CHAPTER – V

GENERAL DISCUSSION
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The present work was carried out on the ethnobotanical study of the Kabui and the Monsang Naga tribes of Manipur, a state within Northeast India, a biodiversity hotspot (Indo-myanmar hotspot) region. Survey of fields for collection of specimens and relevant information were done during 2008-2012 in various villages inhabited by the Kabui Naga tribe (viz. Tamenglong, Tuosem, Bolongdai, Noney, Keithelmanbi, Langthabal Khoupum, Keikhu, Chingmeirong, Majorkhul, Keisamthong, Tamei, Nungtek, Tolen, Tamenglong, etc.). For the Monsang tribe, Monsang Pantha, Japhou, Japhou Bazar Monsang, Liwa Sarei, Liwa Khullel, Heibunglok (Changnhe), and Liwa Changning villages of Chandel District of Manipur were visited. These tribal communities generally reside in the forest and remote areas where they are settled. They depend on the forest and forest products for their daily requirement of food, medicine, dye, fodder, fiber and other uses. Their sources of income are also generated from the forest and forest products both from minor and major forest resources.

In the present investigation, 328 plant species belonging to 245 genera and 95 families are reported. The reported plant species in the present work are dicotyledons (272 nos.), monocotyledons (50 nos.), gymnosperms (2 nos.) and pteridophytes (4 nos.). These two tribes use different kinds of plants i.e. from small plants like pteridophytes (4 nos.), herbs (153 nos.) and shrubs (52 nos.) to large tree species (82 nos.) and 4 for fulfilling different requirements of their traditional lifestyle and culture. It can be seen from report that among the monocots, Zingiberaceae has highest number of plant species (14) as shown in Figs. 3 & 4 and followed by Poaceae (9) and Liliaceae (7) and others have less numbers i.e., 6, 5, 4, 3, 2 and 1. While among the dicots, Asteraceae and Verbenaceae have the highest number of plant species (18) followed by the family Fabaceae (16) and Lamiaceae
both the tribes under study use these plants for various purposes depending upon their day to day requirement i.e., food, medicine, dye, fibre, fodder, furniture, household material, etc. These plants are found in their surrounding forest areas, jhum fields, road sides and home-gardens. Due to their settlement in remote areas, they manage their above mentioned requirements from their surroundings only. They use herbal medicinal plants to treat many kinds of ailments in their traditional ways and methods. They have developed skill and a traditional technique for using herbs as medicine for treating most of the ailments e.g. diabetes, jaundice, piles, asthma, leucorrhoea, sinusitis, hypertension, malaria, rheumatism, vomiting, paralysis, leprosy, burn, tumor, cholera, skin diseases, cuts and wounds, headache, fracture, toothache, eye problems, sprain, boils, diarrhea, dysentery, etc. They use different kinds of plants i.e. from small plants like bryophytes, pteridophytes, herbs to large angiospermic tree species for fulfilling different requirements of their traditional life style and culture. These collected plants are of different type of plants e.g. herb, shrub, tree and climber.

All the 328 plant specimens are used, use in various purposes, among these reported plants, the Kabui and the Monsang Naga tribes use 232 plant species as herbal medicine to treat various kinds of ailment. Many authors have reported a large number of medicinal plants used by the various communities of the country viz. Gangwar & Ramakrishnan (1990) reported 171 medicinal plants used by the Nishis and Sulung tribes of Arunachal Pradesh, 51 medicinal plant species from Manipur (Singh et al., 1992). Jamir (2000) reported 115 medicinal plants used by the naga tribes of Nagaland and 245 plant species used for treating various kinds of ailments in Cachar District of Assam (Das, 2006), 160 medicinal plants of Thoubal District of Manipur (Meitei & Singh, 2007), 74 herbal medicinal plants used by the
Kabui Naga tribe of Manipur (Devi et al., 2011a) etc. A total of 178 plant species are consumed as vegetables in various food items in different ways by the Kabui and Monsang Naga tribes of Manipur. Ramachandran (2007) reported 25 leafy vegetables of Tamil Nadu and Devi et al., (2011b) claimed that 65 vegetable plant species are used by the Monsang Naga tribe of Manipur. They have indicated number of plant parts for various kinds of uses. Twenty-six (26 nos.) plants are used to treat diabetes by the Kabui and the Monsang Naga tribes of Manipur. Balu et al., (2000) reported 30 folklore remedies of diabetes from Cauvery Delta of Tamil Nadu and 28 anti-diabetic plants are reported by Rana et al., (2000) from same state. 18 medicinal plant species are used as blood purifier and 11 plants are used as remedies of jaundice. Piles is treated with the help of 14 different plant species, asthma is treated by using 22 plants, leucorrhoea is treated with the help of 7 plant species. Drymaria cordata, Leucas aspera and Oroxyllum indicum are used as nasal drops for curing synusitis. For controlling hypertension 15 different plant species are used. 37 plant species are used to treat cough and fever by the different kind of applications. For treating diarrhoea and dysentery, 48 plant species are used by these two tribes. Choudhury et al., (1996) reported 42 folklore medicinal plants used for treating dysentery and diarrhoea. Boils are treated with 17 plants and sprain, muscle pain and joint pains are treated with the help of 35 plant species, while Cucumis sativus, Nelumbo nucifera and Daucus carota are used as remedies for treating eye problems and 14 plant species are used to relieve toothache. While Eryngium foetidum, Paedaria foetida, Allium sativum and Vanda tessellata are remedies for bone fracture, while 15 plant species are used to treat headache. Cuts and wounds are treated with the help of 20 different plant species. For treating skin diseases 37 plant species are used by the Kabui and the Monsang Naga tribes of Manipur. Ashalata et al., (2005) also reported 120 medicinal plants from Manipur, used in skin disorder. Tonsilitis, throat and mouth infection are treated with Cinamomum tamala, Elsholtzia communis, Elsholtzia stachyodes and Solanum melongina.
Abortion is performed with 6 plants and cholera is treated with the help of bulbs of *Allium ascalonicum*, bulbs of *Allium cepa*, leaves of *Andrographis paniculata* and flower of *Nilumbo nucifera*. *Piper betle*, *Colocasia esculenta* and *Alocasia macrorrhiza* petioles are applied to treat skin tumours. Constipation is treated by using 8 herbal medicinal plants by these two tribes. *Lydodium flexuosum* and *Luffa acutangula* are used as remedies for leprosy. Paralysis is treated with *Premna bengalensis*.

*Tinospora cordifolia* is used as a remedy for treating malaria. Vomiting is controlled by *Averrhoa carambola*, *Coriandrum sativum*, *Ziziphus jujube* and *Tinospora cordofolia* and during child birth for treating infants and mothers use 9 plant species in different ways for different purposes. Burn cases are treated with 7 plant species. *Phlogocanthus thyrsiflorus* and *Zingiber officinales* are used as antidotes against food poisoning and *Narium indicum* is used a remedy for epilepsy. Corn is removed with the help of *Asclepias curassavica* latex and *Impatiens balsamina* is remedy for curing nail infection. *Bombax ceiba* and *Clitoria ternatea* are used to treat sexual impotency.

As an appetizer, 8 plant species are used and rheumatism is treated by using 13 plant species and 7 medicinal plants are used to expel intestinal worm.

For the remedy of any type of ailments, plant materials are generally taken by these two tribes at least for a week in different doses of 5 ml, 10 ml, ......, a spoon full, half glass and a glass full (about 300 ml) etc.

*Nicotiana tabacum* is used as nacrotic plant. As anti-biotic and insecticide, different parts of 29 plant species are used by both the tribes under study. Similarly Dwivedi *et al.*, (2007) also have reported 23 antimicrobial plant species from North Karnataka.

Insect bites, snake bites and dog bites are treated with the help of different parts of 9 plant species. Fruit skins of *Citrus aurantium*, *Citrus jambhiri*, *Citrus
maxima and flowers of Gardenia jasminoides and Michelia champaca are used as insect repelants in their houses and surroundings.

To treat domestic animals, 7 plant species are used. Galav et al., (2007) also have reported 33 medicinal plants used in the diseases of domestic animals.

The Kabui and Monsang naga tribes use 15 plant species related to socioreligious. The extracts of 30 plant species are reported in the present work to be used as hair lotion by the Kabui and Monsang Naga tribes of Manipur. Singh (1982) published 9 plant species used as hair lotion. In the present study, Bixa orellana, Hibiscus schizopetalous, Mahonia manipurensis, Mallotus philippensis, Musa paradisiaca, Parkia timoriana, Pasania pachyphylla, Pasania spicata, Punica granatum and Strobilanthes cusia are used to dye yarn, cloths and pots. Fishes are caught using 6 different plants as fish poison and 73 varieties of plants are taken as vegetables in the form of raw or cooked food. They use 48 fruit varities in different uses.

From their surrounding forests, 83 plant species are collected as wild edible plants which are used in various ways. Renchumi et al., (2011) have also reported 98 wild edible fruit plants from Dimapur District, Nagaland. While in the present study 38 underground plant parts are also reported to use for various purposes.

From this study, 22 plant species are reported for their ethnobotanical uses for the first time in ethnobotany. Some reported plants are found in wild, some in jhum fields and some in home gardens. While some of them are found in jhum fields as well as in home gardens.

Phytochemical analysis of some selected medicinal plants has been done. Qualitative phytochemical analysis of Alkaloids, flavonoids, saponins and tannin are done for Acmella oleracea, Cissus adnata. Cissus discolor, Clerodendrum colebrookianum, Curcuma angustifolia, Hedychium greenii, Oroxylum indicum,
Pavetta indica, Pimpinella rhetsa, Zanthoxylum rhetsa and Zehneria scabra. These chemicals compounds are found to be present in all the plant species, except for the species Pimpinella rhetsa and Zanthoxylum rhetsa, where alkaloids were not detected. Further work should be taken up to find out the potential of the above mentioned plants for their commercialization for the benefit of the people of this region at large. A detailed biochemical analysis should give more information about the potency of the plant biochemicals for their use as herbal medicine for the benefit of the common people of the region and the country at large.

In the present work, antibacterial activity of some selected plant extracts have been done against four test human pathogenic organisms viz., Salmonella typhi, Klebsiella pneumonia, Staphylococcus epidermidis and Bacillus subtilis. Various diameter of inhibition zone have been exhibited by the plant extracts against these test organisms. In this experiment, largest diameter of 20.30 mm is shown by the extract of Phlogacanthus thyrsiformis against Salmonella typhi. This extract shows 15.80 mm and 10.50 mm diameter of inhibition zone against Klebsiella pneumonia and Staphylococcus epidermidis respectively. Inhibition zone of 8.33 mm was observed with Eurya japonica against Staphylococcus sp. and 6.33 mm zone by Ficus auriculata against the same pathogenic bacteria was also reported by Thingbaijam et al., (2011). The inhibition zones of selected plant extracts against test organisms are given in the Table 6.5. Andrographis paniculata has shown 8.00 mm, 7.00 mm and 8.00 diameters of inhibition zone against Salmonella typhi, Klebsiella pneumonia and Staphylococcus epidermidis respectively. Vitex trifolia has shown diameters of 17.00 mm, 10.00 mm and 10.50 mm against Salmonella typhi, Klebsiella pneumonia and Staphylococcus epidermidis, respectively. Inhibition zone of 6.33 mm was shown by Eurya japonica and 6.50 mm by Ficus auriculata against Staphylococcus sp. by Thingbaijam et al., (2011). Inhibition zone of 18 mm and 17mm is shown by Psidium guava (bark) and Mangifera indica (bark) against Bacillus subtilis respectively. Akinpelu & Onakoya
(2006) have also reported 12 mm and 14 mm diameter of inhibition zone of these two medicinal plants against *Klebsiella pneumoniae*. Diameters of 6.00 mm, 9.50 mm and 8.00 mm are shown by *Potentilla Canadensis* against *Salmonella typhi*, *Klebsiella pneumonia* and *Staphylococcus epidermedis* respectively. *Artimisia nilagirica* has diameters of 10.00 mm, 12.00 mm and 12.50 mm against *Salmonella typhi*, *Klebsiella pneumonia* and *Staphylococcus epidermedis* respectively. Inhibition zone of 15.43 mm exhibited by *Acasia caesia* against *Klebsiella pneumonia* was reported by Thambiraj & Paulsamy (2010). Gami and Parabia (2011) reported inhibition zone of 8 mm of *Moringa oleifera* (leaves) against *Salmonella typhi*. Whereas, in the present study, no inhibition zone was observed with all these plant extracts against *Bacillus subtilis*. While, Gami and Parabia (2011) reported any inhibition zone is not exhibited by *Alstonia scholaris* (bark), *Achyranthus aspera* (whole plant), *Moringa oleifera* (leaves) *Tinispora cordifolia* (stem) and *Enicostema hyssopifolium* (stem) against *Klebsiella pneumonia*. However, in the present work these plant extracts were not found to be active against the test organism i.e. *Bacillus subtilis*.

These test organisms also have shown inhibition zones against the known antibiotics viz. Penicillin, Chloramphenicol, Streptomycin and Tetracycllin. They have shown different sizes of diameters inhibition zones as given in Table-8.3 and Plate-26-A & B. Penicillin has shows 18.00 mm, 17.50 mm, 24.00 mm and 25.00 mm diameters of inhibition zones against *Salmonella typhi*, *Klebsiella pneumonia, Staphylococcus epidermedis* and *Bacillus subtilis* respectively. Chloramphenicol has shown diameters of 14.00 mm, 16.50 mm, 22.00 mm and 20.30 mm inhibition against *Salmonella typhi*, *Klebsiella pneumonia, Staphylococcus epidermedis* and *Bacillus subtilis* respectively. Diameters of 16.50 mm, 10.50 mm, 19.00 mm and 15.00 mm of inhibition zones are shown by Streptomycin against *Salmonella typhi*, *Klebsiella pneumonia, Staphylococcus epidermedis* and *Bacillus subtilis* respectively. Tetracycllin exhibited 7.10 mm, 15.00 mm, 20.00 mm and 10.00 mm diameter of
inhibition zones against *Salmonella typhi*, *Klebsiella pneumonia*, *Staphylococcus epidermidis* and *Bacillus subtilis* respectively. While inhibition zones of *Acanthus leucostachyus* (leaf), *Ophiorhiza munggos* (rhizome), *Curculigo orchioides* (tuber), *Drynaria quercifolia* (rhizome) and *Peperomia pellucida* (whole plant) against *Staphylococcus* sp. are 5.33 mm, 4.33 mm, 4.66 mm, 5.55 mm and 5.66 mm respectively have been reported by Das (2006).

From this experiment, it is observed that some of the medicinal plants used by the Kabui and the Monsang Naga tribes have antibacterial properties against human pathogenic bacteria. Usage of herbal medicinal plants in their day-to-day life helps them to prevent from many diseases.
CONCLUSION

The thesis entitled “Ethnobotanical studies of the Kabui and Monsang tribes of Manipur” is carried out during the year 2008-2012. During this study detailed knowledge of the Kabui and the Monsang tribes on the ethnobotanical uses of plants for their daily life as well as cultural ceremonies have been documented. These two tribal communities inhabit in hill districts and some Kabuis are inhibiting in valley districts of Manipur, North-Eastern India, one of the biodiversity hotspots.

This study records the ethnobotanical usage of 328 plant species belonging to 245 genera and 95 families used in different purposes. Among these recorded plants 272 plant species are dicotyledons and 48 plants are monocotyledons, 2 gymnosperms and 4 pteridophytes. These two tribal communities use different kinds of plants viz., herbs (153 spp.), shrubs (52 spp.) and trees (82 spp.). They use these plants as medicine, food and for various other purposes. They used the plant species of family Asteraceae and Verbenaceae in largest number (18 spp.), it is followed by family Fabaceae and Lamiaceae with 16 plant species, Malvaceae with 15 species, Cucurbitaceae and Solanaceae (11 spp.) other families have 10, 9, 8……., 3, 2, 1 sp. only. They are found to use leaves, flower, fruit, stem, bark, root, seed, skin of fruits, tubers, rhizomes, corms, etc and some plants are useful as whole plant according to their requirements.

Both these two tribes use 232 herbal medicinal plants for different ailments and 92 plant species are reported as wild edible plants. They consume 47 fruits as fresh fruit and otherwise. 30 plant species are used as hair lotion and 15 plants are used in socio-religious purposes, 39 underground plants parts are used in various ways for varied purposes and 34 plant species are used as spiecry plants. For catching fishes 6 species of plants are used and 10 plants are reported to be used in their dyeing of fabrics.

The medicinal plants are used in various ailments. Among the 232 medicinal plants, 25 plants are used to treat diabetes. Several varieties of plant species are used for treating many kinds of ailment and many other purposes.

These two tribes have developed mostly similar food habit however, they differ in the knowledge of the use of some food plants e.g., Polygonum capitatum is taken only by the Monsang and fermented leaves of Brassica compestris and fermented seeds of Hibiscus cannabinus are consumed only by the Kabui tribe. Kabuis use Urtica parviflora as vegetable. While Vanda tessellate is applied on fracture only by them but these are not known to Monsangs though they are closely related tribes. Camellia sinensisiss was found in the villages settled by both the tribes and they use the same as local varieties as beverage and also as medicinal plant and as vegetable.
But now it is not found in the Monsang villages which indicate the possibility of their abandoning the use of this plant. Yet in proper Tamenglong area and their surroundings, Kabui people have been found to domesticate Camellia sinensis as fencings in home gardens and conserved it in the jhum land and other village surrounding areas as fencing material. Fresh tender leaves of Camellia sinensis are used as vegetable in 'singju' and used as medicine in dysentery by the Kabui Naga tribe. Lantana camara, Duranta repens, some Hibiscus spp. are also cultivated using them as biofencing.

As other tribal communities of Manipur, the Kabui and the Monsang tribes also use some medicinal plants like Centella asiatica, Clerodendrum colebrookianum, Clerodendrum serratum, Oroxyllum indicum, Phlogacanthus thyrsiflorus, Solanum anguivi, Solanum gilo, Solanum torvum etc., without knowing the advantage and disadvantage of those plants in their day-to-day life. They do not have the proper knowledge of the nutritional values of the plants. They simply follow the mode as these plants were used by their ancestors. It will be highly beneficial if they are enlightened with the right uses of these plants. It will help them in maintaining a balanced diet and in curing different kinds of ailments at a comparatively low cost. Thereby the economic condition of the people who are dwelling around those plants can also be improved.

These tribal groups use many kinds of herbal medicinal plants without any scientific knowledge and they do not have any documentation about the herbal medicinal use. Nobody knows about the chemical contents present in the medicinal plants. Even though the doses of the plant extract used as medicine in treating diseases are given as per the traditional knowledge by the healers. Giving of right medicine and appropriate doses is required to cure any disease. As a part of this study, biochemical components were analyzed viz., alkaloids, flavonoids, saponins and tannins present in some medicinal plants which are found easily in the surrounding areas of the Kabui and the Monsang tribes. Now, it is required to extend awareness of scientific knowledge on the herbal medicinal use to the villagers for maintaining their health themselves by the related governmental authorities and NGOs. The culture and ethics of these tribes should be safeguarded for ensuring the conservation and transmission of their rich traditional knowledge they have inherited from generation to generation.

From the present investigation, it has been observed that the Monsang tribe and the Kabui tribe have their own rich ethnobotanical heritage. It is also available in their literature, publications etc. written in their language but using English alphabet.

From the observation, on the species composition in the study sites, it is found to be gradually decreasing and it appears that some plant species may become endangered in due course of time. Due to lack of knowledge on the environmental
conservation excessive harvesting is done by uprooting the plant when a part of the plant is required to be used. Thus many valuable plants may be entirely loss from the environment due to this over harvesting. So, it is high time to promote the knowledge of conservation of floras in the habitat and other adjacent areas, usage through proper scientific documentation and dissemination of knowledge of the usage of herbs and other plants among the tribes of the region in general and to the tribes under study in particular i.e. Kabui and Monsang tribes of Manipur. The findings of the present work should contribute to the knowledge of ethnobotanical and other uses of plant species as a document for the tribes under study.