CHAPTER-III

MATERIALS AND METHODS
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Review of the literature

A retrospection of the healing power of plants and a return to natural remedies is an absolute need of our time. Scientist in many parts of the world has carried out extensive research and has proven to humanity the effective use of herbal medicine.

Major floristic works carried out in last two century in India include Roxburgh (1820-24), published *Flora Indica* and *Wealth of India: Raw Materials* by CSIR (revised 1985-2005). Meanwhile Hooker (1872-97) explored the plant wealth of India and published *Flora of British India*.


In India, the reference available to the curative properties of some herbs in the *Rigveda* (5000 B.C) seems to be the earliest records of use of plants as medicine. Amongst the ancient civilizations, India has been known to be a rich repository of medicinal plants. In *Rigveda* (5000 B.C) mentioned 99 medicinal plants, *Yajurveda* 82 and *Atharvaveda* (4500-2500 B.C.) 288 species. Later the *Charak-Samhita* (700 B.C) and *Sushrut Samhita* (200 B.C) have described properties and uses of 1100 and 1270 plants respectively. The period from 800-1000 B.C is considered as the golden era in the Indian system of medicine. Sharngadhara (14th century), who wrote *Sharngadhara Samhita*, a systematic Ayurvedic materia medica. Acharya Bhava Mishra (15th century), a native of Benaras wrote *Bhayprakash* that contains more than 600 drugs. *Saligram Nighantu* was written by Lala

In comparison to other parts of India, the northeastern region is still botanically unexplored. During the last two decades several publications have appeared on floristic there include Kanjlal et al (1934-1940) on Flora of Assam; Deb (1983) The Flora of Tripura state; Kar & Panigrahi (1964) on Rubiaceae from Assam and NEFA. Rao (1963) on botanical tour of Sikkim State, Eastern Himalayas.

There is no comprehensive work on the ethnobotany of the people of northeast India. During the last two decades several publications appeared on ethnobotany of northeastern India. Different aspects of ethnobotany of northeast were published by Laha (1998) on Wild vegetables of Lushai,Hmar,Tuikuk tribe of Mizoram; Islam (2000) on ethnobotany of bark of 143 genera of North-East India.; Arora (1981) on native food plants of the northeastern tribes; Borthakur (1981a) on certain plants in folk-lore and folk-life of Karbis (Mikirs) of Assam; Borthakur (1981b) on masticatories and dyestuff plant of the Karbis; Jain & Dam (1979) on ethnobotanical notes from northeastern India; Hajra & Baishya (1981) on ethnobotanical notes on the Miris (Mishing) of Assam plains; Jain & Borthakur (1980) on ethnobotany of the Mikirs of India; Jain & Shanpru (1977) on wild edible plants from bazar of Meghalaya; Rao & Shanpru (1981) on some plants in the life of Garos of Meghalaya; Rao & Neogi (1980) on ethnobotany of the Khasi and Garo tribes of Meghalaya; Nath & Saikia (2002) on local use of Aquilaria malaccensis Lamk. in Northeast India; Lalramnghinglova (2002) on ethnobotanical use of 78 edible plants from Mizoram; Tripathi & Goel (2001) on ethnobotanical diversity of Zingiberaceae in Northeastern India ; Hutton (1923) on some economic plants of the Naga Hills.


The interesting works carried out on district flora of Arunachal Pradesh include Deb & Dutta (1972-1975) contribution to the flora of Tirap Frontier Division; Kingdon – Ward (1953) on Lohit Valley; Pal (1990) on Flora of Lower Subansiri; Griffith (1837) explored Mishmi hills; Rao & Joseph (1965) on the flora of Siang Frontier division; Joseph (1975) recorded
Asraoa triandra (Arecaceae) - a new genus and species of palm from Lohit district.

Ethnobotanical works carried out from different district of Arunachal Pradesh include Pal (1984) on the ethnobotany of tribals of Subansiri; Das (2001) on 10 wild edible mushrooms of Adi of East Siang district; Pal (1992) on less known interesting tribal uses of plants in Lower Subansiri district;


The major inhabitants of Arunachal Pradesh are tribal population. Some attempts have been made to study the useful plants of some tribes of Arunachal Pradesh. Dam & Hajra (1996) on ethnobotany of the Monpas; Das (1996) on less known uses of plants among the Adis; Nath & Bordoloi (1993) on plant folk medicine among the Chakma, Singphow and Tangsa tribes; Rawat & Chowdhury (1998) on Ethno-Medico-Botany of Nishi & Apatani Tribes; Dutta (1985) on herbal medicine and its implication in family planning of the Singphou; Dutta (1987) on ethno-medicines of Singphou; Dutta &

Floristic explorations in the erstwhile Kameng district were carried out by Srinivasan (1959) on botanical tour to Bomdila; Sahni (1969) on flora of Kameng & Subansiri district; Deori & Hajra (1975) recorded Oberonia maxima Hook. f. - an interesting orchid from Kameng district; Rao & Hajra (1977) recorded Hedychium radiatum & H. robustum (Zingiberaceae)- two new species from Kameng district; Sahni & Naithani (1979) recorded Rhododendron tawangensis new orchid from Tawang district; Dam & Dam (1981) on Rhododendron dalhousiae Hooker var. rhabdatum Balf. f. & Cooper Cullen from Kameng district; Dam & Dam (1982) on Chrysoglossum erraticum Hook. f. - a rare orchid from Kameng district;

Sporadic work carried out on medicinal plants of West Kameng and Tawang district are Pandey (1998) on healing herbs of The Mons amongst the minor forest produce; Sarmah et al (2001) on ethnomedicinal uses of 116 plants from West Kameng and Tawang districts; Dam et al (1981) on ethnobotany of Monpas of Kameng district. Hajra (1977) recorded some important medicinal plants from Kameng district.

**Materials & methods**

**Methods of Study**

The present work is based on carefully planned intensive survey and field studies conducted during 2002-2005 in the areas inhabited by the Aka, Monpa, Nishi, Mji and Sherdukpen of erstwhile Kameng of Arunachal Pradesh. While planning the field works various techniques suggested by different investigators Jain 1967, 1981, 1987; Jain & Rao 1967; Jain et al 1984; Rao RR 1984; Tribhuwan 1998; Rozario et al 1999 were taken into
consideration. Several weeks, sometimes—even one/two months together, were spent among the local people in each visit in a particular area and a close study of the uses and names of plants was made in the field. An effort was made to visit the same locality in different seasons, but it was not always possible for obvious reasons. Field observations on plants and information on their uses were recorded in a field book. Voucher specimens were collected for all the plants used by the tribes of erstwhile Kameng and preserved according to the conventional herbarium techniques (Jain & Rao 1977). The field data were incorporated in the herbarium sheets. The specimens, on whom this study is based, have been deposited in the Herbarium of the Botany Department, Gauhati University for future reference.

Informants

As in many societies, the knowledge of medicinal herbs and treatment among the tribes of erstwhile Kameng is often rather specialized, limited to a few members of the community, who are recognized as medicinemen or Mugou, Adua in Aka; Manpo, Chobje in Monpa; Nube in Nishi; Jijis in Sherdukpen and Nyabo in Miji. These persons are generally the most respected and rather indispensable members of the society. Generally medicinemen treat all kinds of illness rather than being specialized in some specific illness. Some practitioners, on the other hand, are highly specialized and treat only some specific illness.

Few plants are grown especially for their medicinal value. Most of the medicinal plants are obtained from the forests. However, some medicinal herbs, which generally do not grow in an area, are usually procured from other places. There do not appear to be any special harvesting techniques and leaves; bark and roots are taken from any plant of the required species. Those herbs which are not easily available and which do not lose the medicinal properties on preservation are usually dried and preserved by medicinemen.
Most of the medicines are prepared in the form of decoction or infusion. Pounding the plant and plant parts into paste or steeping the pounded material in water to get the extract or squeezing them or boiling them, for the juice are common practice. Generally pounded products are administered directly and only rarely they are made into pills or into ointment form. For joint pain, swellings, bruises and boils, the roots, bark or leaves are crushed and applied as a poultice. Dry plant parts are usually made into powder and in certain cases barks or roots of medicinal plants are chewed and sucked.

The folk medicine among the tribes of erstwhile Kameng is an art practiced mainly by the old people. However, the author in the course of the present study has come across several young men prescribing herbal medicines. They have acquired the knowledge from their father or uncles. Many women know about the household remedies and the ailments associated with women and children. This is because of the fact that childcare is regarded as the main activity of the women amongst the tribes of erstwhile Kameng. Nevertheless, remedies for common ailments like cuts, dysentery pains, fever etc., are known to most of the common people. In general, the young generation also knows and cares about the subject. However, those who have spent several environments have very little knowledge of old beliefs, customs and uses associated with the plants of the area. In each locality, there are several individuals, though not recognized, as medicinemen yet possess knowledge and reliable information. Thus, the informants sought in the present study are of two broad categories viz., (i) the recognized medicinemen of the locality and (ii) some individuals possessing knowledge due to their personal effort and interest.

Contrary to the medicinal uses, plants associated with other material culture like food, house-building, other domestic uses, etc. and plants associated with ceremonies, taboos, worships, etc. are known almost equally...
to both men and women of almost all the age groups among the tribes of erstwhile Kameng.

**Approach and rapports**

The Akas, Monpas, Nishis, Sherdukpen and Mijis maintain a relative secrecy about the use of their herbal medicines. This is because of the fact that they believe, the medicines will lose their 'healing power', if too many people know about them.

There is often a feeling among the tribes of erstwhile Kameng that outsiders consider their customs to be funny or even absurd and there is a concomitant reluctance to expose himself to a casual visitor. However, contrary to such apprehensions, when a proper approach was made, not much difficulty was encountered in getting them to talk.

One cannot work long among the erstwhile Kameng tribes without participating in their feasts, festivals and ceremonial occasions. It brings a friendly atmosphere and they slowly become less secretive. After establishing friendly relations the author used to ask them in Hindi and Assamese language about plants and their uses. They become confidant that the author was interested in their plants and they offered full cooperation.

Sometimes one has to wait for a suitable occasion to develop friendly relations. In that situation, the author used to collect plants of known uses or those recorded in other localities without asking the people of that area. Naturally, in curiosity, they would come and ask about the purpose of the collection. In that case, the author used to explain the medicinal and/or other uses from his previous experience, and pretended that he know enough and not much interested in knowing their uses of plants. This usually drew their voluntary cooperation and created an atmosphere where new information as well as verification of the earlier data was possible.
It soon became evident that the more the author knew of their plants and uses, more information was forthcoming voluntarily. Earlier much fewer facts were disclosed. But once the author gained the confidence that he was not misusing the information, the reservation was replaced by enthusiasm in sharing their knowledge on uses of plants. It is true, however, that in many cases the medicinemen were reluctant to admit or divulge their knowledge, even after the author have become trusted member of the community. The few prescriptions, which the medicinemen alone knew, gave him status and some income. This observation is based on several instances where medicinemen did not divulge a prescription in the presence of local villagers, lest a rival competitor might emerge. Very often the medicinemen pounded their plant remedies so that even the patient would not recognize those. It was observed that when the knowledge of the medicinemen was respected and had given a leading role in discussions, he or she generally spoke out without reservation, of course in private.

Sometimes the author recount a story associated with the plant to a possible informer and ask whether the informer knows the story. In many occasions the informer gives some other story associated with the same plant or other plants. This method was employed to extract information regarding the socio-cultural practices or regarding folklores.

Emphasis was first given to make the inhabitants understand that the information would be preserved for the benefit of their children and coming generations. Next, that their neighbours would not be told the information given in confidence, for each family often had their secret remedies for ailments, given free to their friends but sold to others.

**Methods of procuring information**

The general procedure for gathering data was same as described by (Rao 1989; Jain 1967,1987 and Rozario 1999) and comprised of interviewing
the informants or by witnessing the uses during the stay in field. During fieldwork, the informants were requested to accompany to the field and to show the plants. Alternatively, a particular plant was picked up and queries made as to how it is useful for them. The reply could either be a description of the use or a reply in negative. Where possible, both a man and woman were employed; as the women were supposed to know the food, vegetable, medicine, etc., and the man the materials in wood working, housing as well as medicine.

In many instance the informant was to busy or too infirm to accompany the author and it was necessary to deviate from the usual procedure. Under such circumstances, the described plants were collected under the guidance of a direct relative or trusted friend of the informant familiar with plants and later showed to him for confirmation. Sometimes information could be gained only by carrying large number of fresh and pressed plants to show them. Effort was made to bring to them, as far as possible, freshly collected plants carried in polythene bags. For they are not usually accustomed to 'identify' the dried specimen. It was also not uncommon that after understanding the genuine purpose of the study, the informants themselves brought plants to the authors and explained their uses on informant’s own initiative. Sometimes informants especially on medicine would show the contents of their own ‘medicine bags’ and again were employed to secure and identify the plants under discussion in the field.

During the stay in the field, festivals and other ceremonies were attended and observed, where plants were often used. Discussions were made of legends, songs, proverbs, etc., relating to plants, especially with old people of the localities. Village and local markets were visited to witness and to record the plants and plant products sold or bartered.

In no case information was accepted without verification by actual plants. The accompanying voucher specimens were taken either to the
Kanjilal Herbarium (ASSAM), Botanical Survey of India, Eastern Circle, Shillong or to the Central National Herbarium, Sibpur, Kolkata, Botanical Survey of India and to the Herbarium of Botany Department, Gauhati University for proper identification. To eliminate any chance of error in identification by mixing of species, that very particular specimen which was the basis of discussion and information with the informant was brought to the herbarium and identified.

**Method of recording information**

A relevant question may be asked to what extent the authenticity of the statements of the informants can be relied upon. Extra effort was made in this direction, and the same plant specimens were made the subject of discussion with different informants on different days at different places or villages. This helps greatly, because the membership of the gathering changed, and there was also scope for new information or even for contradiction of some old notes. This resulted in confirmation of notes and statements.

In discussing the edibility of certain plants, the informant would have no doubt; he would pluck the fruit or leaves or anything else and would start chewing them with a noticeable display of relish. Similarly, in case of medicinal plants, the informants would crush the leaves in his palm or scrape the root, rhizome or bark and sniff the parts in order to ascertain the medicinal use. When on crushing some plant parts give a burning sensation, then it is discarded being poisonous.

Once the information on particular plant was considered reliable after repeated verification, its local name and uses were recorded. Details about the parts utilized in preparing the medicine, the illness, the preparation, dose and other uses of the same plants were noted.
Evaluation of data


The Present Account

The present account is not a work on the flora from the taxonomic point of view, but attention has been given to plants considered to be useful by the Akas, Monpas, Nishis, Sherdukpens, Mijis of erstwhile Kameng. Both wild and cultivated plants are included. The plants have been arranged in alphabetical order according to their scientific names. In fact this work has not only been planned to help botanists but also to meet the requirement of others not specialized in taxonomy or with classifications of plants.

On botanical side, an effort has been made to present as far as possible, the nomenclature accepted as valid in current literature and for which mostly the work of Bennet (1987); Santapau (1973) Dictionary of the flowering plant in India and Common Indian Wild Flowering Plants Kehimkar

For the sake of brevity and as available in most of the floras of Arunachal Pradesh (Kanjila et al 1934-1940; Hajra et al 1996; Haridasan et al 1995), botanical description and distribution of plants are in brief.

In the result after scientific name important synonym were cited. The local names recorded in the field were provided and name of the tribe kept inside the bracket and in abridged form as AK= Aka; DM= Dirang Monpa; TM= Tawang Monpa; KM= Kalaktang Monpa; N= Nishi; Mi= Miji; Sher= Sherdukpen. After local name brief description of the plant, habitat, figure of the plant, regeneration, flowering time, fruiting time, distribution, part(s) and local uses, form of use, preparation, dose, other uses, uses in Ayurveda, Unani and Siddha, market value and finally exsiccatum were cited.

In the distribution (a) represented for world distribution (b) for distribution in India and (c) represented for local distribution, their range of distribution and inside parenthesis whether plant is common or rare in that region are also mentioned.

For uses in Ayurveda, Unani and Siddha medicine, Kirtikar & Basu (1935); Murthy & Pandey (1982); Anonymous (1998, 1998, 1999) and plant used in Siddha medicine - google website search (Indian Ayurvedic and Siddha herbs) are taken as standard references.

In the market value (a) denote local market (b) denote national market and (c) denote international market value. Local market prices of the herbal plants were collected from village market, local herbal traders, local market and from professional herbalist. Sometimes prices of a same plant vary from area to area and fluctuate the rate time to time. For national market prices of

In the Exsiccatum first cited the name of the place from where specimen were collected then collection date, then surname of the collector and finally collector number (e.g. Namchoo, 20.9.2003, Kar 20).

Abbreviations have been used in the thesis are for Synonym = Syn; Local name = LN; Description = Desc; Regeneration = Regen; Flowering time = Fl; Fruiting time = Fr; Fruiting body = Fr (b); Distribution = Distrib; Data defecit = DD; Figure = Fig; Rupees = Rs; Gram = gm; Kilogram = kg; Centimeter = cm; Meter = m; January = Jan; February = Feb; March = Mar; April = Apr; August = Aug; September = Sept; October = Oct; November = Nov; December = Dec.