for wounds. The leaves or flowers are ground and few drops of the juice put inside the ear to cure ear ache with collection of puss.

23) *Calocasia esculenta* (L.) Schott, in Schott & Endl., Melet. Bot. 1:18.1832; FJ 2:1983.

Calocasia antiquorum Schott Melet 1:18.1832; FBI 6:523. 1893. (Araceae)

Coll. no. E 117. Laitlyngkot, EKH.

LN: **Wang**

Description: Herbaceous, rhizome hard often tuberous, leaves peltate, ovate or subtriangular, petioles purplish violet, spathes convolute, curved in flowers, tube greenish limb narrowly lanceolate, pale yellow.

Parts used: Leaves.

Preparation and application: A young clean leaf is taken and covered over the head to reduce high fever and bring down the temperature.

24) *Capsicum frutescence* L., (Solanaceae).

Coll. no. E.414. Laitlyngkot, EKH.

LN: **Sohmynken**

Description: Perennial herbs, leaves entire, pedicels mostly 2-3 together, berry, elongate, oblong.

Parts used: Fruits.

Preparation and application: Paste of single fruit is applied on the affected area in case of cat bite.

Uses reported in literature:

Bundi (Rajasthan): Powder of fruit and honey are mixed together and applied on the affected area in case of scorpion bite. (Shekhawat and Batra, 2006).

25) *Capsicum minimum* Roxb., Hort. Beng. 17; FBI 4:239.1883; FA 3:365. 1939. (Solanaceae).

Coll. no. E397. Laitlyngkot, EKH.

LN: **Sohmynken khnai**

Description: Perennial herbs, leaves entire, pedicels mostly 2-3 together, berry small suberect, elongate, oblong.

Parts used: Fruits

Preparation and application: Paste of single fruit taken orally stops blood dysentery.

26) *Cassia fistula* L., FFM 1:319. 1985; FBI 2:261. 1878; FA 2:128. 1938. (Ceasalpinaceae).

Coll. no. E398. Umsning, RB.

LN: **Dieng laroo/ Soh naro**

Description: Middle sized trees upto 12m high, leaves upto 50cm long, leaflets ovate, ovate elliptic, racemes upto 60cm long, flowers yellow, pods cylindric, indehiscent, blackish, seeds immersed in pulp, shining brown. **(PLATE 6, D)**

Parts used: Fruits

Preparation and application: Fruit pulp is taken raw to relieve cough.

Uses reported in literature:

Meghalaya (Garo): Fruit as purgative. (Rao and Shanpru, 1981).

Sikkim: Fruit for urinary trouble. (Srivastava *et al.*, 1987).

Manipur: Bark, leaf, flower, seed for skin disease, leaf for enlarged spleen, hepatitis (Sinha, 1987).

Madhya Pradesh (Bhill): Fruit extract is applied in case of scorpion sting (Jadhav, 2008).

27) *Cassia alata* L., Sp. Pl.378.1753; FBI 2:264. 1878; FFM 1:319. 1985; FA 2:133. 1938. (Ceasalpiniaceae).

Coll. no. E272. Wahkdait, EKH.

LN: **Dawai khniang**

Description: Shrub with thick downy branches, leaves upto 60cm long, leaflets 10-12 pairs, larger towards the tip, racemes upto 30cm long, petals bright yellow, pods 4-angled. (PLATE 6, E)

Parts used: Leaves

Preparation and application: Leaf paste applied for skin diseases.

Uses reported in literature:

Naga: Leaf for skin disease. (Rao and Jamir, 1982a).

West Bengal: Leaves and root paste as purgative and antiparasitic. Santhals apply leaves for cure of ringworm, decoction of leaves is useful as a cure for herpes in venereal disease (Bhattacharjee and Chatterjee, 2007).

Arunachal: Leaf for eczema (Tiwari *et al.*, 1979), ringworm (Nath and Bordoloi, 1989).

28) *Centella asiatica* (L.) Urb. Mart., Fl. Bras. 11:287.t.78. 1f.11.1879; FJ 1:218. 1981.

Hydrocotyle asiatica L. Sp. Pl. 234. 1753; FBI 2:669. 1879; FA 2:340. 1938.

(Apiaceae).

Coll. no. E27. Laitlyngkot, EKH.

LN: **Khliang syiar/ lbong syiar/ jamynsyiar**

Description: Perennial herbs, stems creeping, rooting at nodes, leaves in rosettes, reniform, petiole long, umbels solitary or 2-5 together in axils of long bracts, flowers pink.

Parts used: Whole plant

Preparation and application: Leaves are taken raw to cure anaemia and for purification of blood. Leaves are chewed and the paste is applied for wounds and injuries. Whole plant paste is taken for blood dysentery, diarrhoea, as brain tonic, heart tonic and applied locally on boils, mouth sores, and tumours. Its leaves along with leaves of *Schima wallichii* and bark of *Myrica esculenta* Buch. Ham. ex D. Don., are ground to form paste and taken orally for diarrhoea.

Uses reported in literature:

Meghalaya (Khasi, Jaintia, and Garo): Leaves are boiled with small ginger and black pepper and the syrup taken for cough (Joseph and Kharkongor, 1981). Leaf for diarrhoea, headache, bodyache and wounds (Kumar *et al.*, 1987). Leaf for headache (Rao and Neogi, 1980). Juice of whole plant is used in eye infection, dysentery and stomachache (Baruah *et al.*, 2006).

Assam: Fresh juice of entire plant given for diarrhoea (Gogoi and Borthakur, 2001). Whole plant for dysentery, skin diseases, leaf for syphilis. (Karnick *et al.*, 1981).

Nagaland: Leaf for cholera, dysentery and stomachache. (Rao and Jamir, 1982a; Jamir, 1989).

Uttaranchal: Plant paste and juice are used in mental weakness and skin diseases (Uniyal and Shiva, 2005).

Arunachal (Chakma): Taken as boiled vegetable in stomach disorders, skin diseases and given to mother after childbirth (Sarmah, *et al.*, 2008).

29) *Cinnamomum obtusifolium* (Roxb.) Nees, in Wall. Pl. As. Rar. 2:73.1831; FBI 5:128. 1886; FA 4:56. 1940.

C. bejolghota (Buch. - Ham.) Sweet, Hort. Brit. Ed. 1:344. 1827; FFM 2:720. 1987. (Lauraceae).

Coll. no. E208. Pynursla, EKH.

LN: **Lakhyrdop**

Description: A large robust tree, leaves very large, glabrous, elliptic oblong, obtuse, acute or acuminate 3 nerved, flowers small, often crowded at the ends of the much branched long peduncled crowded panicles.

Parts used: Stem bark

Preparation and application: Stem bark paste applied for body swellings, bodyaches and bone fractures. Also see (68).

Uses reported in literature:

Meghalaya: Bark for urinary trouble and gall bladder stone (Rao, 1981b).

Manipur: Bark for cough, cold, liver complaints and toothache (Sinha, 1986, 1987).

Arunachal (Chakma): Root extract is drunk for treatment of liver troubles (Sarmah, *et al.*, 2008).

30) *Cinnamomum glaucescens* (Nees) Hand. –Mazz., in Oest. Bot. Zeits. 85: 214. 1936; FJ 2:406. 1883; FFM 2:722. 1987.

Cinnamomum cecidodaphne Meissn., in DC. Prodr. 15(1):25. 1864; FBI 5:135. 1886.

Coll. no. E195. Thangsning, EKH.

LN: **Dieng Pingwait**

Description: Trees, leaves elliptic-oblong or lanceolate, cuneate at base, acute to blunt acuminate, flowers white, tomentose, fruits ellipsoid.

Parts used: Leaves

Preparation and application: For treatment of sinusitis in adults and mild nose blockage in infants the leaves are ground into a paste and the juice is squeezed out for inhalation.

Uses reported in literature:

Manipur (Kuki): Bark for urinary trouble. (Sinha, 1987).

31) *Cinnamomum verum* Presl., Priroz. Rostlin 2:36.t.7. 1825. Wscobecný Rostlin. 2:1301.1846.

Cinnamomum zeylanicum Breyne, Ephem. Nat. Cur.dec. i. ann. 4. 139; FBI 5:131. 1886. (Lauraceae).

Coll. no. E106. Bhoirymbong, RB.

LN: **Dieng syiem**

Description: Evergreen trees, leaves glabrous, ovate or ovate-lanceolate, panicle longer than the leaves subsilky pubescent, 3-5 nerved.

Parts used: Stem bark

Preparation and application: Bark of the stem in powdered form is taken with tea in case of diabetic patients.

Uses reported in literature:

Meghalaya (Khasi & Jaintia): Leaf for cough. (Kharkongor and Joseph, 1981).

32) *Citrus medica* L., Sp. Pl.782.1753; FBI 1:514. 1875; FJ 1:116. 1981; FA 1:213. 1934. (Rutaceae).

Coll. no. E015. Rynjah, EKH.

LN: **Sohmad**

Description: A small tree, spines straight, leaves elliptic, petiole naked, flowers purplish white, solitary or in axillary racemes, fruit large oblong, rind usually warted, thick and aromatic.

Parts used: Leaves

Preparation and application: Leaves of *Citrus medica* L., and rhizome of *Zingiber rubens* are boiled in water and that water is used for bathing newborns and infants to prevent them from getting cold.

Uses reported in literature:

Nagaland: Fruit for malarial fever (Megoneitso and Rao, 1983), kidney and urinary trouble. (Rao and Jamir, 1982b).

Sikkim: Root for jaundice. (Krishna and Singh, 1987).

Nicobar Island (Shompens): Raw fruit as an antibiotic (Elanchezhian *et al.*, 2007).

Bundi (Rajasthan): Juice of the fruit is applied in case of wasp, bee and scorpion sting (Shekhawat and Batra, 2006).

33) *Clerodendron colebrookianum* Walp., Rep. 4:114. 1845; FBI 4:594. 1885; FFM 2:676. 1987. (Verbenaceae).

Coll. no. E096. Bhoirymbong, RB.

LN: **Jarem**

Description: A shrub, with foetid smell, leaves broad-ovate, subcordate at base, inflorescence in dense corymbose panicles, flowers white, drupelets globose.

Parts used: Leaves

Preparation and application: Leaf decoction is taken against high blood pressure, malaria and liver complaints. Also see (68).

Uses reported in literature:

Meghalaya (Khasi and Jaintia): Leaves warmed over fire made into paste and massaged in rheumatism (Kharkongor and Joseph, 1981).

Arunachal (Nishi): Leaf for fever, cough, diarrhoea and stomach pain. (Gangwar and Ramakrishnan, 1990). Leaves used in fever and high blood pressure, bark extract is taken for malaria (Sarmah, *et al.*, 2008).

Nagaland: Root, bark and leaf for malarial fever (Rao and Jamir, 1982a)

Assam: Leaf for reducing blood sugar (Sakhlani and Jain, 1994)

34) *Clerodendron bracteatum* Wall. ex Walp. Rep. 4:106. 1845; FFM 2:676.1987; FJ 2:370. 1983; FBI 4:593. 1885. (Verbenaceae).

Coll. no. E178. Quinine, RB.

LN: **Jarem saw**

Description: Shrubs, leaves ovate, ovate-lanceolate, acuminate, stellate tomentose beneath, cymes bracteates, capitates forming leafy panicles, bracts reddish tinge flowers white with slender corolla, drupes bluish purple.

Parts used: Leaves

Preparation and application: Leaf paste is tied with the help of a piece of white cloth over the stomach to stop bleeding after child birth (antihemorrhagic); Leaf paste tied over the forehead to get relieve from headaches.

Uses reported in literature:

Nagaland: The leaves act as strong antidote for neutralizing the effects of other poisonous material (Jamir and Rao, 1990).

35) *Clematis gouriana* DC., Syst. 1:138. 1818; FBI 1:4.1872; FA 1(1): 4. 1934; FJ 1:57. 1981; FFM 1:49. 1985. (Ranunculaceae).

Coll. no. E408. Pynursla, EKH.

LN: **Jyrmi bteng**

Description: Large climbers, leaves ternate or biternate, petioles flattened at base, leaflets ovate-lanceolate or elliptic, acute to acuminate, inflorescences axillary or terminal, flowers greenish white, achenes narrowly oblong.

Parts used: Stem

Preparation and application: See (46), (68), and (125).

36) *Coix lacryma- jobi* L., Sp. Pl. 972. 1753; FBI 7:100. 1896; FJ 2:608. 1983. (Poaceae).

Coll. no. E131. Pynursla, EKH.

LN: **Sohriew**

Description: An annual grass, culms stout, branching, rooting at lower nodes, leaves cordate at base, male spikelets imbricate, female spikelets ovoid, entirely enclosed in hardened involucre bracts, forming a bluish grey involucre, fruits pear shaped.

Parts used: Leaves

Preparation and application: Leaf juice is taken in diarrhoea, dysentery, fever, small pox and as tonic.

37) *Crassocephalum crepidioides* (Benth.) Moore, in Jour. Bot 50:211, 1912; FFM 2:520. 1987. (Asteraceae).

Gynura crepidioides Benth. Hook. f. Fl. Niger 438. 1849; FA 3:127; FJ 1:270. 1981.

Coll. no. E52. Bhoirymbong, RB.

LN: **Jathymmai**

Description: Slender erect herbs, leaves obovate- elliptic, oblong- elliptic, acute, tapering to base, dentate, glabrous, heads deep red, drooping.

Parts used: Leaves

Preparation and application: Leaf paste is applied on cuts and wounds, acts as haemostat.

Uses reported in literature:

Meghalaya (Khasi): Leaf juice taken for constipation and stomach disorders (Rao, 1981a).

Nagaland: Leaf on cuts and wounds. (Rao and Jamir, 1982a.)

38) *Crinum amoenum* Roxb. ex Ker-Gawl., in J. Sci. Arts. London 3: 106. 1817; FBI 6:282.1892; FJ 2:533. 1983. (Amaryllidaceae).

Coll. no. E244. Thangsning, EKH.

LN: **Rynsun Blei**

Description: Herbaceous, bulbs globose, leaves ensiform, acuminate, peduncles solitary arising from axils of old leaves, umbel 3-12 flowered, flowers white. (PLATE 6, F)

Parts used: Bulb

Preparation and application: Bulb paste applied for skin diseases like eczema, scurvy.

Uses reported in literature: Bulb for stomach disorder and caterpillar infection. (Hajra and Baishya, 1981).

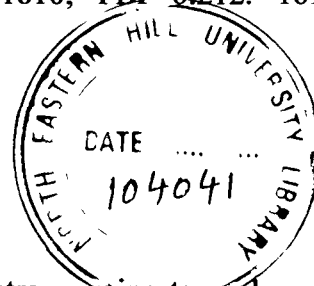
39) *Curcuma aeruginosa* Roxb., Asiat. Res. 11:335. 1810; FBI 6:212. 1890. (Zingiberaceae)

Coll. no. E216. Lad Umsaw, RB.

LN: **Shyrmit iong / Sying Blei**

Description: A perennial herb, rhizome pale blue in the centre, verging towards grey, pseudostem 30-35 cm tall, lamina with purple patch on the midrib on upper side only throughout the whole length, calyx 3 joined opened on one end only, corolla dark purple, labellum yellow, lower bracts green, coma bracts greenish white with purple patch, flowers light purple. (PLATE 6, G-I)

Parts used: Rhizome



Preparation and application: Rhizome paste is applied for burns, body swellings, injuries, bone fractures and against skin diseases of cattle and chicken. A piece of rhizome is kept in the mouth daily to get relieve from toothaches, prevent dental caries. Rhizome paste is taken orally in case of poisoning, it acts as antidote. Also see (43) and (170).

Uses reported in literature:

Assam: Rhizome juice is used in jaundice. (Das and Saikia, 2001)

South India: Rhizome used as a medicine for stomach disorders. (Sabu, 2006).

Darjeeling and Sikkim Himalayas: It is a stomachic, diuretic, aromatic, stimulant, carminative and used to cure sprain and bruises, cough, asthma and allergic eruption. (Hussain and Hore, 2007).

40) *Curcuma amada* Roxb., in Asiat. Res. 11:341. 1810; FBI 6:213. 1890. (Zingiberaceae).

Coll. no. E123. Nongstoin. WKH.

LN: **Ban kitri/ dawai sohpieng**

Description: Perennial herb, rhizome light yellow with the smell of green mango, petiole long, leaves oblong-lanceolate, fertile bracts pale green, coma bracts pinkish, flowers pale yellow. (PLATE 6, J & 7, A & B)

Parts used: Rhizome

Preparation and application: See (43).

Uses reported in literature:

Assam (Bodos): Rhizome paste is applied for skin diseases, decoction is taken for bronchitis, asthma, constipation and gastric troubles. (Gogoi and Borthakur, 2001).

Tubers made into a paste with spirit and eggwhite is applied for chronic rheumatism and bruises. (Sabu, 2006).

41) *Curcuma longa* L., Sp. Pl. 1:2. 1753; FJ 2:520. 1983, FBI 6:214. 1890.
(Zingiberaceae)

Coll. no. E401. Mawlai, EKH.

LN: Shynrai/ Shyrmitt

Description: Perennial herb, rhizome medium sized, deep orange yellow inside, strongly aromatic, root tubers rare, leaves oblong lanceolate, margins wavy, inflorescence central, coma bracts white, fertile bracts pale green, flowers pale yellow. (PLATE 7, C-E)

Parts used: Rhizome

Preparation and application: Rhizome paste is applied on wounds, injuries, sprains and diseases of the nails where they fall off. Rhizome has anti bacterial properties so it is taken for blood dysentery. Juice of fresh rhizome mixed with water is taken against disorders in urinary system and as anti- allergic.

Uses reported in literature:

Assam: Rhizome juice is used in jaundice. (Das and Saikia, 2001).

42) *Curcuma* sp. (Zingiberaceae).

Coll. no. E280. Wahkdait, EKH

LN: **Sying iong**

Description: Perennial herb, rhizome pale bluish, vertical, leaves with purple tinge on the upperside middle portion of midrib, lower bracts purple-green, fertile uppermost whitish with purple patch at the top, flowers groups of three, yellow, corolla light purple, labellum yellow. (PLATE 7, F&G)

Parts used: Rhizome

Preparation and application: Rhizome consumed for stomach problems.

43) *Curcumorpha* sp. (Zingiberaceae).

Coll. no. E124.Nongstoin, WKH

LN: **Amkitri shynrang**

Description: Perennial herb, rhizome faintly aromatic, roots cylindrical, ending in white tubers, leaves oblong- lanceolate, acuminate, spikes 1-5, radical, flowers white, reddish on lip, corolla tube white below pinkish upwards. (PLATE 7, H & I)

Parts used: Rhizome

Preparation and application: Its rhizome along with rhizome of *Curcuma amada* Roxb., *Curcuma aeruginosa* Roxb. and *Eriosema himalaicum* Ohashi., are boiled in water and the juice is taken for measles, gastric complaints and as antidote for snake bites.

44) *Cuscuta reflexa* Roxb., Cor. Pl. 3. t. 104; FBI 4:225. 1883. (Cuscutaceae)

Coll. no. E248.Umktieh Bhoi, RB.

LN: Shaw/ Jamirai/Jitrai

Description: Leafless twining parasite on low trees and shrubs, yellowish, flowers subracemose, white, corolla campanulate.

Parts used: Whole plant

Preparation and application: For swelling of the legs during pregnancy whole plant is boiled in water and the solution is taken orally. Whole plant paste is mixed with oil and applied all over the body for rheumatism and also body swellings. Whole plant paste is applied for burns. Also see (68).

Uses reported in literature:

Meghalaya (Khasi and Jaintia): Whole plant in mixture with three other plants is made into a paste and used as a balm in bodyache and rheumatism (Kharkongor and Joseph, 1981). Juice of whole plant is used in jaundice (Baruah *et al.*, 2006).

Assam (Bodos): Fresh juice of whole plant is taken for jaundice (Gogoi and Borthakur, 2001). Whole plant as plaster for dislocation of bones (Boissya and Majumdar, 1980).

Arunachal (Apatani): Whole plant as purgative (Baruah and Sarma, 1987).

Manipur: Whole plant for prolonged fever (Sinha, 1987).

Solan (Himachal Pradesh): Whole plant crushed with raisins and half glass juice is taken to remove intestinal worms (Verma and Chauhan, 2006).

45) *Cynodon dactylon* (L.) Pers., Syn. Pl. 1:85. 1805; FBI 7:288.1896. (Poaceae)

Coll. no. E329. Bhoirymbong, RB.

LN: Semtyrpai

Description: Grass, stem prostrate, often, widely creeping and forming matted tufts, leaves narrow, flat, spikelets minute.

Parts used: Whole plant

Preparation and application: Whole plant chewed for dental caries and toothaches.

Uses reported in literature:

Assam: Whole plant with others for stomach troubles (Hajra and Baishya, 1981).

Manipur: Whole plant on cuts and with sugar for uterine haemorrhage (Sinha, 1987).

Uttaranchal: Plant juice is used for fever and burning sensation (Uniyal and Shiva, 2005).

46) *Dendrobium chrysanthum* Lindl., Gen. Sp. Orchid. 80. 1830; FBI 5:747.1890; FJ 2:509. 1983. (Orchidaceae).

Coll. no. E73. Thangsning, EKH.

LN: **Tiew lyngskaw**

Description: An epiphyte, stems pendulous, leaves lanceolate, flowers borne on short peduncles on leafless stems, yellow with two blood red patches on lip, dorsal sepal and petals ovate. **(PLATE 7, J)**

Parts used: Stem

Preparation and application: Its stem along with stem of *Clematis gouriana* DC. is made to a paste mixed with little water and applied externally on injuries and after setting a fractured bone.

47) *Desmodium griffithianum* Benth., Pl. Jungh. 222; FBI 2:171. 1876. (Fabaceae).

Coll. no. E150. Bhoirymbong, RB.

LN: **Sohbyrthit**

Description: Herbaceous, stems long, moderately robust, densely clothed upwards with fine spreading hairs, leaflets 3, subcoriaceous, glabrous above, racemes terminal.

Parts used: Whole plant

Preparation and application: Whole plant along with *Swertia agustifolia* Ham., leaves are ground and applied externally after setting a fractured bone.

48) *Desmodium triflorum* DC., Prodr. ii.334; FBI 2:173. 1876. (Fabaceae).

Coll. no. E350. Tyrsad, EKH.

LN: **Kynbat shria shria**

Description: An undershrub, stems caespitose, slender, clothed with fine spreading hairs, leaflets obovate, truncate or emarginate, calyx pubescent.

Parts used: Leaves

Preparation and application: Leaves eaten raw for dysentery and diarrhoea.

49) *Dichrocephala bicolor* (Roth) Schldl., Linnaea 25:209. 1852; FJ 1:261. 1981.

Dichrocephala latifolia (Poir.)DC., Guill. Arch. Bot. 2:518.1833 et Prodr. 5:371.1836;

FBI 3:245.1881. (Asteraceae)

Coll. no. E94. Pynursla, EKH.

LN: **Kynbat sniang/bat sohphie**

Description: Erect herbs, often creeping at base, leaves ovate, lyrate, heads in small rigid terminal racemose panicles, ray florets greyish white, disc florets greenish.

Parts used: Leaves

Preparation and application: Leaf paste applied for wounds and injuries. Leaf juice taken for throat problems.

50) *Dioscorea deltoidea* Wall. ex Griseb., in Mart., Fl. Bras.3:43.1842; FBI 6:291.1892. (Dioscoreaceae).

Coll. no. E236. Umktieh, RB.

LN: **Phan ka khlam**

Description: Climber, braches very slender, terete, unarmed, leaves hastately or subdeltoidly-cordate, membranous, reticulate beneath, acuminate 7-9 nerved, male spikes very slender, flowers solitary or clustered, capsule orbicular, deltoid or obtusely quadrate, seeds variable in form, winged all round or on one side. (PLATE 7, K)

Parts used: Tuber

Preparation and application: Tuber taken for dissolution of kidney stones.

51) *Dioscorea puber* Bl., Enum. Pl. Jav. 1:21. 1827; FN 315. 1982. (Dioscoreaceae).

Coll. no. E231.Umktieh, RB.

LN: **Dawai suhjungdong**

Description: Climber leaves broadly ovate to suborbicular, glabrous above, and finely pubescent along nerves beneath, flowers in axillary panicles. (PLATE 8, A)

Parts used: Tubers

Preparation and application: Tuber taken raw as a cure for urinary tract infection and dissolution of kidney stones.

Uses reported in literature:

Orissa: Tubers and bulbils are cooked and given to cure colic pain (Pandey and Rout, 2006).

52) *Dischidia benghalensis* Coleb., in Trans. Linn. Soc. 12:367. 1817; FBI 4:50. 1883; FA 3:299. 1930; FN 179. 1982. (Asclepiadaceae).

Coll. no. E279. Wahkdait, EKH.

LN: **Dawai bsein**

Description: Fleshy, epiphytic, root-climbers, branches pendulous, leaves narrowly oblanceolate to oblong, cuneate at base, in distant subsessile pairs, flowers white.

Parts used: Whole plant

Preparation and application: Whole plant is made into a paste and applied locally as antidote in case of snake bites.

53) *Dischidia nummularia* R. Br., Prodr. Fl. Nov. Holl. 1:461. 1810; FBI 4:49. 1883; FJ 2:315. 1983; FFM 2:617. 1987. (Asclepiadaceae).

Coll. no. E180. Mawlai, EKH.

LN: **Kynbat kudam**

Description: A very slender herb, rooting on tree trunks, leaves fleshy, sub sessile, flowers minute, red in axillary umbels.

Parts used: Leaves

Preparation and application: Leaf paste is applied for cuts, wounds, injuries and bone fractures.

54) *Dischidia* sp.(Asclepiadaceae).

Coll. no. E250.Umktieh Bhoi, RB.

LN: **Syntiew maw**

Description: Slender herb, body hairy, rooting on tree trunks, leaves fleshy dark green, sub sessile.

Parts used: Leaves

Preparation and application: Leaf paste is applied for burns and rheumatism.

55) *Drymaria diandra* Blume, Bijdr 62. 1825; FI 2:533. 1993. (Caryophyllaceae).

Drymaria cordata (L.) Roem. & Schult., FBI 1:244. 1874.

Coll. no. E147. Laitlyngkot, EKH.

LN: **Kynbat thalap/ Bat nongrim.**

Description: Herbaceous pubescent annuals, prostrate or spreading, leaves reniform or deltoid, cymes dichasial, terminal or axillary, capsules ovoid.

Parts used: Whole plant

Preparation and application: Leaf paste is kept on the affected tooth to get relieved from toothaches. For diseases in pigs whole plant is given. Whole plant paste is applied against leprosy. Also see (67).

Uses reported in literature:

Meghalaya (Khasi & Jaintia): Whole plant with seeds of *Citrus* is mashed to a paste and the diluted solution is taken for vomiting, diarrhoea and dysentery. (Kharkongor and Joseph, 1981). Leaves crushed and applied in case of snakebite (Rao, 1981b). Whole plant on burns and for skin diseases. (Rao, 1981a).

Manipur: Whole plant for mouth and tongue disease. (Rao and Jamir, 1982b).

Sikkim: Whole plant for cough, cold, fever, headache and pneumonia. (Srivastava *et al.*, 1987).

56) *Emilia sonchifolia* (L.) DC., in Wt. Contr. Bot. Ind. 24.1834; FBI 3:336. 1881; FJ 1:269. 1981; FFM 2:529.1987. (Asteraceae).

Coll. no. E079. Umtyngar, EKH

LN: Hurmawroh/Jhurmwawria

Description: Erect weak puberulous herbs with radical, lyrate and cauline, glaucous leaves, flowers pinkish-purple.

Parts used: Whole plant

Preparation and application: Whole plant paste applied for burns, boils, sores with abscess.

Uses reported in literature:

Meghalaya (Garo): Leaf on boils. (Kumar *et al.*, 1980).

57) *Eriosema himalaicum* Ohashi, J. of Japanese Bot., Tokyo 41:96. 1966; FBI 2:219.

Eriosema chinense Baker, FJ 1:165. (Fabaceae).

Coll. no. E83. Nongstoin, WKH.

LN: **Sohpen**

Description: Herbaceous with trifoliate leaves, stem erect, woody, little branched, densely pubescent, pod oblong.

Parts used: Tubers

Preparation and application: Raw tubers taken orally against dysentery; Tubers paste is taken with honey to prevent bad breathe coming from the mouth. Also see (43).

58) *Eryngium foetidum* L., Sp. Pl. 232.1753; FA 2:340. 1938; FN 129:1982.

(Apiaceae).

Coll. no. E032. Bhoirymbong, RB.

LN: **Dhonia Bhoi/ dhonia khlaw/ kynbat ksuid**

Description: A very aromatic glabrous, erect, perennial herb with spatulate spinous marginal leaves, flowers in heads, petals white. **(PLATE 8, B)**

Parts used: Leaves

Preparation and application: Victims of fits and epilepsy are made to smell or inhale the leaf paste. For fever in children the leaf is ground and the resultant juice is given and also applied all over the body (febrifuge).

59) *Erythrina arborescens* Roxb., Pl. corom.3:t. 219 1811; FBI 2:190. 1876; FFM 1:300.1985. (Fabaceae).

Coll. no. E051. Bhoirymbong, RB.

LN: **Diengsong**

Description: A small tree with few prickles on the branches. Flowers coral red in colour borne in dense racemes, pod is curved and narrows gradually to a distinct beak and stalk.

Parts used: Stem

Preparation and application: Stem pieces (about 15 cm long) burnt at the tip and are smoked like a cigar. The smoke relieves toothache and prevents dental caries.

Uses reported in literature:

Meghalaya: Paste of leaf and ginger is applied for skin diseases and hair fall in pigs (Rao 1981a).

Nagaland: Bark for skin diseases caused by contact of *Rhus acuminata* with leaf of *Artemisia parviflora* and root of *Passiflora edulis* on sores. (Megoneitso and Rao, 1983).

60) *Eucalyptus tereticornis* Sm., Sp. Bot. New. Holl. 41. 1793; FFM 1:391.1985; FA 2:286. 1938. (Myrtaceae).

Coll. no. E402. Thangsning, EKH.

LN: **Dieng Tyrphin**

Description: Large trees, crown open, adult leaves usually lanceolate, acuminate, umbels 4-9 flowered, flowers simple, conical in buds, fruits hemispherical.

Parts used: Leaves

Preparation and application: See (68).

61) *Eulophia nuda* Lindl., Gen. & Sp. Orchid. 180.1833; FBI 6:5. 1890; Orchids of Meghalaya, 145. 1986. (Orchidaceae).

Coll. no. E068. Thangsning, EKH.

LN: **Bat piat**

Description: Terrestrial orchid, tubers spherical, leaves appearing much before flowering, elliptic-lanceolate, acuminate, inflorescence tall erect. **(PLATE 8, C-E)**

Parts used: Tubers

Preparation and application: See (68).

62) *Fagopyrum cymosum* Meisn., in Wall. Pl. As. Rar. 3:63. 1832; FBI 5:55. 1886. (Polygonaceae).

Coll. no. E091. Umtyngar, EKH.

LN: **Jarain**

Description: A tall branching herb with a perennial root, leaves triangular, with short acute or obtuse basal lobes, petiole long slender, flowers small white, recurved on the branches.

Parts used: Leaves

Preparation and application: Leaf juice taken to cure jaundice. Paste of young leaves applied for boils.

Uses reported in literature:

Nagaland: Root for intestinal worms and whole plant for dandruff. (Megoneitso and Rao, 1983).

63) *Ficus heterophylla* L., f. Suppl. 442.1781; FBI 5:518. 1888; FA 4:215. 1940; FFM 2:826. 1987. (Moraceae).

Coll. no. E223. Bhoirymbong, RB.

LN: **Soh eitblang shynrang**

Description: Shrubs, leaves ovate in outline, leaves-5 lobed, base rounded, lobes elliptic-lanceolate, acuminate, receptacles pyriform orange yellow with red osteole.

Parts used: Fruits

Preparation and application: For treatment of boils (in the breast region which arise during the lactation period) its fruits along with fruits of *Ficus hirta* var *roxburghii* is made into a paste and applied locally on the affected region.

64) *Ficus hirta* Vahl, Enum. 2:201.1806; FBI 5:531. var *roxburghii* (Miq.) King l. c.150 t.189; FJ 2:440. 1983; FA 4:256. 1940. (Moraceae).

Coll. no. E224. Bhoirymbong, RB.

LN: **Soh eitblang kynthei**

Description: Shrubs or small trees, leaves suborbicular, 3-5 lobed, densely velvety-tomentose beneath, synconia paired, subglobose.

Parts used: Fruits

Preparation and application: See (63).

65) *Flemingia procumbens* Roxb., Fl. of India 3:338. 1832; FBI 2:230. 1876.

(Fabaceae).

Coll. no. E108. Laitlyngkot, EKH.

LN: **Sohphlang**

Description: Trailing herbs, cultivated for the sake of its tuberous esculent root, leaves digitately tri foliate, corolla bright red.

Parts used: Tubers

Preparation and application: Tuber skin is taken raw for deworming.

66) *Galingsoga parviflora* Cav., Ic. Descr. Pl. 3:41. t. 281.1794; FJ 1:258. 1981; FFM 2:530. 1987. (Asteraceae).

Coll. no. E295. Mawsynram, EKH.

LN: **Batnongrim**

Description: Erect weak herbs, leaves opposite, ovate or oblong-ovate, acute or cuneate at base, heads terminal and axillary, ray florets white, disc florets pale yellow.

Parts used: Leaves

Preparation and application: Leaf paste applied for toothaches and wounds.

Uses reported in literature:

Meghalaya (Khasi & Jaintia): Leaf with leaf of other plants used as antidote for snake bite. (Kharkongor and Joseph, 1981).

Manipur: Leaf for diarrhoea, fever and vomiting. (Sinha, 1987).

67) *Galium asperifolium* Wall., in Roxb. Fl. Ind. 1:381. 1820; FJ 1:252. 1981, FFM 2:473. 1987.

Galium mollugo (non L. 1753) *sensu* FBI 3:207. 1881; FA 3:95. 1939. (Rubiaceae).

Coll. no. E240, E356, E338. Thangsning, EKH.

LN: **Kynbat mynsaw/ Kynbat laiproh**

Description: Perennial herbs, scandent or rambling, stems 4-angled, bristly or scabrous, leaves whorled, sessile, narrow, oblanceolate, flowers yellowish.

Parts used: Whole plant

Preparation and application: Whole plant paste is applied for injuries and body sores with maggot attack. Leaf of *Gallium asperifolium* Wall. along with leaf of *Drymaria diandra* Blume is made into a paste and applied for removal of corns.

68) *Gaultheria fragrantissima* Wall., in As. Res.13:397.1820; FBI 3:457. 1882; FFM 2:535. 1987; FA 3:147. 1939. (Ericaceae).

Coll. no. E 008.Umtyngar, EKH.

LN: **Lathynrait**

Description: Bushy shrubs, branches more or less trigonous, leaves lanceolate to ovate, shining, punctuate beneath, racemes axillary and terminal, flowers creamy white.

Parts used: Leaves and stem bark.

Preparation and application: Leaves of *Gaultheria fragrantissima* Wall., *Clerodendron colebrookianum* Walp., *Eucalyptus tereticornis* Sm., stem of *Clematis gouriana* DC. and tubers of *Eulophia nuda* Lindl. are crushed and the juice is massaged

over the body of persons suffering from rheumatism, arthritis and paralysis. In case of migraines and pneumonia the juice is applied over the forehead.

Whole plant of *Cuscuta reflexa*, leaves of *Gaultheria fragrantissima* Wall., rhizome of *Zingiber officinalis* and leaves of *Strobilanthes flaccidifolius* Nees. are boiled in water and the hot solution is formented all over the body of a rheumatic patient.

Stem bark of *Gaultheria fragrantissima* Wall., stem of *Clematis gouriana* DC. rhizome of *Zingiber officinalis*, leaves of *Cinnamomum obtusifolium*, *Ricinus communis* L. *Impatiens radiata* Hk.f. and mustard oil are boiled in water and the mixture is taken orally as well as applied over the body to cure rheumatism and athritis.

Stem bark of *Gaultheria fragrantissima* Wall., stem of *Clematis gouriana* DC., rhizome of *Zingiber rubens*, leaves of *Cinnamomum obtusifolium*, *Mazus pumilus* (Burm. f.) Steenis, whole plant of *Viscum articulatum* Burm. are boiled in water and when cooled, mustard oil is added. The balm is applied to get relieve from bodyache.

69) *Geranium nepalense* Sweet, Geraniac. 1.t.12.1820; FBI 1:430. 1874. (Geraniaceae).

Coll. no. E100.Thangsning, EKH.

LN: **Batmieng**

Description: Decumbent ascending herbs, slender, much branched, leaves pentagonal, petioles long, flowers light purple, sepals shortly awned almost equally the entire petals.

(PLATE 8, F)

Parts used: Leaves

Preparation and application: Leaves are chewed to get relieve from toothache and bleeding gums.

Uses reported in literature:

Sikkim: Root for stomach disorder. (Krishna and Singh, 1987).

70) *Gleichenia volubilis* Jungh., Reisen durch Java 452. 1845, et Java 1:592. 664. 1853; FFAM 41:1982. (Gleicheniaceae)

Coll. no. E193. Thangsning, EKH.

LN: **Tyrkhang nar**

Description: Ferns, rhizome scales brown, lanceolate, ciliate. Stipes woody, solid erect 2-3m long, 0.7cm diam, scaly at base, glabrous above. Primary pinnae 100x30cm, secondary pinnae deeply pinnatifid near to the costa, segments small, oblong-acute, 1x0.2, rachis, costa and costules raised on the ventral surface surface, densely clothed with palea and hairs, palea 2-3 celled, broad, margin ciliate, ferruginous, hairs stellate with 10-13 arms. Sori small, globose, submarginal, spores light yellow.

Parts used: Fronds

Preparation and application: To cure migranes and dizziness the fronds are ground and taken orally in small doses.

71) *Hedyotis uncinella* Hook. & Arn., Bot. Beech.Voy. 192. 1833; FBI 3:56. 1880; FA 3:38. 1939; FJ 1:245. 1981; FFM 2:476. 1987. (Rubiaceae).

Coll. no. E084. Umtyngar, EKH.

LN: **Bat iong**

Description: Erect stout herbs, stem glabrous, quadrangular, ribbed, leaves ovate, acute or rounded at base, heads axillary or terminal, bracteate.

Parts used: Leaves

Preparation and application: Leaf paste is applied for insects' stings.

Uses reported in literature:

Meghalaya (Khasi & Jaintia): Leaf paste with tobacco is applied for skin diseases (Kharkongor and Joseph, 1981).

72) *Hedyotis scandens* D. Don., Prodr. Fl. Nep. 134. 1825; FBI 3:57. 1880; FA 3:37. 1939; FJ 1:244. 1981; FFM 2:475. 1987. (Rubiaceae).

Coll. no. E341. Smit, EKH.

LN: **Bat iong**

Description: Scandent shrubs, often woody, leaves lanceolate, acute or cuneate at base, inflorescence panicles of cymes.

Parts used: Whole plant

Preparation and application: Whole plant paste applied for injuries to stop bleeding (hemostat).

Uses reported in literature:

Meghalaya (Khasi & Garo): Leaf for eye trouble. (Rao and Shanpru, 1981). Root for dysentery. (Kumar *et al.*, 1981). For cough, cold, decoction of dried leaves is taken (Maikhuri and Gangwar, 1993).

Arunachal: Root for abdominal pain and diarrhoea (Tiwari *et al.*, 1979). Stem as toothbrush for toothache (Singh and Krishna, 1983).

Nagaland: A decoction of leaves cures urinary and kidney disorders (Jamir and Rao, 1990).

73) *Helixanthera parasitica* Lour, Fl. Cochinch. 142. 1790; FFM 2:756; FA 4:120. 1940; FJ 2:414. 1983. (Loranthaceae).

Coll. no. E255. Umktieh Bhoi, RB.

LN: **Mangkaring heh sla**

Description: Parasitic on trees, branches spreading, nodes swollen, leaves lanceolate, inflorescence raceme, flowers scarlet red.

Parts used: Whole plant

Preparation and application: Whole plant taken orally in dried powdered form for relieve from bodyache (analgesic).

74) *Hibiscus* sp. (Malvaceae).

Coll. no. E229. Umktieh Bhoi, RB.

LN: **Tiew jain saw**

Description: Large shrub, leaves ovate, serrate, flowers solitary, axillary, corolla red.

Parts used: Stem bark

Preparation and application: Stem bark ground mixed with oil and applied externally for wounds and after setting a fractured bone.

75) *Hibiscus rosa sinensis* L., Sp. Pl. 694. 1753; FBI 1:344.1834; FN 51. 1982.

(Malvaceae).

Coll. no. E342. Wahkdait, EKH.

LN: **Tiew ot**

Description: Perennial shrubs, leaves simple, ovate, entire at the base and coarsely toothed at the apex, flowers pedicellate, stamens monadelphous.

Parts used: Leaves

Preparation and application: Leaf paste applied for boils.

Uses reported in literature:

Madhya Pradesh: Buds are chewed to cure urinogenital problems in males (Jadhav, 2006).

Arunachal (Chakma): Flower fried with ghee is taken to check excessive menstrual bleeding, root extract for cough (Sarmah, *et al.*, 2008).

76) *Houttuynia cordata* Thunb., Vet. Acad. Stockh. Handl 4:149.151. t. 5. 1783; FBI 5:78.1886; FA 4:31. 1940. (Saururaceae).

Coll. no. E045. Umtyngar, EKH.

LN: **Jamyrdoh**

Description: Perennial herbs, rootstock creeping, leaves cordate, spikes terminal with peduncle, presence of involucre, of 4-6 white petaloid bracts.

Parts used: Whole plant

Preparation and application: Whole plant is taken raw for cure of dysentery, diabetes, anaemia and as blood purifier.

Uses reported in literature:

Meghalaya (Khasi and Garo): Leaves eaten raw for blood purification; applied to treat sores and boils (Rao 1981a).

Assam (Bodos): Fresh juice of leaves taken for diarrhoea (Gogoi and Borthakur, 2001).

Arunachal (Chakma): Plant extract is taken for treatment of liver, digestive problems and urinary disorder (Sarmah, *et al.*, 2008).

77) *Hypericum laxum* (Blume) Koidz., Bot. Mag. Tokyo 40:344. 1926; FBI 1:256. 1874; FJ 1:86. 1981. (Hypericaceae).

Coll. no. E071. Thangsning, EKH.

LN: **Bat rit sla/ bat saw rit sla /kynbat thyrnia**

Description: Erect herbs, few branched, leaves ovate to obovate, flowers yellow, terminal or axillary in few flowered dichasial cymes.

Parts used: Whole plant

Preparation and application: Whole plant paste is taken for stomach problems, also applied for boils, wounds. Also see (102).

78) *Iresine herbstii* Hook.f. Gardn., Chron. 654.1206.1864; FJ 2:387. 1983. (Amaranthaceae).

Coll. no. E404. Mawsynram, EKH.

LN: **Syntiew saw**

Description: Succulent perennial herbs, erect, leaves ovate-orbicular to obovate, fleshy, shiny red, spikes 5-50cm, flowers yellowish white.

Parts used: Leaves

Preparation and application: Leaves boiled and the juice is taken for cure of rheumatism, paralysis and also as a tonic to fight anaemia.

79) *Impatiens benthamii* Steenis, Bull. Bot. Gard. Btzg. Ser. 3, 17:385.1948; FJ 1:112. 1981.

I. radicans Hook. f & Th., J. Linn. Soc.4:126. 1860; FBI 1:451.1875. (Balsaminaceae).

Coll. no. E309. Mawkyrwat, WKH.

LN: **Sohpohloh**

Description: Herbs, sparsely branched; stems trigonous, leaves acute to rounded at base, with minute ciliate serrations, flowers dark purple, solitary or in fascicles of 2-4.

Parts used: Leaves

Preparation and application: Leaf paste applied locally for boils.

80) *Impatiens radiata* Hook.f., FBI 1:476. 1875; FI 4:201. 1997.

I. racemosa DC., Prodr.1:688. 1824; FBI 1:479. 1875. (Balsaminaceae).

Coll. no. E334. Mawkyrwat, WKH.

LN: **Wieh raid**

Description: Herbs, tall, quite glabrous, leaves long petioled, elliptic- ovate, pedicels numerous, bracts persistent, flowers small yellow, lip conical ending in a short spur.

Parts used: Leaves

Preparation and application: See (68).

81) *Inula cappa* (D. Don) DC., Prodr. 5:469. 1836; FJ 1:265. 1981; FBI 3:295. 1881; FA 3:116. 1939. (Asteraceae).

Coll. no. E225. Umktieh Bhoi, RB.

LN: **Ja raikhoh shynrang**

Description: Stout herbs or undershrubs, leaves oblong-lanceolate, acute or rounded at base, panicles terminal, corolla yellow.

Parts used: Roots

Preparation and application: For allergic rashes the roots are crushed, boiled and water taken orally and also applied on the body (antiallergic).

Uses reported in literature:

Arunachal: Leaf applied on lower abdomen for promoting delivery. (Nath and Bordoloi, 1989).

82) *Ixeris gracilis* (Wall. ex. DC.) Stebbins, in J. Bot 75:50.1939 var *khasiana* (Hook. f)

Mamgain & Rao in J. Bombay Nat. Hist. Soc. 86(2): 273. 1989.

Lactuca gracilis DC. var. *khasiana* Hook. f., FBI 3:411. 1881. (Asteraceae).

Coll. no. E037. Umtyngar, EKH.

LN: Khmut sim, jhur kthang

Description: Slender annual herbs, leaves mainly radical and few cauline, linear lanceolate, heads in terminal lax corymbs, corolla pale yellow. **(PLATE 8, G)**

Parts used: Leaves

Preparation and application: Leaves are taken raw against high blood pressure, diabetes, to reduce and cure skin pigmentation appearing on the face.

83) *Justicia adhatoda* L., Sp. Pl.15. 1753; FBI 4:540. 1885.

Adhatoda zeylanica Medic., Hist. & Commentat. Acad. Elect. Sci. Theod.- Palat. 6:393. 1790; FFM 2:661. 1987. (Acanthaceae).

Coll. no. E063. Bhoirybong, RB.

LN: Lathadat

Description: Shrubs upto 3m high, leaves elliptic- lanceolate, acuminate or acute, spikes 5-10cm long, flowers greenish white.

Parts used: Leaves

Preparation and application: Leaves cut into small pieces and boiled with honey, 5-6 drops of the mixture is taken against cough.

Uses reported in literature:

Assam: Root for bronchial infection, tender shoot with leaf of banana for liver enlargement and leaf for rheumatic pain. (Karnick *et al.*, 1981).

84) *Kaempferia galanga* L., Sp. Pl. 3. 1753; FBI 6:219. 1890. (Zingiberaceae).

Coll. no. E078. Bhoirymbong, RB.

LN: **Sying khmoh/ Sying shmoh**

Description: Herbaceous, rootstock tuberous, leaves spreading flat on the ground, round ovate, tip deltoid lanceolate, flowers purplish white, calyx as long as bract, anther crests small with two shallow obtuse lobes. **(PLATE 8, H)**

Parts used: Rhizome

Preparation and application: Paste of rhizome is taken orally when an individual is poisoned (accompanied with blood vomiting), to cure throat problems, jaundice, cough, inflammation of glands (adenitis), gastric complaints and fever. In infants, the rhizome is crushed and the extract is applied for mouth sores with abscess.

85) *Kalanchoe pinnata* Pers., Miq. Fl. Ind. Bat.i. pt. i.728; FBI 2:413.1878.

Bryophyllum pinnatum Kurz., J. As. Soc. 1876, pt.ii. p. 309; FBI 2:413.1878.
(Crassulaceae).

Coll. no. E077. Bhoirymbong, RB.

LN: **Bat rben/ syntiew thylliej**

Description: Tall erect succulent herbs, leaves opposite, flowers large, pendent, in spreading panicles with opposite branches, reproduction takes place by epiphyllous buds. **(PLATE 8, J)**

Parts used: Leaves

Preparation and application: The leaf paste is applied for burns, injuries and bone fractures. Leaves are taken raw for dissolution of calculi (antilithic) in gall bladder. Leaf juice is used as an eye drop for eye problems.

Uses reported in literature:

Meghalaya: Leaf for headache, influenza and stone in gall bladder. (Rao, 1981b).

Manipur: Leaves for boils and dysentery (Sinha, 1987).

86) *Laggera pterodonta* Benth., Gen. Pl. 2:290; FBI 3:271. 1881; FFM 2:530. 1987.
(Asteraceae).

Coll. no. E256.Umktieh Bhoi, RB.

LN: **Bat nongrim**

Description: Viscid herbs with winged stems, lyrate basal leaves and purplish, recurved heads.

Parts used: Whole plant

Preparation and application: Whole plant paste applied for rheumatism.

Uses reported in literature:

Nagaland: Whole plant for reducing high blood pressure (Megoneitso and Rao, 1983).

87) *Lantana camara* L., Sp. Pl. 627. 1753. var. *aculeata* (L.) Moldenke in Torreyia 34:9.1934; Santapau in Bull. of BSI Cal. 3:18.1962; FFM 2:681. 1987. (Verbenaceae).

Coll. no. E253. Mawlai, EKH.

LN: **Sohpang khlieh.**

Description: Prickly shrubs, leaves ovate, spikes globose, flowers orange to pink, fruits shining, purplish blue when ripe.

Parts used: Flowers.

Preparation and application: Flower paste taken orally or covered over the forehead to get relieve from headache.

Uses reported in literature:

Khasi: Leaf is used in skin diseases and to stop bleeding (Baruah *et al.*, 2006).

88) *Leucas ciliata* Benth., in Wall. Pl. As. Rar.i.61, FBI 4:687. 1885. (Lamiaceae).

Coll. no. E066.Thangsning, EKH.

LN: **Bat nianglynur**

Description: Herbaceous, stem and branches hirsute with spreading and deflexed hairs, leaves coarsely serrate, pubescent. (PLATE 8, K)

Parts used: Whole plant

Preparation and application: See (102).

89) *Leucosceptrum canum* Sm., Exot. Bot. 2:113. t. 116. 1805; FBI 4:699. 1885; FA 3:529. 1939; FFM 2:699. 1987. (Lamiaceae).

Coll. no. E167. Laitlyngkot, EKH.

LN: **Soh Kjit/ soh khajup**

Description: Small trees, stem and branches hirsute with spreading and deflexed hairs, leaves elliptic, grey tomentose beneath, corolla white or pinkish.

Parts used: Roots

Preparation and application: Roots are boiled in water and the root juice is taken for malaria.

90) *Lindenbergia muraria* (Roxb.) Bruhl, in J. Dep. Sc.Univ. Calc. 2:27. 1920; FJ 2:336. 1983.

Lindenbergia urticifolia Lehm., in Link & Otto, Ic. Pl. Rar. 95. T. 48. 1831; FBI 4: 262. 1884. (Scrophulariaceae).

Coll. no. E067. Thangsnung, EKH.

LN: **Bat saw stem syntiew**

Description: Annual herbs, branches erect, leaves ovate cuneate at base, sparsely hairy, flowers solitary, axillary, corolla yellow.

Parts used: Whole plant

Preparation and application See (102).

91) *Litsea salicifolia* (Roxb ex. Nees) Hk. f., Fl. Brit. Ind. 5:167. 1886; FA 4:87. 1940; FJ 2:404. 1983. (Lauraceae).

Coll. no. E249. Umktieh Bhoi, RB.

LN: **Sying jrong sla**

Description: Small trees, leaves acute or acuminate at apex, umbels in fascicles or in short racemes, fruits orbicular, purplish black.

Parts used: Leaves and fruits.

Preparation and application: Its leaves and fruits together with whole plant of *Ageratum conyzoides* L. is ground to a fine paste. The paste is then mixed with oil and hens fat. This balm is applied in case of rheumatism.

92) *Mahonia pycnophylla* (Fedde) Takeda, in Notes R. Bot. Gard. Edinb. 6:218. tt. 48 & 33. ff. 6-13.1917; FJ 1:70. 1981; FFM 1:82. 1985. (Berberidaceae).

Berberis nepalensis (non Spreng) Hook. f. & Th. FBI 1: 109.

Coll. no. E371. Siatbakon, EKH.

LN: **Sohlangmat/ Sohrnong.**

Description: Erect, rarely branched shrubs, wood yellowish, leaflets ovate, acuminate, spinous serrate, racemes fasciculate, dense flowered, flowers yellow.

Parts used: Stem bark

Preparation and application: The juice of the stem bark is used as an eye drop for eye infection.

Uses reported in literature:

Meghalaya: Bark for eye diseases. (Rao, 1981a)

93) *Mazus pumilus* (Burm. f.) Steenis, in Nov. Guinea n. s. 9:31. 1958; FJ 2:337. 1983
Mazus rugosus Lour., Fl. Cochinch. 385. 1790; FBI 2:259. 1879. (Scrophulariaceae).

Coll. no. E386. Smit, EKH.

LN: **Bat iong**

Description: Herbs with tufted ascending stems, basal leaves opposite, obovate, upperleaves obovate- spatulate, cuneate at base, corolla white with yellow spots inside, upper lip pale purple. **(PLATE 8, I)**

Parts used: Whole plant

Preparation and application: Whole plant paste applied for injuries and body sores. Leaves made into a paste mixed with jaggery and applied for skin diseases. Also see (68).

94) *Melasma avense* (Benth.)Hand.-Mazz, Symb. Sin 7:843. 1936; Yamzaki, Fl of Eastern Himalaya, Tokyo. (Ed. H. Hara) 288.1966.

Alectra indica Benth. DC., Prodr. 10:339. 1846; FBI 4:297. 1884. (Scrophulariaceae).

Coll. no. E126. Nongstoin, WKH.

LN: **Bat khlamsyiar**

Description: Erect, scaberulus herbs, leaves sessile, ovate lanceolate, cuneate to subcordate at base, spikes terminal, dense flowered, corolla yellow.

Parts used: Whole plant

Preparation and application: Whole plant dried, powdered and given to chicken in diseases.

95) *Mikania micrantha* Kunth, HBK. Nov. Gen. Pl. 4:134; FFM 2:524. 1987; FJ 1:257.

1981. (Asteraceae)

Coll. no. E252. Quinine, RB.

LN: **Jyrmi ba pur**

Description: Extensive twiners, branches slender, leaves ovate, ovate-lanceolate, acuminate, base cordate, entire, heads in dense compound corymbs, florets white or creamy white.

Parts used: Whole plant

Preparation and application: Whole plant paste is taken orally in case of vomiting in humans and can be given to cattle also.

Uses reported in literature:

Meghalaya (Garo): Whole plant for stomach trouble (Rao and Neogi, 1980).

Nagaland: Stem for constipation and indigestion (Megoneitso and Rao, 1983).

Arunachal: Leaf for headache. (Tiwari *et al.*, 1979).

96) *Mimosa pudica* L., Sp. Pl. 516. 1753; FBI 2:291. 1878; FA 2:152. 1938; FFM 1:340. 1985; FJ 1:179. 1981. (Mimosaceae).

Coll. no. E343. Wahkdait, EKH.

LN: **Tiewkhapbrip**

Description: Decumbent straggling prickly shrubs, leaves bipinnate, leaflets narrowly oblong, flowers pink, heads globose, axillary, pods linear-oblong, flat.

Parts used: Leaves

Preparation and application: The leaves are boiled in water and the resultant juice is taken for cure of diabetes.

Uses reported in literature:

Meghalaya: Root as snake repellent and whole plant for insomnia (Rao and Neogi, 1980).

Assam: Root as oral contraceptive (Tiwari *et al.*, 1982).

97) *Morus australis* Poir., Lamk. Encycl. Meth. 4:380. 1797; FJ 2:443. 1981; FFM 2:836. 1987.

Morus indica (non. L.1753) *sensu* FBI 5:492. (Moraceae).

Coll. no. E176. Wahkhen, EKH.

LN: **Sohlyngdkhur**

Description: Trees or shrubs, leaves ovate, truncate or cordate at base, flowers in axillary, solitary spikes, yellow green, fruits ovoid, subglobose, black.

Parts used: Fruits

Preparation and application: Fruits are boiled in water and the juice is taken as a cure for anaemia.

Uses reported in literature:

Meghalaya (War Jaintia): Leaf on ulcers (Kumar *et al.*, 1987).

98) *Musa paradisiaca* L., Sp. Pl. 1043.1753. (Musaceae).

Coll. no. E415. Laitlyngkot, EKH.

LN: **Lakait/ kait**

Description: Large herbs, leaves very long oblong, flowers in a decurved spike,

Parts used: Roots and fruits.

Preparation and application: Paste of root applied for sprain, bone fractures and burns.

Fruit is eaten in case of diarrhoea.

Uses reported in literature:

Assam: Fruit for jaundice (Gogoi and Boissya, 1984).

99) *Musa* sp. (Musaceae).

Coll. no. E050. Bhoirymbong, RB.

LN: **Ladew pyrthat**

Description: Medium sized herbs, leaves entire, oblong.

Parts used: Pseudostem

Preparation and application: The inner white part of the pseudostem is ground wrapped in *Phrynium pubinervi* Bl., leaves and the packet is heated in the fire and covered with ash so that it does not get burnt. After half an hour the packet is taken out while it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented locally on the body for cure from body swellings.

100) *Myrica esculenta* Buch.- Ham. ex D. Don., Prodr. Fl. Nep. 56. 1825; FJ 2:455. 1983; FFM 2:851. 1987. (Myricaceae).

Coll. no. E166. Laitlyngkot, EKH.

LN: Sohphie heh

Description: Trees, leaves lanceolate, obovate, acute or cuneate at base, spinous serrate, inflorescence spike or raceme, berries ovoid tuberculate, greenish sometimes yellowish when ripe.

Parts used: Fruits

Preparation and application: Ripe fruits are cut into small pieces (seeds are discarded) mixed with jaggery in a bowl and taken against any stomach disorder. Ripe fruits are crushed and the whole content is strained through a piece of clean white cloth and the collected juice is stored in bottles. When there is any stomach disorder or nausea, 2 to 3 teaspoons of the juice is mixed with half a cup of water and a pinch of salt and this mixture is taken for quick relieve. Also see (28), (113).

Uses reported in literature:

Nagaland: Bark on cuts and for cough, dysentery and malarial fever (Megoneitso and Rao, 1983).

Uttarakhand: Bark is used externally as a plaster for rheumatism (Bisht and Pundu, 2008).

101) *Myrica nagi* (non Thunb.) Hook., FJ 2:394. 1983. (Myricaceae).

Coll. no. E169. Laitlyngkot, EKH.

LN: Sohlia

Description: An evergreen dioecious tree, branchlets pubescent, inflorescence spike or raceme, leaves lanceolate, fruit globose, red and succulent.

Parts used: Stem bark

Preparation and application: Stem bark in powdered form is mixed with a glass of water and 1 drop of lemon juice added, the mixture is taken against blood dysentery. The stem bark is boiled in water and the clean juice is used as an ear drop for ear aches.

102) *Neanotis wightiana* var *compressa* (G. Don.) Lewis, in Anal of the Missouri Botanical Garden Missouri 53:40, 1966. (Rubiaceae).

Coll. no. E070. Thangsning, EKH.

LN: **Bat lyngkha smaiwtung synlei**

Description: Perennial herb, tomentose, leaves sessile or subsessile, heads involucrate by two leaves, flowers light purple, shortly pedicled.

Parts used: Whole plant

Preparation and application: Whole plant of *Neanotis wightiana* var *compressa* (G. Don.) Lewis, *Lindenbergia muraria* (Roxb.) Bruhl, *Hypericum laxum* (Blume) Koidz., *Leucas ciliata* Benth. and leaves of *Paederia foetida* L. are ground and the extract is applied as an antidote for snakebites.

103) *Nepenthes khasiana* Hook. f., FJ 2:394. 1983; FBI 5:70. 1886; FA 4:25; 1940 (Nepenthaceae).

Coll. no. E239. Pynursla, EKH.

LN: **Tiew rakot**

Description: Erect or prostrate undershrubs, leaves consisting of basal lamina with excurrent tendrillar midrib, bearing at apex a pitcher, lamina sessile, pitchers sub cylindrical

Parts used: Unopened pitchers and roots.

Preparation and application: The juice of unopened pitchers is taken orally for urinary troubles and also put few drops inside the ear to cure ear ache. Root powder is sometimes taken for relieve from cough.

Uses reported in literature:

Meghalaya: The juice of unopened pitchers mixed with rice beer is taken for urinary troubles and blockages; the juice also cures stomach disorders and eye sores (Joseph and Kharkongor, 1981). Digestive juice for cholera (Rao and Shanpru, 1981). Root and pitcher for skin diseases, digestive juice as eye drop (Kumar *et al.*, 1980).

104) *Nephrolepis cordifolia* (L.) Presl., Text. Pterid. 79. 1836; Clarke in Trans Linn. Soc. Ser. 2(Bot) 1:540. 1880; Bedd., Handb. Ferns. Brit. India Suppl. 282. t.114.1892; FFAM 105.

Polypodium cordifolium L. Sp. Pl. 1089. 1753. (Polypodiaceae)

Coll. no. E259. Nongstoin, WKH.

LN: **Tyrkhang**

Description: Erect fern, rhizome short, erect, densely clothed with ferruginous scales, emitting slender paleate stolons, usually bearing small tubers. Rachis dark brown or violet, stout, erect, densely covered with dark brown paleae and hairs. Lamina simple,

pinnate, linear lanceolate, pinnae numerous in close set, lower pinnae reduced, usually sterile, upper pinnae gradually decreasing to acute apex, auricled at base, overlapping the rachis on ventral surface, sori in a single row near the margin.

Parts used: Tubers

Preparation and application: The tuber is ground and the juice is extracted for applying over the stomach in case of UTI.

Uses reported in literature:

Nagaland: Tuber for free breathing and nasal trouble (Rao & Jamir, 1982b).

105) *Nerine sarniensis* (L.) Herb., in Bot. Mag. 47:t. 2124. 1820. (Amaryllidaceae)

Coll. no. E237. Umktieh, Bhoi.

LN: Syntiew

Description: Perennial, bulbous, bisexual, flowers tubular, orange, perianth with 6 segments arranged in two whorls, fruit is a dry capsule.

Parts used: Root

Preparation and application: Root paste applied for burning sensation of the feet.

106) *Oenanthe javanica* (Bl.) DC., Prodr. 4:138.1840; FJ 1:220. 1981

Oenanthe stolonifera DC. Prodr. 4:138.1830; FBI 2:696. 1879; FA 2:341. 1938.

(Apiaceae).

Coll. no. E064. Bhoirymbong, RB.

LN: Jatira

Description: Perennial glabrous herbs, leaflets ovate to elliptic-lanceolate or rhomboid, shallowly serrate to pinnatifid, umbels terminal or leaf opposed flowers white.

Parts used: Leaves

Preparation and application: Leaves taken raw to cure anaemia.

Uses reported in literature:

Meghalaya (Khasi and Jaintia): For stomach pain, constipation, eextract of fresh leaves is taken orally (Maikhuri and Gangwar, 1993).

Sikkim: Fruit for diarrhoea, dysentery and headache (Bennet, 1983).

107) *Oryza sativa* L., Sp. Pl. 333. 1753; FBI 7:92. 1896. (Poaceae).

Coll. no. E122. Nongstoin, WKH.

LN: **Khaw**

Description: Erect annual grass, culms angled, smooth, nearly enclosed in glabrous, strongly nerved leaf sheaths, leaf blades long, more or less scabrous, panicle terminal narrow, spikelets strongly flattened sidewise,

Parts used: Seeds (grains)

Preparation and application: The grains are washed in water and that whitish water is taken as an effective remedy for Urinary Tract Infection.

108) *Osbeckia crinita* Benth., FA 2:292. 1938; FBI 2:517. 1879. (Melastomataceae).

Coll. no. E146. Umktieh Bhoi, RB; E196. Thangsning, EKH.

LN: **Dieng Sohphyrno/ dieng lakum/ kynbat tukhra**

Description: Shrubs, leaves ovate to oblong-lanceolate, cuneate to rounded at base, acute or acuminate, flowers purple, in terminal and upper axillary corymbose cymes, capsules ovoid narrowed into a neck. (PLATE 8, L)

Parts used: Stem bark, root bark, roots, leaves.

Preparation and application: Stem bark or underground part crushed, boiled and the juice is taken against blood dysentery. Root bark dried, powdered and taken for all kinds of stomach troubles. For anaemia and diabetes the root is boiled and the juice is taken. Leaf paste applied for cuts and wounds.

Uses reported in literature:

Nagaland: Root and bark for indigestion and stomachache. (Rao, 1981b).

Meghalaya: Bark on cuts, wounds and snake bite to stop bleeding (Rao, 1981a).

109) *Osbeckia capitata* Walp., Nov. Act. Acad. Caesp. Leop.- Carol Nat. Cur. 19 suppl. 1:331. 1843; FJ 1:206. 1981; FA 2:295. 1938; FBI 2:516. 1879. (Melastomataceae).

Coll. no. E385. Siatbakon, EKH.

LN: **Jalyngkthem rit**

Description: Herbs, upto 50 cm, leaves sessile, rounded at base, acute, flowers pinkish- purple, terminal capsules ovoid.

Parts used: Root

Preparation and application: Root bark dried, powdered and taken for all kinds of stomach troubles.

Uses reported in literature:

Meghalaya: Leaf for maggots of cattle (Kharkongor and Joseph, 1981).

110) *Oxalis corniculata* L. Sp. Pl. 435. 1753; FBI 1:436.1874. (Oxalidaceae).

Coll. no. E202. Mawlai, EKH.

LN: **Sohkhia khnai**

Description: A weed abundant in cultivated places, herbaceous, stems creeping or decumbent, leaves palmately 3-foliolate with long petiole, leaflets obcordate, flowers yellow, sub umbellate.

Parts used: Whole plant

Preparation and application: Whole plant ground with *Drymaria diandra* Blume, mixed with water and taken against fever having vomiting. Whole plant paste taken for stomach problems.

Uses reported in literature:

Meghalaya: Whole plant mixed with ginger is applied for snakebites; leaf juice with honey cures chronic cough; whole plant taken during dysentery. (Joseph and Kharkongor, 1981). Leaf paste is applied and taken orally for snake bite; leaf juice for chronic cough and dysentery (Rao, 1981a).

Assam: Plant juice is used in jaundice (Das and Saikia, 2001).

Manipur: Whole plant eaten raw for bowel disorder and easy digestion (Sinha, 1987).

Uttarakhand: Leaf juice is given to children at the time of scurvy disease (Bisht & Pundu, 2008).

Uttaranchal: Leaf paste is applied on skin ulcer and wound (Uniyal and Shiva, 2005).

111) *Paederia scandens* (Lour) Merr. in Contr arn Arb 8:163, 1934.

Paederia foetida L. FBI 3:195. 1881. (Rubiaceae)

Coll. no. E069. Thangsning, EKH.

LN: **Jyrmis ma iwtung**

Description: Slender climber, foetid when bruised, leaves simple, opposite, long petioled, lanceolate, flowers in axillary paniced cymes.

Parts used: Leaves

Preparation and application: See (102).

Uses reported in literature:

Meghalaya: Whole plant for rheumatism (Rao and Shanpru, 1981).

Manipur: Leaf for dysentery and stomach disorder (Sinha, 1987).

Assam: Leaf for diarrhoea and dysentery (Hajra and Baishya, 1981).

Arunachal (Chakma): Whole plant extract is taken for treatment of urinary disorder, kidney stone and digestive problems (Sarmah, *et al.*, 2008).

112) *Panax wangianus* S. C. Sun., in Icon. Pl. Omeiensum 2:194.1946. (Araliaceae).

Coll. no. E065. Thangsning, EKH.

LN: **Ginseng**

Description: Perennial plant, rootstock long with scars of fallen stems, stem erect, leaves palmately compound, leaflets 5, oblong, margin serrate, peduncle arising from tip of aerial stem, erect bearing a single terminal umbel. (PLATE 9, A)

Parts used: Rhizome

Preparation and application: Dried root powder mixed with powdered stem bark of *Taxus baccata* and whole plant of *Viscum articulatum* Burm. is mixed in water and five teaspoonful of the juice is given for treatment of cancer.

113) *Passiflora edulis* Sims. Mag. t. 1949.1818; FA 2:323. 1938. (Passifloraceae).

Coll. no. E033. Mawlai, EKH.

LN: **Sohbrap**

Description: Twining shrubs, leaves palmilobed, stipules thread like. Flowers pedunculate, corona of one or more rows of fine threads springing from the throat of the calyx tube.

Parts used: Leaves and fruits.

Preparation and application: Leaves are boiled in water and juice taken against stomach troubles, diabetes and high blood pressure. The pulp of fruits is taken as a brain tonic.

Tender leaves are ground with *Psidium guajava* L., leaves and the juice taken in blood dysentery. For dysentery leaves of *Passiflora edulis* Sims., bark of *Myrica esculenta* Buch. Ham., rhizome of *Curcuma longa*, leaves of *Prunus persica*, Benth et Hk. f., are ground and taken.

Uses reported in literature:

Nagaland: Root with leaf of *Artemisia parviflora* and bark of *Erythrina arborescens* for sores and leaf for stomachache (Megoneitso and Rao, 1983).

114) *Peperomia heterophylla* (Forst. f.) Hook. & Arn. Bot. Beech. Voy. 2:96. 1832. FJ 2:395. 1983. (Piperaceae).

Coll. no. E330. Laitlyngkot, EKH.

LN: **Bat kudam**

Description: Epiphytic, annual or perennial, succulent herbs, densely branched, leaves orbicular, obtuse or rounded, coriaceous, fleshy, spikes solitary, white hairy, bracts orbicular.

Parts used: Leaves.

Preparation and application: Leaf paste applied for wounds and injuries.

115) *Phlogacanthus thyrsiflorus* (Roxb.) Nees in Wall. Pl.As. Rar. 3:99.1832; FBI 4:512. 1885; FA 3:443.1939; FJ 2:360. 1983; FFM 2:665.1987. (Acanthaceae).

Coll. no. E.270. Wahkdait, EKH.

LN: **Soh byrguh.**

Description: Shrubs, 3-4m high, bark greyish-brown, branchlets quadrangular, leaves oblanceolate to elliptic, acuminate, spikes 10-25cm long, flowers deep red.

Parts used: Leaves

Preparation and application: Leaf paste taken to cure dysentery and diarrhoea.

116) *Phrynium pubinerve* Blume, Enum. Pl. Jav. 1:38.1827; FJ 2:530. 1983. (Marantaceae).

Coll. no. E105. Bhoirymbong, RB.

LN: **Sla met**

Description: Herbs with widely creeping rhizome, leaves oblong, rounded or abruptly cuneate at the base, spikes on upper half of the petioles, bracts red, flowers purplish red.

(PLATE 9, B)

Parts used: Leaves

Preparation and application: See (99), (125).

Uses reported in literature:

Meghalaya (War Jaintia): Tuber as masticatory (Kumar *et al.*, 1987).

117) *Phyllanthus glaucus* Wall. ex Muell.-Arg. *Linnaea* 32:14. 1863; *FBI* 5:288. 1887; *FFM* 2:798. 1987.

Flueggeopsis glauca (Wall.)A. Das *FA* 4:158.1940. (Euphorbiaceae)

Coll. no. E221. Bhoirymbong, RB.

LN: **Sohrynniaw**

Description: Shrubs, branches divaricate, leaves obovate- oblong, obtuse, base rounded, glaucous beneath, flowers yellow, fruits globose.

Parts used: Leaves

Preparation and application: Leaves are fried in coconut oil and applied for external sores.

118) *Pinus kesiya* Royle ex Gordon, *FA* 4:341. 1940. (Pinaceae).

Coll. no. E203. Mawlai, EKH.

LN: Kseh khasi

Description: A tall gregarious tree, branched whorled, shoots dimorphic (long and short), leaves needle like, female cones solitary or whorled.

Parts used: Shoots

Preparation and application: Young shoots are taken early in the morning to get relieve from cough in children.

Uses reported in literature:

Manipur (Tangjhul Naga): Whole plant for skin diseases (Elangbam *et al.*, 1989).

119) *Piper betel* L. Sp. Pl. 28. 1753; FJ 2:396. 1983; FBI 5:85. 1886; FA 4:35. 1940.
(Piperaceae).

Coll. no. E260. Wahkdait, EKH.

LN: Tympew/ pathi

Description: Large woody climbers, leaves ovate or oblong ovate, cordate at base, acute to acuminate, petioles 1-4 cm, female spikes 10-12 cm, berries immersed in rachis.

Parts used: Leaves

Preparation and application: Leaf paste is applied for cuts and wounds. In case of cough in children, just before going to bed at night two big clean leaves are taken and mustard oil is applied over them, the leaves are warmed over fire and covered over the chest and back of the child. This is left overnight and removed next morning.

To get rid of diseases due to evil eye three clean leaves are smeared with oil and a pinch of slake lime applied on each of them, then it is burnt over the fire or thrown on the roadside, together with chanting of mantras to chase the evil eye away. Also see (12).

Uses reported in literature:

Meghalaya: Leaf juice as an eye drop for eye troubles (Kharkongor & Joseph , 1981).

Assam: tuber with seed of black pepper for permanent sterilization (Majumdar *et al.*, 1978).

120) *Piper peepuloides* Roxb. Fl. Ind. 1:159. 1820; FA 4:34. 1940; FBI 5:83. 1886; FFM 2:708. 1987. (Piperaceae).

Coll. no. E271. Wahkdait, EKH.

LN: **Sohmrit khlaw**

Description: Glabrous undershrubs, often erect, leaves ovate, ovate lanceolate, acuminate, base rounded or cordate, flowering spikes long yellow, fruiting spikes black cylindric, erect.

Parts used: Fruits

Preparation and application: Dried ripe fruits are taken raw mixed with honey or mustard oil as a remedy against whooping cough. Also see (4).

Uses reported in literature:

Sikkim: Fruit for cough (Krishna and Singh, 1987).

121) *Plantogo erosa* Wall. in Roxb. Fl. Ind. 1:423. 1820; FA 3:531. 1939; FJ 2:384. 1983.

Plantogo major L., FBI 4:705.1885. (Plantaginaceae).

Coll. no. E028. Mawlai, EKH.

LN: **Shkor blang/ bat runai**

Description: Herbs, rootstock erect, stout, leaves radical, ovate oblong, cuneate or decurrent at base, peduncles axillary, flowers sessile, corolla white, seeds peltate, angled, black.

Parts used: Leaves

Preparation and application: Leaf paste mixed with lime is applied in diseases of the nails, cuts, wounds and injuries. Also see (124).

Uses reported in literature:

Meghalaya: Whole plant on burns (Rao, 1981a). Leaf on cuts and wounds (Kumar *et al.*, 1987).

Arunachal (Sinpho): Whole plant for inflammation (Tiwari *et al.*, 1979).

Manipur: Leaf for boils and on wounds and seed for abortion (Sinha, 1987).

Uttaranchal: Used for digestion (Uniyal and Shiva, 2005).

122) *Plectranthes striatus* Benth. Wall. Pl. As. Rar. 2:17.1831; FJ 2:376. 1983; FBI 4:618. 1885; FA 3:507. 1939. (Lamiaceae).

Coll. no. E339. Smit, EKH.

LN: **Jashun**

Description: Herbs, leaves ovate, rounded or acute at base, acuminate, verticillasters in terminal or upper axillary paniculate racemes, corolla white with purple patches on lower lip.

Parts used: Leaves

Preparation and application: Leaf paste applied for scabies in between the toes.

Uses reported in literature:

Meghalaya: Leaf on corns. (Kharkongor and Joseph, 1981).

123) *Potentilla fulgens* Wall., FBI 2:349. 1878. (Rosaceae).

Coll. no. E080. Umtyngar, EKH

LN: Lynniang

Description: Perennial silky herbs, rootstock very stout, leaflets clothed with silvery hairs, flowers panicled or corymbose. (PLATE 9, D)

Parts used: Roots

Preparation and application: Roots are boiled in water and the juice taken or root in dried powdered form is taken half teaspoon three times daily against high blood pressure. Root is also consumed raw against urinary troubles, diabetes and for dissolution of kidney stones (lithotriptic). The root is boiled in water together with leaves of *Ageratina adenophora* (Spr) King & Rob., *Rubia cordifolia* L. and the juice is taken for one week to cure gastric troubles (carminative).

Uses reported in literature:

Uttaranchal: Leaf paste used in mouth ulcer (Uniyal and Shiva, 2005).

124) *Polygonum nepalense* Meisn. Monogr. 84. t. 7. F. 2. 1826; FJ 2:391. 1983

Polygonum alatum Spreng. Syst. Cur. Post. 154. 1827; FBI 5:41. 1886.

(Polygonaceae).

Coll. no. E005. Laitlyngkot, EKH.

LN: **Jakyrphuh**

Description: Herbs, stems rarely creeping for a short distance at the base, glabrous, leaves small ovate or acute narrowed into a broadly winged often amplexicaul petiole, sepals white or pale purple.

Parts used: Whole plant

Preparation and application: Whole plant paste applied for boils. Leaf paste applied for toothaches and taken orally for dysentery. Leaf paste of *Polygonum nepalense* Spreng. and *Plantago major*, L. is applied for burns. Also see (125).

125) *Polygonatum oppositifolium* (Wall.)Royle, III Bot. Himal. 1:380. 1839; FBI 6:320.

1892. (Liliaceae).

Coll no. E044. Thangsning, EKH.

LN: **Sying maw**

Description: Stem tall furrowed, leaves opposite, shortly petioled coriaceous oblong acuminate, shining above, perianth white and berry ovoid, scarlet. **(PLATE 9, C)**

Parts used: Rhizome

Preparation and application: Its rhizome along with mature leaves of *Zanthoxylum acanthopodium* DC., *Pteris wallichiana* Ag. rhizome, *Sarcandra glabra* (Thunb.)

Nakai., leaves (more quantity than the others) and *Polygonum nepalense* Meisn., leaves are mixed together and ground. The fine mixture is then wrapped into many small packets using *Phrynium pubinervi* Bl., leaves and the packets are heated in the fire and covered with ash so that they do not get burnt. After half an hour all the packets are taken out while it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented on the body of persons suffering from cancer, leprosy and also paralytic patients. This hot mixture is effective in treating various kinds of skin diseases as well. (PLATE 12, A-C)

In case of boils, the rhizome of *Polygonatum oppositifolium* Royle and tubers of *Eulophia nuda* Lindl. and stem of *Clematis gouriana* DC. is made to paste and applied locally.

126) *Polystichum pseudotsus-simense* Ching. in Bull. Fan. Mem. Inst. Biol 2: 190-191. 1931 (Aspidiaceae).

Coll. no. E 222. Bhoirymbong, RB.

LN: **Tyrkhang nar Bhoi**

Description: Terrestrial ferns, rhizome erect, paleaceous, paleae polymorphous, basifixed, fronds 60-75x17-20mm, tufted lanceolate-oblong, bipinnate, caudate, acute, stipw 35-40cm long, base grooved dorsally and dorso-laterally smaller upwards, rachis similar not proliferous, lamina 30-40cm long, pinnae about 13 pairs below the pinnatifid apex, the largest in the middle, sori terminal, median a bit closer to margin, spores, blackish brown. (PLATE 9, E)

Parts used: Fronds.

Preparation and application: Leaves crushed and applied as first aid in case of burns.

127) *Pouzolzia hirta* (Blume) Hassk. Cat. Hort. Bogor. 80. 1844; FJ 2:451. 1983; FBI 5:586. 1888; FA 4:291. 1940. (Urticaceae).

Coll. no. E348. Smit, EKH.

LN: **Jamynsleh/bat kris**

Description: Herbs, leaves oblong lanceolate, cordate at base, acute, flowers in clusters axillary.

Parts used: Leaves and roots.

Preparation and application: Root paste applied locally for boils. Leaf paste applied for wounds, bone fractures and rheumatism.

Uses reported in literature:

Sikkim: Whole plant for bodyache and stiffness of muscles (Srivastava *et al.*, 1987).

128) *Prunus persica* (L.)Batsch., Beytr. Pragm. Gesch. Naturr. 1:30. 1801; FBI 2:313. 1878; FA 2:182. 1938. (Rosaceae).

Coll. no. E174. Mawlai, EKH.

LN: **Soh phareng**

Description: Moderate sized tree, leaves oblong lanceolate, acuminate, sharply serrate, flowers pink, drupe downy, succulent, stone deeply and irregularly furrowed.

Parts used: Leaves

Preparation and application: Leaf paste taken for diarrhoea. Also see (113).

Uses reported in literature:

Manipur: Leaf for swelling on foot of cattle due to infection (Sinha, 1987).

129) *Psidium guajava* L., Sp. Pl. 470. 1753; FBI 2:468. 1878; FFM 1:391. 1985; FA 2:287. 1938. (Myrtaceae).

Coll. no. E399 Mawlai, EKH.

LN: **Soh priam**

Description: Middle sized trees, leaves oblong, elliptic-oblong, base cordate, flowers greenish white, berry yellowish white seeds immersed in pulp.

Parts used: Leaves

Preparation and application: Young tender leaf juice is taken against diarrhoea and blood dysentery.

Uses reported in literature:

Meghalaya (War Jaintia): Green bark and leaf for dysentery, stomachache and vomiting (Kumar *et al.*, 1987).

Assam: Leaf with root of *Sida* sp. and goat milk for jaundice (Tiwari *et al.*, 1987).

130) *Pteris wallichiana* Ag., Rec. Sp. Gen. Pteridophytes 69.1839; FFAM 111.1982.

(Pteridaceae).

Coll. no. E072. Thangsning, EKH.

LN: Tyrkhang shatri

Description: Rhizome short, suberect, fronds irregularly branched in trichotomy, erect, upto 100x 50cm, tri or quadripinnatifid. Stipes erect upto 75cm long, glabrous, purple slender, rachis trichotomously forked at base, bearing two lateral pinnae and one terminal pinna; lateral pinnae, bi or tripartite at their basioscopic edge, terminal pinna not forked, glabrous above, hairy beneath. Veins forked, acroscopic one pair anastomosing above the sinus, others free. Sori confluent marginal confined to basal region of pinnules along the sinuses, spores light brown. **(PLATE 9, G)**

Parts used: Rhizome

Preparation and application: See (125) & (147).

131) *Pyrus pashia* Ham., Don. Prodr. 236; FA 2:216. 1938; FBI 2:374. 1878.
(Rosaceae).

Coll. no. E191. Laitlyngkot, EKH.

LN: Dieng Sohshur/ Soh dieng shieng

Description: A medium sized tree, bark rough, leaves ovate-elliptic, lanceolate, flowers white, in short corymbs, or fascicles at the ends of short lateral branches, fruit globose, depressed at the top, somewhat rough with raised white specks, dark brown when ripe.

Parts used: Stem bark and fruits.

Preparation and application: Stem bark boiled in water and the juice taken for gastric troubles. The fruits are ground mixed with garlic, mustard oil and honey, the mixture is taken for relieve of cough.

Uses reported in literature:

Uttaranchal: Fruit juice is used in eye injury (Uniyal and Shiva, 2005).

132) *Ranunculus diffusus* DC., Prodr 1:38. 1824; FBI1:19. 1872. (Ranunculaceae)

Coll. no. E393. Mairang, WKH.

LN: **Kynbat pang bniat**

Description: A perennial diffuse or prostrate herb, usually densely hirsute, leaves 3-partite, peduncles one flowered, terminal or leaf opposed, flowers yellow, achenes ovate, compressed.

Parts used: Leaves

Preparation and application: Paste of leaves applied inside the mouth for cure from toothaches.

133) *Remusatia vivipara* (Lodd.) Schott, Melet.1:18.1832; FBI 6:521.1893; FJ 2:565.

1983. (Araceae)

Coll. no. E354. Tyrsad, EKH.

LN: **Shriew maw/ Kynbat tah thung**

Description: Tuberous herbs, tubers depressed-globose, pinkish outside, pale pink inside, leaves broad, ovate-cordate

Parts used: Yam

Preparation and application: Paste of the yam is applied locally on boils.

134) *Rhus chinensis* Mill., Gard. Dict. ed. 8. sub.n.7. 1768; FN 76. 1982.

Rhus semialata Murray, in Comm. Soc. Goett 5:27. t. 3, 1784; FBI 2:10.1876; FA 1:331. 1934. (Anacardiaceae).

Coll. no. E053. Bhoirymbong, RB.

LN: **Sohma / Sohmluh**

Description: A small tree, branchlets, petiole, and leaves beneath clothed with a dense soft pubescence, petiole winged above, panicle large, broad with a stout peduncle, flowers small, yellowish, drupes pink.

Parts used: Fruits

Preparation and application: Dried fruits are taken against dysentery.

Uses reported in literature:

Meghalaya (Khasi and Garo): Fruits soaked in water taken for stomachache; boiled buds taken for diarrhoea (Rao 1981). For stomach pain, intestinal worm infestation decoction of fruits is taken orally (Maikhuri and Gangwar, 1993).

135) *Rhynchosyris ellipticum* (D. Dietr.) A. DC., DC. Prodr. 9:285. 1845; FBI 4:373.1884; FA 3:399. 1939; FFM 2:654. 1987; FJ 2:344. 1983. (Gesneriaceae).

Coll. no. E054. Bhoirymbong, RB.

LN: **Jamehek**

Description: Shrubs, young parts downy tomentose, bark greyish white, cymes on leafless lower nodes, flowers pink.

Parts used: Leaves

Preparation and application: Juice of boiled leaves taken as tonic to regain strength after recovery from illness.

136) *Ricinus communis* L., Sp. Pl. 1008. 1753; FN 242.1982; FFM 2:803.1987.

(Euphorbiaceae).

Coll. no. E333. Smit, EKH.

LN: **Sla ryndi/ Sla ryndia**

Description: Small trees, leaves alternate, broad, palmately 7 to many lobed, flowers large in terminal sub panicled racemes, monoecious, apetalous upper male crowded, lower female.

Parts used: Leaves

Preparation and application: Leaf paste of *Ricinus communis* and *Citrus medica* together applied for skin diseases. Also see (68).

Uses reported in literature:

Meghalaya: Leaf for body swelling and rheumatism (Kharkongor and Joseph, 1981).

Tamil Nadu: Juice extracted from leaves is used to increase secretion of milk and oil of seeds is used to treat stomachache (Muthu *et al.*, 2006).

Solan (Himachal Pradesh): Leaves are used for aching joints, swelling of stomach, paste of seeds is applied over skin ulcers, oil of seeds for constipation, root paste taken orally for inducing abortion (Verma and Chauhan, 2006).

Uttaranchal: Root and bark are used in asthma, bronchitis and skin diseases. Fruits are used to cure jaundice. Leaf with hot steam is applied for knee pain (Uniyal and Shiva, 2005).

137) *Rosa indica* (Rosaceae).

Coll. no. E287. Lad Umroi, RB.

LN: **Tiew kulab saw**

Description: Perennial shrub armed with prickles, leaves petiolate, ovate, serrate, adnate stipules, flowers solitary, bracteate, red and sweetly scented

Parts used: Flowers

Preparation and application: Unopened flower buds consumed for skin diseases including removal of pigmentation on the face.

138) *Rotala rotundifolia* (D. Don) Koehne, Bot. Jahrb. 1:172. 1880; FJ 1:207. 1981. (Lythraceae).

Coll. no. E040. Umtyngar, EKH

LN: **Bat dohkoid**

Description: Glabrous perennial herbs, rhizomes creeping, leaves opposite, sessile, flowers purplish pink borne in long terminal simple racemes.

Parts used: Leaves

Preparation and application: Leaf paste is applied for boils.

Uses reported in literature:

Manipur: Dried plant powder paste mixed with lime is applied externally to cure eczema (Jain *et al.*, 2007).

139) *Rubia cordifolia* L., Sp. Pl. 397. 1753; FJ 1:238. 1981; FFM 2:503. 1985; FA 3:94. 1939; FBI 3:202. 1880. (Rubiaceae).

Coll. no. E246. Thangsning, EKH.

LN: **Jyrmisaw/ Kynbat thar/ Mei rihoi**

Description: Scabrid climbers, leaves ovate acuminate base sub cordate, hospid above and scabrous along nerves beneath, flowers minute in terminal panicles, greenish yellow, fruit purplish.

Parts used: Leaves

Preparation and application: Leaf paste applied for rheumatism, snake bites, cuts and wounds. Leaf paste taken with water to cure diarrhoea and dysentery. Also see (123).

(PLATE 9, H)

Uses reported in literature:

Meghalaya: Root and stem for stomachache, whole plant with whole plant of tobacco and *Leucas lavandulifolia* for caterpillar sting and snake bite (Kharkongor & Joseph, 1981). Leaf for ulcer (Rao, 1981a).

140) *Rubus rugosus* Sm., in Rees, Cyclop. 30:34. 1815. FJ 1:186. 1981. (Rosaceae).

Coll. no. E042. Umtyngar, EKH

LN: **Sohnepbah**

Description: Shrubs, with prickles scattered, leaves with long petiole, suborbicular, usually deeply cordate, panicles terminal and upper axillary, fruit globose, succulent, composed of many scarlet small drupes.

Parts used: Stem bark and fruits.

Preparation and application: Fruits edible taken against cough. Stem bark crushed and taken for mouth ulcers.

Uses reported in literature:

Meghalaya: Fruit for body swelling (Kharkongor and Joseph , 1981).

141) *Rubus ellipticus* Sm., Rees Cyclop. 30: 16. 1819; FBI 2:336. 1878; FA 2:196. 1938. (Rosaceae).

Coll. no. E207. Smit, EKH.

LN: **Sohshiah.**

Description: Suberect shrubs, with reddish bristles, prickles short, leaves pinnately 3-foliolate, leaflets elliptic, flowers white crowded in short terminal leafy panicles, fruits orange.

Parts used: Roots

Preparation and application: Roots are crushed and taken for rheumatism and against dysentery.

Uses reported in literature:

Meghalaya: Root with root of *Osbeckia stellata* and fruit of *Brucea javanica* for dysentery (Kharkongor and Joseph, 1981).

Uttaranchal: Root paste is applied on ulcer and skin infection (Uniyal and Shiva, 2005).

142) *Sansevieria trifasciata* Prain, in Bengal Pl. 2:1054. 1903. (Liliaceae).

Coll. no. E288. Lad Umroi, RB.

LN: **Waitlam**

Description: Evergreen xerophytic herbs, perennial, forming dense stands, spreading by way of its creeping rhizome, leaves fleshy, thick growing vertically from a basal rosette, mature leaves are dark green with light gray-green cross banding.

Parts used: Roots

Preparation and application: Underground part paste is applied for centipede, insect bites and boils.

143) *Sarcandra glabra* (Thunb.) Nakai, Fl. Sylv. Koreana 18: 17. 1930; FJ 2:398. 1983.

Chloranthus brachystachys Blume Fl. Jav. 8:13. t. 2. 1829; FBI 5:100. 1886.

(Chloranthaceae).

Coll. no. E049. Thangsning, EKH

LN: **Tiew Krismas**

Description: Glabrous shrubs, leaves oblong-lanceolate, acute at the base, spikes terminal, often in panicles, flowers white, drupes ellipsoid, bright red. (PLATE 9, F)

Parts used: Leaves and roots

Preparation and application: Its leaves, with rhizome (small pieces) of *Zingiber zerumbet* is made into a paste and applied on wounds where there is collection of pus. Root extract is taken orally for irregular menstrual bleeding. Also see (125).

Uses reported in literature:

Meghalaya: Whole plant for blood deficiency, paralysis and roots to bring down body temperature of children in fever (Joseph and Kharkongor, 1981).

144) *Scutellaria discolor* Colebr., Wall. Pl. As. Rar. 1:66. 1830; FJ 2:375. 1983; FBI 4:667. 1885; FA 3:519. 1939. (Lamiaceae).

Coll. no. E308. Mawkyrwat, WKH.

LN: **Jalem shynrang**

Description: Herbs with creeping rootstock, leaves suborbicular, opposite, long petioled, verticillasters in terminal long racemes, corolla pale blue.

Parts used: Leaves

Preparation and application: Leaf paste applied locally for snake bites.

Uses reported in literature:

Meghalaya: Root and leaf for nausea and vomiting and leaf for constipation, flatulence, indigestion, skin afflictions and snake bite (Kharkongor and Joseph, 1981).

Manipur: Leaf on wounds (Sinha, 1987).

145) *Sechium edule* (Jacq.) Sw., Fl. Ind. Occ. 2:1150. 1800; FFM 1:424. 1985.

(Cucurbitaceae).

Coll. no. E335. Smit, EKH.

LN: **Biskot**

Description: Climber, leaves broadly ovate, flowers monoecious, greenish, fruits with single viviparous seeds.

Parts used: Young shoots

Preparation and application: For dissolution of gallstones, kidney stones the tender shoots are boiled and when cooled the resultant juice is taken.

146) *Sida rhombifolia* L., Sp. Pl. 684. 1753; FBI1:323. 1874; FJ 1:97. 1981.

(Malvaceae)

Coll. no. E283, Bhoirymbong, RB.

LN: **Synsar dwar**

Description: Undershrubs, leaves oblong-lanceolate, obtuse, acute to; truncate at base, stipules filiform, flowers yellow, axillary solitary or in clusters of 2-5 mericarps flattened trigonous.

Parts used: Leaves

Preparation and application: Paste of leaves applied for cuts and wounds.

Uses reported in literature:

Tamil Nadu (Malasar): Plant crushed and applied externally on the head to treat headache and inflammation in eyes (Kumar *et al.*, 2007).

Uttaranchal: Root juice is useful for children in stomachache (Uniyal and Shiva, 2005).

147) *Smilax ferox* Kunth, Enum. Pl. 5:251. 1850; FBI 6:307. 1892. (Smilacaceae).

Coll. no. E098. Thangsning, EKH

LN: **Shiah krot**

Description: A stout shrub, branches strongly prickly, leaves epunctate and elineolate, umbels from the young shoots only.

Parts used: Roots

Preparation and application: For dissolution of kidney stones *Smilax ferox* Kunth roots, bark of *Symplocos paniculata* (Thunb.) Miq., along with *Pteris wallichiana* Ag. rhizome are pounced in a mortar and then the mixture is boiled in water. One cup of this solution is taken daily three times a day.

148) *Solanum torvum* Sw., Prodr. 47; FBI 4:234. 1883; FFM 2:648. 1987. (Solanaceae).

Coll. no. E149. Umktieh Bhoi, RB.

LN: **Soh pdok**

Description: A shrub, stem prickly, leaves lobed stellately tomentose beneath, without prickles. Berry globose, smooth much exceeding the triangular oblong unarmed calyx lobes.

Parts used: Fruits

Preparation and application: A plate filled with water is taken and then a red hot iron dao (big iron knife used for cutting wood) which was heated over the fire till it becomes

red is placed on top of this plate. Dried seeds of *Solanum torvum* Sw. are put on one corner of the heated dao and the seeds are covered with a hollow tube. A small amount of mustard oil is poured on the seeds through the tube. The seeds get burnt in mustard oil due to the heat from the hot dao and fumes appear and come out through the tube, the fumes are allowed to circulate in the buccal cavity to prevent dental caries or to get relieve from toothaches. This should be done early in the morning before brushing the teeth and before taking any food.

Its fruits along with ginger are crushed together and taken with warm water for giddiness and dizziness.

Uses reported in literature:

Meghalaya: Leaf for snake bite and fruits for toothache (Joseph and Kharkongor, 1981).

Manipur: Fruits for cough and tonsil complaints (Sinha, 1987).

Tamil Nadu: Juice extracted from the leaf is used to reduce body heat and unripe fruits are used to strengthen the body (Muthu, *et al.*, 2006).

Arunachal (Chakma): Boiled and crushed fruits taken as remedy for enlarged spleen (Sarmah, *et al.*, 2008).

149) *Solanum myriacanthum* Dunal., Hist. Solan. 218. t. 19. 1813 et. DC. Prodr. 13:243. 1852.

Solanum khasianum Clarke FBI 4:234. 1884; FA 3:371. 1939. (Solanaceae).

Coll. no. E331. Mawlai, EKH.

LN: Sohpdok

Description: Spiny undershrubs, leaves broadly ovate, variously shallowly lobed and angled, acute hirsute, on both surfaces, long straight spiny along main nerves and petiole, flowers greenish white berries bright yellow when ripe.

Parts used: Fruits

Preparation and application: Seeds are chewed to prevent dental carries and to get relieve from toothaches.

Uses reported in literature:

Meghalaya: Leaf for snakebite and fruit for toothache (Kharkongor and Joseph, 1981).

150) *Sonchus brachyotus* DC., Prodr.7:186. 1838; FI 12:320. 1995. (Asteraceae).

Coll. no. E30. Mawlai, EKH.

LN: Jalynniar

Description: Herbs, perennial, rhizomatous, leaves radical, cauline, glabrous, entire or spinous toothed, rounded or acute at apex, heads cylindric, involucrel bracts many seriate, ligules yellow achenes dark yellowish.

Parts used: Whole plant

Preparation and application: Young leaves taken raw to stop white discharge in women. Whole plant taken raw to cure anaemia.

Uses reported in literature:

Assam (Boro): Whole plant on wounds to relieve pain (Baruah and Sarma, 1984).

151) *Spilanthes paniculata* DC., Prodr. 5:625. 1836. (Asteraceae).

Coll. no.048. Bhoirymbong, RB.

LN: **Jasat**

Description: Annual herbs, rooting at basal nodes, leaves opposite, ovate, heads numerous paniced, florets yellow.

Parts used: Flowers

Preparation and application: Brushing teeth with inflorescence relieves toothache.

152) *Stachytarpheta dichotoma* Vahl., Enum. Pl. 1: 207. 1804. FFM 2:688. 1987.

(Verbenaceae).

Coll. no. 327. Umsning, RB.

LN: **Jaiong khlaw**

Description: Branched undershrubs, branches dichotomous, leaves ovate-elliptic, acute, dentate, spikes decurved, flowers whitish blue.

Parts used: Leaves

Preparation and application: Leaves for brushing teeth to relieve toothaches.

153) *Sterculia villosa* Roxb., Cor. Pl. 1:25. t. 24. 1795; FBI 1:355. 1874; FA 1:151.

1934. (Sterculiaceae).

Coll. no. 058. Bhoirymbong, RB.

LN: **Tluh**

Description: Lofty, deciduous tree, bark brown, leaves crowded at branch tips, deeply palmately, 5-7 lobed, lobes acuminate, inflorescence dull brown pubescent, racemes dense, pendulous flowers greenish yellow, fragrant.

Parts used: Stem bark

Preparation and application: The stem bark is boiled in water and that water is used for bathing to cure allergic rashes (antiallergic).

Uses reported in literature:

Manipur: Unripe fruits with salt for dysentery (Sinha, 1987).

Assam: Bark for constipation (Jain and Borthakur, 1980).

154) *Stereocaulon macrocephalum* Mill. Arg., Fl. 74:371. 1891, Lamb, J. Hattori Bot. Lab. 43:272; Pant & Upreti in Mukerji et. al. (eds), Biol. Lichens 262. 1999. (Stereocaulaceae).

Coll. no. 172. Umtyngar, E K H.

LN: Niut maw

Description: Pseudopodetia erect, 1.5-2.5 cm tall, simple or bifurcating at apex, ca 2m diam, brown, surface rugose, corticate, phyllocladia cylindrical terete, densely covering the pseudopodetia 1-2mm long, sometimes furcated; cephalodia brown, lateral, usually near base subglobose, up to 1mm diam, protosacculate, containing Nostoc. Apothecia brown- black to black, 1-2 diam; spores vermiform, 16-26 septate, 105-120x3-6 μ m, one end round other end tapering. (PLATE 9, H)

Parts used: Whole plant

Preparation and application: The matured plants are collected from the rock surfaces and properly cleaned to remove sand and dust particles. Then they are dried under the sun. For treating burns on any part of the body a small amount of the dry plant material is heated over fire in a frying pan until it becomes hard and brownish. The contents are ground to fine powder and the powder is applied locally on burns with blisters or pus collection to heal. The lichen has antiseptic as well as fast healing properties.

155) *Strobilanthes flaccidifolius* Nees., in DC. Prodr. 11:194; FBI 4:468.1884.
(Acanthaceae).

Coll. no. E340. Smit, EKH.

LN: **Lamuh iong**

Description: A glabrous shrub, leaves elliptic acute at both ends, spikes forming dense panicles, flowers opposite many remote, bracts petioled, ovate, deciduous.

Parts used: Leaves

Preparation and application: See (68).

156) *Swertia agustifolia* Ham., in Don Prodr. 127; FBI 4:125. 1883. (Gentianaceae).

Coll. no. E125. Nongstoin, WKH.

LN: **Charita**

Description: A perennial herb, leaves linear lanceolate, opposite, flowers greenish yellow.

Parts used: Leaves and roots.

Preparation and application: Leaves and roots are taken for treating malaria. Also see (47).

157) *Symplocos glomerata* King ex. Cl., in FBI 3:577. 1882; FA 3:210. 1939; FFM 2:576. 1987. (Symplocaceae).

Coll. no. E233. Umktieh Bhoi, RB.

LN: **Dawai suhot**

Description: Small trees, leaves oblong-lanceolate, base narrowed, fascicles in leafy and fallen leaf axils, flowers yellowish.

Parts used: Stem bark

Preparation and application: Stem bark paste mixed with water is taken for blood dysentery.

158) *Symplocos chinensis* (Lour.) Druce, in Rep. Bot. Ench. Cl. Brit. Isles 1916, 650. 1917. (Symplocaceae).

Coll. no. E234. Umktieh Bhoi, RB.

LN: **Jajew ding**

Description: Small tree, leaves lanceolate, flowers fragrant, yellowish white, in axillary panicles.

Parts used: Roots

Preparation and application: Root taken for constipation.

159) *Symplocos laurina* (Retz.) Wall. ex. Rehd. & Wils., in Sargent Pl. Wils 2:594.
1916. FFM 2:576. 1987.

Symplocos spicata Roxb., Fl. Ind. 2:541. 1832; FBI 3:573. 1882; FA 3:210. 1939.
(Symplocaceae).

Coll. no. E194.Thangsning, EKH.

LN: **Dieng Sohkpei**

Description: Middle sized tree, bark grayish brown, leaves lanceolate- elliptic, acuminate or acute, sub entire, midrib impressed above, flowers white fragrant, fruits globose.

Parts used: Leaves

Preparation and application: Mature leaves taken one piece at a time to bring down high fever.

160) *Symplocos paniculata* (Thunb.) Miq., in Ann. Mus. Bot. Lugd. Bat. 3:102. 1867;
FJ 1:297. 1981; FFM 2:578. 1987.

Symplocos crataegoides D. Don, Prodr. 145. 1825; FBI 3:573.1882.

Coll. no. E384. Thangsning, EKH.

LN: **Diengiong**

Description: Trees, bark light grey, leaves obovate-lanceolate, acute or acuminate, flowers fragrant, yellowish white, in axillary and terminal panicles. **(PLATE 9, I)**

Parts used: Stem bark

Preparation and application: See (147).

161) *Tabernaemontana divaricata* (L.) R. Br., in R. & S. Syst. 4:427.1819; FBI 3:647.

1882; FJ 2:311. 1983. (Apocynaceae)

Tabernaemontana coronaria Br. FA 3:255.1939.

Coll. no. E133. Umsyiem, EKH.

LN: **Syntiew khlaw**

Description: A shrub, much dichotomously branched, leaves caudate rather coriaceous, flowers pure white, fragrant in axillary or terminal lax corymbose cymes.

Parts used: Leaves

Preparation and application: Leaf paste with lime is applied for insect bites and skin diseases.

Uses reported in literature:

Meghalaya: Whole plant has anthelmintic properties and leaf paste is applied to relieve headache and fever (Joseph and Kharkongor, 1981). Leaf on sores and boils, fruit latex for eye diseases (Kumar *et al.*, 1987).

Arunachal: Root for pain after delivery, root and leaf as plaster on rheumatic joints (Nath & Bordoloi, 1989).

162) *Tricyrtis maculata* (D. Don.) Macbr. in Contr. Gray Herb. n. s. 3. 53:5. 1918; An Enumeration of The Flowering Plants of Nepal 1:80.1978.

Tricyrtis pilosa Wall. Tent. Fl. Nep. 61. t. 46; FBI 6:359. 1892. (Liliaceae).

Coll. no. E082. Umtyngar, EKH.

LN: **Sohkhia Blei**

Description: Herbaceous, glandular pubescent, leaves cordately amplexicaul, flowers loosely corymbose, yellowish white with purple spots.

Parts used: Leaves

Preparation and application: The leaves are boiled and the juice is taken for blood dysentery.

163) *Thysanolaena latifolia* (Roxb. ex Hornem) Honda, J. Fac. Sci. Univ. Tokyo. Sect. 3. Bot. 3 (1):312-313.1930.

Thysanolaena maxima Herb. O. Kuntze, FBI 7:61. 1897. (Poaceae).

Coll. no. E018. Pynursla, EKH.

LN: **Synsar**

Description: A large glabrous grass, stem solid, leaves coriaceous, mouth of sheaths hairy, spikelets pale yellow, shining.

Parts used: Flowers

Preparation and application: Inflorescence paste, mixed with a pinch of slaked lime is applied locally for treatment of boils and cancer.

Uses reported in literature:

Young stems juice is applied on the eye when eyes become red and dirty (Kharkongor and Joseph, 1981).

164) *Valeriana jatamansii* Jones, As. Res. 2:416. 1790; FJ 1:253. 1981; FFM 2:514. 1987.

Valeriana wallichii DC., Prodr. 4:634. 1830 et Mem. Valer. 15. t. 4. 1832; FBI 3:213.

1881. (Valerianaceae).

Coll. no. E128. Nongstoin, WKH.

LN: **Jatung**

Description: Pubescent erect herbs, rootstock thick, radical leaves persistent, ovate to cordate in shape, panicles dense flowered, flowers white. **(PLATE 10, A)**

Parts used: Whole plant

Preparation and application: Whole plant paste is applied externally after setting a fractured bone and locally applied against diseases of the nails where the nails fall off.

Uses reported in literature:

Uttaranchal: Root extract is given in nervous disorders and fits. Leaf juice is useful for stomachache (Uniyal and Shiva, 2005).

165) *Viburnum foetidum* Wall., Pl. As. Rar. 1:49. t. 61.1830; FBI 3:4. 1880; FA 3:3.

1939; FJ 1:228. 1981, FFM 2:458. 1987. (Caprifoliaceae).

Coll. no. E047. Umtyngar, EKH.

LN: **Sohlang**

Description: Shrubs, leaves rhomboidal, obovate, distantly denticulate, base truncate, compound umbels, flowers white, drupes ellipsoid, bright red when ripe.

Parts used: Fruits

Preparation and application: For irregular menses the fruits are boiled in water and a glass of the juice is taken along with a spoon of honey added to it.

166) *Viola hamiltoniana* D. Don., Prodr Fl. Nepal 206. 1825; FI 2:363. 1993.
(Violaceae).

Viola distans Wall., Trans Med. Phys. Soc. Calc. 7:227. 1835; FBI 1:183. 1872.

Coll. no. E043. Mawsynram, EKH.

LN: **Jamaiang /Kynbat iawoh**

Description: Perennial herbs with slender woody rootstock, leaves ovate, cordate at base, flowers solitary, capsules with persistent style and sepals.

Parts used: Leaves

Preparation and application: Leaf paste is applied on boils. Whole plant used for treating cancer.

167) *Zanthoxylum acanthopodium* DC., Prodr. 1:727. 1824; FBI 1:493. 1875; FFM 1:190. 1985. (Rutaceae).

Coll. no. E074. Thangsning, EKH

LN: **Jaiur khlaw**

Description: A small tree armed with stout prickles, leaves alternate unequally pinnate, cymes axillary, flowers purplish, fruits globose with shining black seeds. (**PLATE 10, B**)

Parts used: Leaves

Preparation and application: See (125).

Uses reported in literature:

Sikkim: Fruit for headache and stomach trouble (Bennet, 1983). Seed for appendicitis (Krishna and Singh, 1987).

Arunachal (Apatani): Fruit eaten for dysentery and stomachache (Pal, 1984).

Manipur: Seed for chronic fever, cough and indigestion (Sinha, 1987).

168) *Zanthoxylum armatum* DC., Prodr. 1:727. 1824; FJ 1:117. 1981; FFM 1:191. 1985. (Rutaceae).

Zanthoxylum alatum Roxb. FBI 1:493. 1875.

Coll. no. E110. Bhoirymbong, RB.

LN: **Jaiur**

Description: Small trees, stems thorny, leaflets oblong-lanceolate, acuminate, panicles pyramidal flowers greenish yellow, fruits reddish, seeds shining black. (PLATE 10, C)

Parts used: Fruits

Preparation and application: Fruits taken as a remedy for toothaches.

Uses reported in literature:

Meghalaya (Garo): Bark with root of *Aristolochia cathartii* and *Cyclea peltata* for small pox (Kumar *et al.*, 1980).

Nagaland: Seed for indigestion and stomachache (Rao and Jamir, 1982a).

Solan (Himachal Pradesh): Fruits help in relieving tooth pain; leaves and fruits are chewed in cases of teeth enamel diseases (Verma and Chauhan, 2006).

169) *Zephyranthes rosea* Lindl., in Bot. Reg. 10:t. 821. 1824. (Amaryllidaceae)

Coll. no. E289. Lad Umroi, RB.

LN: **Tiew piat**

Description: Perennial herb, leaves cylindrical, flowers white borne in erect peduncles.

Parts used: Bulb

Preparation and application: Paste of bulb applied for rheumatism.

170) *Zingiber montanum* (K. D. Koenig) Link ex Dietr., Sp. Pl.1:52. 1831; M. Sabu, Zingiberaceae & Costaceae of South India 231. 2006.

Zingiber cassumunar Roxb. As.. Res. 11:347. t. 5. 1810; A. S. Rao & D. M. Verma, Bull. Bot. Surv. India 14:137. 1972. (Zingiberaceae).

Coll. no. E324 Lad Umsaw, RB.

LN: **Sying Blei/Sying shmoh shynrang**

Description: Rhizomatous herb, Rhizome aromatic, deep yellow inside, stems 1-2m high, leaves sessile pubescent along midrib beneath, inflorescence borne separately from the leafy shoot, peduncle 10-25cm long, spikes ovoid acute at the top, bracts greenish red becoming deep red in age, flowers light yellow. **(PLATE 10, D&E)**

Parts used: Rhizome

Preparation and application: Rhizome paste is taken for chest trouble and rheumatism.

Rhizome of *Zingiber montanum*, *Curcuma aeruginosa* Roxb. *Curcuma montana* Roxb., *Acorus calamus* L., are boiled and the juice is taken to cure urinary tract infection, gynecological problems, stop bleeding after childbirth (antihemorrhagic), restores

normal menstrual problems (emmenagogue), stop white discharge. Rhizome is used against stomachache, ailments due to evil eye and as antidote.

171) *Zingiber rubens* Roxb., in *Asiat. Res.*11:348.1810; *FBI* 6:243.1892. (Zingiberaceae).

Coll. no. E213. Bhoirymbong, RB.

LN: **Sying makhir**

Description: Rhizome upto 2cm thick, reddish yellow within, pungent, leafy shoot upto 1m tall, leaves sessile, membranous, narrowly lanceolate, inflorescence radical, on a leafless peduncle, bracts green turning reddish at maturity, flowers longer than the bracts, corolla tube pale yellow, labellum dark purple, blotched creamy yellow.

Parts used: Rhizome

Preparation and application: To get relieve from toothaches a piece of the rhizome is kept on the affected tooth.

Also see (32), (68).

Uses reported in literature:

Meghalaya: Root with root of *Holmskioldia sanguine* and pseudobulb of *Coelogyne stricta* for bodyache and fever (Kharkongor and Joseph, 1981).

172) *Zingiber zerumbet* (L.) Sm., *Exot. Bot.* 2:103. t. 112. 1804; A. S. Rao & D. M. Verma, *Bull. Bot. Surv. India* 14:137. 1972; *FBI* 6:267. 1892; M. Sabu, *Zingiberaceae & Costaceae of South India* 247. 2006. (Zingiberaceae).

Coll. no. E134. Umsyiem, EKH

LN: **Sying khlaw**

Description: Rhizome large light yellow inside, leaves glabrous or puberulus beneath, inflorescence lateral, on a leafless 20-50cm long peduncle, spike globose, rounded at tip, bracts green or red brown in age, suborbicular, filled with watery mucilage, flowers cream coloured. This species is supposed to be a native of India (Holttum, 1950).

(PLATE 10, I&J; 11, A)

Parts used: Rhizome

Preparation and application: Paste of rhizome with rhizome of *Costus speciosus* applied for leprosy. Rhizome for easy child delivery, malaria, snakebite, in witchcraft. Rhizome given for gastric disorders and stomachaches.

Uses reported in literature:

Manipur: Rhizome for cough and cold (Sinha, 1987).

**The lesser-known medicine ‘*Ka Dawai Ñiangsohpet*’ of the Khasis in Meghalaya,
North east India**

There is an age-old belief of the Khasis in a type of germ that infects the infants and newborns known as ‘*U Ñiangsohpet*’ (Ñiang means germs and sohpet means the navel or umbilical cord in Khasi dialect) and in administering of the herbal medicine ‘*Ka Dawai Ñiangsohpet*’ to eliminate the germs from the body. ‘*Ñiangsohpet*’ is a form of Infantile diarrhoea or irregular bowels and yellowness of the conjunctiva and skin during infancy known as Neonatal jaundice.

Each and every Khasi parent whether young or old, rich or poor believe in the presence of what is known locally as '*U N̄iangsohpet*' in their newly born babies be it girl or boy. However, there is no literature or folklore known of the Khasi tribe which documents the origin of this belief.

It is believed that '*N̄iangsohpet*' are germs, which reside in the lining of the stomach or may be intestines of newly born babies and disturb the digestion processes. When the digestion of the food taken by the baby is disturbed, it is believed that the baby gets diarrhoea and all types of stomach problems, which eventually weakens the body and make them susceptible to various kinds of diseases like chronic cold, fever, constipation, and appetite loss. If the medicine is not administered at an infant stage then as the child grows up the germs multiply inside the body and give rise to various health disorders especially related to the digestive tract.

The germs can be classified into two main types: 1) *N̄iang iong* (Black germs) - They are more in numbers (that is why they appear black in colour) and the treatment takes a longer time at least one year or more. 2) *N̄iang saw* (Red germs) - These are less in numbers and if treated properly can be eliminated from the body within six months. The less prominent ones are 3) *N̄iang stem* (Yellow germs). 4) *N̄iang tamar* (Colour unspecified). The presence of the germs can be felt and the type of germs confirmed by touching or feeling the stomach of the babies. Others confirm their presence by looking at the nail of the thumb of the baby or by pressing the nail of the thumb with the petiole of *Piper betle* L. (Piperaceae) or with a small piece of *Zingiber officinalis* Rosc.,

(Zingiberaceae). Still some can name the type of germ present just by looking at the petticoat that was worn by the baby.

The germs it is believed have come to reside in the stomach of the baby, right from the time it was still in the mother's womb. This was due to the various foodstuffs consumed by the expectant mother. Due to this, advice was sometimes given to the mother to avoid taking *Lycopersicon esculentum* Mill. (Solanaceae), *Solanum melongena* L. (Solanaceae), *Sechium edule* (Jacq.) Sw. (Cucurbitaceae), and Tungrymbai, a local chutney prepared from fermented beans of *Glycine soja* Siebold & Zucc. (Papilionaceae) during the gestation period.

While some elders and local practitioners are of the opinion that it cannot be the presence of germs but they believe the presence of some waste products (known locally as *ka eit 'iawbei*) which has been accumulated in the stomach of the baby during the gestation period. This herbal medicine locally known as "*Ka Dawai N'iangsohpet*" kills the germs and eliminates them and the waste products out of the body.

Right from the olden days the people have been administering the medicine to their young ones. This medicine is not prepared individually at home but by some local traditional healers who prepare the medicine from various herbs and sell it to the people. In olden days mostly female members from the royal families practiced the preparation and the sale of the medicine but now it is seen that the local practitioners are also preparing the medicine. Different medicine men use different types of herbs and follow their own formulation and dose but in spite of all this, the medicine is meant to act for the same purpose that is elimination of the germs from the body. The medicine is given

orally, also applied on the stomach when the baby is only two weeks old and can be continued till the age of 1 to 2 years till the body is free of these germs. It is believed that feeding the baby with mashed banana soon after birth helps to eliminate the germs at a lesser time. The medicine is sometimes mixed with the mashed banana or rice and fed to the baby.

The plants used for the preparation of the medicine are listed below by scientific names followed by family name, collection number, local/vernacular name (LN).

1) *Acorus calamus* L. (Araceae).

See page 75.

Parts used: Leaves and rhizome.

2) *Ageratina riparia* (Regel) R. M. King. & Rob., Phytologia 19:216. 1970.

Eupatorium riparium Regel. Gaertn. Fl. 15:324.t. 525. 1866; FFM 2:523. 1987.

(Asteraceae)

Coll. no. E251. Bhoiryabong, RB.

LN: **Kynbat jewslew.**

Description: Perennial herbs upto 1m high, leaves lanceolate, elliptic-lanceolate, acuminate, dentate-serrate, heads in dense corymbs in leafy panicles, florets white achenes minute, pappus white.

Parts used: Whole plant.

3) *Asparagus racemosus* Willd., Sp. Pl. 2:152. 1799; FBI 6:316. 1892; FJ 2:539. 1983.

(Asparagaceae).

See page 85.

Parts used: Leaves and rhizome.

Uses reported in literature:

Root powder is taken orally to cure bodyache and leucorrhoea, half cup root extract is given to women in early morning for 7 days to increase fertility and conceive (Jain, 2004).

4) *Asparagus filicinus* Buch.-Ham., in D. Don. Prodr. Fl. Nepal. 49. 1825; FBI 6:314.

1892; FJ 2:539. 1983. (Asparagaceae).

Coll. no. E257. Nongstoin, WKH.

LN: Sohpen khlaw

Description: Rootstock creeping, stems erect, branches flexuous, subscaudent, cladodes 2-5 together, falcate acuminate, striate, pedicles jointed above the middle, perianth pale yellow, berries red.

Parts used: Leaves and rhizome.

5) *Cassia fistula* L., Sp. Pl. 377. 1753; FBI 2:261. 1878; FA 2:128. 1938; FN 101. 1982.

(Caesalpinaceae).

See page 91.

Parts used: Fruits (pulp)

6) *Cephalostachyum latifolium* Munro, in Trans. Linn. Soc. 26:140.1868; FBI 7:412.

1897. (Poaceae)

Coll. no. E184. Wahkhen, EKH.

LN: Sylli

Description: Shrubby, semi scandent, stem sheaths linear, leaves glabrous, ovate lanceolate, spikelets glabrous.

Parts used: Stem

7) *Curcuma montana* Roxb., Pl. Corom. 2:28. t. 151. 1802; FBI 6:214.1890. A. S. Rao & D. M. Verma, Bull. Bot. Surv. India 14:122. 1972; (Zingiberaceae)

Coll. no. E143. Lad Umsaw, RB.

LN: Kynshiang / Syingshmoh kynthei

Description: Rhizome medium size, ovate conical, light orange within, leaves oblanceolate, base tapering, lower surface puberulent, inflorescence central, concealed within the petioles, coma bracts white with pink in the distal half, fertile bracts light green with a pink patch, flowers 4.5 -4.7 cm long, corolla white. (PLATE 11, B&C)

Parts used: Rhizome

Preparation and application: Also see (170).

8) *Curcuma aeruginosa* Roxb., (Zingiberaceae).

See page 101.

Parts used: Rhizome

9) *Cyclea bicristata* (Griff.) Diels., in Engler Pflanzenr. 46:317. f.93.A-E. 1910; FJ 1:68. 1981; FFM 1:792. 1985.

Lophophyllum bicristatum Griff. Notul. 4:313. 1854; FBI 1:105. 1872. (Menispermae)
Coll. no. E214. Pynursla, EKH.

LN: **Batpyllon**

Description: Large climbers, stems striate, leaves ovate-lanceolate, ovate-deltoid, acuminate, base sub-cordate, flowers yellowish, minute, drupes orbicular, compressed.

Parts used: Leaves and rhizome.

Uses reported in literature:

The bitter bark of roots is chewed with water for dysentery and gas trouble (Jamir and Rao, 1990).

10) *Melastoma malabathricum* L., DC. Prodr. 3:145; FBI 2:523. 1879.
(Melastomataceae).

Coll. no. E391. Siatbakon, EKH.

LN: **Krah rngai**

Description Bushy shrubs, up to 4m, leaves oblong-lanceolate, rounded to acute at base, appressed hairy above, strigose on main nerves beneath, flowers purple, in clusters at branch ends, fruits ovoid, purple.

Parts used: Root

Uses reported in literature:

Khasis: Extract of leaf and young twigs is applied in dysentery and worm infestations in children (Baruah *et al.*, 2006).

Nicobar Island (Shompens): Leaves, stems and roots used to heal wounds (Elanchezhian *et al.*, 2007).

11) *Osbeckia crinita* Benth., (Melastomataceae).

See page 140.

Parts used: Whole plant

12) *Rubia cordifolia* L., (Rubiaceae).

See page 160.

Parts used: Stem and root.

13) *Rubus ellipticus* Sm., (Rosaceae).

See page 161.

Parts used: Root

14) *Schima wallichii* (DC.) Korth., Bijdr. Ternstr. Tem. Verh. Nat. Gesch. Bot. 3:143.

1840; FFM 1:120. 1985; FJ 1:91. 1981. (Theaceae).

Coll. no. E265. Wahkdait, EKH.

LN: **Dieng ngan**

Description: Large trees with spreading crown, young tips silky tomentose, leaves elliptic-lanceolate, acute, base cuneate, margin entire, flowers white scented, axillary, fruits depressed globose supported by persistent calyx.

Parts used: Stem

Also see (28).

15) *Smilax ferox* Kunth, (Smilacaceae).

See page 165.

Parts used: Root

16) *Symplocos laurina* (Retz.) Wall.ex Rehd. & Wils. (Symplocaceae).

See page 172.

Parts used: Stem

17) *Ternstroemia gymnanthera* (W&A) Bedd., Fl. Sylv. 91.1871; FJ 1:94.1981.
(Ternstroemiaceae).

Coll. no. E076. Bhoirymbong, RB.

LN: Jyrmi N'iangsohpet

Description: Stunted shrubs, 3-20m; leaves pseudo-verticillate at apices of stems, elliptic to oblong-lanceolate, entire or minutely crenulate at margins, flowers yellow, solitary, axillary, fruits fleshy or corky, obovoid or globose.

Parts used: Stem bark

18) *Viscum articulatum* Burm.f., Fl. Ind. 311. 1768; FBI 5:226.1886; FA 4:119.1940; FJ 2:412. 1983. (Loranthaceae).

Coll. no. E095. Thangsning, EKH.

LN: **Mangkaring**

Description: A pendulous much di-tri-chotomously branched green shrub, internodes flattened disarticulating at nodes, very variable in length and breadth, inflorescence lateral, flowers few or numerous in the cup shaped bract.

Parts used: Whole plant

Preparation and application: Also see (68).

19) *Zingiber montanum* (K. D. Koenig) Link ex Dietr. (Zingiberaceae)

See page 178.

Parts used: Rhizome

20) *Zingiber rubens* Roxb. (Zingiberaceae).

See page 179.

Parts used: Rhizome

Different types of formulation for the medicine as given by the local practitioners:

a. Stem bark of *Ternstroemia gymnanthera* (W&A) Bedd is boiled in water till the water turns red, then the black pulp of *Cassia fistula* L. (seeds are discarded) together

with small pieces of rhizome of *Zingiber rubens* (L.) Sm. is added to the solution. 1- 2 teaspoonfuls twice a day is given to infants. 10 - 15 pods of *C. fistula* L. can be used for 5 bottles (500 ml each) of medicine.

b. Stem bark of *Ternstroemia gymnanthera* (W&A) Bedd. and small pieces of a root are boiled in 2L water for 2 hrs. When cooled the medicine is ready. About 1-2 teaspoonfuls twice a day is given to infants.

c. Whole plant of *Viscum articulatum* Burm.f. together with root of *Smilax ferox* Kunth. is boiled with water in an aluminum pot over the fire well kindled from dried wood for three to four hours until the color of the solution turns like red tea. When cooled the solution is poured in clean aluminum pots and again filled in bottles of 500ml capacity. To each bottle two or three small pieces of *Zingiber rubens* Roxb . is put and a small amount of smoked dried, powdered bark of a root is poured. The bottle is shaken properly to mix the contents and the medicine is ready. It is given to newborns (varies with age from 1-5 teaspoonful three times daily) and also applied over the stomach. At least 1 teaspoonful of the same juice is also given daily to lactating mothers and they are advised to avoid egg, pork and *tungrymbai* (a local chutney). It was told that *Viscum articulatum* Burm, *Smilax ferox* Kunth and *Zingiber rubens* Roxb keeps the baby warm, reduces gripping pain of the stomach while the bark of the root stops dysentery.

d. Root of *Smilax ferox* Kunth and *Melastoma malabathricum* L. together with root of *Rubus ellipticus* Sm. and whole plant of *Osbeckia crinita* Benth. Leaves are boiled

in water for 2-3 hrs. When cooled this solution serves as the medicine. About one to two teaspoonfuls twice a day is given to infants.

e) Roots and leaves of *Acorus calamus* L. are boiled in water with rhizome of *Curcuma aeruginosa* Roxb., *Curcuma montana* Roxb. *Zingiber montanum* (K. D. Koenig) Link ex Dietr. for 2-3 hrs. About 1-2 teaspoonful of the cooled juice is given to infants and even the expectant mother can take about half a cup daily.

f) The stem of *Rubia cordifolia* is boiled in water and when cooled pieces of *Zingiber rubens* (L.) Sm. are kept. Then the medicine is ready for use.

g) The powdered stem or root of *Rubia cordifolia*, powdered stem of *Symplocos laurina* (Retz.) Wall.ex Rehd. & Wils., powdered stem of *Schima wallichii* (DC.) Korth. (little amount), powdered *Cephalostachyum latifolium* Munro. are boiled and the juice is given.

h) Roots and leaves of *Acorus calamus* L. with pieces of *Zingiber rubens* (L.) Sm. are boiled in water. When cooled the medicine is ready.

i) Whole plant of *Ageratina riparia* is boiled and the juice is given orally.

WILD AND CULTIVATED EDIBLE FRUITS AND VEGETABLES

There are at least 3000 edible plant species known to man (Cooper *et al.*, 1996). In India there are about 1532 edible wild food species mostly from Western Ghats and Himalayan regions (Arora and Pandey, 1996). According to Arora (1981) in North eastern region of India about 300 plant species out of the native flora are used as edible types. Of these, over 30 provide tubers, rhizomes, 54 are consumed as green leaves /tender shoots, 20 provide flower buds cooked as vegetables, 172 ripe fruits are eaten raw or pickled and about 20 edible seeds are eaten raw or roasted. Only few species are meeting human need of food, and still huge diversity of plants is to be explored for their utility.

CULTIVATED AND WILD MARKETABLE EDIBLE PLANTS

1) *Allium tuberosum* Rottl. ex Spreng. (Liliaceae).

See page 81.

Uses: Fleshy bulbs and young leaves are consumed raw. Cultivated in home gardens and sold in the market at Rs. 3/ small bunch and available throughout the whole year.

2) *Allium hookeri* Thw., Enum. Pl. Zeyl. 339. 1864; FBI 6:341. 1892. (Liliaceae).

Coll. no. E81. Umtyngar, EKH.

LN: Jaut

Description: Medium tall herbs, bulbs with hardly any base of stem clothed with long narrow membranous sheathes, leaves basal membranous, flowers white.

Uses: Fresh young leaves are ground and consumed as chutney; dried leaves are stored in containers and used as a condiment. Cultivated in home gardens, fresh leaves sold in the market Rs. 3/ small bunch. Leaves available throughout the whole year.

3) *Aporusa dioica* (Roxb.) Muell.-Arg. in DC., Prodr. 15(2): 472. 1866; FJ 2:1983; FFM 2:773.1987. (Euphorbiaceae).

Coll. no. E205. Pynursla, EKH.

LN: **Sohkhyrwiat/ sohkhyrwit**

Description: Trees, bark blackish or dark grey with close, longitudinal, reticulate fissures, leaves elliptic-lanceolate to oblong lanceolate, male spikes often fascicled, capsules ellipsoid. **(PLATE 15, A&B)**

Uses: Ripe fruits edible, sold in the market at Rs. 40/ kg. Fruits available in the months of April and May.

4) *Areca catechu* L. (Arecaceae)

See page 83.

Uses: Nuts taken with betel leaf and lime, sold in the market Rs. 200/ 100 numbers. The palms are planted and maintained in forest gardens known as 'Bri' in Khasi dialect. During the off season betel nuts (Known as kwai skob) which were kept in big cane baskets and preserved in a pool of water are available. **(PLATE 15, C)**

5) *Artocarpus heterophyllus* Lamk., Encycl 3:210. 1789.

Artocarpus integrifolia L., f. suppl. Pl. 412. 1781; FBI 5: 541. 1888. (Moraceae).

Coll. no. E145. Umsning, RB.

LN: **Sohphan.**

Description: Trees, leaves obovate or elliptic-oblong, cuneate or acute at base, male heads ellipsoid or clavate, female heads ellipsoid, syncarps cylindrical covered with pointed tubercles.

Uses: Both young and ripe fruits are edible. Young fruits are cut into tiny pieces and pickled, also cooked with meat. The price of each fruit ranges from Rs 20-40 depending upon the size. Seeds are boiled and taken with tea. Value added products are in the form of pickles of raw fruit. Fruits available in the months of August to October.

6) *Baccaurea sapida* Mull.-Arg. in DC. Prodr. 15(2):459.1866; FBI 5:371. 1887; FJ 2:422. 1983. (Euphorbiaceae).

Coll. no. E377. Pynursla, EKH.

LN: **Sohramdieng**

Description: Trees, leaves glabrous elliptic lanceolate, acuminate, racemes paniced, on trunks, capsules subglobose, seeds flat embedded in pink pulp. **(PLATE 15, D)**

Uses: Ripe fruits are edible, sold in the market at Rs. 40/kg. Fruits available in the months of October and November.

7) *Calamus erectus* Roxb., Fl. Ind. 3:774. 1832; FBI 6:438. 1892; FFM 2:867. 1987. (Arecaceae).

Coll. no. E182. Wahkhen, EKH.

LN: **Sohthri**

Description: Stems tall, erect, leaves with many equidistant leaflets, spines on full grown petiole and upwards, spadices branched elongate ending in a flagellum, fruits ovoid- oblong. **(PLATE 15, E)**

Uses: Ripe fruits edible, sold in the market at Rs. 30/kg. Fruits available in the months of February to April.

8) *Calocasia esculenta* (L.) Schott, (Araceae)

See page 90.

Uses: Cultivated in home gardens. Petioles, inflorescence and bulb are properly cooked with dry fish and taken as vegetable. Boiled bulbs are taken with tea as snacks. Petioles and inflorescence are sold at Rs. 10/ bunch, tubers at Rs. 40/kg. Bulbs are available throughout the year, while other edible parts are available from June to September.

(PLATE 15, F)

9) *Capsicum frutescens* L. (Solanaceae).

See page 90.

Uses: Fruits are consumed, cultivated in home gardens. Ripe fruits sold in the market at Rs. 80-100/kg and available throughout the year. Value added products are in the form of pickles of both raw and ripe fruits. **(PLATE 21, A&B)**

10) *Capsicum chinense* Jacq. (Solanaceae)

Coll. no E 413. Mawsynram, EKH.

LN: **Sohmynken rakot**

Uses: Fruits are consumed during meals with rice. Cultivated in home gardens. Ripe fruits sold in the market at Rs. 3-5 each and available throughout the year. **(PLATE 21, C)**

11) *Capsicum minimum* Roxb., (Solanaceae).

See page 91.

Uses: Fruits are consumed, cultivated in home gardens. Ripe fruits sold in the market at Rs. 100-150/kg and available throughout the year. Value added products are in the form of pickles of both raw and ripe fruits. **(PLATE 21, H)**

12) *Castanea sativa* Mill., Gard. Dict. ed. 8. 1.1768; FA 4:325. 1940; FFM 2:854.1987.

(Fagaceae).

Coll. no. E31. Rynjah, EKH.

LN: **Sohot phareng**

Description: Middle sized trees with a gradually spreading crown, leaves broadly oblong, oblong- elliptic, acuminate, glaucous and pubescent beneath, spikes creamy white, cupule subspherical, spiny.

Uses: Seeds edible, nuts sold in market, at Rs. 40-50/ kg. Nuts available in the months of October to November.

13) *Castanopsis indica* A. DC. Seem., J. Bot. 1:182. 1863; FBI 5:620. 1888; FA 4:321. 1940; FJ 2:458. 1983; FFM 2:856. 1987. (Fagaceae).

Coll. no. E380. Nongstoin, WKH.

LN: **Sohot.**

Description: Large trees with spreading umbrella shaped crown, leaves oblong-elliptic, oblong- lanceolate, male spikes laxly branched, female solitary, cupule densely covered with spines brown when ripe.

Uses: Seeds edible, fruits sold in market at Rs. 80/kg. Nuts are available from December to January.

14) *Centella asiatica* (L.) Urb. (Apiaceae).

See page 93.

Uses: Leaves eaten raw as salad, with boiled potatoes. Sold in the market Rs. 3-5/ small bunch and available from May to December.

15) *Cinnamomum verum* Presl., (Lauraceae).

See page 96.

Uses: Leaves and bark of the stem used as condiment. Leaves sold at Rs. 10/ bunch and available throughout the year.

16) *Cinnamomum tamala* (Spreng.) Nees & Eberm., Handb. Med. Pharm. Bot. 2:426. 1831; FBI 5:128. 1886; FA 4:56. 1940; FJ 2:407. 1983. (Lauraceae).

Coll. no. E19. Pynursla, EKH.

LN: **Latyrpad**

Description: A moderate sized tree, leaves ovate oblong or lanceolate usually acuminate, shining above, panicles scarcely exceeding the leaves, fruit small ellipsoid.

Uses: Leaves used as condiment. Leaves sold at Rs. 10/ bunch and available throughout the year.

17) *Citrus aurantium* L., Sp. Pl. 782. 1753; FBI 1:515. 1875; FI 4:279. 1997.

(Rutaceae).

Coll. no. E14. Mawlai, EKH.

LN: **Sohjew khasi**

Description: A small slender tree, young shoots glabrous greenish white, leaflet elliptic or ovate, acute, petiole winged, flowers white, fruit globose.

Uses: Ripe fruits edible. Cultivated in home gardens, sold in the market for Rs. 3 each and available from November to March.

18) *Citrus medica* L., (Rutaceae). (PLATE 15, G)

See page 96.

Uses: Ripe fruits edible. Cultivated in home gardens and sold in market at Rs. 3-5 each and available from March to November.

19) *Citrus reticulata* Blanco, Fl. Filip 610. 1837; FI 4:287. 1997. (Rutaceae).

Coll. no. E199. Rynjah, EKH.

LN: **Sohniamtra**

Description: A small slender tree, fruits globose to oblate, surface smooth, colour orange-yellow to bright orange, rind thin with very little adherence, segments usually 10, pulp vesicles uniformly orange, texture coarse, juice abundant with well-blended flavour. The mandarin orange grown in Meghalaya is considered to be of very high quality. (PLATE 15, G)

Uses: Ripe fruits edible. Cultivated in home gardens and sold in the market Rs. 3-5 each. Available from October to March.

20) *Citrus maxima* (Burm. f.) Merr., Interpr. Herb Amboin 46. 1917.

Citrus decumana L., Syst. Nat ed 12:508. 1767; FBI 1:516. 1875. (Rutaceae).

Coll. no.E17. Rynjah, EKH.

LN: **Sohmongor heh.**

Description: Medium sized trees, young shoots pubescent, leaflet large ovate-oblong, petiole broadly winged, flowers large white, fruit large globose, rind thick, pulp whitish or pink.

Uses: Ripe fruits edible. Cultivated in home gardens and sold in the market Rs. 10-15 each and available from October to March.

21) *Citrus macroptera* (Montr) var *annamensis* Tanaka Bull. Mus. Hist. Nat. (Paris), 2 ser 2:164, 1930.

Col. no. E394. Umsyiem, EKH.

LN: **Soh kwit.**

Description: Medium sized trees, leaflet large ovate-oblong, petiole winged, flowers white, fruit medium globose, rind thick and pulp yellow.

Uses: Ripe fruits edible, sold in the market Rs. 5 each and available from December to May. The rind of the fruit is dried in the sun and used for culinary purposes.

22) *Coix lachryma jobi* L., Sp. Pl. 972. 1753; FBI 7:100. 1896; FJ 2:608. 1983.

(Poaceae).

Coll. no. E131. Pynursla, EKH.

LN: **Sohriew.**

Description: Culms stout, branching, rooting at lower nodes, leaves cordate at base, male spikelets imbricate, female spikelets ovoid, entirely enclosed in hardened involucre bracts, forming a bluish grey involucre.

Uses: Fruits edible when ripe. Seeds are cooked with rice and eaten. Cultivated in home gardens, sold in the market at Rs. 20/kg and available from August to October.

23) *Curcuma* sp. (Zingiberaceae).

Coll. no. E159. Siatbakon, EKH.

LN: **Latara.**

Description: Perennial herb, rhizome light yellow, leaves oblong-lanceolate, fertile bracts pale green, coma bracts pinkish to purplish, flowers yellow.

Uses: Leaves and inflorescence cooked as vegetable, sold in the market Rs. 10/ bunch and available from April to May. (PLATE 16, A)

24) *Cyphomandra batacea* (Cav.) Sendt Seeds (Solanaceae)

Coll. no. E078. Rynjah, EKH.

LN: **Sohbaingon dieng/ sohbaingon pylleng.**

Description: Small tree with shallow roots, leaves alternate, cordate at base,, fragrant pale pink flowers are borne in small loose clusters. The long stalked pendent fruit borne singly or in clusters of 3-2 is smooth egg shaped but pointed at both ends and capped with persistent conical sepal cup, flesh colour varies from orange red or orange to cream yellow.

Uses: Ripe fruits are consumed in the form of salad or chutney. Cultivated in home gardens and fruits available throughout the year. Ripe fruits sold in the market at Rs. 80/kg. (PLATE 16, B&C)

25) *Dioscorea alata* L., Sp. Pl. 1033. 1753; FBI 6:296. 1892; FN 315. 1982. (Dioscoreaceae).

Coll. no. E409. Pynursla, EKH.

LN: **Phan mluh.**

Description: Climbers, leaves broadly ovate, shallowly cordate at base petioles long, male flowers in slender fascicled spikes.

Uses: Tubers are boiled and taken. Boiled tubers sold in the market at Rs. 10 each and available in the month of September.

26) *Diplazium esculentum* (Retz) Sw., in Schrad. J. Bot. 1801:312. 1803; Bedd., Handb. Ferns Brit. India 192. 1883; Copel. Gen. Fil 149. 1947; FFAM 140.1982. (Aspidiaceae), Coll. no. E024. Umtyngar, EKH.

LN: **Tyrkhang.**

Description: Terrestrial, rhizome black semi erect, covered with much fibrous, stiff roots, scales broad lanceolate, toothed dark brown. Frond bipinnate, upto 1.5cm tall, lamina spreading, secondary pinnae distant on the rachis pinnatifid at the base, serrate at apex. Sori linear, short, parallel on both sides of the veins.

Uses: Young fronds edible when fried. Fronds sold at Rs. 10/ bunch and available from April to July.

27) *Eleagnus infundibularis* Momiyama, J. of Jap. Bot., Tokyo 48:262. 1973.

Eleagnus latifolia L. FBI 5:202. 1886; FA 4:114. 1940. (Eleagnaceae).

Coll. no. E175. Umtyngar, EKH.

LN: **Soh shang/ Sohlangi.**

Description: A large woody straggling shrub, often spiny, branchlets densely crowded with ferruginous scales, leaves ovate-oblong or elliptic, acute or acuminate, clothed beneath with silvery scales, flowers in dense axillary fascicles, fruit ovoid red or yellow when ripe.

Uses: Ripe fruits are eaten raw. The plants are cultivated in home gardens. Ripe fruits sold in the market at Rs. 40/kg and available from February to May. Value added products are in the form of pickles of semi ripe fruits.

28) *Docynia indica* (Wall.) Decne, in Nouv. Arch. Mus. Paris 10:131. t. 14.1874; FJ 1:190. 1981; FBI 2:369. 1878; FFM 1:345. 1985; FA 2:210. 1938. (Rosaceae).

Coll. no. E381. Tyrsad, EKH.

LN: **Sohphoh khasi.**

Description: Trees, branches slender, leaves ovate-lanceolate, oblanceolate, abruptly long acuminate, flowers white densely woolly tomentose, fruits oval crowned by calyx lobes.

Uses: Fruits edible, pickles are also made. Ripe fruits sold in the market at Rs. 20/kg and available from January to March. Value added products are in the form of grated fruit salad mixed with salt and powdered chilly and sold at Rs. 5/ 30 gm. Boiled fruits mixed with salt and chilly powder is sold at Rs. 3/ piece.

29) *Eryngium foetidum* L., (Apiaceae).

See page 112.

Uses: Leaf paste taken as chutney. Cultivated in home gardens sold in the market at Rs. 3/ small bunch and available from April to July.

30) *Flemingia procumbens* Roxb., (Fabaceae).

See page 116.

Uses: Properly cleaned white tubers (with skin peeled off by rubbing with sand and water in cane baskets, by the side of the stream or river) are taken with powdered seeds of *Perilla frutescens* (L.) Britt. and a pinch of salt. It is widely sold in all the tribal markets and rated as one of the local favourites. Cleaned tubers are sold from Rs. 5 above and available from November to March. **(PLATE 16, D)**

31) *Gentiana quadrifaria* Blume, Bijd. 847. 1826; FBI 4:111. 1883; FJ 2:324. 1983; FA 3:323.1939. (Gentianaceae).

Coll. no. E011. Umtyngar, EKH.

LN: **Jamiaw.**

Description: Herbs, stems decumbent, radical leaves lanceolate, cauline, smaller coriaceous, cymes 3-5 flowered, corolla blue.

Uses: Whole plant mixed with boiled potatoes is taken as salad, sold in the market Rs. 3/ small bunch and available from May to August.

32) *Gomphogyne cissiformis* Griff. Pl. Contor. 26. t. 4.1837; FBI 2:632. 1879. (Cucurbitaceae).

Coll. no. E093. Laitlyngkot, EKH.

LN: Soh **thliem/ Jhur thliem.**

Description: Climbing weak, succulent herbs, leaves petioled, with 5-7 lanceolate serrate leaflets, flowers monoecious, males racemed, females paniced, capsule top shaped, seeds ellipsoid, little compressed, black, obscurely margined.

Uses: Fruits taken as vegetable fried or boiled. Cultivated in home gardens, sold in the market at Rs. 30/kg and available from September to October.

33) *Houttuynia cordata* Thunb., (Saururaceae).

See page 122.

Uses: Whole plant taken raw as salad, sold in the market Rs. 3-5/ small bunch and available throughout the year.

34) *Kaempferia galanga* L., (Zingiberaceae).

See page 126.

Uses: Rhizome edible, used in chutneys. Cultivated in home gardens, rhizome sold in the market at Rs. 60/kg and available from June to July.

35) *Ixeris gracilis* (Wall. ex. DC) Stebbins, (Asteraceae)

See page 125.

Uses: Leaves taken raw as salad, sold in the market Rs. 5/ small bunch and available from April to June.

36) *Lactuca lahulensis* Mamgain and Rao, in Bull. Bot. Surv. India 27 (1-4): 120-122. 1985; FI 12:292. 1995.

Coll. no. E026. Umtyngar, EKH.

LN: **Jangew pylon.**

Description: Herbs, perennial, erect, glabrous, upper middle leaves broadly cordate or deltoid, finely membranous with long and broadly winged petioles, uppermost leaves ovate or lanceolate, inflorescence terminal panicle, heads on subpaniculate branches, peduncle small, ligules purplish, achenes subcylindric, yellowish brown.

Uses: Leaves taken raw as salad, sold in the market Rs. 5/ small bunch and available from April to June.

37) *Litchi chinensis* Sonn., Voy. Ind. Or. Chine 2:230. t. 129. 1782; FJ 1:142. 1981; FFM 1:258. 1983. (Sapindaceae).

Coll. no. E022. Umsning, RB.

LN: **Sohmanir.**

Description: Middle sized tree, crown dense, leaflets oblong- lanceolate, elliptic-oblong, acute, shining above brown and glaucous beneath, drupe fleshy with a brown muricated rind turning red, seeds shining.

Uses: Ripe fruits edible, sold in the market at Rs. 40/kg and available from July to August. Fruits cultivated in Umsyiem of East Khasi Hills is one of the sweetest in Meghalaya.

38) *Meyna pubescens* (Kurz) Robyns, Bull. Jard. Bot. Brux. 11:235.1828; An Enumeration of the Flowering Plants of Nepal 2:204.1979.

Vangueria spinosa Roxb., Fl. Ind 1:536. 1820; FBI 3:136.1880; FA 3:66. 1939. (Rubiaceae).

Coll. no. E109. Bhoirymbong, RB.

LN: **Sohmon, Sohmatan**

Description: Middle sized trees, with short spines, leaves elliptic, ovate-elliptic, abruptly acuminate, cymes axillary, flowers greenish white, drupes soft reddish yellow when ripe.

Uses: Ripe fruits edible. Fruits sold at Rs. 3 each and available from July to October.

Consumption of the fruits in large amount causes intoxication.

39) *Morus australis* Poir. (Moraceae).

See page 134.

Uses: Ripe fruits edible, sold in the market at Rs. 30-40/kg and available from March to April. (PLATE 16, E)

40) *Musa paradisiaca* L. (Musaceae).

See page 134.

Uses: Fruits, flowers and pseudostem edible. There are many varieties and known as Ka Kait mon, Ka Kait shyieng, Ka Kait syiem, Ka Kait joji, Ka Kait jrong, Ka Kait klong. Ripe fruits are mashed and given to new born babies and infants. Fruits sold in the

market at Rs. 30-60/ bunch, spadices at Rs. 10-15 each and pseudostem at Rs. 10/ small bunch and available throughout the year. **(PLATE 16, F, G, &H)**

41) *Musa acuminata* Colla, in Mem. Gen. Musa. 66. 1820. (Musaceae).

Coll. no. E120. Umsning, RB.

LN: **Kait khlaw** .

Description: Herbaceous perennials, leaves oblong, bracts greenish red, lanceolate, flowers five to seven in a single row, white.

Uses: Flowers are edible when boiled. Spadices sold at Rs. 20 each and available from October to March. **(PLATE 15, I)**

42) *Myrica esculenta* Buch.- Ham. ex D. Don., (Myricaceae).

See page 135.

Uses: Ripe fruits edible, young fruits are pickled. Fruits sold in the market at Rs. 40-60/kg and available from April to July. **(PLATE 17, A&C)**

Value added products are in the form of pickles and juice of the fruits.

43) *Myrica* sp., (Myricaceae).

Coll. no. E169. Laitlyngkot, EKH.

LN: **Sohlia**.

Uses: Ripe fruits edible, sold in the market Rs. 30/kg and available from April to July.

44) *Myrica nagi* (non Thunb.) Hook. f., (Myricaceae).

See page 136.

Uses: Ripe fruits edible, sold in the market Rs. 40- 60/ kg and available from April to July. (PLATE 17, B, D&E)

45) *Oenanthe linearis* Wall., Cat 586; FBI 2:696. 1879. (Apiaceae).

Coll. no. E006. Umtyngar, EKH.

LN: **Jatira.**

Description: Perennial herbs, stem decumbent, nodes rooting freely, leaves 2-pinnate, ultimate segments of the upper half linear, peduncles elongate, umbels terminal or leaf opposed, flowers white.

Uses: Young tender leaves are cooked with meat. Cultivated in home gardens. Leaves sold at Rs. 10/ bunch and available from March to June.

46) *Oenanthe javanica* (Bl.) DC., (Apiaceae).

See page 139.

Uses: Young tender leaves cooked as vegetable with meat. Leaves sold at Rs. 10/ bunch and available from March to June.

47) *Oryza sativa* L., Sp. Pl. 333. 1753; FBI 7:92. 1896. (Poaceae).

See page 140.

Uses: Grains are cooked and consumed as rice. **Khaw Khasi** is sold at Rs. 27/kg and **Khaw shawlia** at Rs. 36/kg. Local cultivars are known as **Khaw Khasi** (mixed reddish and white coloured grains, grown in Umroi and Bhoirymbong of Ri Bhoi District ; reddish coloured grains grown in Tynring and Mawpdang of East Khasi hills District; white coloured grains grown in Kyrdem of Ri Bhoi District) and **Khaw shawlia** (white sticky rice) grown in Umroi of Ri Bhoi District. **(PLATE 20, A-F)**

A good number of local food items are prepared from rice which will be seen in the following pages.

48) *Passiflora edulis* Sims., (Passifloraceae).

See page 144.

Uses: Ripe fruits edible, leaves cooked with meat as vegetable. Cultivated in home gardens. Ripe fruits sold in the market at Rs. 4 each and available from September to November. Value added product is in the form of juice from ripe fruits.

49) *Perilla frutescens* (L.) Britt.

Perilla ocimoides L. (Lamiaceae).

Coll. no. E406. Rynjah, EKH.

LN: **Nei lieh.**

Description: Herbaceous, erect, upright reaching a height of 2-3 m, strongly quadrangular stems with opposite leaves, short spikes of purplish flowers.

Uses: The seeds are dried in the sun and stored properly. For making of chutney, seeds are fried, mixed with chilly and salt pounced in a mortar till it becomes powdery and sticky. Cultivated in home gardens, seeds are sold at Rs. 180-200/kg and available from November to March.

50) *Piper betle* L., (Piperaceae).

See page 147.

Uses: Leaves are taken with betel nut and lime. Sold in the market at RS 15-30/23 numbers. Available throughout the whole year. **(PLATE 17, F)**

51) *Prunus domestica* L., Sp. Pl. 1. 1753. (Rosaceae).

Coll. no. E002. Rynjah, EKH.

LN: **Sohplum.**

Description: Small trees, leaves lanceolate, flowers white in axillary racemes, fruits drude, red.

Uses: Fruits edible. Ripe fruits sold in the market at Rs. 20/kg and available from May to June. Many varieties like Soh plum snam, Soh plum doris and Soh plum santarose are available.

52) *Prunus nepalensis* Ser., FA 2:178. 1938; FJ 1: 354. 1981; FFM 1:357. 1985.

(Rosaceae).

Coll. no. E168. Mawshabuit, EKH.

LN: **Sohiong**

Description: Deciduous middle sized trees, branchlets spreading, leaves ovate-lanceolate, acuminate, stipules linear-lanceolate, racemes, flowers white, flowers from November to January and ripe oblong, fleshy, purple drupaceous fruits can be harvested from August to early October. **(PLATE 17, G&H)**

Uses: Over the years, the locals of Meghalaya have found many uses of Sohiong besides enjoying its fresh fruit. These include value added products in the form of jams, jellies, squash and wine. The scope for export outside the state is vast as this fruit is unique in its taste and being indigenous. With this aim in mind the Directorate of Horticulture, Meghalaya, Shillong holds '**The Sohiong Festival**' every year during the month of September to create awareness and encourage the people of Meghalaya to grow and increase the production of Sohiong. Ripe fruits sold in the market at Rs. 40/kg and available from August to October.

53) *Prunus persica* (L.) Batsch., (Rosaceae).

See page 153.

Uses: Ripe fruits edible, sold in the market, home made jams and squash are prepared. Varieties with green or yellow pulp is available. Ripe fruits sold in the market at Rs. 20/kg and available from April to June.

54) *Pyrus communis* L., Sp. Pl. 459. 1753; FBI 2:374. 1878; FA 2:217. 1938. (Rosaceae).

Coll. no. E003. Rynjah, EKH.

LN: **Sohphoh.**

Description: Middle sized trees, leaves broadly ovate, abruptly acuminate, base rounded, flowers white, pome ovoid-ellipsoid, greenish yellow when ripe.

Uses: Fruits edible, value added product in the form of jam is made. Cultivated in home gardens. Ripe fruits sold in the market at Rs. 30/kg and available from October to November. Varieties like Sohphoh klong, Sohphoh Nongkhlaw and Sohphoh lakun are available.

55) *Sechium edule* (Jacq.) Sw., (Cucurbitaceae).

See page 164.

Uses: Tuberous roots, leaves and fruits are eaten boiled or fried. Cultivated in home gardens. Fruits sold at Rs. 20/kg and available from October to January. Leaves are available in the month of August and tubers in March and April.

56) *Sesamum orientale* L., Sp. Pl. 634. 1753; FA 3:497.1939; FJ 2:1983.

Sesamum indicum L. Sp. Pl. 634. 1753; FBI 4:387.1884. (Pedaliaceae).

Coll. no. E405. Nongstoin, WKH.

LN: **Nei iong.**

Description: Erect, annual herbs, upto 1m, glandular hairy, lower leaves on 2-12 cm long petioles, often palmately 3-foliolate, upper leaves on shorter petioles, oblong-

lanceolate to linear with mucilaginous hairs beneath, flowers purplish or white, capsules oblong, seeds compressed, black or brown.

Uses: Seeds are pounded in a mortar and used as a condiment. It is cultivated in gardens and sold in the market at Rs 100/kg and available from October to November.

57) *Solanum incanum* L., Sp. Pl. 188. 1753. (Solanaceae).

Coll. no. E114. Nongstoin, WKH.

LN: **Sohngang heh.**

Description: Shrub, spiny, leaves ovate elliptical or oval, leaf apex acute, base cuneate, inflorescence racemose, flowers purple, fruit berry, ovoid, yellow.

Uses: Fruits eaten as vegetable when fried. Cultivated in home gardens, sold in the market Rs. 30/ kg and available from October to November. **(PLATE 17, I)**

58) *Solanum aethiopicum* L., in Cent. Pl. 2:10.1756. (Solanaceae).

Coll. no. E.413. Nongstoin, WKH.

LN: **Sohngang heh.**

Uses: Fruits eaten as vegetable when fried. Cultivated in home gardens, sold in the market Rs. 30/ kg and available from July to September.

59) *Solanum kurzii* Brace ex Prain, in J. As. Soc. Beng. IXV.54; FFM 2:648. 1987; FA 3:368. 1939. (Solanaceae).

Coll. no. E247. Mawlai, EKH.

LN: **Sohngang rit.**

Description: Unarmed shrubs, leaves ovate, entire, more or less irregularly lobed, with stellately tomentose racemes and purple flowers, berry glabrous, globose, bitter in taste.

(PLATE 18, A)

Uses: Fruits eaten as vegetable when fried. Cultivated in home gardens, sold in the market Rs. 30/ kg and available from October to November.

60) *Sonchus oleraceus* L., FBI 3:414; FFM 2:531. 1987. (Asteraceae).

Coll. no. E118. Rynjah, EKH.

LN: **Jhurkthang.**

Description: Erect laticiferous herbs with hollow stems, sagittate leaves and yellow heads.

Uses: Leaves are eaten raw as salad, sold in the market Rs. 3/ small bunch and available from April to August

61) *Thelypteris nudata* (Roxb.) C. V. Morton, Contr. U. S. Natl. Herb. 38:352.1974.

(Pteridaceae)

Coll. no. E121. Umsning, RB.

LN: **Tyrkhang.**

Description: Rhizome widely creeping, stipe upto 75cm long, scabrous, sparsely covered with dark brown membranous scales, distant on rhizome, lamina unipinnate, rough, coriaceous, pinnae 10-15 pairs, pinnae widest near base than very gradually

tapering, base broadly cuneate, acuminate, margin sharply crenate, lower surface of pinnae postular, variously hairy, upper surface hairy on costa only. Sori small round, medial sporangia glabrous, spores dark, exine minutely spinulose.

Uses: Young fronds edible when fried. Leaves sold in the market at Rs. 10/ bunch and available from October to November.

62) *Viburnum foetidum* Wall., (Caprifoliaceae).

See page 175.

Uses: Ripe fruits edible, sold in the market Rs. 5-10/ bunch and available from October to December. **(PLATE 18, B)**

63) *Vigna umbellata* (Thunb.) Ohwi & Ohashi, J. Jap. Bot. 44:31.1969; FJ 1:170. 1981.

Phaseolus calcaratus Roxb., Fl. Ind. 2:289.1832; FBI 2:203. 1876; FA 2:83. 1938.

(Fabaceae).

Coll. no. E395. Bhoirymbong, RB.

LN: **Rymbai Ja.**

Description: Slender herbs, leaves 3-foliolate, stipules subfulcate, leaflets ovate-lanceolate to rhomboid-ovate, racemes 10-20 flowered, yellow, pods compressed, seeds brown.

Uses: The seeds are boiled mixed with salt and eaten as snacks with tea. Cultivated in the fields. The seeds are sold at Rs. 80/kg and available throughout the whole year.

64) *Zanthoxylum armatum* DC., (Rutaceae).

See page 177.

Uses: Fruits edible, used in chutneys. Cultivated in home gardens. Raw and ripe fruits sold in the market at Rs. 70/kg and available from October to November.

65) *Zanthoxylum rhetsa* (Roxb.) DC., Prodr 1:728.1824; FFM 1:193. 1985; FA 1(2):197. 1936; FBI 1:495. 1875. (Rutaceae).

Coll. no. E261. Bhoirymbong, RB.

LN: **Jaiur khlaw.**

Description: A deciduous tree with a large crown, covered with sharp prickles, leaves paripinnate or imparipinnate, leaflets 16-25, opposite, oblong-lanceolate, glaucous beneath, flowers greenish yellow, fruits globose.

Uses: Young leaves edible as vegetable when fried, sold in the market Rs. 10/ bunch and available from March to May.

66) *Zingiber rubens* Roxb., (Zingiberaceae).

See page 179.

Uses: Rhizome used in chutney. Cultivated in home gardens and fields. Rhizome sold in the market at Rs. 80-100/kg and available throughout the year.

A good number of food items is prepared from rice in Meghalaya (**PLATE 20, G&H**).

They are as follows:

1. Shira: Shira is prepared from a variety of rice known as Khaw biruin. Shira is taken with tea. The best quality shira is made in Cherrapunjee and sold in the market at Rs. 80-100/kg.

2. Ja-shawlia: Khaw shawlia after it has been cooked, becomes sticky and is thus known as sticky rice or Ja shawlia. The rice when taken with tea tastes good. A small amount of the rice is packed in *Phrynium* leaf and sold at Rs. 5/packet. (**PLATE 19, A**)

3. Putharo: Here the rice is ground to a fine powder and mixed with water to form a paste. Then it is baked in a clay plate, specially meant for the purpose. Under the heat of the fire from the burning wood the putharo is ready. It is taken with meat or with tea alone. (**PLATE 19, B**)

4. Pumaloi: Here the rice is ground to a fine powder and then sieved. The larger particles of rice which do not pass through the sieve is rejected. The fine powder of rice is then sprinkled with water after which it is packed in small bowls. Then water is boiled in a large pot whose cover has many holes so that the steam can escape out. The small bowls containing rice powder are then kept over the holes and thus by the influence of the

steam, the rice is steamed and cooked. After being cooked it is then taken out. Pumaloi is taken with tea. It is sold at Rs. 5/ piece. **(PLATE 19, C)**

5. Pusyep: It is also prepared as Pumaloi except that the powdered rice is sometimes mixed with grated coconut and packed in larger bowls and steamed. It becomes drier than Pumaloi. It is sold at Rs. 10/ piece.

6. Pusla: The rice or sometimes maize is ground, mixed with little water, jaggery and baking soda. Then the mixture is wrapped in *Phrynium* leaf and kept in boiling water and left to boil. Pusla is taken with tea. It is sold at Rs. 2/ piece. **(PLATE 19, D)**

7. Pukhleim: Rice is ground to a fine powder mixed with jaggery and the mixture is made into round balls. The balls are fried in oil until it turns brown. It is taken with tea. It is sold at Rs. 2/ piece. **(PLATE 19, E)**

8. Pudoh: Rice is ground and mixed with water, it is then made into flat rectangular or round pieces with pieces of boiled pork inserted inside. The mixture is wrapped in a *Phrynium* leaf and then boiled in water. It is sold at Rs. 5/ piece. **(PLATE 19, F)**

9. Punei: Rice is ground to a fine powder, mixed with powdered seeds *Perilla frutescens* and water. The mixture is moulded in flat round pieces and then fried in oil. It is sold at Rs. 2/ piece. **(PLATE 19, G)**

10. Pusaw: The powdered rice of mixed with red tea and a little soda and sugar. Then it is moulded to round pieces and baked with a little quantity of oil. After being cooked, it is taken with tea. It is sold at Rs. 5/ piece.

11. Putyndong: The powdered rice is poured into a bamboo container which is made like a tube in which one end is closed and the other end is open. The containers are filled with powdered rice after which they are heated or smoked. The rice is taken out of the container and ready to serve. Each container of rice is sold at Rs. 15.

12 Pupnah: Sticky rice is ground to a fine powder mixed with water to form paste and made into round flat pieces. The pieces are boiled in water and then fried in oil. It is sold at Rs. 2/ piece. **(PLATE 19, H)**

13: Umshit ja: The rice is boiled and before it is fully cooked the water is drained off in another vessel. Then salt or sugar is added to the thick rice water. This is given to ailing patients, new born babies and lactating mothers because it is very nutritious.

14. Jadoh: The meat pieces together with onion, pepper, ginger and spices are fried in oil and then rice is added. Water is poured and left for boiling until the rice is fully cooked.

CULTIVATED AND WILD NON MARKETABLE EDIBLE PLANTS

1) *Agapetes serpens* (Wight.) Sleumer, Bot. Jahrb. Syst ix. 105. 1939. (Vacciniaceae).

Coll. no. E034. Umtyngar, EKH.

LN: **Sohpdung heh.**

Description: Epiphytic shrub, stem thickened at the base, leaves subsessile, acute, rounded at base, coriaceous, glabrous, margins recurved, flowers axillary corymbose, corolla bright red with transverse marks, fruit globose, five winged.

Uses: Ripe fruits are consumed.

2) *Agapetes obovata* (Wight) Hook. f., Benth. & Hk. f. Gen. Pl. 2:572.1876; FBI 3:447.

1881; FA 3:137. 1939; FJ 1:282. 1981; FFM 2:542. 1987. (Vacciniaceae).

Coll. no. E363. Kyrphei, EKH.

LN: **Soh lieh.**

Description: Lithophytic shrubs, much branched leaves obovate to elliptic, flowers axillary, tubular, white to cream.

Uses: Ripe fruits are consumed.

3) *Alternanthera philoxeroides* (Mart.) Griseb., Abh. Konigl. Ges. Wiss. Gottingen 24:36.1879. (Amaranthaceae).

Coll. no. E92. Umtyngar, EKH.

LN: **Japung.**

Description: Perennial stoloniferous herb, stems hollow when mature, leaves opposite sessile, linear-lanceolate, entire, white pappery flower heads, tepals concave.

Uses: The young shoots are cooked as vegetable.

4) *Amaranthus tricolor* L. (Amaranthaceae)

See page 181.

Uses: Tender leaves are fried and eaten as vegetable. Cultivated in home gardens.

5) *Anthogonium gracile* Lindl., Nat. Syst. 341. ed. 2. 1836; FBI 5:822. 1890.

(Orchidaceae).

Coll. no. E87. Umtyngar, EKH.

LN: **Sohkha**

Description: Pseudobulbs small, ovoid, leaves linear-lanceolate, acuminate, inflorescence a raceme, from the base of pseudobulb, slender erect, flowers pale pink.

Uses: Bulbs edible when boiled.

6) *Antidesma acidum* Retz., Obs. Bot 5:30. 1789; FFM 2:769. 1987. (Euphorbiaceae).

Antidesma diandrum (Roxb.) Roth. Nov. Sp. 369. 1821; FBI 5:361. 1887; FA 4:167.

1940; FJ 2:423. 1983.

Coll. no. E59. Bhoirybong, RB.

LN: **Jajew ding.**

Description: Small trees, leaves variable in size, rusty pubescent along nerves beneath, flowers greenish yellow, fruits ellipsoid, purplish red.

Uses: Leaves cooked with dry fish as vegetable. Ripe fruits eaten when ripe.

7) *Antidesma bunius* (L.) Spreng., Syst. Veg. 1:826. 1825; FFM 2:770. 1987; FBI 5:358. 1887; FA 4:166. 1940; FJ 2:423. 1983. (Euphorbiaceae).

Coll. no. E85. Bhoirymbong, RB.

LN: **Soh synlei.**

Description: Medium sized trees, leaves oblong- lanceolate, obtuse, base narrowed, shining green above, flowers minute, fruits ellipsoid, red.

Uses: Fruits eaten when ripe.

8) *Artemisia japonica* Thunb., Fl. Jap. 310. 1784; Kitamura in An Enumeration of The Flowering Plants of Nepal (Ed Hara *et al.*), 3:13. 1982

Artemisia parviflora, Roxb. Fl. Ind. 3:420. 1832; FBI 3:322. 1881. (Asteraceae).

Coll. no. E23. Rynjah, EKH.

LN: **Jalalud.**

Description: Erect herbs, leaves sessile, lobed, glabrous or pubescent beneath, heads subglobose, fascicled on large terminal paniculate racemes.

Uses: Young leaves edible, cooked with fish.

9) *Bauhinia purpurea* L., Sp. Pl. 375. 1753; FBI 2:284. 1878; FFM 1:316.1985.

(Caesalpinaceae).

Coll. no. E274. Pynursla, EKH.

LN: **Jalong.**

Description: Middle sized tree, leaves deeply lobed, cordate or subcordate at base, racemes tomentose, flowers white.

Uses: Young leaves cooked as vegetable.

10) *Bauhinia variegata* L., Sp. Pl. 375. 1753; FBI 2:284. 1878; FA 2:140.1938; FJ 1:172. 1981. (Caesalpinaceae).

Coll. no. E20. Pynursla, EKH.

LN: **Jalong.**

Description: Small or middle sized deciduous trees, crown irregularly spreading, leaves deeply cordate, lobes rounded glaucous and puberulous along nerves beneath, flowers pink or purple, pods 20-30cm, dark brown.

Uses: Young leaves cooked as vegetable.

11) *Begonia roxburghii* A. DC., Prodr. 15(1): 398. 1864; FBI 2:635. 1879.

(Begoniaceae).

Coll. no. E55. Bhoirymbong, RB.

LN: **Jajew jylwang, jajewla.**

Description: An erect succulent herb, stem and leaves pubescent when young, leaves broadly ovate; peduncles axillary, divided into dichotomous cymes, flowers light pink, monoecious.

Uses: Leaves taken as vegetable.

12) *Brunella vulgaris* L., FBI 4:670. 1885. (Lamiaceae).

See page 88.

Uses: Leaves edible, cooked or fried with fish.

13) *Chenopodium* sp.(Chenopodiaceae).

Coll. no. E119. Rynjah, EKH.

LN: **Jada.**

Uses: Leaves cooked and eaten as vegetable. Cultivated in home gardens.

14) *Citrus dimorphocarpa* Lush., *Indian Forester* xxxvi. 346. 1910. (Rutaceae).

Coll. no. E200. Rynjah, EKH.

LN: **Sohkynphor shrieh.**

Description: Evergreen small trees, often spiny, fruits big, rind thick.

Uses: Ripe fruits edible. Cultivated in home gardens.

15) *Citrus limetta* Risso, in Ann. Mus. Par. xx. 195.t.2.f.1.1813. (Rutaceae).

Coll. no. E198. Rynjah, EKH.

LN: **Sohnairiang.**

Description Evergreen medium trees, flowers small white, fruit globose.

Uses: Ripe fruits edible. Cultivated in home gardens.

16) *Citrus indica* Tanaka, in Stud. Citrolog 2:160,164.1929. (Rutaceae).

Coll. no. E382.Siatbakon, EKH.

LN: **Sohjew khlaw.**

Description: Evergreen small trees, often spiny, fruits small, rind thick.

Uses: Ripe fruits edible.

Citrus indica is considered the most primitive and progenitor of all *Citrus* species.

17) *Citrus latipes* (Swingle)Tanaka, in Stud. Citrolog. 2:155. 1929; FJ 1:116. 1981.

C. hystrix (non DC.1813) FBI 1:515.1875. (Rutaceae).

Coll. no. E190. Laitlyngkot, EKH.

LN: **Dieng soh Blei/Soh adong.**

Description: Medium sized trees, spines ascending, leaflets ovate elliptic or lanceolate equaling or smaller than the very broad petiole, flowers small white, fruit globose.

Uses: Ripe fruits edible. Cultivated in home gardens.

18) *Crassocephalum crepidioides* (Benth.) Moore, (Asteraceae).

See page

Uses: Leaves cooked as vegetable.

19) *Cryptocarya amygdalina* Nees, Wall. Pl. As. Rar. 2:69. 1831; FBI 5:118. 1886; FFM 2:724. 1987. (Lauraceae).

Coll. no. E219. Bhoirybong, RB.

LN: **Sohiong khlaw.**

Description: Middle sized trees, leaves broadly oblong, elliptic, acuminate to sub-acute, panicles terminal or from upper axils, flowers tomentose outside, fruits oblong, blue black when ripe.

Uses: Fruits edible when ripe.

20) *Curcuma zedoaria* (Christm.) Rosc., in Trans. Linn. Soc. 8:354. 1862; FBI 6:210. 1890. (Zingiberaceae).

Coll. no. E039. Umtyngar, EKH.

Description: Herb, rootstock large, pale yellow, leaves glabrous, inflorescence lateral, bracts ovate, pale green, those of coma tinged with pink, flowers yellowish.

LN: **Sying Blei.**

Uses: Inflorescence taken raw as salad. (PLATE 22, A)

21) *Dioscorea pentaphylla* L., Sp. Pl. 1032. 1753; FBI 6:289. 1892; Rao and Verma in Bull. Bot. Surv. Ind. 15:193. 1973; FJ 2:537. 1983. (Dioscoreaceae).

Coll. no. E369. Kyrphei, EKH.

LN: **Sohksu.**

Description: Stems upto 10m, abundantly prickly, bulbils many, leaves 3-5 foliolate, leaflets acute, rounded at base, male inflorescences on large axillary or terminal leafless branches, female inflorescences 1-3 together, capsules black winged.

Uses: Bulbils edible when boiled.

22) *Dioscorea bulbifera* L., Sp. Pl. 1033. 1753; FBI 6:296.1892; Rao and Verma in Bull. Bot Surv. Ind. 15:201. 1973. (Dioscoreaceae).

Coll. no. E 407. Mawlai, EKH.

LN: **Phanshynreh.**

Description: Stems ascending, upto 30m, terete, tubers globose, 10-15 cm diam, with purplish black skin, leaves broadly cordate, caudate-acuminate, male inflorescences 1-4 together, female inflorescence solitary or paired, axillary, wings semi- elliptic.

Uses: Bulbils and tubers are boiled and taken.

23) *Duchesnea indica* (Andr.) Focke Engler & Prantl., Pflanzenfam 3(3):33. 1888; FFM 1:370. 1985; FJ 1:187. 1981.

Fragaria indica Andr. Bot. rep. t. 479; FBI 2:343. 1878. (Rosaceae).

Coll. no. E010. Laitlyngkot, EKH.

LN: **Sohshan.**

Description: Stoloniferous herbs with trifoliate leaves, peduncles solitary axillary 1-flowered, petals yellow, fruit spherical bright red.

Uses: Ripe fruits edible.

24) *Elaeocarpus prunifolius* (C. Muell.) Mast., FBI 1:407. 1874; FA 1:180. 1934; FJ 1:105.1981. (Elaeocarpaceae).

Coll no. E375. Tyrsad, EKH.

LN: **Soh khyllam.**

Description: Middle sized trees, leaves cuneate at base, flowers yellowish green, in axillary racemes, drupes oblong ovoid, stone ovoid slightly rugose.

Uses: Both raw and ripe fruits are edible.

25) *Eleagnus pyriformis* Hook. f. FBI 5:202. 1886; FA 4:115. 1940; FFM 2:752. 1987. (Eleagnaceae).

Coll. no. E001. Umtyngar, EKH.

LN: **Soh khlur.**

Description: Scandent shrubs, branches brown, leaves silvery beneath, racemes, flowers scaly, fruits small pyriform acute at both ends.

Uses: Ripe fruits are edible and can also be pickled.

26) *Emilia sonchifolia* DC., Wight Contrib. 24; Prodr. 6:302; FBI 3:336. 1881; FFM 2:529. 1987. (Asteraceae).

Coll. no. E79. Umtyngar, EKH.

LN: **Hurmawroh./Jhurhawria.**

Description: Herbs with radical, lyrate and cauline, glaucous leaves, flowers pinkish-purple.

Uses: Leaves taken raw as salad.

27) *Fagopyrum cymosum* Meisn. (Apiaceae).

See page 114.

Uses: The young leaves are cooked with dry fish or fried.

28) *Ficus racemosa* L., Sp. Pl. 1060. 1753; FJ 2: 436.1983.

Ficus glomerata Roxb. Pl. Corom. 2: t. 123. 1798; FBI 5:535. 1888. (Moraceae).

Coll. no. E062. Bhoiryabong, RB.

LN: **Sohdoit.**

Description: Trees, shoots glabrous or pubescent, leaves oblong-obovate to lanceolate, acute or obtuse at base, caudate to blunt acuminate, synconia pyriform, reddish.

(PLATE 22, B)

Uses: Ripe fruits edible.

29) *Ficus auriculata* Lour., Fl. Cochinch. 666. 1790; FJ 2:439.1983.

Ficus roxburghii Miq. Ann. Mus. Bot. Lugd. Bat. 3:296. 1897; FBI 5:534. 1888; FA 4:262. 1940. (Moraceae).

Coll. no. E132. Pynursla, EKH.

LN: **Sohshet.**

Description: Trees, leaves ovate orbicular, nerves prominent on both surfaces, deeply cordate or round at base, synconia from shortened leafless branches at trunk base.

Uses: Tender young leaves are cooked as vegetable, ripe fruits are edible.

30) *Ficus hirta* Vahl, Enum 2:201. 1805; FBI 5:531. 1888; FFM 2:826. 1987; FA 4:255. 1940; FJ 2:439. 1983; FFM 2:826. 1987. (Moraceae).

Coll. no. E328. Bhoirymbong, RB.

LN: **Sohmyntaid**

Description: Shrubs, leaves oblong- lanceolate to suborbicular, acute, 3-5 lobed, base cordate, synconia paired, subglobose hairy.

Uses: Ripe fruits edible.

31) *Flacourtia jangomas* (Lour.) Raeusch., Nomencl. Bot. ed. 3:290. 1897. FJ 1:79. 1981; FFM 1:91. 1985.

Flacourtia cataphracta Willd., Sp. Pl. 4:830. 1806; FBI 1: 193. 1872. (Flacourtiaceae).

Coll. no. E373. Pynursla, EKH.

LN: **Soh mluh**

Description: Middle sized trees, crown oval, leaves ovate lanceolate, acuminate, broadly cuneate at base, crenate serrate, glabrous, flowers greenish yellow, berries globose, dark purple, crowned by persistent column of the style.

Uses: Ripe fruits edible.

32) *Gonatanthus pumilus* (D. Don) Engl. & Krause, in Engl. Pflanzenr. 71:19. 1920; FN 333.1982. FJ 2:565. 1983.

Gonatanthus sarmentosus (Fischer) Klotz., in Link, Klotz. & Otto. Ic. Pl. Rar. Hort. Berol. 1:33. 1841; FBI 6:522. 1893. (Araceae).

Coll. no. E154. Quinine, RB.

LN: **Wang um**

Description: Terrestrial, corms 0.5-3.0cm diam, leaves oblong-ovate, peltate rounded at base, acuminate at apex, petioles 6-40 cm, spathes 12-20cm, tube globose-ovoid, limb linear-lanceolate, green becoming yellow, male zone cylindrical, creamy, female zone, green. (PLATE 22, C)

Uses: Leaves and corms eaten as vegetable when properly cooked.

33) *Gynura nepalensis* DC., Prodr. 6:300. 1838; FBI 3:333. 1881; FI 13:221. 1995. (Asteraceae)

Coll. no. E387. Laitlyngkot, EKH.

LN: **Jali**

Description: Tall, acuminate, usually irregularly coarsely toothed, corymbs large and broad, ray florets reddish orange. (PLATE 22, D)

Uses: Young leaves taken raw as vegetable

34) *Hibiscus sabdariffa* L., Sp. Pl. 695. 1753; FBI 1:340. 1874. (Malvaceae).

Coll. no. E101. Bhoirymbong, RB.

LN: **Jajew**

Description: Erect shrubs, stems red, leaves palmately lobed, flowers pale yellow with a bright purple centre, calyx blood red, enlarged and thick fleshy in fruits.

Uses: Fleshy calyx and leaves cooked as vegetable.

35) *Hibiscus syriacus* L., Sp. Pl. 695. 1753; FBI 1:344. 1874. (Malvaceae).

Coll. no. E177. Wahkhen, EKH.

LN: **Jymbiar/ Dieng tiew jain**

Description: Erect shrubs, 3-6m high, young branches pubescent with stellate hair, mature portion glabrous, leaves deltoid –ovate to rhomboid-ovate, often 3 lobed, apex acute, cuneate at the base, flowers solitary, axillary pedicels equal to or shorter than the petioles, petals obovate, staminal column white or pale purple.

Uses: Young tender leaves cooked as vegetable.

36) *Holboellia latifolia* Wall., Tent. Fl. Nepal. 24. t. 16. 1824; FBI 1:108. 1872; FA 1:61. 1934; FJ 1:71. 1981. FFM 1:84. 1985. (Lardizabalaceae).

Coll. no. E337. Kyrphei, EKH.

LN: **Sohlyngkait, Sohtymbra**

Description: Climbers, leaves 3-5 foliate, leaflets oblong lanceolate, oblong- elliptic, glabrous and shining above, flowers pinkish purple, berries pyriform purplish white when ripe, many seeded. **(PLATE 22, E&F)**

Uses: Fully ripe soft fruits are eaten. Cultivated in home gardens.

37) *Homalomena aromatica* (Roxb.) Schott., in Schott & Endl., Melet. Bot. 20. 1832;
FBI 6: 532.1893. (Araceae)

Coll. no. E160. Bhoirymbong, RB.

LN: **Wangmaw**

Description: Herbs, rhizome stout, leaves entire very variable in shape, spathe erect convolute, wholly persistent round the fruit, spadix included male and female

Uses: Whole plant edible when cooked.

38) *Hydrocotyl javanica* Thunb., Diss. Hydrocot. 3. t. 6.f. 2. 1798; FBI 2:667. 1879; FJ 1:218. 1981; FA 2:339. 1938. (Apiaceae).

Coll. no. E378. Siatbakon, EKH.

LN: **Jasyiar**

Description: Herbs, stems prostrate, rooting at nodes, leaves orbicular- rhomboid, cordate at base, umbels simple or irregularly compound, fruits orbicular.

Uses: Leaves taken raw as salad.

39) *Hypochoeris radicata* L., Sp. Pl. 2:810. 1753; FFM 2:530. 1987. (Asteraceae).

Coll. no. E 29. Laitlyngkot, EKH.

LN: **Jakhain**

Description: Rosette laticiferous herbs, with golden yellow, ligulate florets.

Uses: Leaves taken raw as salad.

40) *Justicia adhatoda* L. (Acanthaceae).

See page 126.

Uses: Leaves cooked as vegetable.

41) *Lasia spinosa* (L.)Thw., Enum. Pl. Zeyl. 336. 1864; FJ 2:561. 1983.

Lasia heterophylla Schott. Melet. 1:21. 1832; FBI 6:550. 1893. (Araceae)

Coll. no. E155. Quinine, RB.

LN: **Wang shiah**

Description: A stout prickly herb, with thick creeping rhizome, leaves long petioled, hastate- sagittate, spadix sessile short, cylindrical densely packed with pink flowers.

Uses: Leaves edible when cooked.

42) *Litsea cubeba* (Lour.) Pers., Syn Pl. 2:4. 1806; FFM 2:729. 1987.

Litsea citrata Bl. Bijdr. 565. 1825; FBI 5:155. 1886; FA 3:81. 1940; FJ 2:403. 1983.

(Lauraceae).

Coll. no. E379. Langtor, WKH.

LN: **Dieng Sohsyng**

Description: Middle sized trees, slender drooping branches, leaves lanceolate, tapering at the tip, long acuminate, umbels in short corymbs, flowers pale yellow, fruits ovoid-ellipsoid.

Uses: Ripe fruits edible.

43) *Luffa cylindrica* (L.) Roem., Farm. 2:64. 1846; FN 127, 1982.

Luffa aegyptica Mill. FBI 2:614.1879. (Cucurbitaceae).

Coll. no. E112. Bhoirymbong, RB.

LN: **Sohprew**

Description: Extensively climbing hairy, leaves reniform- orbicular, dentate, usually scabrous, flowers yellow, monoecious, mature fruits densely fibrous within.

Uses: Young green fruits is taken as vegetable. Cultivated in home gardens

44) *Lyonia ovalifolia* (Wall.) Drude, Engl. & Prantl. Pflanzenfam. 4(1):44. 1891.

var *elliptica* (Sieb. & Zucc.) Hand. - Mazz Symb. Sin. 7:788. 1936; FFM 2:536. 1987.

Pieris ovalifolia Wall ex. D. Don. Edinb. Phil. J. 17. 159. 1834; FBI 3:460. 1882; FA 3:150. 1939. (Vacciniaceae).

Coll. no. E036. Umtyngar, EKH.

LN: **Jatyrniang**

Description: Middle sized shrubs, bark reddish brown, leaves elliptic, rounded or acute at base, racemes upto 4cm long, flowers recurved, creamy white, capsules subglobose, depressed above.

Uses: Ripe fruits edible.

45) *Mahonia pycnophylla* (Fedde) Takeda, (Berberidaceae).

See page 131.

Uses: Ripe fruits edible.

46) *Ophiopogon parviflorus* (Hook. f.) Hara, J. Jap. Bot. 40: 21. 1965; FJ 2:541. 1983.

Ophiopogon intermedius D. Don var. *parviflorus* Hook. f. FBI 6:296. 1892

(Hemodoraceae)

Coll. no. 349. Tyrsad, EKH.

LN: **Sohkyiad**

Description: Rootstock short, leaves tufted, linear, peduncles leafless, flowers solitary or fascicled, white, fruits red.

Uses: Ripe fruits edible.

47) *Piper trioicum* Roxb., Hort. Beng. 4. 1814; FBI 5:90 (Piperaceae).

Coll. no. 152. Quinine, RB.

LN: **Tympew shrieh**

Description: Plants pendulous, flowers unisexual, bract not forming a cup beneath the flowers, stem slender, climbing, leaf ovate, elliptical or oval, leaf apex acuminate, leaf base cordate, inflorescence spike, flower sessile, fruit berry.

Uses: Young tender leaves edible.

48) *Plantago erosa* Wall. (Plantaginaceae).

See page 149.

Uses: Leaves taken raw as salad.

49) *Polygonum nepalense* Meisn. (Polygonaceae).

See page 151.

Uses: Leaves cooked as vegetable.

50) *Polygonum rude* Meisn., in DC. Prodr. 1:137. 1856; FFM 2:703.1987; FBI 5:49. 1886; FA 4:19. 1940. (Polygonaceae).

Coll. no. 165. Laitlyngkot, EKH.

LN: **Jalynnoh/ Jarain heh**

Description: Straggling shrubs, stems covered with deflexed hairs, broadly elliptic, elliptic-lanceolate, acuminate-acute, panicles, flowers yellowish white, fruits black.

Uses: Young tender leaves edible when cooked.

51) *Polygonum microcephalum* D. Don., Prodr. Fl. Nep. 72. 1825; FBI 5:42. 1886; FA 4:18.1940; FJ 2:391 1983. (Polygonaceae).

Coll. no. 217. Umtyngar, EKH.

LN: **Jajew siej**

Description: Decumbent herbs with woody base, leaves ovate to elliptic-lanceolate, petioles winged, heads on branched leafless long peduncles, flowers pale pink.

Uses: Young tender leaves edible when cooked. Leaves used for cleaning bronze decorations.

52) *Polygonum chinense* L., Sp. Pl. 363. 1753; FBI 5:44. 1886; FA 4:16. 1940; FJ 2:390. 1983. (Polygonaceae).

Coll. no. 157. Quinine, RB.

LN: **Miandok**

Description: Shrubs, leaves oblong-lanceolate, subcordate, heads on corymbose panicles, flowers white.

Uses: Young tender leaves edible when cooked.

53) *Pothos curtisii* Hk. f., FBI 6:554. 1893; Telopia 9(3):547-549. 2001.

Pothos kunstleri Hk. f. FBI 6:554. 1893. (Araceae)

Coll. no. E161. Quinine, RB.

LN: **Jajew maw**

Description: Climbing branched shrubs, leaves linear oblong acuminate, base cuneate or rounded, peduncles terminal, flowers in crowded spirals.

Uses: Leaves edible.

54) *Premna scandens* Roxb., Fl. Ind. 3:82. 1832; FBI 4:573. 1885; FA 3:472.1939.

(Verbenaceae)

Coll. no. E60. Bhoirymbong, RB.

LN: **Jatyngkain**

Description: Scandent shrubs, leaves oblong-elliptic, long acuminate, flowers greenish white, drupes long obovoid, black.

Uses: Leaves eaten cooked with fish. Cultivated in home gardens.

55) *Pyrus pashia* Ham., (Rosaceae).

See page 155.

Uses: Fruits edible can be made into jam and squashes. (PLATE 22, G)

56) *Rhododendron arboreum* Sm., Exot. Bot. 1:9 .t. 6. 1805; FBI 3:465. 1882; FA 3:152. 1939; FJ 1:280. 1981. (Ericaceae).

Coll. no. E013. Umtyngar, EKH.

LN: **Tiew saw**

Description: Middle sized trees, trunk usually crooked, leaves oblong, oblong-oblong, acute, corymbs terminal, flowers scarlet red, capsules oblong, cylindrical.

Uses: Flowers (corolla) eaten by children, sour in taste.

57) *Rhus chinensis* Mill., (Anacardiaceae).

See page 157.

Uses: Dried fruits edible.

58) *Rhynchosyris elliptica* (D. Dietr.) A. DC. (Gesneriaceae).

See page 157.

Uses: Young leaves taken as vegetable, or boiled with milk.

59) *Ricinus communis* L. (Euphorbiaceae).

See page 158.

Uses: Young leaves edible as vegetable when fried.

60) *Rubus ellipticus* Sm. (Rosaceae).

See page 161.

Uses: Ripe fruits edible.

61) *Rubus rugosus* Sm., (Rosaceae).

See page 161.

Uses: Ripe fruits edible.

62) *Rubus paniculatus* Sm., in Rees Cyclop. 30. 1815. (Rosaceae)

Coll. no. E366. Tyrsad, EKH.

LN: **Sohnep**

Description: A deciduous shrub upto 3m tall, branchlets brownish to reddish brown, with sparse minute prickles, leaves simple, unarmed, base cordate, inflorescence terminal or axillary, petals white, aggregate fruits dark red to blackish purple, globose, pyrenes distinctly rugose.

Uses: Ripe fruits edible.

63) *Rumex nepalensis* Spreng. Syst. Veg. (ed. 16) 2:159. 1825. (Polygonaceae)

Coll. no. E336. Smit, EKH.

LN: **Jaba**

Description: Herbs, perennial, stems erect, branched above, grooved, basal leaves- leaf blade broadly ovate, both surfaces glabrous, base cordate, margin entire, cauline leaves- shortly petiolate, ovate lanceolate, ocrea fungacious, membranous, inflorescence paniculate, achenes brown, shiny.

Uses: Young leaves are taken as vegetable when fried.

64) *Smilax ferox* Kunth, (Smilacaceae).

See page 165.

Uses: Young tender leaves are boiled and taken.

65) *Solanum* sp. (Solanaceae).

Coll. no. E113. Bhoirymbong, RB.

LN: **Sohbaingon pylleng**

Description: Small shrub, leaves more or less irregularly lobed, with spines, flowers violet, fruits elliptical, white when young and turns yellow upon ripening. (**PLATE 22, H**)

Uses: Both young and ripe fruits are used for making chutney.

66) *Solena heterophylla* Lour., Fl. Cochinch. 514. 1790; FFM 1:421. 1985; FJ 1:211. 1981.

Zehneria umbellata Thw. Enum. Pl. Zeyl. 125. 1853; FBI 2:625.1879. (Cucurbitaceae).

Coll. no. E364. Kyrphei, EKH.

LN: **Sohkhai Blei**

Description: Stems angular, leaves acuminate, sagittate, cordate, at base, flowers dull white, fruits oblong, subangular, red. (**PLATE 23, A**)

Uses: Ripe fruits edible.

67) *Sonchus brachyotus* DC. (Asteraceae).

See page 167.

Uses: Young leaves taken raw as salad.

68) *Sonchus wightianus* DC., Prodr. 7:187. 1838. subsp. *wightianus* FI 12:321. 1995.
(Asteraceae).

Coll. no. E90. Umtyngar, EKH.

LN: **Jakhain**

Description: Herbaceous, leaf alternate, elliptical or oval, sessile, leaf apex acute, glabrous, leaf base amplexicaul, inflorescence head, florets ligulate, pappus white silky, achenes ribbed.

Uses: Leaves are eaten raw as salad.

69) *Spilanthes paniculata* DC. (Asteraceae)

See page 168.

Uses: Leaves cooked as vegetable.

70) *Styrax serrulatum* Roxb., Fl. Ind. 2:414. 1832; FBI 3:588. 1882; FA 3:219. 1939; FJ 1:300. 1981. (Styraceae).

Coll. no. E116. Umsning, RB.

LN: **Soh tymmoh.**

Description: Trees, leaves ovate acuminate or acute, base rounded, flowers in axillary panicles, white fruits ellipsoid, crowned by stylar base and supported by the copular calyx, greyish.

Uses: Fruits edible when ripe.

71) *Syzygium cumini* (L.) Skeels, U. S. Dept. Agr. Bur. Pl. Indus. Bull. 248:25. 1918; FFM 1:394. 1985; FJ 1:199. 1981.

Eugenia jambolana Lamk., Encycl. 3:198. 1789; FBI 2:499. 1879. (Myrtaceae).

Coll. no. E211. Malki, EKH.

LN: **Sohum**

Description: Large trees, crown umbrella shape, leaves oblong- elliptic, oblanceolate- elliptic, abruptly acuminate, flowers white or greenish-white, berry red, turning purplish black, oblong, ovoid. **(PLATE 23, B)**

Uses: Ripe fruits edible.

72) *Tetrastigma obovatum* (Laws) Gagnep., Not. Syst.1:266.1911; FFM 1:245; FJ 1:137. 1981.

Vitis obovata Laws. FBI 1:658. 1875; FA 1(2):298. 1936. (Vitaceae)

Coll. no. E263. Laitlyngkot, EKH.

LN: **Sohlarpung**

Description: Large lianas, stems flat, tendrils simple, leaflets obovate, obovate-elliptic, acute, distantly bristly serrate, cymes in corymbs, flowers, greenish yellow, berries ellipsoid, black.

Uses: Ripe fruits edible.

73) *Toddalia asiatica* (L.) Lamk., Tabl. Encycl. 2:116.1797; FFM 1: 189. 1985; FJ 1:117. 1981.

Toddalia aculeata Pers. Syn.1:249. 1805; FBI 1:497. 1875. (Rutaceae).

Coll. no. E374. Tyrsad, EKH.

LN: **Sohsat**

Description: Large, prickly climbing shrubs, leaves trifoliolate, leaflets oblanceolate, acuminate, gland punctuate, flowers yellowish- white, fruits globose, fleshy, lobed, cells 1-2 seeded. (PLATE 23, C)

Uses: Ripe fruits edible.

74) *Trichosanthes tricuspidata* Lour., Fl. Cochinch. 589.1790; FFM 1:422. 1985.

Trichosanthes palmata Roxb., Fl. Ind. 3:704. 1832; FBI 2:606. 1879. (Cucurbitaceae)

Coll. no. E357. Tyrsad, EKH.

LN: **Sohrynshang**

Description: Large climbers, leaves 3-7 lobed, sub-orbicular, cordate, lobes acuminate or acute, male flowers white, axillary, racemose, female flowers solitary, berries subglobose, red with orange streaks.

Uses: Fruits edible, seeds are dried powdered and used for making palau.

75) *Vaccinium griffithianum* Wight, Ic. Pl. Ind. Or. 4(1):4. t. 1192. 1848; FBI 3:454. 1882; FA 3: 144. 1939; FJ 1:285. 1981; FFM 2:546. 1987. (Vacciniaceae).

Coll. no. E35. Umtyngar, EKH.

LN: **Sohryngkham**

Description: Bushy shrubs, leaves elliptic, elliptic-lanceolate, racemes often branched, flowers white, berries globose.

Uses: Ripe fruits edible.

76) *Vaccinium vacciniaceum* (Roxb.) Sleumer, in Engl. Bot. Jaharb 71:479.1941; FJ 1:285. 1981; FFM 2:547. 1987.

Vaccinium serratum (G. Don) Wight Ic. Pl. Ind. Or. 4(1):4. t. 1184. 1848; FBI 3:452. 1882; FA 3: 141. 1939. (Vacciniaceae).

Coll. no. E46. Umtyngar, EKH.

LN: **Sohpdung barit**

Description: Epiphytic shrubs, leaves oblanceolate, oblong- elliptic, acute, racemes terminal or subterminal, flowers greenish yellow or greenish white, berries globose.

Uses: Ripe fruits edible.

PLANTS USED IN SOCIO-RELIGIOUS CEREMONIES OF THE KHASIS

MARRIAGE CEREMONY

The plants and plant parts used are rice grains, powdered rice or rice flour (kpu), *Lagenaria leucantha* (Duch.) Rusby (klong/skaw), banana leaves (lakait).

The ceremony is performed in either one of the following ways. Some people complete the marriage ceremony by using only rice grains while in another type of marriage ceremony in addition to rice grains, people make use of powdered rice or rice flour (rice grains are first soaked in water and then ground in a wooden mortar and pestle till it becomes powdery), banana leaf, *Lagenaria leucantha* (the fruit is sun dried and through a small opening that is bored at the apex, all the seeds and pulp are removed and what remains is only the outer skin or ectocarp, which shows the appearance of a bottle with a mouth at the top. This is known as skaw).

In the first type of marriage ceremony the priests takes a handful of rice grains and holding the grains in his hand he offers prayers and seeks the blessings of the Almighty for the couple. After this is completed he gives half the handful of grains each, first to the bride and then to the bridegroom. Then both the bride and bridegroom exchange the grains with each other and keep them in their pockets. Thus their union is completed.

In the second type of marriage ceremony, the bride and the bridegroom sit next to each other and facing the priest. The ceremony begins with the priest pouring a little

amount of local liquor inside the skaw and then adding a pinch of powdered rice. Few banana leaves are laid on the floor opposite the bride and the bridegroom. The priest keeps a handful of powdered rice on the leaves and holding the skaw with both hands he bows his head three times and offers prayers to seek the blessings of the Almighty for the couple. After this is completed he then sprays the local liquor from the skaw to the rice flour on the banana leaves. He then takes a pinch of the powdered rice three times, each time offering prayers for the couple's wellbeing. The priest gives half of the powdered rice held in his hand each to the bride and bridegroom and both of them keep it in their pockets. Thus the marriage ceremony is declared over.

NAMING CEREMONY

The plants and plant parts used are Rice grains (U Khawjer), Powdered rice or rice flour (pujer/puthoh/purew), *Lagenaria leucantha* (skaw), local rice beer (Ka kiad um), banana leaves (Ka lakait/lakhar), *Curcuma longa* rhizome (U Shynrai), five pieces of dried fish (Khapiah) winnowing trays (U prah). Besides the above in case of a male child a bow (tiah jer made from *Bambusa tulda*) and three arrows (namjer made from *Saccharum spontaneum* L. with feathers of hornbill stuck to its end) are required while in case of female child a carrying basket (ka khoh made from *Dendrocalamus hamiltonii* Nees & Arn. ex Munro) and the head strap (U star made from *Calamus leptospadix* Griff) are kept together. **(PLATE 24)**

The naming ceremony begins in the morning when the rice grains contributed from the paternal and maternal side of the child is soaked in water till it becomes soft.

Then the female friends and relatives grind the grains by means of wooden pestle and mortar. The rice flour (pujer/puthoh/purew) is poured in big winnowing trays (U prah) and a small amount of pujan is kept aside in a small winnowing tray or basket for use in the ritual, the local rice beer (Ka kiad um) is poured into the *Lagenaria leucantha* (skaw) with a little amount of pujan is added, paste of *Curcuma longa* rhizome is made, all these are kept in the room.

The priest (U Nongduwai) spreads a single leaf of banana on an empty winnowing tray and water sprinkled on it. He keeps the filled skaw and all other things as per requirement for naming a male or female as mentioned above on the empty winnowing tray. Holding the winnowing tray with his hand he chants prayers seeking permission from God before performing the rituals. He then takes a small amount of pujan which was kept aside in one hand and brings his hand near the child and back to the winnowing tray, then offers prayer to God inviting him to come before their presence and enlightened them about the name of the child and bless the child and his whole family and keeps the handful of pujan at the outer bottom of the skaw this whole process is repeated thrice. Then the priest is informed by the family members of the proposed name for the child. The priest pours out the local rice beer (Ka kiad um) from the mouth of skaw and if a drop of the rice beer sticks to the mouth of the skaw, it shows acceptance from God and thus the name of the child is accepted by all, in either case if the drop does not stick then another name must be suggested till the drop sticks after each pouring.

The father takes the pot containing the placenta, after having previously placed rice flour and waves it three times over the child and then walks out with it through the main entrance of the house and hangs up the pot to a tree outside the village. When he returns from his duty before he re-enters the house, another throws water over the father's feet. The father being thus cleansed enters the house and holds the rice flour to his mouth three times. Two people then holding the dried fish by their two ends break them in two. The turmeric paste is mixed with a little amount of puger and water. The mixture is taken by the priest to put a mark on the father's right leg followed by the mother and the baby marked on their left leg. Then relatives from the maternal side are marked on their left leg and relatives from the paternal side are marked on their right leg. The remaining puger kept in the winnowing tray is distributed and eaten by all who are present in the ceremony.

FUNERAL CEREMONY (Ka Niam Iap)

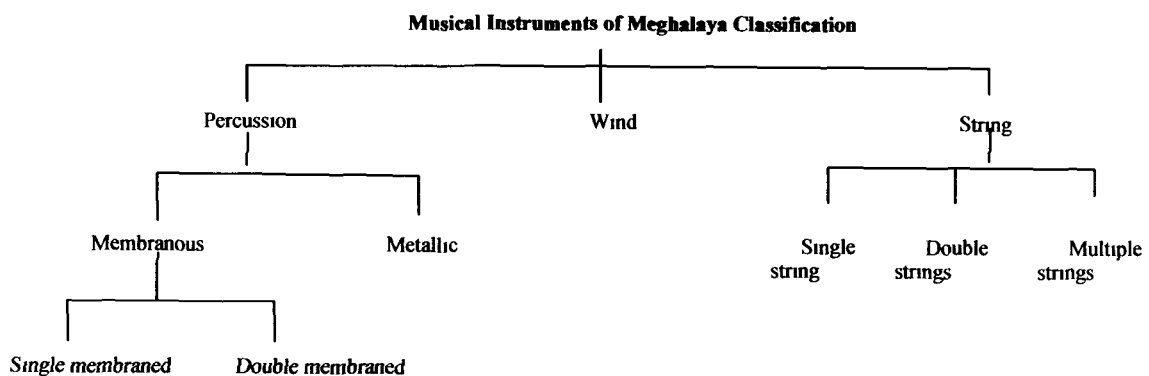
The plants and plant parts used are rice grains, bamboo, betel nut, betel leaf. A member of the family bends down towards the ear of the apparently deceased person and calls him or her by name three times, to make sure that death has occurred. If no answer comes, the family laments, for it is then concluded that the person is really dead. The body is then bathed in warm water from three earthen pots and is laid on a mat made of cane and then dressed. An egg called ka'leng kpoh is placed on the stomach of the deceased. A cock, u'iar krad lynti is sacrificed, the idea being that the cock will scratch a path for the spirit to the next world. A sacrifice of a bull or cow in case the deceased is a

woman follows. Portions of the left leg of the fowl and lower part of the jaw of the bull or cow are kept, to be placed afterwards in the mawshyieng or bone receptacle. A small basket is hung up over the head of the corpse the basket containing pieces of the sacrificed animals. A dish containing eatables and betel-nut and a jar of water are placed near the head of the corpse by way of offering food to the spirit of the departed which is called ai ja miet ja step. If it is intended to burn the body on a masonry pyre (*jingthang*), a bull is sacrificed. If the body is placed in a coffin (*ka shyngoid*) a pig named *u'niang shyngoid* is sacrificed. On the day of funeral procession pigs are sacrificed by the relatives and friends of the deceased, those who cannot afford pigs bring liquor, a small portion of which they pour on the funeral pyre. The coffin is laid on a bamboo bier (*ka krong*) adorned with silk cloths or dhara. Before lifting the bier a handful of rice and water from a jar are thrown outside and a goat (*u'lang sait ksuid*) is sacrificed, this is for purification purpose. A goat is then sacrificed, *u'lang mawkjat*. The corpse is laid on the pyre inside the coffin, with the head to the west and the feet to the east. Logs of wood are placed around the body, and the egg (*ka 'leng kpoh*) is broken by throwing on the pyre in the direction of the feet of the corpse. Fire is then applied to the pyre. Another fowl, *u'iar padat* is sacrificed and the bier is then broken to piece. Three arrows are shot from the bow, one to the north, another to the south and the third to the east. These arrows are called *ki 'nam tymphem*. Before leaving the burning place the relatives and friends of the deceased place betel-nuts on the pyre and bid farewell to the deceased (by saying good- bye, go and eat betel nut in the house of God).

TRADITIONAL WOODEN MUSICAL INSTRUMENTS OF THE KHASIS, MEGHALAYA

Music is an art of controlling or organizing sounds for maintaining tune, rhythm and musical concord in appropriate order. It is a blanket term which includes both dance and music. Grace of dance is created by the musical concord. Musical concord is controlled by the musical beating time. Without beating time dance cannot be properly performed. Character of beating time is expressed through musical instruments.

Music in Meghalaya is integrally associated with the traditional cultural life. Social ceremonies, religious performances, recreational activities, fares and festivals are marked by dance and music. Music is used for invoking supernatural power and also for deriving pleasure. Music communicates history and traditional culture in tradition bound social life. The Khasis are great lovers of music. They have different kinds of musical instruments for accompanying musical items. Musical instruments documented in the study area are mainly made in Wahkhen, Nongblai, Nongjri.



A) PERCUSSION INSTRUMENTS OR MEMBRANE INSTRUMENTS: It is found that generally drums of this tribe are fashioned out of wood, not of metal or earthenware as in Assam (Barthakur, 2003).

I) **DOUBLE MEMBRANE DRUMS:** These types of drums as their name suggests have their two ends covered by leather and are smaller in size. The drums are used in musical performances during social functions, religious ceremonies, festive occasions and recreational activities. For the convenience of playing the drum is kept hanging from across the shoulder with a leather thong so that it remains in horizontal position across the belly of the drum player.

1) **KSING – SHYNRANG (male drum):** It is a two-sided drum, oval in shape about 2 feet long. The wooden frame or shell is hallowed from the tree cutting of *Artocarpus integrifolia* L. or *Wightia gigantea* Wall. leaving a fringe of ½ inch thickness with the two ends (lyndiang) kept bare. The left end (approx 10 inches diameter) is then covered with cowhide and played by hand while the right end (approx 7 inches diameter) is covered with goat hide and played with a drumstick made from the stem of *Viburnum foetidum* Wall. The membranous heads are stretched round hempen loops fastened to the shell and strained by means of thongs or leather interlaced or strong cotton cords. The cotton cords are made to pass through rings meant for tuning. Most favourable months for making the instrument are November and December. **(PLATE 25, A)**

2) KA KSING - KYNTHEI (female drum): Ka Ksing Kynthei is a cylindrically shaped drum having the appearance of Dhol (Borthakur, 2003). It is a two-sided drum and takes its name from the fact that this drum is beaten when women dance. Like the Ksing Shynrang its wooden frame is made from the wood of *Artocarpus integrifolia* L. or *Wightia gigantea* Wall. The two ends (lyndiang) are covered with goat hide and the middle portion of each end is covered with wax (laha). Both sides are played with hands.

(PLATE 25, B)

II) SINGLE MEMBRANE DRUMS: These types of drums as their name suggests have only their one end covered by leather. Single membrane drums are extensively used in vigorous dance performance, announcements, fairs and festivals, ritual functions and recreational activities for creating an atmosphere befitting to the occasion.

3) KA BOM OR NAKRA: It is the largest among the drums. A one-sided drum (approx 2 ft high, diameter 17 to 19 inches), its body is shaped like a mortar, made from the wood of *Artocarpus integrifolia* L. or *Wightia gigantea* Wall. The inside pulp of the wood is removed leaving only a fringe of the bark which is gently scrapped to a U-shaped structure with a narrow base and top portion broad and wide. The open end of the body is covered with cowhide. Small skin straps are wound round and round in a particular fashion on the drums outer body. The body serves as the resonator and the open end of the body which is covered with a single fold of skin serves as vellum. When beaten it is laid flat with its narrow base touching the ground and the drummer beats at the wide end by means of two wooden drumsticks. **(PLATE 25, C&D)**

4) **KSING PADIAH:** It is a one-sided drum (approx 50 cm tall), shaped like a bowl, made from the wood of *Wightia gigantea* Wall. or *Artocarpus integrifolia* L. its end covered with cowhide and played by two drumsticks.

B) STRING INSTRUMENTS

5) **DUITARA:** One of the most popular instruments of the Khasi-Pnar, the Duitara is an indigenous guitar with a small hollow rectangular frame, its neck which is longer than the main body has at its end four holes in which wooden pegs are fixed holding the four muga silk strings, which is played with a little key (Themprong) held in the hand made from any bamboo. The hollow bottom part of the body is scooped from the wood of *Pinus kesiya* Royle ex Gordon or *Artocarpus integrifolia* L., *Erythrina arborescence* Roxb., *Michelia doltsopa* DC. but long lasting instrument can be made from the wood of *Wightia gigantea* Wall. The open upper part is covered by cow or goat leather. The instrument is the same as Tokari of Assam (Borthakur, 2003). It is usually played by aged people, who spent their night at home sitting round the fire place with their family and side by side stories and folklores were told in the form of songs. The four strings of the instrument have their own meanings. The first string denotes childhood. The two middle strings denote the father and the mother. The last string denotes elder folks.

(PLATE 25, E)

6) **MARYNGOD:** It is a harp like the duitara which contains three parts the belly, neck and head. Belly serves as resonator. The body is made from the wood of *Pinus kesiya* Royle ex Gordon and covered with skin. The three strings are made to pass through a

bridge fitted in the middle of the skin covered belly. Other end is tied to the pegs fitted in the hollow head region. Pegs are used for tuning. The instrument is played upon either by strumming or plucking out by fingers of the right hand during social functions, and recreational activities. **(PLATE 25, F)**

7) SARONG: It is similar in shape with the Maryngod but is played with a bow like a violin.

8) MARYNTHING: It is a kind of large guitar made from gourd of *Lagenaria* sp. with only one string, played with the finger.

C) WIND INSTRUMENTS

9) BESLI or SHYNGWIANG: Besli is a very simple pipe reduced from a thin bamboo like *Bambusa pallida* Munro. or *Cephalostachyum latifolium* Munro. cut amid the two joints, its bark being properly scrapped with seven holes bored into its surface. The besli is mostly played by shepherds who look after the sheep and cattle. It has its multifarious use in giving typical tunes to song and music belonging to different backgrounds The Shyngwiang is like the besli but bears eight holes. **(PLATE 25, G)**

10) TANGMURI: This is considered as the queen of Khasi musical instruments. It is a wind pipe or flute, which is played like a flageolet. Its body consists of three parts: i) Ka Khieh, the wide funnel shaped end ii) Ka Ktang, the narrow portion, both the parts are made from the culm of *Bambusa pallida* Munro. iii) Ka Kdor/ Phlong, the tongue or suckler made from the stem of *Arundo donax* L. **(PLATE 25, H)**. The stem should be plucked at a time when the cock does not crow or from a place far enough to hear the

cock crowing otherwise the tangmuri will not produce the melodious tune when played. The stem is cut into small pieces, properly dried and a single small piece is stuck at the end to act as suckler. The instrument is used with the combination of drums and cymbals in community dance or festivals like Ka Shad Suk Mynsiem held during the month of April. **(PLATE 26, F, G &H)**

11) TANGLOD: It is a flute made from the culm of *Bambusa pallida* Munro. or *Cephalostachyum latifolium* Munro., with seven holes bored on its surface. It has a role in instrumental music and gives laudable support to the vocal music. **(PLATE 25, I)**

12) MIENG (Jew's harp): It is a mouth instrument made from the culm of *Bambusa pallida* Munro. It is held to the piper's mouth by means of a piece of thread on one hand and the fingers of the other hand hold the comb like structure suspended down from the piper's mouth made from a few bamboo chips where a thin tongue runs through. When played by swaying the thread and the other hand moving the bamboo chips suspended below, it produces a sound like flapping, a kind of a bamboo Jew's harp (Bareh,1991). It is the same as Gagona of Assam (Barthakur, 2003). Mieng is commonly used by both men and women for entertainment. They entertain themselves during their journey in dense forest to overcome the solidarity of the nature.

13) SHARATI: It is a kind of flute made from the culm of *Bambusa pallida* Munro. At cremation ceremony before the corpse is burnt, a Sharati is played with small drums beaten (Bareh, 1991), it is also played for invocation of the spirit of the dead. The instrument is also played when the bones and ashes of a clan are collected and placed in the family tomb, or mawbah (Gurdon, 1906).

14) SINGDIENGPONG: It is a primitive harp, which bears eight strings modelled from the soft barks of *Bambusa pallida* Munro.

15) SINGPHONG: It is flat, rectangular in shape consisting of many longitudinal poles of *Bambusa pallida* Munro. or *Themeda villosa* (Poir) A.Camus woven together at their ends by means of *Calamus collinus* to form a flat surface. It is also called the flat bamboo instrument. It is played during dance lessons or dance rehearsals at home.

(PLATE 25, J)

16) KDOR: It consists of three separate solid pieces of culm of *Bambusa tulda* Roxb. kept close together and beaten with two sticks made from *Bambusa pallida* Munro. culm. It is played by the people of Wahkhen in the farm house for scaring away wild animals in the fields at night. **(PLATE 26, A)**

17) PUT SLA (Piping Music in leaf): A leaf is taken folded and blown in a particular fashion to produce music which gives entertainment, during journey in dense forest to overcome the solidarity of the nature.

An account of the plants mentioned is given below:

1) *Artocarpus heterophyllus* Lamk. (Moraceae).

See page 193.

2) *Arundo donax* L. Sp. Pl 81. 1753; FBI 7:302. 1897; FA 5:89. 1940. (Poaceae).

LN: **Japung**

Coll. no. E185. Wahkhen, EKH.

Description: Tall stout perennial grass, leaf base amplexicaul, panicle erect thyriform, panicles 1-2 ft, spikelets green or yellowish.

3) *Bambusa pallida* Munro. in Trans. Linn. Soc. 26:97. 1868; FBI 7:389. 1897.
(Poaceae)

Coll no. E183. Wahkhen, EKH.

LN: **Siej shken**

Description: A caespitose bamboo growing in thick culms, culms smooth, fistular, 12-20m tall, blade of stem sheaths very long auricles small, leaves linear lanceolate glabrous above white hirsute beneath, panicle very large, spikelets pale, sometimes curved.

4) *Bambusa tulda* Roxb., Fl. Ind. 2:193. 1832; FBI 7:387.1896; FA 5:27.1940.
(Poaceae).

Coll no. E189. Wahkhen, EKH.

LN: **Skong**

Description: A tufted bamboo, culms reaching a height of 22m, hollow smooth green, leaves linear-oblong or lanceolate, rounded or cordate at the base, inflorescence variable, usually a gigantic, leafless panicle but sometimes very short, spikelets cylindrical at first then a little compressed.

5) *Cephalostachyum latifolium* Munro in Trans. Linn. Soc. 26:140.1868; FBI 7:412.

1897. (Poaceae)

Coll. no. E184. Wahkhen, EKH.

LN: Sylli

Description: Shrubby, semi scandent, stem sheaths linear, leaves glabrous, ovate lanceolate, spikelets 1-flowered, acuminate, glabrous.

6) *Erythrina arborescens* Roxb., (Fabaceae)

See page 113.

7) *Michelia doltsopa* DC. Syst. 1:448.1818; FBI 1:43. 1872; FJ 1:59. 1981; FFM 1:59.

1985. (Magnoliaceae)

Coll. no. E 416. Wahkhen, EKH.

LN: Dieng rai

Description: Trees upto 20m high, bark corky lenticellate, leaves elliptic or oblong lanceolate, shortly acuminate, glabrous above, flowers white turning pink, faintly fragrant, follicles ovoid beaked.

8) *Pinus kesiya* Royle ex Gordon, (Pinaceae).

See page 146.

9) *Themeda villosa* (Poir.) A. Camus in Fl. Indo Chine 7:364.1922; FA 5:409.1940.

(Poaceae).

Coll. no. E186. Wahkhen, EKH.

LN: **Sder**

Description: A tall tufted reed like perennial grass, culms short to 1.8m tall, leaf blades linear-lanceolate tapering to a narrow base, inflorescence a very large, leafy, decompound panicle.

10) *Viburnum foetidum* Wall. (Caprifoliaceae).

See page 175.

11) *Wightia gigantea* Wall. Pl. As. Rar. 1:71.1830; FBI 4:257. (Scrophulariaceae).

Coll. no. E187. Wahkhen, EKH.

LN: **Dieng slang**

Description: A large tree, leaves ovate lanceolate rounded or elliptic, acute or obtuse, glabrous above, flowers in axillary thyrsi, peduncle and rachis very stout, calyx campanulate, corolla tube incurved, capsule ovoid, thinly coriaceous.

CLANS RELATED PLANTS AND THEIR MODE OF CONSERVATION

The Khasi society reckons its descent in the female line. In other words, any two persons in Khasi society are kins of each other if either one of them is descended from the other (mother and child relationship) or both of them have descended from a common female ancestress. Khasi society thus follows a unilineal principle of matrilineal descent. The largest division in the society on the basis of matrilineal principle is in terms of Kur which can be seen as a near equivalent to a clan. A 'kur' is an exogamous unit in which every member is a kin of every other person of the same 'kur'. All the members belonging to any particular 'kur' refer to each other collectively as 'shi kur', i.e., kins belonging to a single 'kur' (Nongkynrih, 2002). The Khasi society is made up of a multitude of 'kurs' (clans) each of which ascribes its origin to a primeval ancestor (U Thawlang) and the ancestress (Ka Iawbei Tynrai). Some of these kurs, both in the Khasi and Jaintia Hills, consider themselves as bound by ties so intimate that they will not intermarry. It has also been observed that certain clans of the Khasi tribe are directly or indirectly related with plants or their products and do not use them in any form. Clan name and faith attached to plants help in conservation of the species. An effort has been made to document the clan names and the plant species to which they are associated which are as follows:

Table 8: Showing name of clans and their faith attached to plants.

Sl. no.	Name of Kur or Clan	Plant associated (Local name)	Botanical name and Family	Taboo
1.	Nongrum	Tyrkhang	<i>Diplazium esculentum</i> (Retz) Pr. (Aspidiaceae) <i>Thelypteris nudata</i> (Roxb.) C. V Morton (Pteridaceae)	Do not eat any part of the plant
2.	Nongrum	Diengsong	<i>Erythrina arborescence</i> Roxb. <i>E. stricta</i> Roxb. (Fabaceae)	Do not cut or use it as fuel wood
3.	Nongsiej	Lungsiej	<i>Dendrocalamus hamiltonii</i> Munro (Poaceae)	Do not eat the bamboo shoots
4.	Marbaniang	Tyrkhang	<i>Diplazium esculentum</i> (Retz) Pr. (Aspidiaceae) <i>Thelypteris nudata</i> (Roxb.) C. V Morton (Pteridaceae)	Do not eat any part of the plant
5.	Rynjah	Pathaw	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
6.	Rynjah	Kraishan	<i>Paspalum sanguinale</i> Lam. (Poaceae)	Do not eat the grains
7.	Hynniewta	Lungsiej	<i>Dendrocalamus hamiltonii</i> Munro(Poaceae)	Do not eat the bamboo shoots
8.	Malai	Pathaw	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
9.	Shabong	Pathaw	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits

Sl. no.	Name of Kur or Clan	Plant associated (Local name)	Botanical name and Family	Taboo
10.	Nengnong	Dieng ngan	<i>Schima wallichii</i> (DC.) Korth. (Theaceae)	Do not cut or use it as fuel wood
11.	Syiem Myllem	Pathaw	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
12.	Mawrie	Jalynshir	<i>Sonchus</i> sp.(Asteraceae)	Do not eat any part of the plant
13.	Nongtathiang	Sohjew	<i>Citrus limon</i> (L.) Burm. f. (Rutaceae)	Do not cut the wood or consume its fruits
14.	Buhphang	Dieng sohma	<i>Rhus chinensis</i> (Anacardiaceae)	Do not cut the wood or eat its fruits
15.	Diengdoh	Diengdoh	<i>Exbucklandia populnea</i> (R. Br. ex Griff.) R. W. Br. (Hamamelidaceae)	Do not cut or use it as fuel wood
16.	Myllemngap	Pathaw	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
17.	Myllemngap	Kraishan	<i>Paspalum sanguinale</i> Lam. (Poaceae)	Do not eat the grains
18.	Myllemngap	Rymbai ja	<i>Vigna umbellata</i> (Thunb.) Ohwi & Ohashi (Fabaceae)	Do not consume any part of the plant.

Sl. no.	Name of Kur or Clan	Plant associated (Local name)	Botanical name and Family	Taboo
19.	Jyrwa	Lungsiej	<i>Dendrocalamus hamiltonii</i> Munro (Poaceae)	Do not eat the bamboo shoots
20.	Thabah	Jaut/ Jyltah	<i>Allium hookeri</i> Thw. (Liliaceae)	Do not consume any part of the plant.
21.	Mylliempdah	Pathaw Khasi	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
22.	Syiemlich	Pathaw Khasi	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
23.	Syiemlich	Jyllang	<i>Allium tuberosum</i> , Roxb. (Liliaceae)	Do not consume any part of the plant.
24.	Khongwir	Jali	<i>Gynura nepalensis</i> DC.(Asteraceae)	Do not consume any part of the plant.
25.	Sohshang	Sohshang	<i>Eleagnus infundibularis</i> Momiya (Eleagnaceae)	Do not eat the fruits
26.	Ryntathiang	Sohnairiang	<i>Citrus limetta</i> (Rutaceae)	Do not eat the fruits
27.	Tynsong	Dieng Shyrngan	<i>Schima wallichii</i> (DC.) Korth.(Theaceae)	Do not cut or use it as fuel wood

Sl. no.	Name of Kur or Clan	Plant associated (Local name)	Botanical name and Family	Taboo
28.	Khong dkhar	Dieng Bti	<i>Toona ciliata</i> Roem.(Meliaceae)	Do not cut or use it as fuel wood
29.	Mawlong	Lakait	<i>Musa paradisiaca</i> (Musaceae)	Do not cut or eat the plant
30.	Kharshiing	Dieng ngan	<i>Schima wallichii</i> (DC.) Korth. (Theaceae)	Do not cut or use it as fuel wood
31.	Nongrang	Jathong Nongrang		Do not eat any part of the plant
32.	Rumnong	Pathaw	<i>Cucurbita maxima</i> Duchesne (Cucurbitaceae)	Do not eat the fruits
33.	Khongjii	Diengsong	<i>Erythrina arborescence</i> Roxb. <i>E. stricta</i> Roxb. (Fabaceae)	Do not cut or use it as fuel wood
34.	Khonglah	Diengbui		Do not cut or use it as fuel wood
35.	Sohkhia	Sohkhia	<i>Cucumis sativus</i> L. (Cucurbitaceae)	Do not consume the plant.
36.	Khongthaw	Jali	<i>Gynura nepalensis</i> DC. (Asteraceae)	Do not consume the plant.

THE KHASIS CONCEPT OF PLANT NOMENCLATURE AND METHOD OF CALCULATING MONTHS

The Khasis have their own system of recognizing a particular species or a particular group of plants.

1) **Life form category:** One important criterion for the classification is the life forms of plants. This includes general habit, physiological adaptation to a certain ecological factor and gross morphology.

Vernacular name	Life forms
Niut	Weeds
Dieng	Trees
Jyrmi	Woody climbers
Siej	Bamboos
Phlang	Grass
Tyrkhang	Ferns
Niut maw/Phlang jem	Bryophytes
Tiewdieng	Members of Orchidaceae
Wang	Members of Araceae belonging to <i>Calocasia</i> , <i>Alocasia</i> , <i>Remusatia</i> etc.
Ladew, Lakait	Members of Musaceae
Tit	Fungi

2) **Hierarchical category:** The next category contains “generic” taxa which are the most salient conceptual groupings of organisms in any ethnotaxonomy and represent

fundamental units in ethnobiological classification. The plants are given precise ethnotaxonomic folk generic names based on morphological characters like size of the plant, size, shape, colour of leaf, fruits, tubers or structure of plant body in case of fungi. Another category is folk “specific” taxa which are usually labelled binomially, with secondary lexemes.

Folk generic	Folk specific
Wang (<i>Calocasia</i>)	Wang iong (<i>C. affinis</i>), Wang panai, (<i>C. esculenta</i>)
Dieng tyrnem (<i>Camellia</i>)	Dieng tyrnem Bhoi (<i>C. kissi</i>) Dieng tyrnem shynrang (<i>C. caudata</i>)
Ladew, Kait (<i>Musa</i>)	Ladew pyrthat (<i>Musa</i> sp.), Kait khlaw, (<i>M. acuminata</i>), Kait shyieng (<i>M. velutina</i>), Kait syiem, Kait mon, Kait joji, Kait klong (<i>M. paradisiaca</i>)
Sying (<i>Zingiber</i>)	Sying Blei (<i>Z. montanum</i>), Sying makhir (<i>Z. rubens</i>), Sying khlaw (<i>Z. zerumbet</i>), Sying bah (<i>Z. officinalis</i>)

3) **Utilization category:** The third tire of classification recognizes plants according to their use which includes useful and harmful plants. They find medicinal property of plants based on its taste. They feel that herbs which have bitter taste have a great medicinal value. Morphological structure of trees is used to identify whether they are good for fuel and are ideal construction material.

Vernacular name	Utility
Kynbat dawai	Medicinal plants
Dieng soh	Trees bearing edible fruits
Jhur	Cultivated vegetables

Jhur khlaw	Wild vegetables
Vernacular name	Utility
Jatira, Jali, Jarain, Jaut, Jalynniar, Jakhain, Jamehek	In many cases the prefix 'Ja' is given before the name of wild edible leafy vegetables.
Pusla, Putharo , Pumaloi, Pusyep	In many cases the prefix 'Pu' is given before the name of any edible local snacks made from rice

4) General Khasi terminologies for plant parts

Jingthung	Plant
Thied	Root
Phan	Tuber
Shriew	Tuber of members of Araceae belonging to <i>Calocasia</i> , <i>Alocasia</i> , <i>Remusatia</i> etc
Piat	Bulb
Sying	Rhizome
Dieng	Stem or trunk
Snep dieng	Bark
Tnat	Branch
Shiah	Thorn
Sla	Leaf
Syntiew	Flower
Soh	Fruits

Method of calculating months

The Khasis adopt a lunar month, **u bnai**, twelve of which go to the year **ka snem**. Some months of the year are related to plants in some way or the other so therefore needs mention. The following are the names of the months:

1. U Kyllalyngkot or Kyllalyngkhot (January) - This month of the year is the coldest in Khasi Hills. The Khasis sit around the hearth and burn (**Kylla**) the fire wood (**lyngkhot**) in the hearth in order to keep themselves warm in this month, hence its name.
2. U Rymphang (February) – This is the last month of the winter season and also the windy month. The word **Rem** refers to the cold that penetrates the body and **phang** or **naphang** refers to everyone irrespectively.
3. U Lyber (March)-In this month the hills are again clothed with verdure and the grass sprouts (**Lyber**), hence the name of the month.
4. U Iaiong (April) - The changeable weather and the onset of the rainy season makes the sky dark and gloomy, hence the name **bnai iong** or black month. Another believe is that during this season the pastures and the plants look green or deep green with new leaves hence the name Iaiong
5. U Jymmang (May) -This is the month when the plant called by the Khasis U **Tiew Jymmang**, or cobra plant (all *Arisaema* sp; Family-Araceae) bloom, hence the name.

6. U Jylliew (June) - The deep water month, **jylliew** means deep. During this season the rivers, streams, lakes, valleys and plains are filled with water.
7. U Naitung (July) - The foul smelling month, when the vegetation rot owing to excessive moisture due to heavy rains during the month, **iwtung** means foul smell.
8. U Nailar (August) - The month when the plant called **janailar** (*Impatiens* sp; Family-Balsaminaceae) blooms.
9. U Nailur (September) - The month in which weeding is done in the garden and fields.
10. U Risaw (October) - The month when autumn tints first appear, literally when the country, **ri** becomes red, **saw**. This may also suggest that the rice in the field starts ripening to be harvested. During this month rain has become less and dry weather begins. The people began their favourite pastime of arrow shooting. As a preparation of this they make coloured arrows with cane called **thri saw** (*Calamus leptospadix* Griff.), the short form of which is **risaw**.
11. U Nai wieng (November) -The month when cultivators harvest the paddy from the fields, so during this month they cook raishan (*Paspalum sanguinale* Lam.) and rice cakes in **wieng** or big earthen pots to feed the people or helpers in their field.
12. U Nohprah (December) - The time when the **prah** or winnowing trays or baskets for carrying crops are put away (**buh noh**). This indicates that the granary is full and harvesting is over.

THE FOLKLORE ABOUT START OF HERBAL CURE AMONG THE TRIBES IN MEGHALAYA

(As told by Mr. Dhonsing Lyngdoh Nongbri)

The Khasis possess a rich folklore about plants and their correlation. The folklore says that long ago there was a family consisting of a mother with two daughters and a cruel stepfather who practices the art of witchcraft. This stepfather was reluctant in providing proper food to the children, so the mother along with her children are always half fed.

One fine day this helpless mother got an opportunity to please her children by taking them out for a picnic to the woods and they had slaughtered their own goat for the meat. When the food was about to be ready they realized that they have forgotten the salt at home. The mother went back home to fetch the salt leaving her kids alone in the jungle, although they insisted her not to leave them saying that bamboos can be burnt and their ashes taken for salt. Yet she went and on her way back, forgotten the path so could not reach back to her kids, she wandered the whole night through the jungle. The children too were worried and roamed about in search of shelter and all they could find was a small hut. When they entered the hut they found little monkeys living there. The parents of the monkeys had gone to the fields. The children out of hunger snatched the food from the monkeys and chased them away. So the monkeys ran to the fields to tell their parents of what had happened. When the parents reached there they were also beaten and driven out by the kids. The monkeys fled the scene, called all their friends and assembled together to decide on what action is to be taken against humans. Later

they decided to abandon farming and to depend only on wild fruits for their food. The children spent the night inside the hut.

It was dawn, the mother could see a small hut at a distance, she walked towards the hut and on reaching the hut she found her children living peacefully. Back home the angry stepfather on finding nobody at home was filled with rage. For days he kept on waiting for them but they never returned back home again. So at last he called a congregation of all the evil spirits (Ki laiphew ksuid) and commanded them to spill various kinds of diseases and ailments upon humankind for his revenge. Thus diseases start occurring, everyone on this earth screamed for help.

The angels of God heard the cry and took the news to their Master telling him of the diseases invoked by the stepfather. Then God wisely sought out a solution to this problem. He ordered the angels to sow the herbal plants on the earth and to point out the particular herb for curing a particular disease. Thus came the existence of herbal plants.

God commanded his angels to bestow the knowledge upon the people. Thus the knowledge spread far and wide. It was believed that any person having faith in God receives knowledge on how to make and prescribe the herbal medication.

CHAPTER V (2)

ANALYSIS OF DATA

ANALYSIS OF DATA FOR QUANTIFICATION AND VERIFICATION

a) Informant Agreement ratio (Trotter and Logan, 1986).

Table 9: Indications, mentions, taxa and Informant Agreement Ratio (IAR)

Sl. no.	Indication	Mentions	Taxa	IAR
1	Inflammation of glands	9	1	1
2	Antihemorrhagic	5	1	1
3	Appetiser	3	1	1
4	Arthritis	5	1	1
5	Cat bite	15	1	1
6	Chest pain	10	1	1
7	Deworming	30	1	1
8	Heart tonic	5	1	1
9	Lactagogue	5	1	1
10	Mental disorders	3	1	1
11	Nightblindness	3	1	1
12	Pneumonia	3	1	1
13	Small pox	8	1	1
14	Throat problems	9	1	1
15	Ulcer	16	2	0.93
16	Cold remedy	15	2	0.92
17	Sinusitis	13	2	0.91
18	Gall bladder stone	12	2	0.9
19	Liver complaints	12	2	0.9
20	Sprain	11	2	0.9
21	Tonic	11	2	0.9
22	Nail diseases	20	3	0.89
23	Purification of blood	20	3	0.89
24	Brain tonic	17	3	0.87
25	Diarrhoea	58	9	0.85
26	Tumors	15	3	0.85
27	Evil eye	20	4	0.84
28	High blood pressure	20	4	0.84
29	Malaria	20	4	0.84
30	Epilepsy	11	3	0.8
31	Body swellings	19	5	0.77
32	Ear ache	10	3	0.77
33	Stomach problems and Gastric disorders	81	19	0.77

Sl. no.	Indication	Mentions	Taxa	IAR
34	Mouth sores	14	4	0.76
35	Diabetes	25	7	0.75
36	Headache	9	3	0.75
37	Measles	13	4	0.75
38	Veterinary diseases	9	3	0.75
39	Dysentery	83	23	0.73
40	Body sores	12	4	0.72
41	Dizziness & vomiting	8	3	0.71
42	Gyneacological problems	15	5	0.71
43	Anaemia	24	8	0.69
44	Injuries	44	14	0.69
45	Boils	60	20	0.67
46	Burning sensation	4	2	0.66
47	Eye infection	10	4	0.66
48	Poisoning & blood vomiting	7	3	0.66
49	Scabies	4	2	0.66
50	Cuts & wounds	59	22	0.63
51	Allergy	6	3	0.6
52	Kidney stones	16	7	0.6
53	Aphrodisiac	9	5	0.5
54	Bodyache	15	8	0.5
55	Migranes	3	2	0.5
56	Toothaches, dental caries remedy	29	15	0.5
57	Urinary troubles	20	12	0.42
58	Leprosy	11	7	0.4
59	Paralysis	21	14	0.35
60	Menstrual problems	13	9	0.33
61	Snakebite	22	15	0.33
62	Infantile diarrhoea	27	20	0.26
63	Bone fracture	17	13	0.25
64	Cancer	17	13	0.25
65	Asthma	10	8	0.22
66	Burns	16	13	0.2
67	Cough	13	11	0.16
68	Febrifuge	10	9	0.11
69	Skin diseases	18	16	0.11
70	Antirheumatic	27	25	0.07
71	Jaundice	11	3	0.01
72	Corns	2	2	0
73	Insect stings	4	4	0

b) Preference ranking (Martin 1995)

Table 10: CASE III study, an improvised preference ranking of the use of plants as herbal home remedies by 20 respondents of Laitlyngkot village, East Khasi Hills (10 most useful, 1 least useful).

Plant species	Respondents																				Ranking
	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s		
<i>Centella asiatica</i>	10	9	8	10	10	10	10	9	10	8	9	9	10	10	9	8	9	10	9	A	
<i>Psidium guajava</i>	9	10	9	8	8	7	8	10	8	9	10	10	8	8	10	9	10	8	10	B	
<i>Ageratina adenophora</i>	8	7	10	9	7	9	7	8	9	10	8	7	9	7	8	10	8	9	7	C	
<i>Pouzolzia hirta</i>	4	6	7	7	9	8	9	7	7	7	7	6	7	9	7	7	7	4	6	D	
<i>Potentilla fulgens</i>	3	5	6	1	6	6	6	6	1	6	6	5	1	6	6	6	6	5	5	E	
<i>Sechium edule</i>	1	3	2	6	5	5	3	5	6	2	5	3	6	3	5	2	5	6	3	F	
<i>Myrica esculenta</i>	7	1	1	5	3	4	5	4	5	1	3	1	5	5	4	5	4	7	1	G	
<i>Flemingia procumbens</i>	5	8	4	3	2	2	2	3	3	4	1	8	3	2	3	3	3	3	8	H	
<i>Piper peepuloides</i>	6	4	3	4	4	3	4	2	4	3	4	4	4	4	2	1	2	1	4	I	
<i>Zingiber zerumbet</i>	2	2	5	2	1	1	1	1	2	5	2	2	2	1	1	4	1	2	2	J	

c) Reliability of data (Khan 2001)

Table11: Showing application of Relative Reliability Index (RRI)

Sl. no.	Species name	vA	vB	vC	vD	vE	Total	RRI
1	<i>Acorus calamus</i>	3	2	2	2	2	11	1.04
2	<i>Adenia trilobata</i>	1	1	2	2	2	8	0.9
3	<i>Ageratina adenophora</i>	4	2	2	2	2	12	1.07
4	<i>Ageratina riparia</i>	3	2	2	2	2	11	1.04
5	<i>Ageratum conyzoides</i>	3	2	2	2	2	11	1.04
6	<i>Aleuritopteris subdimorpha</i>	1	1	2	2	2	8	0.9
7	<i>Aloe vera</i>	4	2	2	2	2	12	1.07
8	<i>Allium sativum</i>	4	2	2	2	2	12	1.07
9	<i>Allium tuberosum</i>	3	2	2	2	2	11	1.04
10	<i>Amaranthus tricolor</i>	2	2	2	2	2	10	1
11	<i>Anaphalis adnata</i>	3	2	2	2	2	11	1.04
12	<i>Anemone rivularis</i>	2	2	2	2	2	10	1
13	<i>Areca catechu</i>	4	2	2	2	2	12	1.07
14	<i>Argyreia hookeri</i>	2	2	2	2	2	10	1
15	<i>Artemisia indica</i>	3	2	2	2	2	11	1.04
16	<i>Asparagus filicinus</i>	3	2	2	2	2	11	1.04
17	<i>Asparagus racemosus</i>	3	2	2	2	2	11	1.04
18	<i>Begonia roxburghii</i>	3	2	2	2	2	11	1.04
19	<i>Belamcanda chinensis</i>	2	2	2	2	2	10	1
20	<i>Berginia ciliata</i>	3	2	2	2	2	11	1.04
21	<i>Bidens pilosa</i>	2	2	2	2	1	9	0.95
22	<i>Brunella vulgaris</i>	3	2	2	2	2	11	1.04
23	<i>Buddleja asiatica</i>	3	2	2	2	2	11	1.04
24	<i>Calendula officinalis</i>	4	2	2	2	2	12	1.07
25	<i>Calocasia esculenta</i>	4	2	2	2	2	12	1.07
26	<i>Capsicum frutescence</i>	4	2	2	2	2	12	1.07
27	<i>Capsicum minimum</i>	2	2	2	2	2	10	1
28	<i>Cassia alata</i>	2	2	2	2	2	10	1
29	<i>Cassia fistula</i>	2	2	2	2	2	10	1
30	<i>Centella asiatica</i>	4	2	2	2	2	12	1.07
31	<i>Cephalostachyum latifolium</i>	1	2	2	2	2	9	0.95
32	<i>Cinnamomum glaucescens</i>	2	2	2	2	2	10	1
33	<i>Cinnamomum obtusifolium</i>	2	2	2	2	2	10	1
34	<i>Cinnamomum verum</i>	2	2	2	2	2	10	1

Sl. no.	Species name	vA	vB	vC	vD	vE	Total	RRI
35	<i>Citrus medica</i>	4	2	2	2	2	12	1.07
36	<i>Clematis gouriana</i>	2	2	2	2	2	10	1
37	<i>Clerodendron bracteatum</i>	2	1	2	2	2	9	0.95
38	<i>Clerodendron colebrookianum</i>	4	2	2	2	2	12	1.07
39	<i>Coix lacryma- jobi</i>	2	2	2	2	2	10	1
40	<i>Crassocephalum crepidiodes</i>	4	2	2	2	2	12	1.07
41	<i>Crinum amoenum</i>	2	2	2	2	2	10	1
42	<i>Curcuma</i>	2	1	2	2	2	9	0.95
43	<i>Curcuma aeruginosa</i>	4	2	2	2	2	12	1.07
44	<i>Curcuma amada</i>	2	2	2	2	2	10	1
45	<i>Curcuma longa</i>	4	2	2	2	2	12	1.07
46	<i>Curcuma montana</i>	3	2	2	2	2	11	1.04
47	<i>Curcumorpha sp</i>	2	2	2	2	2	10	1
48	<i>Cuscuta reflexa</i>	4	2	2	2	2	12	1.07
49	<i>Cyclea bicristata</i>	1	1	2	2	2	8	0.9
50	<i>Cynodon dactylon</i>	2	1	2	2	2	9	0.95
51	<i>Dendrobium chrysanthum</i>	2	2	2	2	2	10	1
52	<i>Desmodium griffithianum</i>	2	2	2	2	2	10	1
53	<i>Desmodium triflorum</i>	4	2	2	2	2	12	1.07
54	<i>Dichrocephala bicolor</i>	4	2	2	2	2	12	1.07
55	<i>Dioscorea deltoidea</i>	2	1	2	2	2	9	0.95
56	<i>Dioscorea puber</i>	2	1	2	2	2	9	0.95
57	<i>Dischidia sp.</i>	2	1	2	2	2	9	0.95
58	<i>Dischidia benghalensis</i>	2	2	2	2	2	10	1
59	<i>Dischidia nummularia</i>	3	2	2	2	2	11	1.04
60	<i>Drymaria diandra</i>	4	2	2	2	2	12	1.07
61	<i>Emilia sonchifolia</i>	4	2	2	2	2	12	1.07
62	<i>Eriosema himalaicum</i>	2	2	2	2	2	10	1
63	<i>Eryngium foetidum</i>	3	2	2	2	2	11	1.04
64	<i>Erythrina arborescens</i>	1	1	2	2	2	8	0.9
65	<i>Eucalyptus tereticornis</i>	3	2	2	2	2	11	1.04
66	<i>Eulophia nuda</i>	2	1	2	2	2	9	0.95
67	<i>Fagopyrum cymosum</i>	4	2	2	2	2	12	1.07
68	<i>Ficus heterophylla</i>	2	1	2	2	2	9	0.95
69	<i>Ficus hirta</i>	2	1	2	2	2	9	0.95
70	<i>Flemingia procumbens</i>	4	2	2	2	2	12	1.07
71	<i>Galingsoga parviflora</i>	4	2	2	2	2	12	1.07

Sl. no.	Species name	vA	vB	vC	vD	vE	Total	RRI
72	<i>Galium asperifolium</i>	4	2	2	2	2	12	1.07
73	<i>Gaultheria fragrantissima</i>	4	2	2	2	2	12	1.07
74	<i>Geranium nepalense</i>	2	1	2	2	2	9	0.95
75	<i>Gleichenia volubilis</i>	2	1	2	2	2	9	0.95
76	<i>Hedyotis scandens</i>	3	1	2	2	2	10	1
77	<i>Hedyotis uncinella</i>	3	2	2	2	2	11	1.04
78	<i>Helixanthera parasitica</i>	2	1	2	2	2	9	0.95
79	<i>Hibiscus</i>	1	1	2	2	2	8	0.9
80	<i>Hibiscus rosa sinensis</i>	1	1	2	2	2	8	0.9
81	<i>Houttuynia cordata</i>	4	2	2	2	2	12	1.07
82	<i>Hypericum laxum</i>	4	2	2	2	2	12	1.07
83	<i>Impatiens benthamii</i>	2	1	2	2	2	9	0.95
84	<i>Impatiens radiata</i>	2	2	2	2	2	10	1
85	<i>Inula cappa</i>	2	1	2	2	2	9	0.95
86	<i>Iresine herbstii</i>	2	1	2	2	2	9	0.95
87	<i>Ixeris gracilis</i>	4	2	2	2	2	12	1.07
88	<i>Justicia adhatoda</i>	4	2	2	2	2	12	1.07
89	<i>Kaempferia galanga</i>	4	1	2	2	2	11	1.04
90	<i>Kalanchoe pinnata</i>	4	2	2	2	2	12	1.07
91	<i>Laggera pterodonta</i>	2	1	2	2	2	9	0.95
92	<i>Lantana camara</i>	2	1	2	2	2	9	0.95
93	<i>Leucas ciliata</i>	2	2	2	2	2	10	1
94	<i>Leucosceptum canum</i>	2	1	2	2	2	9	0.95
95	<i>Lindenbergia muraria</i>	2	1	2	2	2	9	0.95
96	<i>Litsea salicifolia</i>	2	1	2	2	2	9	0.95
97	<i>Mahonia pycnophylla</i>	3	2	2	2	2	11	1.04
98	<i>Mazus pumilus</i>	3	2	2	2	2	11	1.04
99	<i>Melasma avense</i>	1	1	2	2	2	8	0.9
100	<i>Melastoma malabathricum</i>	2	2	2	2	2	10	1
101	<i>Mikania micrantha</i>	2	1	2	2	2	9	0.95
102	<i>Mimosa pudica</i>	2	2	2	2	2	10	1
103	<i>Morus australis</i>	2	1	2	2	2	9	0.95
104	<i>Musa paradisiaca</i>	4	2	2	2	2	12	1.07
105	<i>Musa sp</i>	2	2	2	2	2	10	1
106	<i>Myrica esculenta</i>	4	2	2	2	2	12	1.07
107	<i>Myrica nagi</i>	4	2	2	2	2	12	1.07
108	<i>Neanotis wightiana var compressa</i>	2	1	2	2	2	9	0.95
109	<i>Nepenthes khasiana</i>	3	2	2	2	2	11	1.04

Sl. no.	Species name	vA	vB	vC	vD	vE	Total	RRI
110	<i>Nephrolepis cordifolia</i>	2	1	2	2	2	9	0.95
111	<i>Nerine sarniensis</i>	1	1	2	2	2	8	0.9
112	<i>Oenanthe javanica</i>	4	2	2	2	2	12	1.07
113	<i>Oryza sativa</i>	4	2	2	2	2	12	1.07
114	<i>Osbeckia capitata</i>	4	2	2	2	2	12	1.07
115	<i>Osbeckia crinita</i>	3	2	2	2	2	11	1.04
116	<i>Oxalis corniculata</i>	3	2	2	2	2	11	1.04
117	<i>Paederia scandens</i>	2	1	2	2	2	9	0.95
118	<i>Panax assamensis</i>	2	1	2	2	2	9	0.95
119	<i>Passiflora edulis</i>	4	2	2	2	2	12	1.07
120	<i>Peperomia heterophylla</i>	3	1	2	2	2	10	1
121	<i>Phlogacanthus thyrsoiflorus</i>	1	1	2	2	2	8	0.9
122	<i>Phrynium pubinerve</i>	2	1	2	2	2	9	0.95
123	<i>Phyllanthus glaucus</i>	2	2	2	2	2	10	1
124	<i>Pinus kesiya</i>	4	2	2	2	2	12	1.07
125	<i>Piper betel</i>	4	2	2	2	2	12	1.07
126	<i>Piper peepuloides</i>	4	2	2	2	2	12	1.07
127	<i>Plantago major</i>	4	2	2	2	2	12	1.07
128	<i>Plectranthes striatus</i>	2	1	2	2	2	9	0.95
129	<i>Polygonatum oppositifolium</i>	2	1	2	2	2	9	0.95
130	<i>Polygonum nepalense</i>	3	2	2	2	2	11	1.04
131	<i>Polystichum pseudotsussimense</i>	2	1	2	2	2	9	0.95
132	<i>Potentilla fulgens</i>	4	2	2	2	2	12	1.07
133	<i>Pouzolzia hirta</i>	4	2	2	2	2	12	1.07
134	<i>Prunus persica</i>	4	2	2	2	2	12	1.07
135	<i>Psidium guajava</i>	4	2	2	2	2	12	1.07
136	<i>Pteris wallichiana</i>	2	1	2	2	2	9	0.95
137	<i>Pyrus pashia</i>	4	2	2	2	2	12	1.07
138	<i>Ranunculus diffusus</i>	2	1	2	2	2	9	0.95
139	<i>Remusatia pumila</i>	2	1	2	2	2	9	0.95
140	<i>Rhus chinensis</i>	4	2	2	2	2	12	1.07
141	<i>Rhynchoetichum ellipticum</i>	4	2	2	2	2	12	1.07
142	<i>Ricinus communis</i>	2	1	2	2	2	9	0.95
143	<i>Rosa sinensis</i>	1	1	2	2	2	8	0.9
144	<i>Rotala rotundifolia</i>	4	1	2	2	2	11	1.04
145	<i>Rubia cordifolia</i>	2	2	2	2	2	10	1
146	<i>Rubus ellipticus</i>	3	2	2	2	2	11	1.04

Sl. no.	Species name	vA	vB	vC	vD	vE	Total	RRI
147	<i>Rubus rugosus</i>	3	2	2	2	2	11	1.04
148	<i>Sansevieria trifasciata</i>	1	1	2	2	2	8	0.9
149	<i>Sarcandra glabra</i>	2	2	2	2	2	10	1
150	<i>Schima wallichii</i>	1	1	2	2	2	8	0.9
151	<i>Scutellaria discolor</i>	2	1	2	2	2	9	0.95
152	<i>Sechium edule</i>	4	2	2	2	2	12	1.07
153	<i>Sida rhombifolia</i>	2	1	2	2	2	9	0.95
154	<i>Smilax ferox</i>	3	2	2	2	2	11	1.04
155	<i>Solanum myriacanthum</i>	3	2	2	2	2	11	1.04
156	<i>Solanum torvum</i>	3	2	2	2	2	11	1.04
157	<i>Sonchus brachyotus</i>	3	2	2	2	2	11	1.04
158	<i>Spilanthes paniculata</i>	4	1	2	2	2	11	1.04
159	<i>Stachytarpheta dichotoma</i>	1	1	2	2	2	8	0.9
160	<i>Sterculia villosa</i>	2	1	2	2	2	9	0.95
161	<i>Stereocaulon macrocephalum</i>	2	1	2	2	2	9	0.95
162	<i>Strobilanthes flaccidifolius</i>	2	1	2	2	2	9	0.95
163	<i>Swertia agustifolia</i>	3	2	2	2	2	11	1.04
164	<i>Symplocos chinensis</i>	2	1	2	2	2	9	0.95
165	<i>Symplocos glomerata</i>	2	1	2	2	2	9	0.95
166	<i>Symplocos laurina</i>	2	1	2	2	2	9	0.95
167	<i>Symplocos paniculata</i>	2	1	2	2	2	9	0.95
168	<i>Tabernaemontana divaricata</i>	2	2	2	2	2	10	1
169	<i>Ternstroemia gymnanthera</i>	2	1	2	2	2	9	0.95
170	<i>Thysanolaena latifolia</i>	2	1	2	2	2	9	0.95
171	<i>Tricyrtis maculata</i>	3	2	2	2	2	11	1.04
172	<i>Valeriana jatamansii</i>	4	2	2	2	2	12	1.07
173	<i>Viburnum foetidum</i>	2	1	2	2	2	9	0.95
174	<i>Viola hamiltoniana</i>	4	2	2	2	2	12	1.07
175	<i>Viscum articulatum</i>	4	2	2	2	2	12	1.07
176	<i>Zanthoxylum acanthopodium</i>	2	1	2	2	2	9	0.95
177	<i>Zanthoxylum armatum</i>	4	2	2	2	2	12	1.07
178	<i>Zephyranthes rosea</i>	2	1	2	2	2	9	0.95
179	<i>Zingiber montanum</i>	3	2	2	2	2	11	1.04
180	<i>Zingiber rubens</i>	4	2	2	2	2	12	1.07
181	<i>Zingiber zerumbet</i>	2	1	2	2	2	9	0.95

CHAPTER VI (1)
RESULTS AND
DISCUSSION

RESULTS AND DISCUSSION

A consolidated account of the ethnobotanically important plants collected in the present work is as follows:

A total of 181 plant species of ethnomedicinal importance belonging to 81 families of the plant kingdom and represented by 150 genera have been documented to be used by the traditional healers and village folks in the three districts of Meghalaya (Table 12a; Fig 5). The Dicotyledons has the highest number of recorded species which is 132 while the lowest is shared by Lichens and Gymnosperms with 1 each. The genera with highest number of species documented are *Curcuma* (5 species) and *Symplocos* (4 species). Coming to the family level Asteraceae has the highest number of members with 17 species and Zingiberaceae with 10 species recorded, the other 79 families are represented by numbers ranging from 1-6 species (Table 12b). The botanical name, family, collection number, place of collection, local or vernacular name, brief description of the plant, parts used, diseases for which treated and mode of usage have been recorded for each species. The 181 species documented were recorded to serve as remedy for treatment of 73 different diseases and ailments with the highest number of 25 species reported for use as antirheumatic followed by dysentery (23 species), cuts and wounds (22 species) and infantile diarrhoea and boils (20 species each) and the other diseases ranging from 1-19 species each. The species with the highest number of medicinal uses documented are *Acorus calamus* (19), *Curcuma aeruginosa* (12), *Aloe vera* (11), *Zingiber montanum* (10).

Table12 a: Showing total medicinal plant species documented

Plant group	Family	Genera	Species
Dicotyledons	58	110	132
Monocotyledons	16	33	42
Gymnosperms	1	1	1
Pteridophytes	5	5	5
Lichens	1	1	1

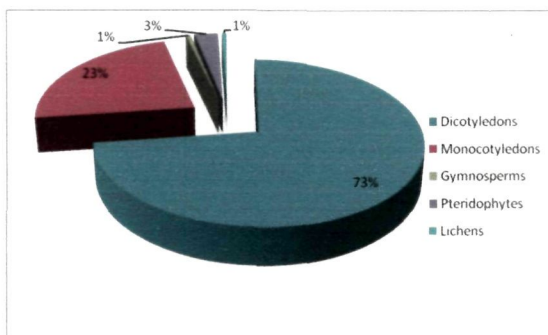


Fig 5: Medicinal plants represented by different plant group

Table12 b: Showing no. of medicinal plant species in each family

Dicotyledons			
Family	No. of species	Family	No. of species
Acanthaceae	3	Loranthaceae	2
Amaranthaceae	2	Lythraceae	1
Anacardiaceae	1	Malvaceae	3
Apiaceae	3	Melastomataceae	3
Apocynaceae	1	Menispermae	1
Asclepiadaceae	3	Mimosaceae	1
Asteraceae	17	Moraceae	3
Balsaminaceae	2	Myricaceae	2
Begoniaceae	1	Myrtaceae	2
Berberidaceae	1	Nepenthaceae	1
Caprifoliaceae	1	Oxalidaceae	1
Caryophyllaceae	1	Passifloraceae	2

Cesalpiniaceae	2	Piperaceae	3
Chloranthaceae	1	Plantaginaceae	1
Convolvulaceae	1	Polygonaceae	2
Cucurbitaceae	1	Ranunculaceae	3
Cuscutaceae	1	Rosaceae	6
Ericaceae	1	Rubiaceae	6
Euphorbiaceae	2	Rutaceae	3
Fabaceae	5	Saururaceae	1
Gentianaceae	1	Saxifragaceae	1
Geraniaceae	1	Scrophulariaceae	3
Gesneriaceae	1	Solanaceae	4
Hypericaceae	1	Sterculiaceae	1
Lamiaceae	4	Symplocaceae	4
Lauraceae	4	Ternstroemiaceae	1
Loganiaceae	1	Theaceae	1
Urticaceae	1	Verbenaceae	4
Valerianaceae	1	Violaceae	1
Monocotyledons			
Family	No. of species	Family	No. of species
Aloaceae	1	Iridaceae	1
Amaryllidaceae	3	Liliaceae	5
Araceae	3	Marantaceae	1
Araliaceae	1	Musaceae	2
Arecaceae	1	Orchidaceae	2
Asparagaceae	2	Poaceae	6
Crassulaceae	1	Smilacaceae	1
Dioscoreaceae	2	Zingiberaceae	10
Gymnosperm		Lichen	
Family	No. of species	Family	No. of species
Pinaceae	1	Stereocaulaceae	1
Pteridophytes			
Family	No. of species	Family	No. of species
Aspidiaceae	1	Pteridaceae	1
Gleicheniaceae	1	Sinopteridaceae	1
Polypodiaceae	1		

The different methods of preparation or usage of plant parts are in the form of infusion, decoction, steaming or inhaling of vapours, boiled, paste, juice extract which is taken orally, applied topically, fomentation, herbal hot water bath. **(PLATE 12, D-F)** Plant parts used are whole plant, young shoot, stem, bark, leaf, flower, fruit, seed, root, rhizome, bulb and tuber. A comparison of the different plant parts to their various medicinal uses shows that the plant part mostly used for treatment is the leaf (mostly matured leaves) which is used in 191 medications and the rhizome used in 100 medications recorded (Fig 6). Out of the total 236 prescriptions for various ailments, 192 prescriptions involve single plant, while 21 involve two plant ingredients, 5 prescriptions three, 8 prescriptions involve four and 5 prescriptions involve the use of more than four plant ingredients. For majority of cases a single plant is administered singly but for a good number of diseases also the recipe includes a combination of many plants and plant parts. At the same time it was seen that a single herbal recipe is effective for treatment of a number of ailments, which shows that a single plant is used for more than one ailment. The medicine men believe that the herbal medicines have no sight effects if taken in proper doses.

In the preparation of medicines, household utensils like knife, cups, big aluminium pots and materials like sticks, wooden or stone made pestle and mortar are used for grinding purpose. For boiling, wood is used as fuel in locally made traditional hearths. Most of the herbs or plant parts are used in fresh form or naturally sundried and preserved in big plastic containers for later use in the off season **(PLATE 13, A-D)**.

Plant parts like matured leaves are mostly plucked after the monsoon while rhizomes are dug during winters. Adult plants are mostly sought for medicinal purposes except in cases where young shoots are needed. In all cases medicines are prepared manually, and most preparations do not specify the quantities of ingredients while some indicate the use of rough measurements through physical observations or use of cups or mugs.

In the CASE I study conducted among the 165 patients who come to consult 11 traditional medicine men, by scrutiny of questionnaires (a copy of filled Questionnaire A given in the next page) it was observed that the number of ailments or complaints recorded from them is 47 with each patient coming with more than one complaint (Table 12c). Thus the highest number of patients is observed to be for Infantile diarrhoea, Stomach and gastric problems, Menstrual problems, Urinary problems and bodyache. Also from the present study, out of total 165 patients interviewed, 57 patients (who are purely locals) come with their children for the treatment of '*U Njangsohpet*' which accounts for about 42.4% of the patients who come for consultation. It means people have strong belief in the curable properties of the herbal remedy. It is also seen that not only locals come to consult but also people from other states, like Assam, Nagaland etc. do come to consult.

Diseases	No. of complaints	Diseases	No. of complaints
Boils	1	Paralysis	8
Bone fracture	2	Poisoning	5
Burns	1	Rheumatism	5
Cancer	5	Skin diseases	5
Chest pain	3	Sores with abcess	2
Cough	3	Sprain	2
Deworming	1	Sterility	1
Diabetes	2	Stomach and gastric problems	22
Diarrhoea	3	Throat problems	2
Earache	4	Toothache	1
Epilepsy	1	Tuberculosis	4
Evil eye	1	Tumour	2
Eye troubles	4	Ulcer	2
Fever	1	Urinary problems	15
Gall bladder stone	3	Weakness	1
Headache	1	Whooping cough	1
Infantile diarrhoea	57		

Altogether 20 plant species belonging to 8 families have been found essential for preparation of the medicine '*Dawai N̄iangsohpet*'. Many more plant species are being used for its preparation but the secretiveness of the medicinal practitioners and fear of over exploitation of the plant resources by the people outside their communities or business groups pose a hindrance in gathering all the information which is still hidden with them.

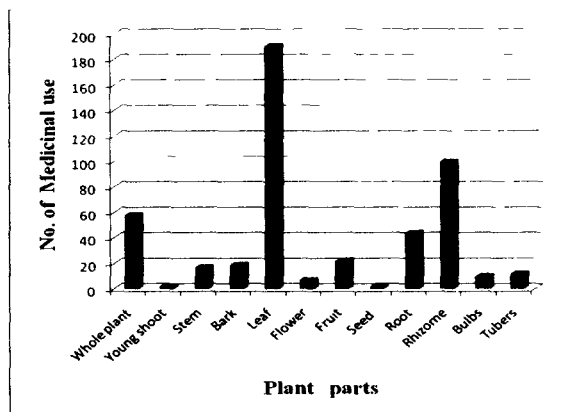


Fig 6: Comparison of different parts of plants to their number of medicinal use

In the CASE II study scrutiny of the questionnaires filled by 300 students of 13 schools in all the three districts (a copy of the filled Questionnaire B is shown below) provides a clue that their family still use many herbal home remedies for various ailments. Various kinds of wild fruits and vegetables have found a place in their daily diet. The wild fruits, vegetables and medicinal plants are known by different vernacular names in each district. Out of these 300 students who filled up the questionnaires, 207 of them revealed that they or their family have faith in medicinal plants and that they have consulted a traditional medicine man at one point of time in their life. They have brought forward the names of 72 medicine men that they have consulted in their own villages.

diarrhoea etc. has the highest score as the most commonly used home remedy from among the 10 plant species selected for the preference ranking, which is followed by *Psidium guajava* and *Ageratina adenophora*. The species with the lowest ranking as a home remedy is *Zingiber zerumbet*. The choice of a particular plant for home remedy by the people could be due to several reasons, such as effectiveness, availability and abundance in their surroundings.

Pharmacological studies and clinical trials are the ultimate tests to judge the veracity of an ethnobotanical claim. But in view of money and time involved, this kind of research programmes must be based on highly reliable claims only. Application of Relative Reliability Index to the present ethnomedicinal claims documented (Table 11), it was seen that 53 species have the highest reliability of 1.07, 35 species with RRI of 1.04, 30 species with 1.00, 50 species with RRI of 0.95 and 13 species with lowest reliability of 0.9.

In Meghalaya it was seen that knowledge of herbal remedies for treatment of various diseases rests with the traditional healers, which belong to a family of indigenous practitioners and skills have been passed on from one generation to the other only by word of mouth. Each village has one or two traditional healers or *Nong ai dawai kynbat* as they are called locally. Interestingly, it was also noted that in some cases prayers to the almighty or chanting of mantras sometimes accompany administering of the herbal medications. For most ailments and remedies, the dosage given depends upon the sex, age, duration of illness, health and physical condition of the patient. The

ethnobotanist establishes credibility in the community and a relationship with the specialists based on trust sometimes obtains information that may even be kept from the rest of the native community.

It was seen that traditional knowledge is being lost throughout the world including Meghalaya due to rapid development in many areas where indigenous people live. A number of herbalists now complain of having to walk increasingly greater distances for herbs that once grew almost outside their door. As habitats for plants disappear and over harvesting for commercial uses reduces stocks of wild medicinal plant material, there is corresponding drop in the availability of the plants used as the first and last resort for health care by many rural populations. Plant species are being used in various human cultures around the world for medical purposes and many of them are subjected to uncontrolled local and external trade. The forest is the living pharmacy of the indigenous communities. However medicinal plants in the forest are not always readily available when needed. Often they are only found in a specific part of the forest that may be distant and arduous to reach. This could be addressed by cultivating the identified medicinal plants in the backyard or communal gardens making them more easily available and thereby improving community health.

Coming to wild and less known cultivated plants a total of 142 plant species have been recorded from the three studied districts, out of these 66 plant species belonging 31 families of the plant kingdom and represented by 49 genera have been documented as marketable edibles while 76 plant species belonging 39 families of the plant kingdom

and represented by 59 genera have not yet come into the market but many have a potential to be marketable. Out of the total 142 plant species, 46 of them have been reported to have medicinal properties also in the present work. Their ethnobotanical importance in terms of scientific name, family, collection number, place of collection, local or vernacular name, brief description of the plant, plant parts which are edible, seasonal or monthly availability, value added products, and market price of the edible parts (in case of marketable plant species) have been documented.

Regarding the marketable edibles the group Dicotyledons has the highest number of recorded species which is 51 while the lowest is Pteridophytes with only 2 species (table 13a: Fig 7). The genus with the highest number of species documented is *Citrus* (5 species). Coming to the family level the family Solanaceae and Rutaceae has the highest number of members with 7 species each and among the monocots Zingiberaceae with 3 species recorded. The other 28 families are represented by numbers ranging from 1-6 species (Table 13b).

Table13 a: Showing total marketable edible plant species documented

Plant group	Family	Genera	Species
Dicotyledons	22	36	51
Monocotyledons	7	11	13
Pteridophytes	2	2	2

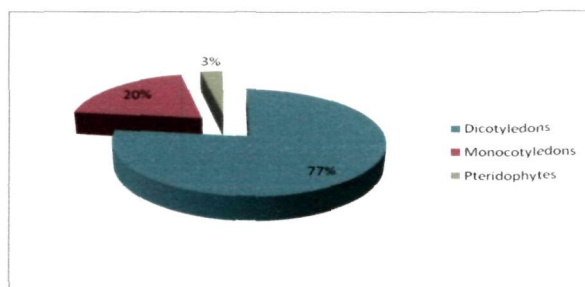


Fig 7: Edible marketable plants represented by different plant group

Table 13 b: Showing number of marketable edible plant species in each family

Dicotyledons			
Family	No. of species	Family	No. of species
Apiaceae	4	Passifloraceae	1
Asteraceae	3	Piperaceae	1
Caprifoliaceae	1	Rosaceae	5
Eleagnaceae	1	Rubiaceae	1
Euphorbiaceae	2	Rutaceae	7
Fabaceae	2	Sapindaceae	1
Fagaceae	2	Saururaceae	1
Gentianaceae	1	Solanaceae	7
Lauraceae	2	Cucurbitaceae	2
Moraceae	2	Lamiaceae	1
Myricaceae	3	Pedaliaceae	1
Monocotyledons			
Family	No. of species	Family	No. of species
Araceae	1	Musaceae	2
Arecaceae	2	Poaceae	2
Dioscoreaceae	1	Zingiberaceae	3
Liliaceae	2		
Pteridophytes			
Family	No. of species	Family	No. of species
Aspidiaceae	1	Pteridaceae	1

It was interesting to note that 25-35 types of marketable edible plants are available in the market each month depending upon the season (Fig 8). Maximum number of fruits are available in October, while leafy vegetables are available from March through October. A large variety of vegetables are available in wild when cultivated vegetables are not yet available and households food store are low.

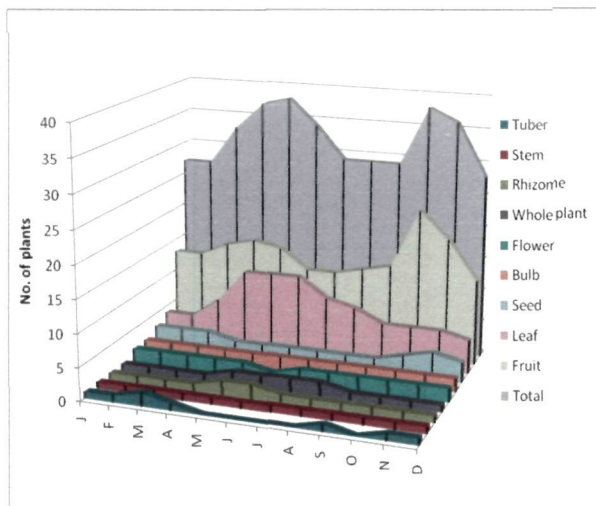


Fig 8: Monthly availability of different marketable edible plant species in the market

Among the non-marketable edible the group Dicotyledons has the highest number of recorded species which is 66 while the lowest is Monocotyledons with only 6 species (Table 13c; Fig 9). The genera with the highest number of species recorded are *Citrus* and *Polygonum* (4 species each). Coming to the family level the family Asterceae has the highest number of members with 7 species and among the monocots

Araceae with 4 species recorded. The other 37 families are represented by numbers ranging from 1-6 species (Table 13d).

Table13 c: Showing total non-marketable edible plant species documented

Plant Group	Family	Genera	Species
Dicotyledons	33	50	66
Monocotyledons	06	09	10

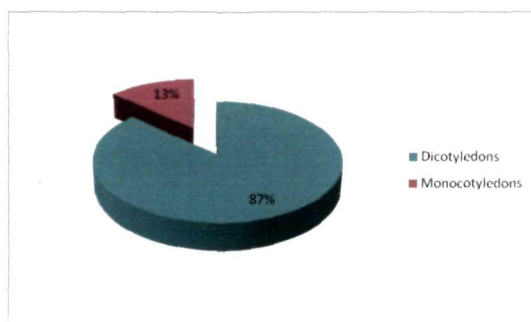


Fig 9: Edible non marketable plants represented by different plant group

Table 13d: Showing number of non-marketable edible plant species in each family

Dicotyledons			
Family	No. of species	Family	No. of species
Acanthaceae	1	Lamiaceae	1
Amaranthaceae	2	Lardizabalaceae	1
Anacardiaceae	1	Lauraceae	2
Apiaceae	2	Malvaceae	2
Asteraceae	7	Moraceae	3
Asteraceae	1	Myrtaceae	1
Begoniaceae	1	Piperaceae	1
Berberidaceae	1	Plantaginaceae	1
Cesalpiniaceae	2	Polygonaceae	5
Chenopodiaceae	1	Rosaceae	5
Cucurbitaceae	3	Rutaceae	5
Elaeocarpaceae	1	Solanaceae	1
Eleagnaceae	1	Styraceae	1

Ericaceae	1	Vacciniaceae	5
Euphorbiaceae	3	Verbenaceae	1
Flacourtiaceae	1	Vitaceae	1
Gesneriaceae	1		
Monocotyledons			
Family	No. of species	Family	No. of species
Araceae	4	Orchidaceae	1
Dioscoreaceae	2	Smilacaceae	1
Hemodoraceae	1	Zingiberaceae	1

Plant parts used are whole plant, young shoot, stem, bark, leaf, flower, fruit, seed, root, rhizome, bulb, tuber and corm. A comparison of the different plant parts to their various edible uses (both marketable and non marketable edibles) shows that the plant part mostly used for consumption is the fruit which is followed by the leaf (Fig 10). They are eaten as raw (mainly fruits) or cooked as vegetables. All these species are equally consumed by rural as well as urban people; however, people in villages directly collected them from forest areas while urban people purchase them from local market. In CASE II study the 300 students also brought specimens of cultivated and wild edible plants. Valuable information was given for the uses of the plants, its value and way of consumption. Each family consumes 15-20 types of wild edible plants in a year and about 4-5 times a week.

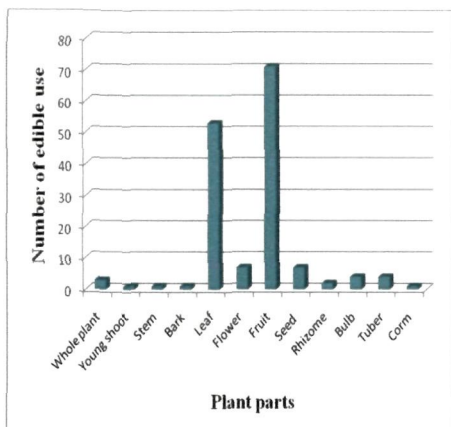


Fig: 10. Comparison of different plant parts to their edible use

In Meghalaya the large numbers of wild growing plants or their parts still provide considerable quantities of food supply to a large section of human society. The local people have wonderful skill in order to identify these, their palatability, products and preparations. The wild fruits are refreshing, some are sweet and some are sour while some are a little hot in taste. The people take the seasonal wild fruits at home after food or while going to the fields or forests. In many cases fruits are sold without any value addition that could have been otherwise elevated the earnings of primary collectors. Some wild edible plants are available only for a short duration and some have very low shelf life and thus they are sold at very low cost by the villagers. Some of these species can certainly boost the economy of poor people if value addition is done to them. Pickles can be prepared by natural fermentation of fruits and vegetables. These pickles besides having nutritional value also act as food adjunct and appetizers and add palatability to the foods. The nutritional and dietary benefits of continued consumption of wild foods can be substantial. Continued use of wild food plants offers several nutritional and

dietary advantages. These plants add nutrients and energy to the diet based on cultivated foods. Moreover varied diet also increases palatability and this can contribute to a higher overall food intake. Some wild plants are high in their nutrient contents, even superior to the cultivated ones, and thus form the rich source of minerals. There is a further need to study and document the current role of wild edible plants to understand the local food systems in many communities, which can formulate a basis for agricultural, forestry and nutritional strategies.

Ethnobotanical knowledge can serve as an effective development tool to improve the living conditions of indigenous communities without degrading the environment. It can be used to increase and enhance livelihood options, revitalize agriculture, increase food security, improve health and promote a sense of cultural pride within the community. Ethnobotanical knowledge helps the people cope with periodic food shortages by utilizing non timber forest products. When crops fail or when there is food shortage during the lean season, especially before the coming harvest season, the people harvest nuts, berries wild vegetables in the forest. The forest provides them with a buffer from hunger.

Regarding traditional wooden or plant based musical instruments used in the three studied districts, altogether 11 plant species belonging to 10 genera under 7 families including dicotyledons, monocotyledons and gymnosperms have been documented to be used in the making of 17 musical instruments which include percussion instruments, wind instruments, string instruments. Wooden musical

instruments played a role in sharing their joy and sorrow. It was seen that rice grains play a major role in all the socio religious ceremonies of the Khasis.

There are 33 clans which are forbidden from consuming or using in any form 21 plant species under 20 genera belonging to 14 families including dicotyledons, monocotyledons, gymnosperm and pteridophytes. Recording the various indigenous strategies of the Khasis, will help in a long way in conservation of biodiversity.

Table 14: A comparison of the present work with other ethnobotanical studies reported earlier

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Acorus calamus</i>	19	+	+	+
<i>Adenia trilobata</i>	1	+		+
<i>Ageratina adenophora</i>	6	+	+	+
<i>Ageratina riparia</i>	1	+		
<i>Ageratum conyzoides</i>	3	+	+	
<i>Aleuritopteris subdimorpha</i>	1	+		
<i>Allium sativum</i>	3	+	+	+
<i>Allium tuberosum</i>	4	+		
<i>Aloe vera</i>	11	+	+	+
<i>Amaranthus tricolor</i>	1	+		+
<i>Anaphalis adnata</i>	4	+		
<i>Anemone rivularis</i>	1	+		
<i>Areca catechu</i>	1	+		
<i>Argyreia hookeri</i>	1	+		
<i>Artemisia indica</i>	1	+		+
<i>Asparagus filicinus</i>	1	+		
<i>Asparagus racemosus</i>	9	+	+	+
<i>Begonia roxburghii</i>	4	+		+
<i>Belamcanda chinensis</i>	1	+		
<i>Berginia ciliata</i>	4	+		+
<i>Bidens pilosa</i>	1	+		+
<i>Brunella vulgaris</i>	2	+		
<i>Buddleja asiatica</i>	1	+		+
<i>Calendula officinalis</i>	2	+		
<i>Calocasia esculenta</i>	1	+	+	
<i>Capsicum frutescens</i>	1	+		+
<i>Capsicum minimum</i>	1	+		
<i>Cassia alata</i>	1		+	+
<i>Cassia fistula</i>	1	+		

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Centella asiatica</i>	9	+	+	+
<i>Cephalostachyum latifolium</i>	1	+		
<i>Cinnamomum glaucescens</i>	2	+		+
<i>Cinnamomum obtusifolium</i>	3	+		+
<i>Cinnamomum verum</i>	1	+		+
<i>Citrus medica</i>	1	+		+
<i>Clematis gouriana</i>	7	+		
<i>Clerodendron bracteatum</i>	2	+		+
<i>Clerodendron colebrookianum</i>	8	+	+	+
<i>Coix lacryma-jobi</i>	5			+
<i>Crassocephalum crepidioides</i>	1		+	
<i>Crinum amoenum</i>	1	+		+
<i>Curcuma aeruginosa</i>	12	+		+
<i>Curcuma amada</i>	3	+		+
<i>Curcuma longa</i>	6	+		+
<i>Curcuma montana</i>	2	+		
<i>Curcuma</i> sp 1	1	+		
<i>Curcumorpha</i> sp.	3	+		
<i>Cuscuta reflexa</i>	4	+	+	+
<i>Cyclea bicristata</i>	1	+		+
<i>Cynodon dactylon</i>	1	+		+
<i>Dendrobium chrysanthum</i>	1	+		
<i>Desmodium griffithianum</i>	1	+		
<i>Desmodium triflorum</i>	1	+		
<i>Dichrocephala bicolor</i>	2	+		
<i>Dioscorea deltoidea</i>	1	+		
<i>Dioscorea puber</i>	2	+		+

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Dischidia</i>	2	+		
<i>Dischidia benghalensis</i>	1	+		
<i>Dischidia nummularia</i>	3	+		
<i>Drymaria diandra</i>	4	+		+
<i>Emilia sonchifolia</i>	3	+	+	
<i>Eriosema himalaicum</i>	5	+		
<i>Eryngium foetidum</i>	2	+		
<i>Erythrina arborescens</i>	1	+		+
<i>Eucalyptus tereticornis</i>	3	+		
<i>Eulophia nuda</i>	4	+		
<i>Fagopyrum cymosum</i>	2	+		+
<i>Ficus heterophylla</i>	1	+		
<i>Ficus hirta</i>	1	+		
<i>Flemingia procumbens</i>	1	+	+	
<i>Galingsoga parviflora</i>	2	+	+	+
<i>Galium asperifolium</i>	3	+		
<i>Gaultheria fragrantissima</i>	4	+		
<i>Geranium nepalense</i>	1	+		+
<i>Gleichenia volubilis</i>	2	+		
<i>Hedyotis scandens</i>	1	+		+
<i>Hedyotis uncinella</i>	1	+		+
<i>Helixanthera parasitica</i>	1	+		
<i>Hibiscus</i>	2	+		
<i>Hibiscus rosa sinensis</i>	1	+		+
<i>Houttuynia cordata</i>	3		+	+
<i>Hypericum laxum</i>	4	+		
<i>Impatiens benthamii</i>	1	+		
<i>Impatiens radiata</i>	2	+		
<i>Inula cappa</i>	1	+		+
<i>Iresine herbstii</i>	3	+		

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Ixeris gracilis</i>	3	+		
<i>Justicia adhatoda</i>	1	+		+
<i>Kaempferia galanga</i>	8	+		
<i>Kalanchoe pinnata</i>	5	+	+	+
<i>Laggera pterodonta</i>	1	+		+
<i>Lantana camara</i>	1	+		+
<i>Leucas ciliata</i>	1	+		
<i>Leucosceptum canum</i>	1	+		
<i>Lindenbergia muraria</i>	1	+		
<i>Litsea salicifolia</i>	1	+		
<i>Mahonia pycnophylla</i>	1		+	
<i>Mazus pumilus</i>	4	+		
<i>Melasma avense</i>	1	+		
<i>Melastoma malabathricum</i>	1	+		+
<i>Mikania micrantha</i>	1	+		+
<i>Mimosa pudica</i>	1	+		+
<i>Morus australis</i>	1	+		+
<i>Musa paradisiaca</i>	4	+		+
<i>Musa sp.</i>	1	+		
<i>Myrica esculenta</i>	2		+	+
<i>Myrica nagi</i>	2	+		
<i>Neanotis wightiana</i>	1	+		
<i>Nepenthes khasiana</i>	3	+	+	+
<i>Nephrolepis cordifolia</i>	1	+		+
<i>Nerine sarniensis</i>	1	+		
<i>Oenanthe javanica</i>	1	+		+
<i>Oryza sativa</i>	1	+		
<i>Osbeckia capitata</i>	1	+		
<i>Osbeckia crinita</i>	2	+	+	+
<i>Oxalis corniculata</i>	2	+	+	+
<i>Paederia scandens</i>	1	+		+
<i>Panax</i>	1	+		

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Passiflora edulis</i>	4	+	+	
<i>Peperomia heterophylla</i>	1	+		
<i>Phlogacanthus thrysiflorus</i>	2	+		
<i>Phrynium pubinerve</i>	1	+		
<i>Phyllanthus glaucus</i>	1	+		
<i>Pinus kesiya</i> Royle	1		+	+
<i>Piper betel</i>	3	+		+
<i>Piper peepuloides</i>	1		+	
<i>Plantago major</i>	4	+	+	+
<i>Plectranthes striatus</i>	1	+		+
<i>Polygonatum oppositifolium</i>	5	+		
<i>Polygonum nepalense</i>	4	+		
<i>Polystichum pseudotsussimense</i>	1	+		
<i>Potentilla fulgens</i>	5	+		+
<i>Pouzolzia hirta</i>	4	+		+
<i>Prunus persica</i>	2	+		+
<i>Psidium guajava</i>	2		+	+
<i>Pteris wallichiana</i>	2	+		
<i>Pyrus pashia</i>	2	+		+
<i>Ranunculus diffusus</i>	1	+		
<i>Remusatia pumila</i>	1	+		
<i>Rhus chinensis</i>	1	+		+
<i>Rhynchochum ellipticum</i>	1	+		
<i>Ricinus communis</i> L.	2		+	+
<i>Rosa sinensis</i>	1	+		
<i>Rotala rotundifolia</i>	1	+		
<i>Rubia cordifolia</i>	6	+	+	+
<i>Rubus ellipticus</i>	3	+	+	+

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Rubus rugosus</i>	2	+		+
<i>Sansevieria trifasciata</i>	3	+		
<i>Sarcandra glabra</i>	3	+		+
<i>Schima wallichii</i>	1	+		
<i>Scutellaria discolor</i>	1		+	+
<i>Sechium edule</i>	1		+	
<i>Sida rhombifolia</i>	1	+		+
<i>Smilax ferox</i>	2	+		
<i>Solanum myriacanthum</i>	1		+	+
<i>Solanum torvum</i>	2	+	+	
<i>Sonchus brachyotus</i>	2	+	+	+
<i>Spilanthes paniculata</i>	1	+		
<i>Stachytarpheta dichotoma</i>	1	+		
<i>Sterculia villosa</i>	1	+		+
<i>Stereocaulon macrocephalum</i>	1	+		
<i>Strobilanthes flaccidifolius</i>	2	+		
<i>Swertia agustifolia</i>	2	+	+	+
<i>Symplocos chinensis</i>	1	+		
<i>Symplocos glomerata</i>	1	+		
<i>Symplocos laurina</i>	2	+		
<i>Symplocos paniculata</i>	1	+		
<i>Tabernaemontana divaricata</i>	2	+		+
<i>Ternstroemia gymnanthera</i>	1	+		
<i>Thysanolaena latifolia</i>	2	+		+
<i>Tricyrtis maculata</i>	1	+		
<i>Valeriana jatamansii</i>	2	+		+
<i>Viburnum foetidum</i>	1	+		
<i>Viola hamiltoniana</i>	2	+		
<i>Viscum articulatum</i>	2	+		+

Name of plant	Total medicinal uses documented in the present work	First time or additional medicinal uses recorded in the present work	Medicinal use earlier reported for the same purpose	Earlier reported for different medicinal use
<i>Zanthoxylum acanthopodium</i>	4	+		
<i>Zanthoxylum armatum</i>	1		+	+
<i>Zephyranthes rosea</i>	1	+		
<i>Zingiber montanum</i>	10	+		
<i>Zingiber rubens</i>	4	+	+	+
<i>Zingiber zerumbet</i>	5	+		+

Fig. 15: Threat status of ethnobotanically important plants documented

Sl. no.	Plant species	Family	Status	Distribution	Reference
1.	<i>Bergenia ciliata</i> (Haw.) Sternb.	Saxifragaceae	Vulnerable	Arunachal, Meghalaya, Sikkim	Ved <i>et. al.</i> , (2005)
2.	<i>Citrus macroptera</i> (Montr) var <i>annamensis</i> Tanaka	Rutaceae	Endemic	Assam Meghalaya	Ved <i>et. al.</i> , (2005)
3.	<i>Citrus latipes</i> (Swingle)Tanaka	Rutaceae	Endemic to Meghalaya	Primary Forests, 500-1200m	Balakrishnan (1981);
4.	<i>Dischidia benghalensis</i> Coleb	Asclepiadaceae	Rare	Eastern Nepal, Sikkim, Assam, Meghalaya	Jain & Sastry (1980)
5.	<i>Dioscorea deltoidea</i> Wall. ex Griseb.	Dioscoreaceae	Threatened	Temperate Himalayas including Khasi hills in Meghalaya, Afghanistan & Bhutan	Jain & Sastry (1980)
6.	<i>Elaeocarpus prunifolius</i> (C. Muell.) Mast.	Elaeocarpaceae	Rare	Meghalaya, Manipur, and adjacent Bangladesh, 900-1800m	Nayar & Sastry (1990)
7.	<i>Exbucklandia populnea</i> (R. Br. ex Griff.) R. W. Br.	Hamamelidaceae	Primitive flowering plants	North east India, Eastern Himalaya and Sumatra	Chauhan <i>et al.</i> , (1996)
8.	<i>Nepenthes khasiana</i> Hook. f	Nepenthaceae	Endangered, Endemic to Meghalaya	Jarain, Sutnga, Maheshkola	Haridasan & Rao (1987)

Sl. no.	Plant species	Family	Status	Distribution	Reference
9.	<i>Piper peepuloides</i> Roxb.	Piperaceae	Vulnerable	Arunachal, Assam, Meghalaya, Sikkim	Ved <i>et. al.</i> , (2005)
10.	<i>Polystichum pseudotsus-simense</i> Ching	Aspidiaceae	New record for India	Reported from Arunachal Pradesh	Singh & Panigrahi (2005)
11.	<i>Holboellia latifolia</i> Wall.	Lardizabalaceae	Primitive flowering plants	North east India	Chauhan <i>et al.</i> , (1996)
12.	<i>Rhus chinensis</i> Mill.	Anacardiaceae	Endemic to North east	North east India	Chauhan <i>et al.</i> , (1996)
13.	<i>Sarcandra glabra</i> (Thunb.) Nakai	Chloranthaceae	Primitive flowering plants	North east India, Indo Malaya	Chauhan <i>et al.</i> , (1996)
14.	<i>Tetrastigma obovatum</i> (Laws). Gagnep.	Vitaceae	Endemic to Meghalaya		Haridasan (1999)
15.	<i>Valeriana jatamansii</i> Jones	Valerianaceae	Vulnerable	Arunachal, Assam, Meghalaya, Sikkim	Ved <i>et. al.</i> , (2005)

CHAPTER VI (2)

CONCLUSION

CONCLUSION

The local communities in Meghalaya have the treasure troves of accumulated knowledge and wisdom particularly about the biological resources around them. Such information has immense value to the biodiversity managers, planners and scientist alike. Ethnobiological knowledge system is a very cost effective means of locating alternative food sources and useful compounds/drugs were developed after getting the lead from ethnobotanical investigations. Due to this reason there lies the need for thorough Ethnobotanical investigation in each district of Meghalaya. The work was undertaken to compare and evaluate the ethnobotanical data, for bringing significant medicinal plants for further study for isolating and identifying their active principles.

In the present work ethnobotanical information on 293 species represented by 208 genera spread across 95 families which includes Dicotyledons, Monocotyledons, Gymnosperm, Pteridophytes, lichen, have been documented. The dominant families being Asteraceae, Rutaceae, Zingiberaceae and Poaceae.

The present work provides first hand primary information on the herbal remedies practiced by the well known local traditional medicine men and rural folks of Meghalaya and incorporates the mode of application and dosage of these herbal drugs, which is obtained with great difficulty because in many cases these medicine men are reluctant to share their knowledge for fear of exploitation or because of the believe that sharing their knowledge with strangers will lower the effectiveness of the medication.

The work focused light on the hidden indigenous knowledge of traditional medicines of the Khasis in Meghalaya, which can lead to further investigation by the research communities, analytical research laboratories and the medical science of Pediatrics. The work presents the age-old belief of the Khasis in a type of germ known as '*U Ñiangsohpet*' which causes Infantile diarrhoea and Neonatal jaundice in newborns and infants. The herbal medicine '*Ka Dawai Ñiangsohpet*' works to eliminate the germs from the body. Infantile diarrhoea is still one of the causes for Infant Mortality in India. So if proper initiative is taken by the pharmacologists to work out, isolate, identify the active principles present in these herbs and scientifically prove the effectiveness of the medicine, this "*Dawai Ñiangsohpet*" can be marketed as a new drug and the parents can administer this medicine to their infants as a remedy for Infantile diarrhoea and Neonatal jaundice.

Observation on the number of patients and scrutiny of the questionnaires filled by the sampled patients show that on an average in each local market day a total of 70-100 patients come to consult each medicine man which gives the true picture that a huge number of the population living in the rural areas of the three districts in Meghalaya still depend on local herbal traditional healers to meet their health needs, who provide herbal medicines at very low cost, and have helped in curing a number of diseases. Each person saves minimum of Rs 100-200 by using plant species for treatment.

Efforts have also been made to compare the ethnomedicinal uses documented from the present work with those ethnobotanical studies reported earlier in some

important journals and literature. It is observed that out of the 181 medicinal plant species documented the medicinal uses of 169 plants have been documented for the first time or additional uses have been documented which have not been reported earlier in India. The medicinal use of only 37 plant species is the same as those that have been recorded earlier for Meghalaya or other states of India while for 84 plant species the medicinal uses have been documented earlier too but the medicinal uses are entirely different as far as ailments for which they were administered, method of preparation, plants parts used are concerned, from those documented in the present work.

A critical study of literature shows that except for *Diplazium esculentum* which was earlier reported to be edible by other authors also, the medicinal uses of the rest five species of Pteridophytes documented have been reported for the first time in Meghalaya.

In Meghalaya, no use of lichens in traditional medicines has been documented until now. Ethnobotanical studies conducted in the East Khasi Hills district of Meghalaya, have identified one species of lichen which is used in local traditional medicine.

The works presented earlier in literatures about edible plants was just simply listing of plant names only. In the present work besides listing of names, efforts have been made to demarcate the marketable and non marketable edible plants together with their monthly availability in the market and market price, their value added products, which will prove useful to find ways to improve the economic returns from these edible plants. An attempt has been made to list the less known edible plants grown in the home

gardens in the study area which serve as emergency food or herbal medicine. Today only 15 plant species supply 90 % of world food (Lal & Lal, 2004). It means we have lost or ignored the wild species diversity, which existed in the past and are over-exploiting the current species used in food production.

Traditional indigenous knowledge and scientific knowledge definitely complement each other in addressing many of the problems concerning biodiversity resource. Many underutilized and under exploited vegetable crops are used by the tribal folks. Hardly, attention has been given on this to bring them in mass cultivation and use. There are some plant species which have great potential in order to boost the economy as these are available in abundance during the maturity period like *Myrica esculenta*, *Eleagnus latifolia*, *Prunus nepalensis*. The availability of these plants in large quantity could be helpful in establishment of processing units for their preservation and to make them available for off season consumption. By developing such facilities, it can further generate the employment opportunities to the local inhabitants and also motivate the people to conserve these useful species for sustainable use.

The plants and plant parts used for making of traditional wooden musical instruments in the three districts have been documented for the first time from the local musicians or instructors. From survey of literature it was observed that no reference regarding ethnomusicology has been documented in Meghalaya so far.

Moreover understanding folk taxonomic systems may assist in botanical classification and in understanding the ecology of cultivated and wild plant population.

All these aspects of the knowledge of peoples in primitive societies indicate how very valuable this asset of ethnobotanical investigation can be to the benefit of all mankind, of academic as well as practical use of the world's flora.

CHAPTER VI (3)

SUMMARY

SUMMARY

The term Ethnobotany is defined as the study of human evaluation and manipulation of plant materials, substances and phenomenon including relevant concepts in primitive and unlettered societies.

Meghalaya, a small state situated in the North Eastern part of India, lying between 25°05' N and 26°10' N Latitudes and 89°47' E and 92°47' E Longitudes is the home of three major tribes, viz. the *Khasis*, *Jaintias* and *Garos*. Numerous wild and cultivated plants play a very important and vital role in the life of the tribes. Their interrelationship with plants has evolved over generation of experience and practices.

The research work is undertaken to develop a comprehensive data base on the ethnobotanical important plants of the region, like medicinal plants, supplementary foods, wild fruits, vegetables, plants used in socio-religious ceremonies, in the making of musical instruments and to document plants related to different clans and strategies adopted by the clans for their conservation. The present work especially aims at focusing light on the hidden indigenous knowledge of traditional medicines of the Khasis in Meghalaya. Thus three districts of Meghalaya viz. East Khasi Hills, West Khasi Hills and Ri Bhoi Districts were chosen to be explored ethnobotanically.

Field surveys were conducted in all the three districts covering altogether 13 villages to study the way of living of the people, their beliefs, customs, practices, interaction with nature and most importantly their perception of plants. Interview procedures are both open ended, and semi structured and structured. Informant selection

ranges from random sampling to purposive sampling. Questionnaire and Case Studies were done to derive true and first hand data from the informants. Ten tribal weekly markets were visited for observing marketplace interactions. Collection of data from the traditional priests, village headmen and elder village folks regarding the uses of plants for socio-religious ceremonies, clan plants and folk plant classification. Attending to local festivals, socio-religious ceremonies like Marriage, Naming and Death ceremonies. Local musicians were interviewed on the plants used for making the instruments. Private and state museums, exhibitions and workshops were visited for the same purpose. Voucher specimens of all the plants documented have been collected for future reference. The collected specimens were identified from herbarium of the Botanical Survey of India, Eastern circle, Shillong and also Herbarium of the Department of Botany, NEHU, Shillong. Identification and also confirmation of the identified specimens was done by consultation of various regional and state floras.

Analytical tools used in quantification and data verification are:

- a) Informant Agreement ratio (Trotter and Logan, 1986).
- b) Preference ranking (Martin 1995)
- c) Relative Reliability Index (Khan, 2001)

Ethnobotanical information on 293 species represented by 208 genera spread across 95 families which includes Dicotyledons, Monocotyledons, Gymnosperm, Pteridophytes, Lichen, have been documented. The dominant families being Asteraceae, Rutaceae, Zingiberaceae and Poaceae. A total of 181 plant species of ethnomedicinal

importance represented by 150 genera and belonging to 81 families of the plant kingdom and have been documented to be used by the traditional healers and village folks in the three districts of Meghalaya. The Dicotyledons has the highest number of recorded species which is 132 while the lowest is shared by Lichens and Gymnosperms with 1 each. The family Asteraceae has the highest number of members with 17 species and Zingiberaceae with 10 species recorded. The other 79 families are represented by numbers ranging from 1-6 species. The genera with highest number of species documented are *Curcuma* (5 species) and *Symplocos* (4 species). The 181 species serve as remedy for treatment of 73 different diseases and ailments. The species with the highest number of medicinal uses documented are *Acorus calamus* (19), *Curcuma aeruginosa* (12), *Zingiber montanum* (10). The different methods of preparation are in the form of infusion, decoction, steaming or inhaling of vapours, boiled, paste, juice extract which is taken orally, applied topically, fomentation, herbal hot water bath. The work presents the age-old belief of the Khasis in a type of germ that infects the infants and newborns known as '*U N̄iangsohpet*' which causes Infantile diarrhoea and Neonatal jaundice.

In the CASE I study conducted among the 165 patients who come to consult 11 traditional medicine men it was observed that the number of ailments recorded is 47 with each patient coming with more than one complaint. The highest number of patients is observed to be for Infantile diarrhoea, Stomach and gastric problems, Menstrual problems, Urinary problems and Bodyache. In the CASE II study out of the 295 students

who filled up the questionnaires, 207 of them revealed that they or their family have faith in medicinal plants and have consulted a traditional medicine man at one point of time in their life. In the CASE III study of 20 respondents of Laitlyngkot village it was observed that *Centella asiatica* which is effective against anaemia, blood dysentery, diarrhoea etc. has the highest score as the most commonly used home remedy from among 10 plant species selected.

Application of Relative Reliability Index to the ethnomedicinal claims documented, it was seen that 53 species have the highest reliability of 1.07, 35 species with RRI of 1.04, 30 species with 1.00, 50 species with RRI of 0.95 and only 13 species with lowest reliability of 0.9. The IAR or consensus values range from 0-1 with 14 indications having the highest levels of IAR. These high levels are those indications having a value of IAR greater than the mean value (0.67) plus the standard deviation (0.3) or 0.97.

The medicinal uses of 169 plants have been documented for the first time or additional uses have been documented. The medicinal uses of the five species of Pteridophytes and one species of lichen documented have been reported for the first time in Meghalaya.

A total of 142 plant species of wild and less known cultivated edible plants have been recorded from the study area, out of these 66 plant species belonging 31 families of the plant kingdom and represented by 49 genera have been documented as marketable edibles while 76 plant species belonging 39 families of the plant kingdom and

represented by 59 genera have not yet come into the market but many have a potential to be marketable. Out of the 142 plant species collected, 46 of them have been reported to have medicinal properties also. Efforts have been made to demarcate the marketable and non marketable edible plants together with their monthly availability in the market and market price, their value added products, which will prove useful to find ways to improve the economic returns from these edible plants. In CASE II study all the 295 students brought specimens of cultivated and wild edible plants. Each family consumes 15-20 types of wild edibles annually and about 4-5 times a week.

Altogether 11 plant species belonging to 10 genera under 7 families which include dicotyledons, monocotyledons and gymnosperms have been documented to be used in the making of 17 musical instruments which include percussion instruments, wind instruments, string instruments. There are 33 clans documented which are forbidden from consuming or using in any form 21 plant species under 20 genera belonging to 14 families. Recording the various indigenous strategies of the Khasis, will help in a long way in conservation of biodiversity.

CHAPTER VII
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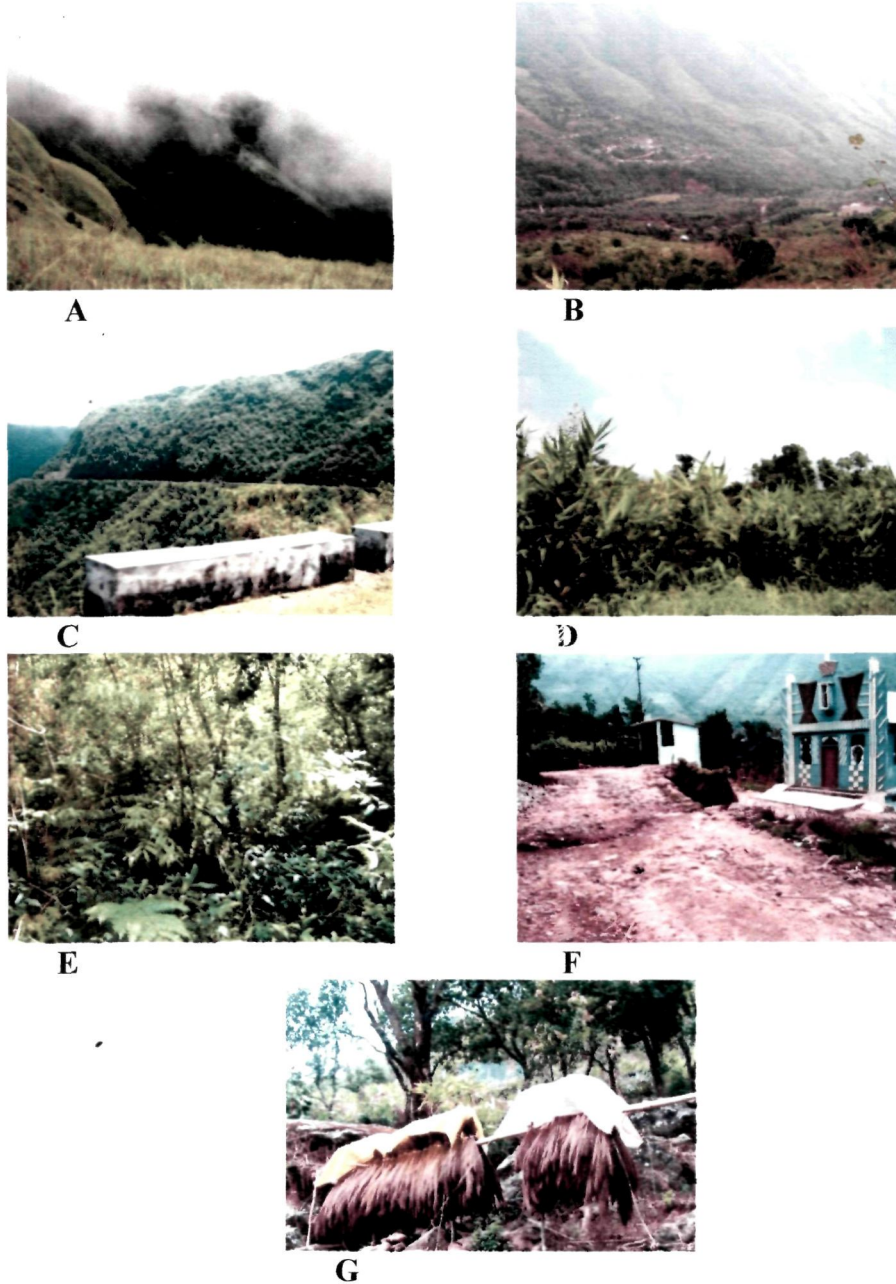
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PLATES

PLATE 1



PL. 1: Showing study area. **A.** Meghalaya “Abode of clouds”. **B.** A view of Wahkhen village. **C.** Road leading to Mawsynram. **D.** *Thysanolaena maxima* cultivated in Wahkdait on the way to Dawki. **E.** Edible and medicinal ferns in a forest at Bhoirymbong. **F.** The road leading to Wahkhen village. **G.** Drying of *Thysanolaena maxima* in Wahkhen village.

PLATE 2



A



B



C



D

PL. 2: Showing study area. **A.** Cane baskets and brooms for sale at Laitlyngkot market. **B.** A Forest garden at Umsyiem containing Areca nut palms. **C.** A man plucking Areca nuts at Umsyiem for sale. **D.** A man plucking betel leaves at Wahkdait for consumption.

PLATE 3



A



B



C



D



E



F



G



H

PL. 3: Local medicine men consulted during the research. **A.** Mr. Boss. L. Myrthong. **B.** Mr. S. B. Roy Snaitang. **C.** Mr. Bringstone Kharumnuid. **D.** Mr. Nising Khongjirem. **E.** Mrs. Rosilian Lyngdoh. **F.&G.** Wife and son of Mr. Bringstone Kharumnuid collecting herbs. **H.** Mr. D. W. Kharbhih.

PLATE 4

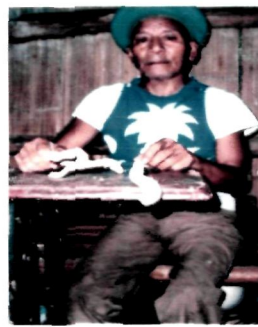


PL. 4 : Local medicine men consulted during the research. **A.** Mr. Bransley Langrin. **B.** Mr. Orlando Kongwang. **C.** Mr Phran Nongsiej (with cap) and his helper. **D.** Mr. S. Lyngdoh. **E.** Mr. T. Nengnong. **F.** Mr. Aior Kurbah. **G.** Mrs. Saian Jala. **H.** Mr. Olin Kshiar. **I.** Mr. S. Lyndem.

PLATE 5



A



B



C



D



E



F



G

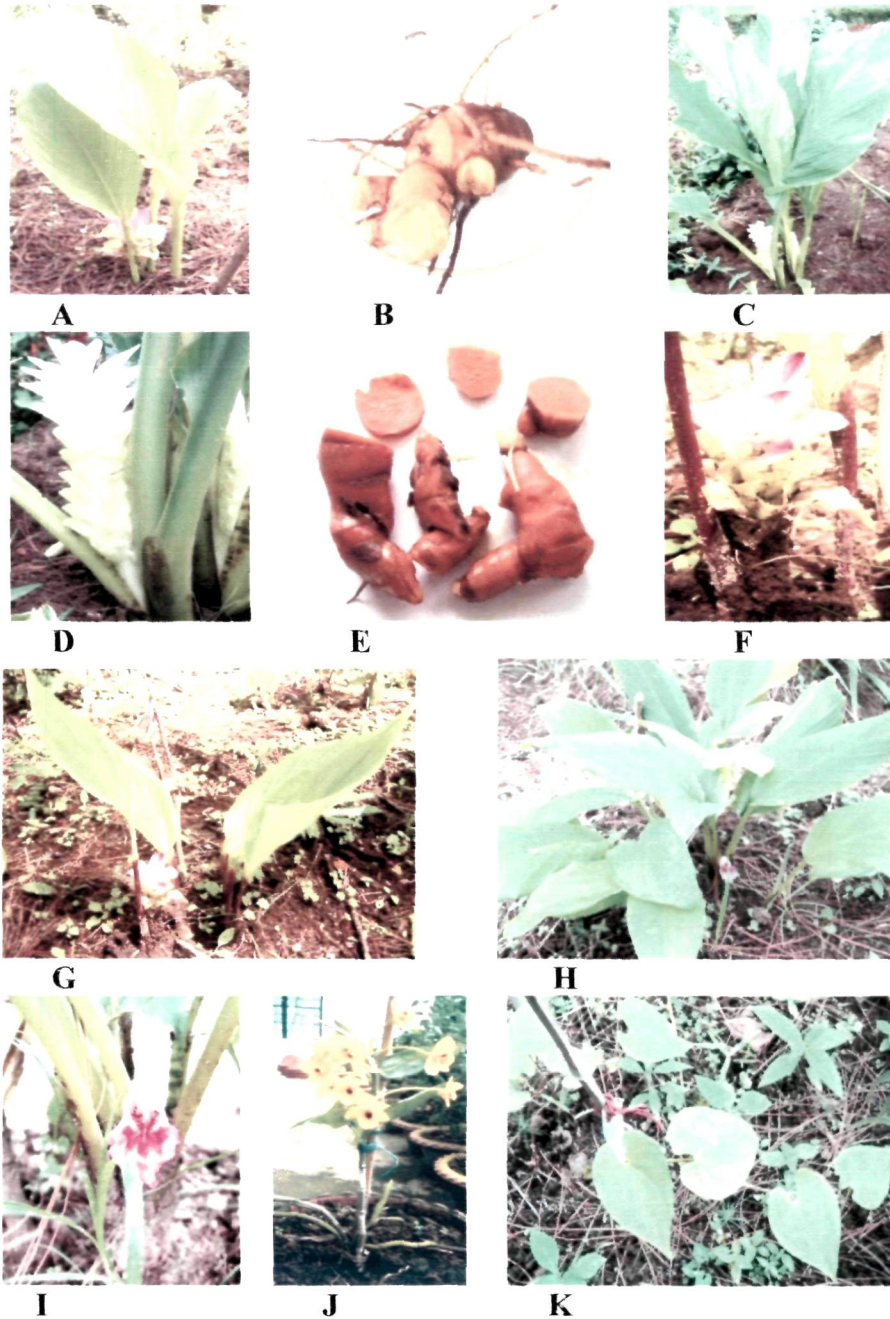
PL. 5: Informants consulted during the research work **A.** Mr. J. Malai. **B.** Mr. Khain Kharsyntiew. **C&D.** Patients consulting local medicine men. **E.** An old lady informant in Laitlyngkot. **F.** The research scholar (L) with Supervisor (R) and informant on one of the field trips. **G.** School students engaged with filling of Questionnaires

PLATE 6



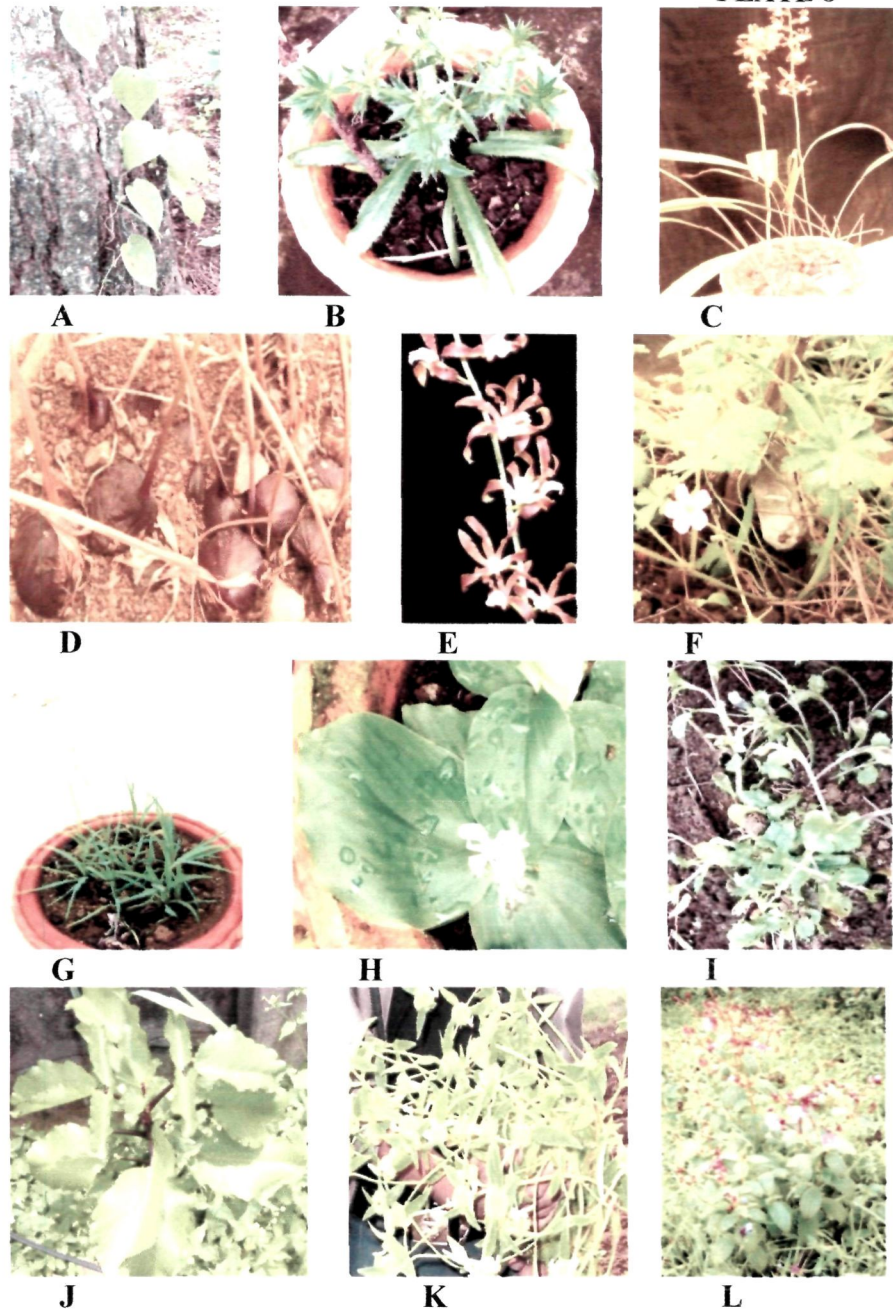
PL.6: Medicinal plants documented from study area. **A.** *Acorus calamus* **B.** *Begonia roxburghii* **C.** *Belamcanda chinensis* flower **D.** Fruits of *Cassia fistula* **E.** *Cassia alata* **F.** *Crinum amoenum* **G- I.** *Curcuma aeruginosa* : **G.** Habit; **H.** Inflorescence; **I.** Rhizome. **J.** *Curcuma amada* inflorescence.

PLATE 7



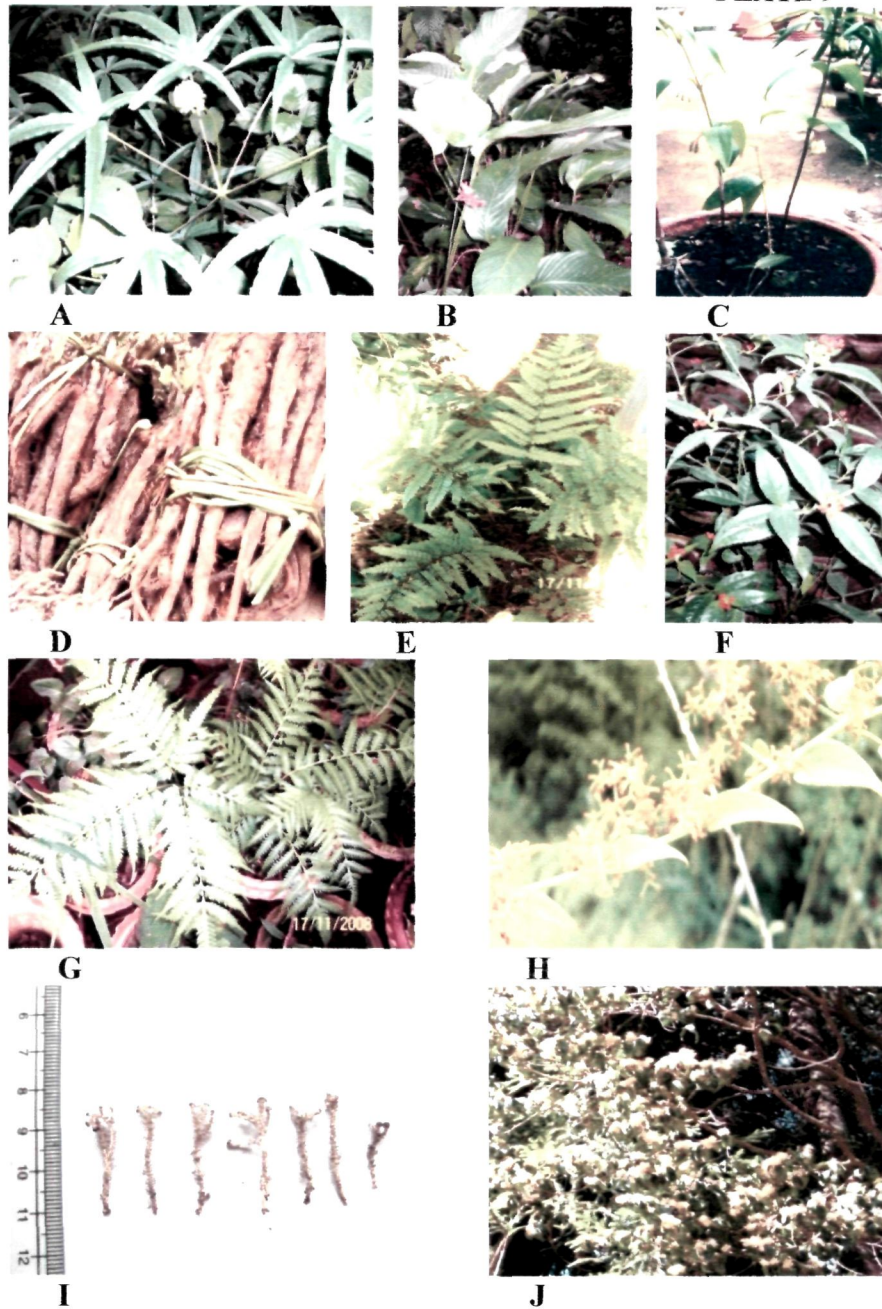
PL.7: Medicinal plants documented from study area. **A,B** *Curcuma amada*: **A.** Habit; **B.** Rhizome. **C.- E.** *Curcuma longa*: **C.** Habit; **D.** Inflorescence; **E.** Rhizome. **F,G.** *Curcuma* sp: **F.** Inflorescence; **G.** Habit. **H.&I.** *Curcumorpha* sp.: **H.** Habit; **I.** Flower. **J.** *Dendrobium chrysanthum* **K.** *Dioscorea deltoidea* habit.

PLATE 8



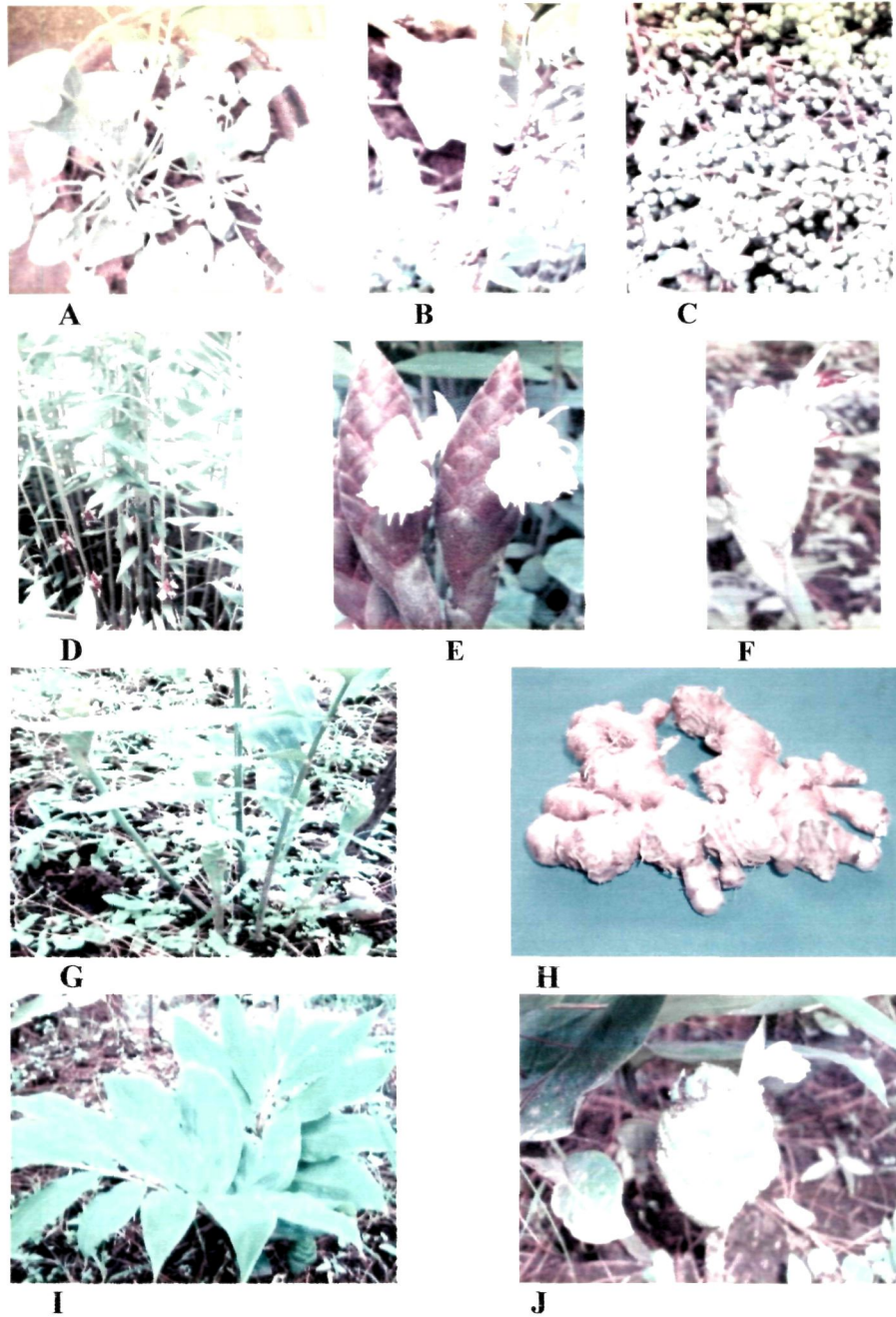
PL. 8 : Medicinal plants documented from study area. **A.** *Dioscorea puber* **B.** *Eryngium foetidum* **C.- E.** *Eulophia nuda*: **C.** Habit; **D.** Tubers; **E.** Flowers. **F.** *Geranium nepalense* **G.** *Ixeris gracilis* **H.** *Kaempferia galanga* **I.** *Mazus pumilus* **J.** *Kalanchoe pinnata* **K.** *Leucas ciliata* **L.** *Osbeckia crinita*

PLATE 9



PL. 9: Medicinal plants documented from study area. A. *Panax wangianus* B. *Phrynium pubinerve* C. *Polygonatum oppositifolium* D. *Potentilla fulgens* E. *Polystichum pseudotsussimense* F. *Sarcandra glabra* G. *Pteris wallichiana* H. *Rubia cordifolia* I. *Stereocaulon macrocephalum* J. *Symplocos paniculata*.

PLATE 10



PL.10: Medicinal plants documented from study area. **A.** *Valeriana jatamansii* **B.** *Zanthoxylum acanthopodium* **C.** *Zanthoxylum armatum* **D.& E.** *Zingiber montanum* : **D.** Habit; **E.** Inflorescence. **F-H** *Zingiber rubens*: **F.** Inflorescence; **G.** Habit; **H.** Rhizome. **I, J** *Zingiber zerumbet*: **I.** Habit; **J.** Inflorescence.

PLATE 11



PL.11: Medicinal plants documented from study area. **A.** *Zingiber zerumbet* infructescence. **B,C.** *Curcuma montana*: **B.** Habit; **C.** Inflorescence. **D- F.** Introduction of collected medicinal plants in the Botanical Garden, NEHU.

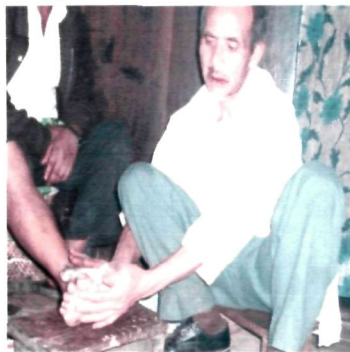
PLATE 12



A



B



C



D



E



F

PL.12: Medicine men with their patient, showing methods of treatment. **A.** Heated mixture of herbal plants. **B & C.** Mixture applied for treating leprosy. **D.** Medicine man massaging the legs of a paralytic patient with herbal oil. **E.** Grinding of herbal plants. **F.** Bandaging a hand with fractured bone.

PLATE 13



A



B



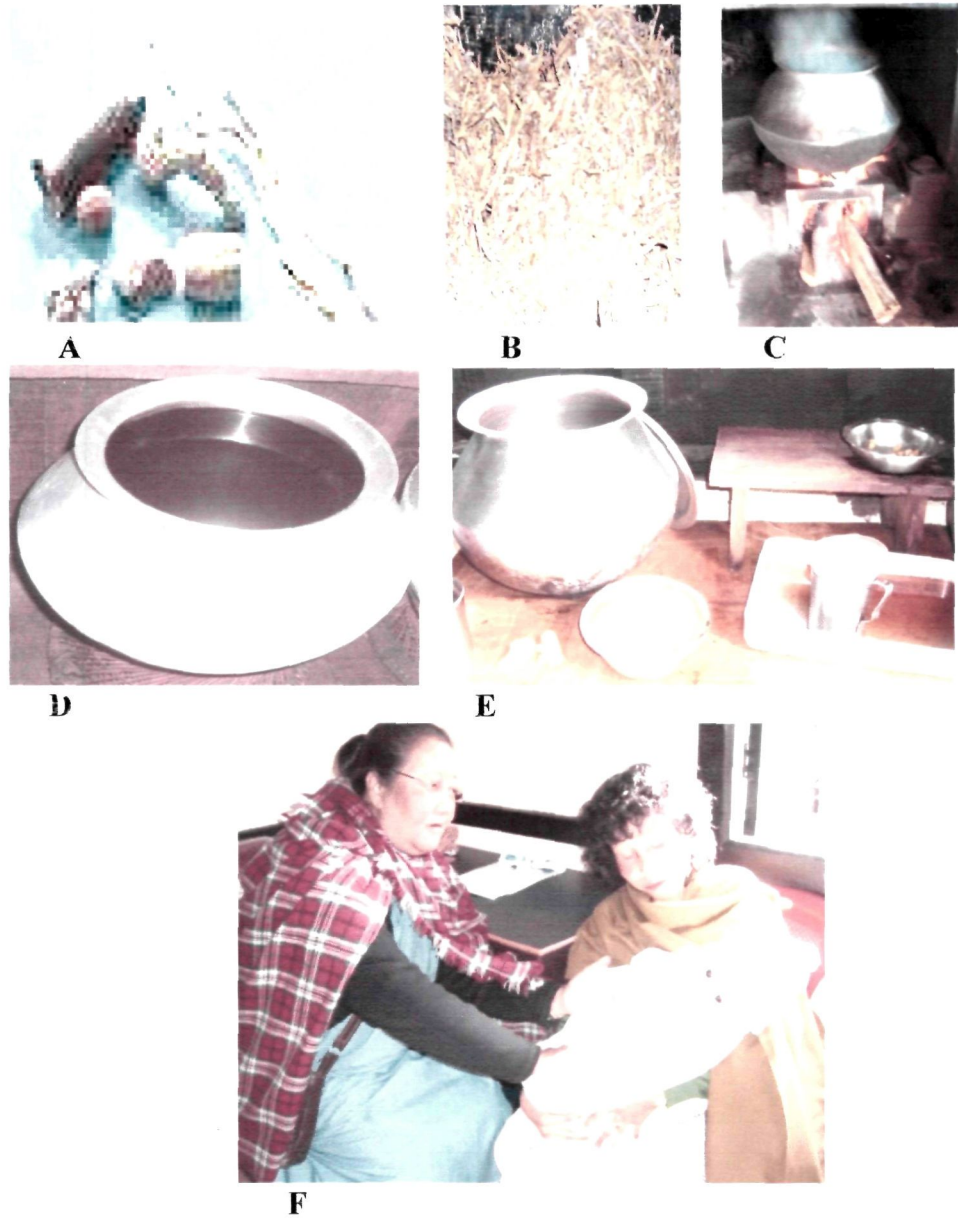
C



D

PL.13: Storage and processing of the medicinal plants. **A.** A lady selling roots of *Valeriana jatamansi* in Mawkyrwat market. **B.** Storage of dried medicinal plant parts. **C.** Mortars made of stone used for pouncing dried plant parts. **D.** Herbal plants boiled in large aluminium pots.

PLATE 14



PL. 14: **A.** Pictures related to *Dawai Njangsohpet*. **A.** Plant parts used for preparation of *Dawai Njangsohpet*. **B.** *Viscum articulatum*. **C.** *Viscum articulatum* Burm.f. together with root of *Smilax ferox* Kunth. are boiled with water. **D.** The cooled solution is poured in clean aluminum pots. **E.** Picture showing measuring utensils and other items for use. **F.** A local healer, Mrs. Esther Syiem feeling the stomach of an infant.

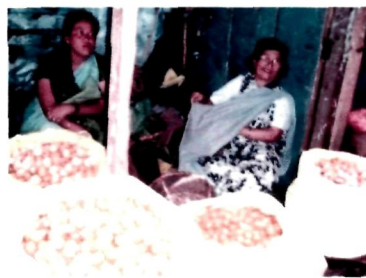
PLATE 15



A



B



C



D



E



F



G



H

PL. 15 : Marketable edibles documented from study area. A, *P. Aporusa dioica* fruits. C. Sale of *Areca catechu* nuts in Pynursla market. D. A woman selling *Baccaurea sapida* fruits in Iewduh. E. Sale of *Calamus erectus* fruits in Pynursla market. F. *Calocasia esculenta* inflorescence. G. *Citrus medica* H. A woman selling *Citrus reticulata* and *Psidium guajava* in Nongstoin market.

PLATE 16



A



B



C



D



E



F



G



H



I

PL. 16 : Marketable edibles documented from study area. **A.** Edible leaves and inflorescence of lalara. **B, C.** *Cyphomandra batacea* grown in home gardens. **D.** Tubers of *Flemingia vestita* **E.** *Morus australis* fruits. **F, G.** Sale of *Musa* fruits in Laitlyngkot market. **H, I.** Sale of *Musa* inflorescence and other local fruits on the way to Nongpoh (Ri Bhoi District).

PLATE 17



A



B



C



D



E



F



G



H



I

PL. 17 : Marketable edibles documented from study area. A, C. Sale of *Myrica esculenta* fruits in Mawkyrwat market. B, D. Sale of *Myrica nagi* fruits in Iewduh. E. Fruits of *Myrica* with scale. F. Women selling *Piper betle* leaves in Iewduh. G, H. Fruits of *Prunus nepalensis* in Iewduh. I. *Solanum incanum* fruits.

PLATE 18



A



B



C

PL.18: Marketable edibles documented from study area. **A.** *Solanum kurzii* grown in home gardens. **B.** *Viburnum foetidum* fruits sold in Iewduh. **C.** A busy market seen in one of the villages of the study area.

PLATE 19



A



B



C



D



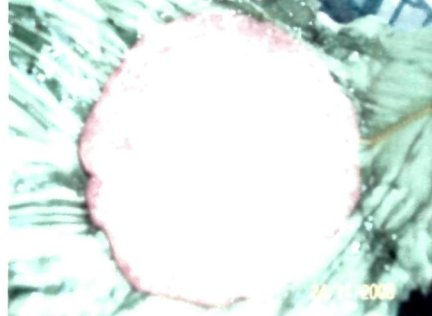
E



F



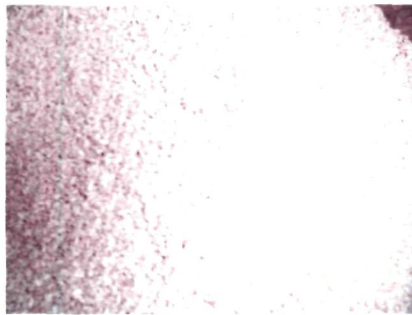
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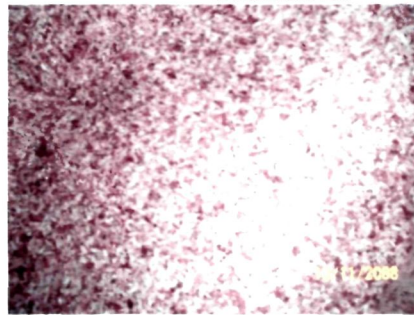
H

PL. 19: Food items prepared from rice in Meghalaya. **A.** Ja-shawlia, **B.** Putharo, **C.** Pumaloi, **D.** Pusla, **E.** Pukhleln, **F.** Pudoh, **G.** Punei, **H.** Pupnah.

PLATE 20



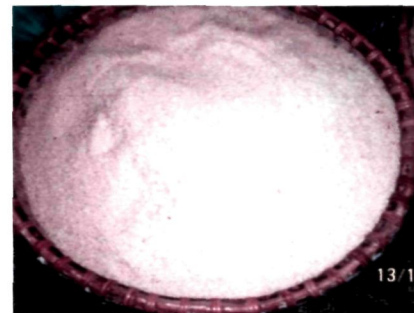
A



B



C



D



E



F



G



H

PL. 20: Sale of local rice and rice products. **A-D.** Varieties of Khaw Khasi, **E. & F.** Women selling rice in Jewduh. **G. & H.** Women selling rice products in local market.

PLATE 21



A



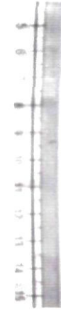
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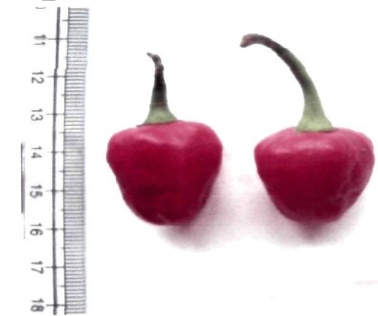
E



G



B



D



F



H

PL. 21: Chillies collected from study area. **A.** A lady selling chillies at lewduh. **B.** *Capsicum frutescence* L. **C.** *Capsicum chinense* Jacq. **D-G.** Different varieties of *Capsicum*. **H.** *Capsicum minimum* Roxb.

PLATE 22



A



B



C



D



E



F



G



H

PL.22: Non marketable edibles documented from study area. A. Inflorescence of *Curcuma zedoaria* B. Fruits of *Ficus racemosa* C. *Gonatanthus pumilus*. D. *Gynura nepalensis* E, F. Raw and ripe fruits of *Holboellia latifolia*. G. Fruits of *Pyrus pashia* H. *Solanum* sp. grown in home gardens.

PLATE 23



A



B



C



D

PL.23: Non marketable edibles documented from study area. **A.** Unripe fruits of *Solena heterophylla*. **B.** *Syzygium cumini* fruits. **C.** Fruits of *Toddalia asiatica*. **D.** Women folks collecting wild leafy vegetables.

PLATE 24



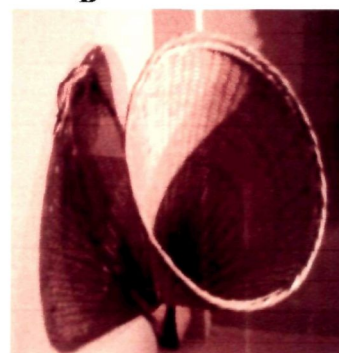
A



B



C



D



E



F

PL. 24: Pictures related to naming ceremony. **A.&B.** A priest performing the naming ceremony. **C.** Rice flour (pujer/puthoh/purew). **D.** Ka khoh & U star. **E.** Winnowing tray. **F.** Ka tiehjer & namjer.



A



B



C



D



E



F



G



H



I



J

PL.25: Wooden Musical Instruments of the Khasis. A. Ksing Shynrang. B. Ksing Kynthei. C. Bom D. Nakra E. Duitara F. Maryngod G. Besli H. Tangmuri I. Tanglod J. Singphong .

PLATE 26



PL.26: Wooden Musical Instruments of the Khasis. **A.** Kdor **B.** Mr. Rojet Buhphang, a musician, music instructor and instrument maker at Wahkhen village. **C.** A music student trying out his hands on the Ksing Shynrang. **D.** Mr. Phlansing Khyriem, a musician and instrument maker. **E.** Mr. Dhonsing L. Nongbri, a Local medicine man, a musician and Duitara maker. **F.** Local musicians playing the instruments during the Shad Suk Mynsiem Festival. **G, H** Virgin ladies and men dance to the beating of drums in the Shad Suk Mynsiem Festival.

Curriculum vitae

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- 1) Hynniewta, S. R. & Kumar, Y. 2008. Herbal Remedies among the Khasi Traditional healers and village folks in Meghalaya. *Indian Journal of Traditional Knowledge*. 7(4):581-586
- 2) Hynniewta, S. R. & Kumar, Y. 2008. Ethnobotanical note on the use of *Stereocaulon macrocephalum* Mill. Arg., in Meghalaya. *Bulletin of British Lichen Society Winter Issue* 12-13.
- 3) Hynniewta, S. R. & Kumar, Y. 2008. Traditional plant wraps for plastic bags: a lesson from North East, India. *Journal of Non Timber Forest Products* 15(3):211-217.
- 4) Hynniewta, S. R. & Kumar, Y. The lesser-known medicine 'Ka Dawai N'iangsohpet' of the Khasis in Meghalaya, North-east India. *Indian Journal of Traditional Knowledge*. (in press)

Herbal remedies among the *Khasi* traditional healers and village folks in Meghalaya

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The paper provides first hand information on the herbal remedies practiced by the rural folks of Meghalaya. During the study, out of several known herbal plants 54 plant species belonging to 53 genera and 38 families were found to be used by the local medicine men and village folks to cure various ailments. The report incorporates the mode of application and dosage of these herbal drugs, which is obtained with great difficulty because in many cases these medicine men are reluctant to share their knowledge.

Keywords: Ethnobotany, Ethnomedicine, Medicinal plants, Traditional healers, Meghalaya

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The term Ethnobotany is defined as the study of human evaluation and manipulation of plant materials, substances and phenomenon including relevant concepts in primitive and unlettered societies¹. The term ethnobotany implies an explanation on local people's perspective on culture and scientific knowledge². It can also be defined as all studies, which describe local people's interaction with the surrounding natural vegetation³. The tribal people and ethnic races throughout the world have developed their own culture, customs, cults, religious rites, taboos, legends and myths, folk tales and songs, foods, medicinal practices, etc. Numerous wild and cultivated plants play a very important and vital role among these cultures. This interrelationship has evolved over generation of experience and practices. The medicinal plants in particular have received the attention of scientists from chemical, pharmacological and clinical angles in India and abroad. Studies on folk medicines through ethnobotanical surveys are also gaining importance. A vast knowledge on medicinal plants exists as oral among the folklore and traditional medicine men of India, where a large number of potent medicinal herbs are found growing wild.

Meghalaya, which lies between 25°05' N and 26°10' N Latitudes and 89°47' E and 92°47' E Longi-

tudes has immense scope of ethnobotanical studies due to the natural forest coverage (Fig 1). Due to poor transportation and medical facilities in the rural areas, the rural folks to a great extent still hold onto their traditional faith in local medicine men and wild herbal plants. Interestingly, it was also noted that in some cases, prayers to the almighty or chanting of mantras sometimes accompany administering of the herbal medications. Therefore, it is interesting to record the traditional wisdom about plant wealth of their surroundings though there is a steady decline in human expertise capable of recognizing various medicinal plants. A paper was brought forward based on the folklore medicobotany of the *Khasi* and *Jaintia* tribes in Meghalaya⁴. A list of 31 medicinal plants used by tribals of Meghalaya was also given⁵. Work on the Ethnobotany of some weeds of *Khasi* and *Garo* hills of Meghalaya brought forth a paper, which deals with the ethnobotany of 65 taxa belonging to 26 families of angiosperms⁶. A record of 74 plant species used by the *Khasi* and *Jaintia* tribes have been published⁷. Work on the ethnobotany of *Khasi* and *Chakma* tribes of Northeast India showed the importance and uses 37 plant species belonging to 34 genera and 15 families⁸.

Methodology

An ethnobotanical survey of the East *Khasi* hills, West *Khasi* hills and Ri Bhoi districts of Meghalaya

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was conducted during January 2005 to April 2006. It was seen that knowledge of herbal remedies for treatment of various diseases rests with the traditional healers, which belong to a family of indigenous practitioners and skills have been passed on from one generation to the other only by word of mouth. Each village has one or two traditional healers or *Nong ai dawai kynbat* as they are called locally. Each of them practices at home or has a place in the weekly market of the villages, where people come to consult him. Information on the traditional medicinal uses of plants was collected through direct field interviews with them. Most importantly, the patients who have been cured by these medicine men were also interviewed. Interviews with a number of elderly people, who have a great deal of experience in indigenous herbal treatment of diseases were also conducted. Contact was established with village headman, community leaders, and priests from whom guidance was sought. Field visits and collection on all seasons was done with the help of the informants. The collected specimens were identified and final identification was done at the Herbarium of Botany Department, North Eastern Hill University (NEHU), Shillong.

Enumeration

The medicinal plants recorded during the work are listed below in alphabetical order by botanical names, family name, local/vernacular name (LN), and use(s).

Allium sativum L., (Liliaceae), LN: *Rynsun*

Uses: Bulb is fried in mustard oil; oil is used for massaging newborns and is taken orally for cough. Bulb is also taken with hot milk to relieve cough. Raw bulb is chewed for mouth sores.

Allium tuberosum Roxb., (Liliaceae), LN: *Jyllang*

Uses: Leaf decoction is given in urinary troubles and as diuretic.

Acorus calamus L., (Araceae), LN: *Bet, Ryniaw*

Uses: Leaf decoction is taken daily in case of paralysis. Decoction of underground plant part is fomented on the body of a paralytic patient. Roots and leaves are used for the treatment of epilepsy, stomach problems in new born, and ailments due to evil eye.

Ageratum conyzoides L., (Asteraceae), LN: *Kynbat myngai*

Uses: Leaf paste is applied on cuts and wounds.

Anotis wightiana Wall., (Rubiaceae), LN: *Bat lynkha smaiwtung synlei*

Uses: Paste of whole plant of *Anotis wightiana* Wall., *Hypericum laxum* (Bl.) Koidzumi, & *Leucas*

ciliata Benth., and leaves of *Paederia foetida* L. is used as an antidote for snakebite.

Areca catechu L., (Arecaceae), LN: *Kwai*

Uses: Nut chewed with *Piper betle* L. and lime is applied on cuts.

Begonia roxburghii A. DC., (Begoniaceae), LN: *Jajew jylwang*

Uses: Leaf decoction is used for bathing a person with measles for quick relief. Tuber paste is taken in diarrhoea and dysentery. The tubers with fruits of *Solenia heterophylla* Lour. are taken to relieve fever⁴. Rootstock is taken in bile dysentery⁵.

Brunella vulgaris L., (Lamiaceae), LN: *Jahynwet*

Uses: Tender leaf paste is applied on cuts and wounds for quick healing.

Centella asiatica (L.) Urb. (Apiaceae), LN: *Khliang syiar, lbong syia*.

Uses: Leaves are taken as raw to cure blood deficiency and helps in purification of blood. Whole plant is also taken for blood dysentery.

Cheilanthes albomarginata Cl., (Cheilanthaceae), LN: *Tyrkhang lieh*

Uses: Ground frond is applied over boils.

Citrus medica L., (Rutaceae), LN: *Sohmad*

Uses: Leaf decoction is used for bathing newborns and infants to prevent them from cold.

Clerodendron colebrookianum Walp., (Verbenaceae), LN: *Jarem*

Uses: Leaf decoction is taken against high blood pressure, malaria and liver troubles. Leaves are first warmed over fire and then leaf paste is applied over the body in case of rheumatism⁴.

Coix lacryma-jobi L., (Poaceae), LN: *Sohriew*

Uses: Leaf juice is taken in diarrhoea, dysentery, fever, small pox and as tonic.

Crassocephalum crepidioides (Benth.) Moore, (Asteraceae), LN: *Jathymmai*

Leaf paste is applied on cuts and wounds.

Dendrobium chrysanthum Lindl., (Orchidaceae), LN: *Tiew lyngskaw*

Uses: Stem paste mixed with little water is applied externally on injuries and after setting a fractured bone.

Dischidia nummularia Br., (Asclepiadaceae), LN: *Kynbat kudam*

Uses: Leaf paste is applied on wounds, injuries and bone fractures.

Drymaria cordata (L.) Willd. ex Roem. & Schult., (Caryophyllaceae), LN: *Kynbat thalap*

Uses: Whole plant paste is applied against leprosy. Leaf paste is applied in case of snakebite⁵.

Eriosema himalaicum Ohashi., (Fabaceae), LN: *Sohpen*

Uses: Tubers are taken orally against dysentery. Tuber paste is taken with honey to prevent bad breath coming from the mouth.

Eryngium foetidum L., (Apiaceae), LN: *Dhonia Bhoi*, *Dhonia khlaw*, *Kynbat ksuid*

Uses: Victims of fits and epilepsy are made to smell the leaf paste.

Erythrina arborescens Roxb., (Fabaceae), LN: *Diengsong*.

Uses: Stem pieces (about 15 cm) burnt at the tip and are smoked like a cigar. The smoke relieves toothache and prevents dental caries.

Flemingia procumbens Roxb., (Fabaceae), LN: *Sohphlang*

Uses: Tuber skin is taken raw for deworming.

Gaultheria fragrantissima Wall., (Ericaceae), LN: *Lathynrait*

Uses: Leaf juice of *Gaultheria fragrantissima* Wall., *Clerodendron colebrookianum* Walp. and *Eucalyptus maculata* Hook. is massaged over the body of persons suffering from rheumatism and paralysis. In case of migraines and pneumonia the juice is applied over the forehead.

Geranium nepalense Sweet, (Geraniaceae), LN: *Batmieng*

Uses: Leaves are chewed to relieve from toothache and bleeding gums.

Hedyotis uncinella Hook & Arn., (Rubiaceae), LN: *Bat iong*

Uses: Leaf paste is applied for insects' stings. It is also applied for skin diseases⁴.

Houttuynia cordata Thunb., (Saururaceae), LN: *Jamyrdoh*

Uses: Leaf juice is taken for cholera, dysentery, curing of blood deficiency and purification of blood.

Hypericum laxum (Bl.) Koidzumi, (Hypericaceae), LN: *Bat rit sla*, *Bat saw rit*

Uses: Extract of whole plant of *Anotis wightiana* Wall., *Hypericum laxum* (Bl.) Koidzumi & *Leucas ciliata* Benth., and *Paederia foetida* L. leaves is used as an antidote for snakebite.

Kaempferia galanga L., (Zingiberaceae), LN: *Sying khmoh*, *Sying shmoh*

Uses: Rhizome is taken orally against poisoning, when there is blood vomiting. In infants, the rhizome is applied for mouth sores and tongue blisters.

Lactuca laevigata (Bl.) DC., (Asteraceae), LN: *Khmut sim*, *Jhur kthang*

Uses: Leaves are taken against high blood pressure, diabetes and skin infections on the face.

Leucas ciliata Benth., (Lamiaceae), LN: *Bat nian-glynur*

Uses: Extract of whole plant of *Anotis wightiana* Wall., *Hypericum laxum* (Bl.) Koidzumi & *Leucas ciliata* Benth., and *Paederia foetida* L. leaves is used as an antidote for snakebite.

Leucosceptum canum Smith., (Lamiaceae), LN: *Soh Kjit*

Uses: Root decoction and root juice is taken in malaria.

Myrica nagi (non Thunb.) Hook., (Myricaceae), LN: *Sohlia*

Uses: Stem bark is taken in powdered form against dysentery.

Oxalis corniculata L., (Oxalidaceae), LN: *Sohkhia khnai*

Uses: Whole plant ground with *Drymaria cordata* (L.) Willd. ex Roem. & Schult., mixed with water and is taken against fever with vomiting.

Paederia foetida L., (Rubiaceae), LN: *Jyrmi sma itwtung*

Uses: Extract of whole plant of *Anotis wightiana* Wall., *Hypericum laxum* (Bl.) Koidzumi, & *Leucas ciliata* Benth., and *Paederia foetida* L. leaves is used as an antidote for snakebite.

Passiflora edulis Sims., (Passifloraceae), LN: *Sohbrap*

Uses: Juice of tender plant leaves ground with *Psidium guajava* L. leaves is taken in blood dysentery.

Phrynium pubinerve Bl., (Marantaceae), LN: *Sla met*

Uses: Plant rhizome along with mature leaves of *Zanthoxylum acanthopodium* DC., *Pteridium aquilinum* rhizome, *Sarcandra glabra* (Thunb.) Nakai. leaves and *Polygonum alatum* Spreng. leaves are mixed together and ground. The fine mixture is then wrapped into many small packets with *Phrynium pubinervi* Bl., leaf and the packets are heated in the fire covered with ash so that they do not get burnt. After half an hour, all the packets are taken out while it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented on the body of persons suffering from leprosy and also in paralytic patients. This hot mixture is effective in treating various kinds of skin diseases

as well (Fig. 2). In case of boils, the rhizome paste is applied locally.

Pinus kesiya Royle ex Gordon, (Pinaceae), LN: *Kseh khasi*

Uses: Young shoots are taken early in the morning to get relieve from cough in children.

Potentilla fulgens Wall., (Rosaceae), LN: *Lynniang*

Uses: Roots are edible and effective against high blood pressure.

Polygonum alatum Spreng., (Polygonaceae), LN: *Jakyrphuh*

Uses: Plant rhizome along with mature leaves of *Zanthoxylum acanthopodium* DC., *Pteridium aquilinum* rhizome, *Sarcandra glabra* (Thunb.) Nakai. leaves and *Polygonum alatum* Spreng. leaves are mixed together and ground. The fine mixture is then wrapped into many small packets with *Phrynium pubinervi* Bl. leaf and the packets are heated in the fire and covered with ash so that they do not get burnt. After half an hour, all the packets are taken out while

it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented on the body of persons suffering from leprosy and also in paralytic patients. This hot mixture is effective in treating various kinds of skin diseases as well. In case of boils, the rhizome paste is applied locally.

Polygonatum oppositifolium Royle., (Liliaceae), LN: *Sying maw*

Uses: Mixture of plant rhizome along with *Zanthoxylum acanthopodium* DC. mature leaves, *Pteridium aquilinum* rhizome, *Sarcandra glabra* (Thunb.) Nakai. leaves and *Polygonum alatum* Spreng. leaves is wrapped into many small packets with *Phrynium pubinervi* Bl. leaf and the packets are heated in the fire and covered with ash so that they do not get burnt. After half an hour all the packets are taken out while it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented on the body of

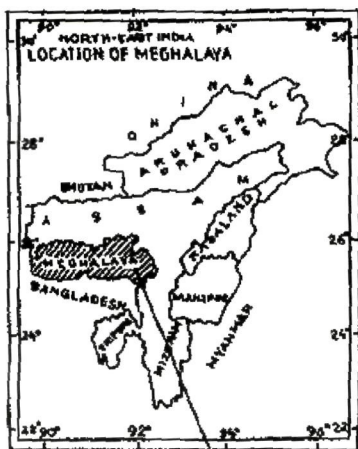


Fig.2 Heated mixture of herbal plants

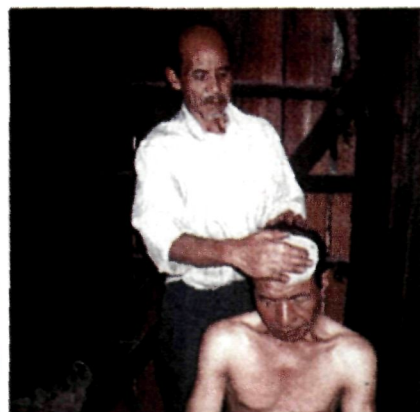


Fig.3 Mixture applied for skin diseases

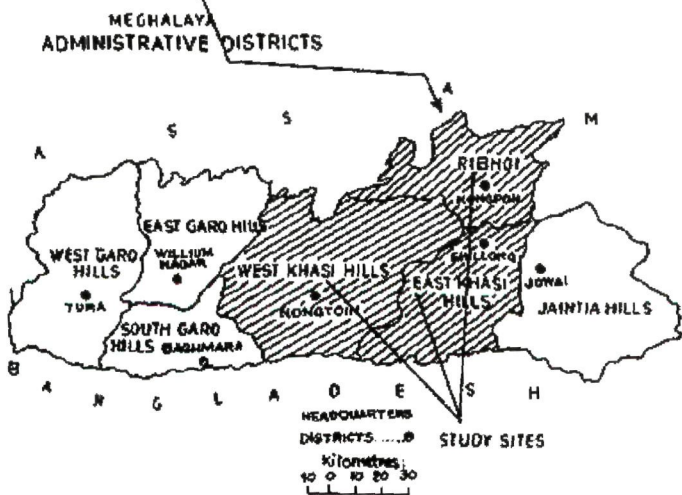


Fig.1 Location map of the study area



Fig. 4 Mixture applied for treating leprosy

persons suffering from leprosy and also in paralytic patients. This hot mixture is effective in treating various kinds of skin diseases as well. In case of boils, the rhizome paste is applied locally.

Pteridium aquilinum (L.) Kuhn ex Decken (Polypodiaceae), LN: *Tyrkhang shatri*

Uses: Plant rhizome along with mature leaves of *Zanthoxylum acanthopodium* DC., *Pteridium aquilinum* rhizome, *Sarcandra glabra* (Thunb.) Nakai. leaves and *Polygonum alatum* Spreng. leaves of are mixed together and ground. The fine mixture is then wrapped into many small packets with *Phrynium pubinervi* Bl., leaf and the packets are heated in the fire and covered with ash so that they do not get burnt. After half an hour, all the packets are taken out while it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented on the body of persons suffering from leprosy and also in paralytic patients. This hot mixture is effective in treating various kinds of skin diseases as well. In case of boils, the rhizome paste is applied locally. For removal of gall stones decoction of *Smilax ferox* Kunth roots along with *Pteridium aquilinum* (L.) Kuhn ex Decken. rhizome is taken daily three times a day.

Rhus semialata Murr., (Anacardiaceae), LN: *Sohma, Sohmluh*

Uses: Dried fruits are taken against cholera and dysentery.

Rotala rotundifolia (Roxb.) Koehne., (Lythraceae), LN: *Bat dohkoid*

Uses: Leaf paste is applied for boils.

Rubus micropetalus Gardner, (Rosaceae), LN: *Sohnepbah*

Uses: Edible fruits are taken against cough. Crushed stem bark is taken for mouth ulcers.

Sarcandra glabra (Thunb.) Nakai., (Chloranthaceae), LN: *Tiew Krismas*

Uses: Ground leaves mixed with ginger are applied on wounds where there is pus. Root extract is taken orally for irregular menstrual bleeding.

Smilax ferox Kunth, (Smilacaceae), LN: *Shiah krot*

Uses: For removal of gall stones, decoction of *Smilax ferox* Kunth roots along with *Pteridium aquilinum* (L.) Kuhn ex Decken. rhizome is taken daily three times a day.

Solanum torvum Sw., (Solanaceae), LN: *Soh pdok*

Uses: A plate filled with water is taken and then a red hot iron *dao* (big iron knife used for cutting wood), which was heated over the fire till it becomes

red is placed on top of this plate. Dried seeds of *Solanum torvum* Sw., are put on one corner of the heated *dao* and the seeds are covered with a hollow tube. A small amount of mustard oil is poured on the seeds. The seeds get burnt in mustard oil due to the heat from the hot *dao* and fumes appear and come out through the tube, the fumes are allowed to circulate in the buccal cavity to prevent dental caries or to get relieve from toothaches. This should be done early in the morning before brushing the teeth and before taking any food. Fruits are reported for similar use⁴.

Spilanthes paniculata DC., (Asteraceae), LN: *Jasat*

Uses: Brushing teeth with inflorescence relieves toothache.

Swertia chirata Ham., (Gentianaceae), LN: *Charita*

Uses: Leaves and root are taken for treating malaria.

Tabernaemontana divaricata (L.) R. Br., (Apocynaceae), LN: *Syntiew khlaw*

Uses: Leaf paste with lime is applied for insect bites and skin diseases. Whole plant has anthelmintic properties and leaf paste is applied to relieve headache and fever⁴.

Thysanolaena maxima Herb. O. Kuntze., (Poaceae), LN: *Synsar*

Uses: Inflorescence paste mixed with a pinch of slaked lime is applied locally for treatment of boils and cancer. Young stem juice is applied on the eye when eyes become red and dirty⁴.

Valeriana jatamansii Jones, (Valerianaceae), LN: *Jatung*

Uses: Leaf and root paste is applied after setting a fractured bone. Whole plant paste is applied against diseases of the nails where the nails fall off.

Viola distans Wall., (Violaceae), LN: *Jamaiang*

Uses: Leaf paste is applied on boils.

Viscum articulatum Burm. (Loranthaceae), LN: *Mangkaring*

Uses: Whole plant along with *Smilax ferox* Kunth, root is boiled in water until the colour of the solution becomes like red tea, then small pieces of ginger is added. This medicine is known locally as *Dawai Niangsohpet*. When cooled, it is given to new born and is also applied over the stomach to prevent stomach troubles. This juice is also given to lactating mothers and expectant mothers to prevent stomach troubles and are advised to avoid egg and pork.

Zanthoxylum acanthopodium DC. (Rutaceae), LN: *Jaiur khlaw*

Uses Its rhizome along with mature leaves of *Zanthoxylum acanthopodium* DC mature leaves, *Pteridium aquilinum* rhizome, *Sarcandra glabra* (Thunb) Nakai, leaves (more quantity than the others) and *Polygonum alatum* Spreng, leaves of are mixed together and ground. The fine mixture is then wrapped into many small packets with *Phrynium pubinervi* Bl, leaf and the packets are heated in the fire and covered with ash so that they do not get burnt. After half an hour all the packets are taken out while it is hot and the contents of each packet is then emptied into a piece of white cloth and tied at one end. It is then fomented on the body of persons suffering from leprosy and also paralytic patients. This hot mixture is effective in treating various kinds of skin diseases as well (Fig 2). In case of boils, the rhizome paste is applied locally.

Discussion

Though the rural folks are often hesitant in sharing their knowledge with others, yet friendship has been established with them through frequent visits to the study area. The present work has brought to light the indigenous medicinal recipes of 54 plant species belonging to 53 genera and 38 families, which could cure a number of ailments without any side effects as proclaimed by these village folks and the patients who have recovered. During the survey some new herbal medicines that are not mentioned in important ethnomedicinal literature have been recorded. It was also observed that for majority of cases a single plant is administered singly but for a good number of diseases also the recipe includes a combination of many plants and plant parts. At the same time it was seen that a single herbal recipe is effective for treatment of a number of ailments, which shows that a single plant is used for more than one ailment.

The medicinal properties of some plants recorded during the present survey were also reported by earlier workers based by tribe *Khasis* and *Jaintias* of Meghalaya^{4,5}. Among these were *Begonia roxburghii*

A DC, *Clerodendron colebrookianum* Walp, *Drymaria cordata* (L) Willd ex Roem & Schult, *Hedyotis uncinella* Hook & Arn, *Sarcandra glabra* Thunb, *Solanum torvum* Sw, *Tabernaemontana divaricata* (L) R Br and *Thysanolaena maxima* Herb O Kuntze. However, some differences are there as far as ailments for which they were administered, method of preparation, plants parts used are concerned. Many new uses of plants and recipes have been recorded and listed for the first time.

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TRADITIONAL PLANT WRAPS FOR PLASTIC BAGS: A LESSON FROM MEGHALAYA, INDIA

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Abstract The present paper aims to focus on the traditional usage of plants that may prove worthy to the modern world. One least thought about yet important issue is the menace of plastic bags and how to find out an effective alternative to do away with plastic bags. The answer to this is using plants for packaging and wrapping. There is an age old practice of the indigenous tribes of Meghalaya, India who use bioresource viz. plant parts like leaves and petiole-sheaths which are biodegradable as one of the substitutes for plastic bags (Low Density and High Density Polyethylene). Use of the natural plant wraps can reduce soil and water pollution thus reducing the threat to the existence of terrestrial and aquatic ecosystems including all species which thrive upon it.

INTRODUCTION

Meghalaya, literally meaning 'the abode of clouds', is one of the seven states of the North Eastern region of India which lies between 25°05' and 26°10' N Latitudes and 89°47' and 92°47' E Longitudes. Meghalaya with a total area of 22,429 km² is the home of three major tribes viz. the Khasis, Jaintias and Garos although other tribes like the Bodo, Hajong, Rabha, Koch, Miri etc. are also present in some pockets.

The indigenous people of Meghalaya have deep respect for nature and greatly value the plants of importance to them. They use many wild plant species for medicinal purposes, as supplementary food, wild fruits, fibres, brooms, fuel, timber, packaging, handicrafts, basketry, magical religious beliefs, socio-cultural functions, building materials, dyes and others. To name a few uncommon ones like *Curcuma aeruginosa* Roxb., *Kaempferia galanga* L., *Lactuca laevigata* (Bl.) DC., *Nepenthes khasiana* Hook. f. (carnivorous plant endemic to Meghalaya) etc. used as herbal medicines. Wild fruits like *Myrica esculenta* Buch.-Ham., *Eleagnus latifolia* L., *Thysanolaena maxima* Herb. O. Kuntze, used as broom, *Curcuma longa* L. used as dye etc. It is seen that by using plants or their products we can do away with the side effects of synthetic medicines, get additional required nutrients from low cost wild fruits, vegetables and find a solution to

environmental problems like water, soil, land pollution and depletion of natural resources.

Studies on plants of ethnobiological value are important for evaluating human plant relationships and for understanding the regional human ecology relations to their environment. In their work on *Carludovica palmata* in Amazonian Ecuador, Bennett and Alarson (1992) found that hats made from this plant are world famous. Bundles of *C. palmata* leaves are used for thatching. Informants claim that *C. palmata* roots last from 2 to 20 years. Indigenous guilds could sell baskets and craft items such as fish traps from this plant, thus earning a good wage and preserving some of their customs. In the present article we are highlighting the traditional packaging materials used in Meghalaya.

MATERIALS AND METHODS

An ethnobotanical study in the East, West Khasi Hills and Ri Bhoi Districts of Meghalaya was conducted during January 2007 to December 2007. Interviews have been conducted which are open ended and semi structured for used in qualitative data collection and structured used for quantitative analyses.

Open ended interviews are essentially casual conversations. Semi-structured interviews pose questions requiring short answers only. These are

either dichotomous requiring a yes/no response, multiple choice where a limited range of answers are possible or of a fill in the blank nature, each type possessing its own particular attributes and limitations. Structured interviews and questionnaires are a series of predetermined questions. Interviews have been taken from village elders; women folks; fruits, vegetable, local snacks vendors; leaf suppliers and retail sellers; plastic suppliers and retail sellers; educated youths; local village folks.

Tribal weekly markets were visited to observe and record the types of wrapping material used for different commodities and to compare the different market price of the packaging materials. A market survey was done in Shillong and its nearby areas to work out the cost, supply and demand of the leaves in comparison with plastics.

RESULTS

Plants and their uses

Macaranga denticulata (Bl.) Muell.-Arg., or 'Dieng Lakhar' (in Khasi dialect), 'Bol-ajak' (in Garo dialect), belonging to the family Euphorbiaceae is a tree species 10-20 m in height, leaves peltate, deltoid-ovate, rounded and peltate at base, 8-30 x 5-25 cm, glaucous beneath, minute flowers yellow to greenish-yellow, capsules blackish, flowering and fruiting Feb.-Aug. It is distributed in Indo-Malaya; North-East India, very common in Meghalaya in secondary forests and jhum fallows. In Meghalaya it is seen in Jarain, Dawki, Umling- Lailad, Raliang, Laskein, Garo hills. The leaves or 'Lakhar' (in Khasi dialect) collected from the wild are used by the tribes for wrapping a precooked local chutney 'Ka Tungrymbai Dawki', also for wrapping bananas which are then kept in cane baskets and transported to weekly markets for sale.

Erythrina arborescens Roxb. belongs to the family Fabaceae, known as 'Ka Dieng-song' (in Khasi dialect), 'Ka Dieng-ja-ra-song' (in Jaintia dialect). The species is mostly distributed in Khasi and Jaintia Hills (frequently found on the roadsides). A small tree with few prickles on the branches, leaves pinnately 3-foliolate, leaflets ovate or rhomboid,

flowers coral red in colour borne in dense racemes, pod is curved and narrows gradually to a distinct beak and stalk. The flowering and fruiting season is from August to January. The leaflets or 'Ka sla Dieng-song' (in Khasi dialect) are employed by the Khasis as wrapping material for local foodstuffs. The leaves are collected from the wild and not available in the market.

Musa paradisiaca L., of family Musaceae known as 'Ka Kait' (in Khasi dialect), is a tropical tree-like herb, whose slender or conical false trunk reaches a height of 10 to 30 feet. The trunk is formed by the overlapping leaf sheaths of the spirally arranged leaves, which form a crown at the top. The large leaves may be up to 3 metres long and ½ metre wide and attached to the fleshy trunk by short petioles. From the center of the crown spring the flowers. The large, leathery bracts are red with yellow unisexual flowers in a single large cluster. Seedless fruits develop without pollination. The leaves 'Ka Lakait' / 'Ka Lakhar' (in Khasi dialect) collected from the wild is used by the Khasis, Jaintias and Garos as leaf wraps for various local food products (Fig. 6), wild vegetables and betel leaves.

Areca catechu L., known as Betel nut tree and 'U Dieng Kwai' (in Khasi dialect) is a single-stemmed palm belonging to the family Arecaceae which grows in much of the tropical, Pacific, Asia and parts of east Africa. It is a medium-sized tree growing to 20 m tall, with a trunk 20-30 cm in diameter surrounded by a crown of pinnate leaves that are 1.5-2 m long. The leaflets are numerous; the petioles expand into a broad, tough, sheath like outgrowth at the lower end. Known as 'Ka Dobwai' (in Khasi dialect) the Khasis use this tough petiole sheath for wrapping wild leafy vegetables (Fig.7) but mostly used for packing lunch or any cooked food by the villagers as well as town dwellers. The sheaths are local collections and therefore not available in the market.

The Marantaceae or arrowroot family or the prayer plant family of the order Zingiberales is a family of flowering plants known for its large starchy rhizomes. It is composed of about 31 genera and 550 species of rhizomatous perennial herbs that

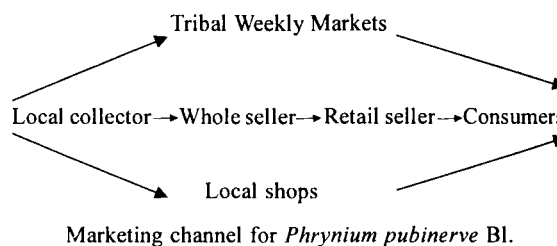
are native to moist or swampy tropical forests. Members of the Marantaceae vary from plants with slender, reed like stalks to leafy spreading herbs to dense bushes nearly 2 m (about 6.5 feet) high. The smooth white rhizomes (underground stems) of some species, such as *Maranta arundinacea*, furnish the starch known as arrowroot. Other members of the family are popular ornamentals, such as the prayer plant (*M. leuconeura kerchoveana*), the leaves of some species are used in basket weaving.

Phrynium pubinerve Bl. is one such species of Marantaceae used as packing and wrapping material. Its morphology shows characters like rootstock creeping, tuberous, perennial, leaves oblong to ovate-oblong, rounded or abruptly cuneate at the base, spikes on upper half of the petioles, bracts red, flowers purplish red, capsules ellipsoid, 2-3 seeded (Fig.1). This species is distributed in Assam (Darrang, Lakhimpur North Cachar and Mikir Hills), Mizoram (Mizo Hills), Meghalaya (Khasi and Jaintia Hills, Garo Hills), Manipur, Nagaland and Arunachal Pradesh (Kameng, Lohit, Tirap). It's flowering and fruiting period is from April to May (Rao and Verma, 1972). In Meghalaya it is found wild in all the districts and also cultivated in War Mawlat, Pynursla, Dawki, Ri Bhoi, Sonapur using vegetative methods of propagation.

Phrynium pubinerve Bl. is an important plant in the lives of the indigenous people of Meghalaya because since time immemorial they have been using its leaves as a wrapping or packaging material for all kinds of eatables or food items ranging from meat, fish, vegetables, local food products (Fig. 5), lunch, betel leaves, slaked lime etc. Known locally as 'Ka Lamet' or 'Ka Sla Songdoh' (in Khasi dialect), 'Ka Sla Lamet' (in Jaintia dialect) and as 'Reruh Patta' (in Garo dialect), the leaves keep the food products fresh for a longer time. Clean and properly washed fresh or semi dried leaves of all sizes viz. small, medium, large are employed (Fig.3). The leaves are available from the wild throughout the year, in all seasons, even sold in the market in the form of bundles containing definite numbers (Figs.2&4). These leaves which are biodegradable and

environment friendly can serve as a substitute for plastic bags thus paving way for a cleaner environment.

A market survey was done in Shillong and its nearby areas to work out the cost, supply and demand of the leaves in comparison with plastics given in Table-1. From the table above we can take an example that for packing 250gm weight of any foodstuff we need a 250 gm capacity plastic bag or aluminium foil container which cost about 93 paise and Rs. 3/- each respectively while in case of leaf packing we need a single big size leaf which cost about 33 paise each which is much lower than the price of plastic or aluminium foil container.



Demerits of plastic bags usage

1. Plastics contribute to the municipal waste and litter (Fig.8). The U.S. Environmental Protection Agency estimated in 2000 that plastic made up over 10 per cent of municipal solid waste that year.
2. Piled up plastic litter spoil water bodies, soil and beautiful landscapes.
3. Plastics interfere with the drainage system, blocking the flow of sewage from homes, industries etc. which in turn leads to accumulation of sewage which proves unhealthy. During the flooding of Mumbai during the 2005 monsoons, plastic bags were reported to have exacerbated the floods by choking drains and gutters (Gupta, 2006).
4. Plastic litter is not biodegradable, making the soil unfit for the growth of plants. The plastic bags do not allow water and air to seep into the soil, thereby reducing the fertility of the soil and depleting underground water. If cereals are

Table-1: Comparative prices of leaves (*Phrynium pubinerve*), plastic bags and aluminium foil containers in Shillong market

Bundle(s)	Price (Rs)	Numbers	Weight (kg)	Capacity	Sale/day of each shop
Whole sale price from the main suppliers					
50	120 to 200	10 (small size) / 12 (large size)			400-600 bundles
Retail price of leaves in the market					
1	5	25 (small size)			200-250 bundles
1	5	15 (big size)			
1	2	10 (small size)			
Retail price of plastic bags in the market					
	60-80	70-80 (250gm)	1	250gm, 500gm, 1kg, 2kg, 3kg, 5kgs, 10kgs	15-20 kgs
Whole sale price of aluminium foil containers in the market					
	180	100		250gms	400-500 numbers
	220	100		450gms	
	320	100		660gms	
Retail price of aluminium foil containers in the market					
	200	100		250gms	100-150 numbers
	250	100		450gms	
	350	100		660gms	

cultivated in this type of soil then the yield / hectare will reduce compared to normal fertile soils.

- Plastics destroy the lively water bodies like lakes, rivers, streams and affect marine ecosystems. Plastic bags, polystyrene foam, coffee cups are often found in the stomach of dead lions, dolphins, sea turtle and others (Leahy, 2004). The more you learn about the role of plastic pollution in the oceans and how our health is affected, the more alarming this issue becomes.
- Plastic does not only kill marine animals that eat it or get tangled in it and drown, but it also damages and degrades their habitat.
- Cattle like cows, goats, pigs may unknowingly consume the plastic bags while grazing or feeding which is harmful. News reports have mentioned cows choking on plastic bags in New Delhi, while trying to eat vegetable waste from the garbage (Gupta, 2006).
- Plastic disturbs the soil microbial activity.
- Plastic bags can also contaminate foodstuffs due to leaching of toxic dyes and transfer of pathogens. The manufacturing of plastics often creates large quantities of chemical pollutants. PVC (polyvinyl chloride), commonly used to package foods and liquids, contains numerous toxic chemicals called adipates and phthalates



Fig. 1: *Phrynium pubinerve* Bl. in bloom showing leaves and inflorescence.



Fig. 5: Putharo (local snack) wrapped in *Phrynium pubinerve* leaves.

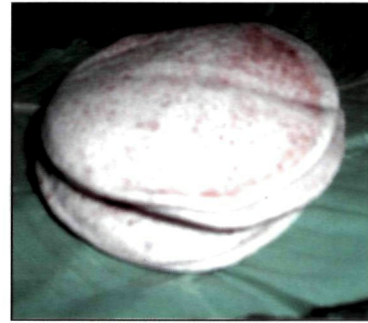


Fig. 2: Leaves arrive in big bundles from the suppliers.



Fig. 6: Jashawlia (local sticky rice) wrapped in banana leaves.



Fig. 3: Leaves of varied sizes small, medium, large.



Fig. 7: Wild leafy vegetable wrapped in 'Dobwai' *Areca catechu* L. petiole sheath.



Fig. 4: The counted leaves are tied into smaller bundles for sale in the market.



Fig. 8: Plastic litter on the roadside, a burden to the environment (L), close up of the litter (R).



(plasticizers), which are used to soften brittle PVC into a more flexible form. Traces of these chemicals can leach out of PVC when it comes into contact with food. The World Health Organization's International Agency for Research on Cancer (IARC) has recognized the chemical used to make PVC - vinyl chloride - as a known human carcinogen.

10. Burning of plastics can release toxic fumes.
11. Last, but not the least playing with plastic bags by children can lead to suffocation even death.

Merits of leaf packaging

1. A lot of money, time, and manpower wasted by the plastic industry for production of plastic bags. Nature gifted plant parts are manufactured by the plant and nature itself, least money, time, manpower needed.
2. Since microorganisms can degrade, the leaves do not contribute much to municipal waste and litter, unlike plastic bags which remain there forever, although there are few reports about the use of biodegradable and heat resistant, thermoplastic composed of modified corn starch and recycled plastics. The leaves can be thrown into compost pits which may later serve as organic manure for crops.
3. Food items do not remain fresh in a plastic wrap or container for longer time, while they stay fresh longer in leaf wraps.
4. The leaves or petiole sheath mentioned can be moulded by trained persons into readymade plates as they are not brittle and do not break easily because of their fibrous nature, compared to the ones which are in the market today.
5. Restaurants and food stalls can make use of the leaves for packaging of the various foodstuffs instead of the plastic or aluminium foil containers which are in use today. One good point in Shillong is the fact that many Chinese restaurants make use of the leaves of *Phrynium pubinerve* as packaging material.
6. If accidentally consumed by cattle or other animals the leaves are not harmful but instead may serve as fodder for them.

DISCUSSION

How should we make use of traditional knowledge?

Use of plastic bags has increased manifold in recent years with people especially in the capital town Shillong of Meghalaya preferring plastic bags for packing meat and fish although other food items mentioned earlier are still wrapped in the leaves. Years back in 2001, 2002 some NGOs and local bodies have put a ban on the use of low and high density plastic bags in Meghalaya but this has worked out only for a short period of a few months. Again recently in the month of August, 2007 the local traditional head 'U Syiem Ka Hima Myllem' has imposed a ban on the use of low density plastics bags especially for meat sellers of Shillong market. In the same month the Shillong Municipal Board has passed an order that use of plastic bags with thickness of less than 40 microns is prohibited as per provisions of the amended Meghalaya Prohibition of Manufacture, Sale, Use, and Throwing of Low Density Plastic Bags Act 2001 (The Shillong Times, 2007).

So it is time for each and every responsible citizen of Meghalaya in particular and the world as a whole to take a deeper thought and make use of the traditional knowledge which the forefathers have passed on to us, since it is the easiest and safest. This knowledge though local yet can be propagated globally through the media, various awareness programmes and active participation of the people and various local governing bodies. Last but not the least, it will help in economic upliftment of the rural folks and farmers of Meghalaya and other parts of the globe too where *Phrynium pubinerve* Bl. is found distributed. Increase in demand will give opportunities to the farmers for cultivation of the plant and harvesting of leaves on a large scale which will generate more employment and income at the same time. Moreover plastic bag dealers can now deal with the sale of *Phrynium pubinerve* leaves to earn their livelihood.

The study revealed that leaves are sold without any value addition that could have been otherwise elevated the earnings of primary collectors. The leaves can be stitched into plates using small sticks

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and then moulded in machine to give shape and rigidity to form bowls or plates for further economy generation

The uses of the other less known plant parts like leaves of *Erythrina arborescens* Roxb , *Musa paradisiaca* L , *Macaranga denticulata* (Bl) Muell - Arg , petiole sheath of *Areca catechu* L , should be made aware to the people so that they can seek an easy alternative for plastic bags and aluminium foil containers We can also think of some other probable plant parts like leaves of *Butea minor* Baker (Fabaceae) which may be used as wrapping material, even culms of many Bamboo species in North-East India can be made into disposable food containers or cups Efforts should be taken to document plants which are used or can be used as substitutes for plastic bags

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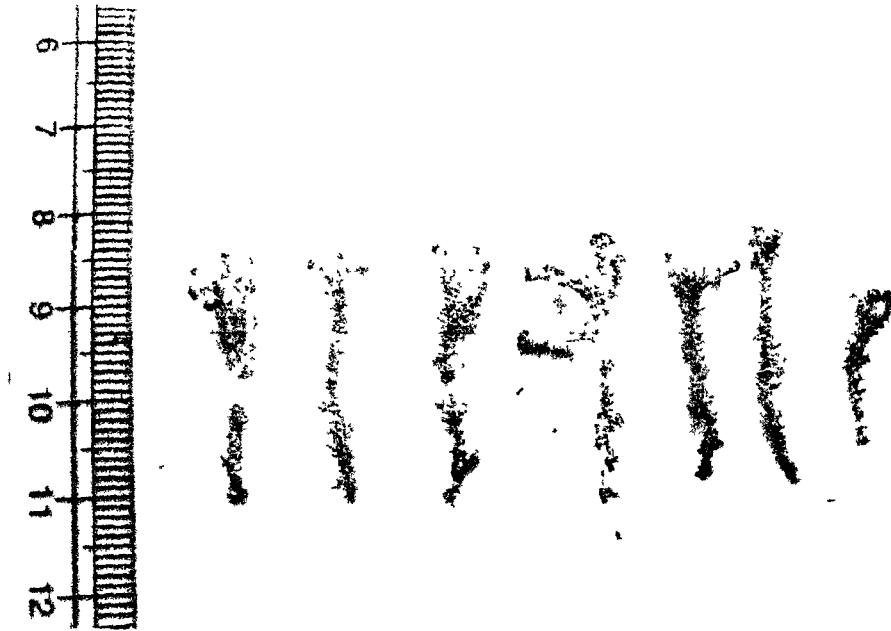
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Ethnobotanical use of *Stereocaulon macrocephalum* in Meghalaya

Lichens are the most successful symbiotic organisms in nature, dominating 8% or more of the earth's terrestrial area. India is a rich centre of lichen diversity. Out of 2080 species of lichens reported from India (Pinokiyo & Singh, 2004), 850 species are recorded from NE India (Bujarbarua *et al.*, 2000).



Stereocaulon macrocephalum collected from Umtyngar (alt 1800m), East Khasi Hills, Meghalaya, India (NEHU 172)

Many lichens have been reported for their use in traditional medicines the world over. In India, lichens have been used as traditional remedies for various ailments (Salkani & Upreti, 1992; Negi & Kareem, 1996; Lal & Upreti, 1995; Lal, 1998). In Meghalaya, no use of lichens in traditional medicines has been documented until now. Ethnobotanical studies conducted in the East Khasi Hills district have identified one species of lichen which is used in local traditional medicine, *Stereocaulon macrocephalum* Müll. Arg. Its vernacular name is "niut maw" and it has a known distribution on rock surfaces in the region including the montane Indian states of Sikkim and Uttaranchal, and also Nepal.

The species is used as follows: mature thalli are collected from the rock surfaces and properly cleaned to remove sand and dust particles. Then they

are dried under the sun. For treating burns on any part of the body, a small amount of the dry lichen material is heated over fire in a frying pan until it becomes hard and brownish. The contents are ground to fine powder and the powder is applied locally on burns with blisters or pus exudate. The lichen appears to have antiseptic properties, and is valued as a preparation to accelerate the healing process.

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