

CHAPTER VIII

MATERIALS AND METHODS

8.1 SELECTION OF THRUST AREAS

Information on the floristic distribution and different aspects of plants with their ethnic relations and uses in general, were collected from the existing literatures. Works from some parts of Nepal and Sikkim Himalayas have been taken as major references for their cultural and anthropological similarity. Understanding that the region has a rich folk medicine culture, emphasis has been given on the plants of medicinal value, their indigenous formulation and methods of preparation by the herbal practitioners and experienced village folks of different ethnic communities. The spiritual healers who claimed of having divine gift are known as *Jhankri* (in general), *Bijuwa* (Rai community), *Boongthing* (Lepcha community), *Lama* (Sherpa and Bhutia community), and *Phedangma* (Limbu community). Such herbal practices are one of the primitive trait in the culture of this Himalayan region, and most of the people in rural and far flung areas know the remedies of common or ordinary ailments.

Information centre of the state government and forest maps (Map-5) were also used to select the thrust areas for easier botanical exploration which include the villages of tribal concentration, forest villages, places of local markets and clinic of herbal practitioners and their private garden of medicinal plants, medicinal plant gardens of the government sector and registered herbal vendors. Besides the author attended at and participated in many cultural and religious ceremonies throughout the study area.

8.2 PLANNING OF THE SURVEY

Comprehending the floristic and ethnobotanical account is not easy unless one can be able to walk under the tree line and reach the tribal and forest villages. The tough terrain, confusing ridges and slopes are some natural barriers to the study. Based on the information gathered and previous personal experience, a plan of action for the collection of ethnobotanical information and specimens was prepared. This was found to be very useful and almost a prerequisite for the survey in most of the hilly areas above 2500m and deep forests which do not welcome random visits. Discussions were held in the visited areas with field guide, local herbal practitioners, vendors, priests of all ethnic groups and the experienced senior rural folks.

8.3. COLLECTION OF THE ETHNOBOTANICAL INFORMATION AND SPECIMENS

The field works was initiated from the month of May 1995 and continued up to the month of August 2001. For the first three years collection has been made randomly from all parts of the studied area and from selected parts afterwards. All the ethnobotanical informations are based on the village and rural life.

The ethnobotanical informations were recorded from the resourceful persons with the help of field guides in distant villages and far flung areas throughout the Darjeeling Himalayan region. Field guides with some school education were selected. However, quite appreciably some persons were school teachers, employee of government and non government organizations, persons/members of the respectable family of the locality and boys with college education. After briefing the importance of ethnobotanical documentation and our aims and objectives of field visit the field guides were motivated and helped in approaching more resourceful persons of their localities. The resourceful persons were mostly the spiritual healers from where most of the ethnobotanical informations were recorded through interviews. Usually these persons were shy and reluctant in most of the cases but after developing the colloquial attitude and familiarization, the field guide usually highlighted their service and contribution to mankind and praised their divine gift followed by the importance of ethnobotanical documentation, which ensures the preservation of their sacred knowledge, experience and practices for future reference to meet the needs of all human beings. This kind of approach was helpful in making them enthusiastic and made many of them ready to co-operate with great zeal. The informations were noted in the notebook at their residence when they were free from domestic works and duties. In case of ethnomedicinal plants the uses of single plant followed by the uses in combination with other plants were recorded including the types of ailments, source of medicine, parts used, method of preparation, mode of administration and duration, and its contraindications or the side effects. Besides these, the experience of herbal practitioners, the efficiency of the prepared medicine and its future prospects were also noted. It was found that in the process of preparation of some ethnomedicine the ingredients used were parts of animal organs and products (forms a separate study of Ethnobiology). Discussions were held on the doubtful specimens and materials and also in case of local names, which varied from place to place, but these were corrected afterwards in the laboratory and herbaria. The stay at different localities, participation in various rural activities with the village folks and sharing information and ideas with them during the stay was more useful to carryout the present work. After completing the interviews, the following columns were filled up for the reference.

Sl.No..... Date.....

Name of the plant..... Local name.....

Family..... Colour of the flower/fruits.....

Parts used..... Used as..... Status.....

Name of the resource person..... Age..... Sex

Profession..... Locality Sub.div.....

Duration of the practices Effectiveness

Each plant was collected in triplicate, tagged with the field number and recorded in the field notebook. They were temporarily preserved in the polythene bags. Other field observations such as habit, frequency of occurrence and their local distribution with some ecological notes were also recorded.

The collected specimens were worked out in the field, and their important taxonomical characters and measurements wherever necessary were taken. They were properly placed in the blotting paper and pressed. The specimens were further processed at the head quarter (Taxonomy and Ethnobiology Laboratory, Kalimpong College) and North Bengal University Herbarium. The methods and techniques suggested by Rao and Sharma (1990) were referred. Care was taken to cover all the habitats including cultivator's villages, Cinchona plantations, tea gardens and forest areas. Attempt have been made to collect the specimens in all seasons preferring their flowering and fruiting conditions or both together whenever available.

8.4 IDENTIFICATION

In the first stage provisional identification of the collected specimens was done in Taxonomy and Ethnobiology Laboratory, Kalimpong College and the herbarium of North Bengal University, Siliguri, supported by the latest monographs. In the second stage, identification was done by the comparison with authentic specimens at the herbaria of Botanical Survey of India, Sikkim circle (Gangtok) and finally from Central National Herbarium, Calcutta.

8.5. NOMENCLATURE AND DESCRIPTION

Efforts have been made to use the latest and correct scientific names for all the *taxa* after consulting the revision works of relevant flora. Most of the names adopted for gymnosperms and angiosperms are differing from those used in the *Flora of British India*. Therefore, in all cases *protologue* have been consulted to decipher nomenclature problems and identity of doubtful specimens.

Synonyms from the later work and other important literatures followed by *basionym* have been included. The nomenclature of different families and genera has been made in accordance to the appendix II & III of the International Code of Botanical Nomenclature (1988).

A short taxonomic description highlighting the important characters of identification, flowering and fruiting periods, ecological status, local and general (world) distributions have been provided. Local names (vernacular) are provided to most of the plants known by the ethnic community. In the collection and ascertaining of Lepcha names Cowan and Cowan (1929), Lepcha museum, Kalimpong, and the Lepcha fortnightly magazine 'Aachuley' were referred. Only a few Bhutia names were found because most of them were the residents of townships. In addition, they were found to usually follow the prescription provided by their *Lamas* or spiritual healers who bring the medicines from Dharmasala (Himachal Pradesh). The ethnobotanical information on the plants used are arranged in an order of medicinal, edible, beverage, spices, domestic or household applications, dyes and gums, veterinary, fodder, cultural and mythological significance, religious, plants of poisoning effects, miscellaneous uses and the plants which are sold in the markets.

The information on plant parts are arranged in an ascending order of root, stem (bark), leaf, young shoot, inflorescence, flower, fruit and seed. The uses of whole plant parts and the mixture obtained from two to more plant parts are included later.

Attempts have been made to collect the maximum information from all ethnic communities of the Darjeeling Himalayan region and some adjoining parts of Nepal, Bhutan and Sikkim. The first hand information collected by the author is written in the bold letter. Information collected from the journals, books, periodicals and regional write ups are given along with their authors and year of publication. The similar information for the same plant and uses are omitted giving the priority to the first publication. To avoid the error in translation, the terms used in the uses of plants and ailments, their therapeutic terminology and the language as given by the original author have not been changed.

The places showing the local distributions are arranged according to the subdivisions where the regions showing general distributions are arranged from west to east. In case of Himalayan distribution (Kashmir–Arunachal Pradesh) means that the species is distributed from Kashmir to Arunachal Pradesh through Garhwal, Kumaon, Nepal, Sikkim, Bhutan and east to Arunachal Pradesh including Darjeeling Himalayas.

8.6. STATUS

Ecological status of collected specimens has been determined at the collection site, sampling was done randomly at many places and a number of species were added together for all sampling studies to take out the mean. Following Raunkiaer's (1934) ecological statistics of frequency the following modified expression have been made under the status of species. However, the plants appearing in the current IUCN list (1998, 2000) have been dealt and categorized. The species which are found to be under threat only for the area of study but not included in the list of IUCN have been treated under Raunkiaer's category of rare/threatened plants.

Class	No. of individuals/unit area
Rare/threatened	1-4
Sparse/occasional	5-14
Frequent	15-29
Common	30-90
Abundant/very common	100+

8.7. MEASUREMENT

The metric unit system (m, cm and mm) has been used in the measurements eg. the dimensions of leaves are given as 6x3, the first figure indicating the length and second the breadth where only one measurement is given eg. fruit 2cm, this will refer to length or height. Measurements in brackets are for specimens outside the average range eg. Tree, 12-20m (-30m) indicates the normal range of height as 12-20m but exceptionally up to 30m.

2. A holy lake located at Sandakphu (3636m).
3. Kalpokhari (3181m) a sacred lake at Singalila national park.
4. A lake on the way to Phalut from Sandakphu - serves as an important wetland in that area.
5. Jorepokhari (3150m) almost in drying stage situated at Neora valley national park.
6. Drinking water reservoir at Delo (1800m).
7. Mirik lake-developed for tourist attraction.
8. Intensely folded rock structure-an evidence of plate collision at National highway NH 31A.
9. Coal seam in the Siwalik belt at Bagrakot (350m).
10. Mineral Oxide deposited on the rock surface in the Siwalik range at Kambal (400m).
11. Unconsolidated material of the Siwalik range at Lesh river bank.
12. Sub alpine vegetation of Singalila national park.
13. Vegetation of Singalila national park.
14. A view of terai from Namthing lake 1800m.
15. Vegetation of Alubari-Neora valley national park.
16. Jaldhaka village and vegetation showing sub tropical vegetation.
17. Paddy fields on the plains of northern Bengal.
18. Tourist hut at Phalut (3500m).



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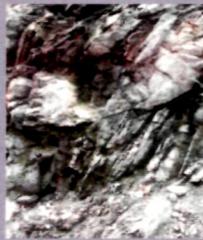
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19. Samanden village (3000m)- an ideal place for the ethnobotanical study.
20. Village of Rambai Cinchona plantation and Rambai Forest.
21. Typical Nepalese/Gorkha house and modern houses at Mungpoo.
22. Village of Munsong Cinchona plantation.
23. Fangtar village at the bank of river Lesh.
24. Typical roof made of *Aurandinaria maling* Gamble
25. Village located at Neora valley national park.
26. A typical house at Tangta village.
27. A typical Nepalese/Gorkha house at Makum village.
28. Tamed tough terrain for the agriculture in Yangmakum village.
29. Ploughing for the new season crop at Suruk village.
30. Members of Rai family at Solak village who prepare clothes from the stem bark of *Girardinia diversifolia* (Link) Friis in this region.
31. Herbal healer of spiritual power Ong Tshering Lepcha and his domestic helpers being interviewed by Dr.R.B.Bhujel at Pochok village of Kalimpong.
32. Villagers at Ponglakha (Kalimpong sub division) carrying the flowers of *Rhododendron arboreum* Smith and stem bark of *Edgeworthia gardneri* (Wall.) Meisner used for various household purposes.
33. A women at work in Kambal village preparing cattle feed.
34. An experienced village folk of Panbu village.
35. A domesticated fowl (hen) kept for the incubation.
36. A women collecting leaf and young shoots of nettle plant (*Urtica dioica* L.) for food and medicine.



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37. Tea plucking at Rangneet Tea Garden, Darjeeling.
38. A girl carrying fuel wood for rainy season.
39. A man carrying fodder for the domesticated cattle and goat.
40. A man showing mono pan balance generally used in trading at *haat* (one day village market).
41. Village children playing in the paddy field.
42. A woman collects milk in bamboo vessel of *Dendrocalamus sikkimensis* Gamble.
43. Extraction of butter by the process of churning on Bamboo vessel in the cowshed of Singalila national park.
44. A man making ropes from the stem bark of *Sterculia villosa* Smith at Kambal village.
45. A village man taking out bamboo strips (Choya).

46. Weaving of baskets by the bamboo strips (*Dendrocalamus hamiltonii*, *Bambusa nutans*) at Rimbick village.
47. Husking of paddy by traditional method at Kambal village.
48. Animal sacrifice-a part of Nepalese/Gorkha culture during major festivals in *Dashai* (Dashera).
49. *Jhankri* dance celebration *Gurupuja* at Chowrasta (Darjeeling).
50. An aged *Jhankri* returning home from Mahakal danra (Darjeeling) concluding *Gurupuja*.
51. Two *Jhankries* at trance state during *Gurupuja*.
52. A decorated rim of *Dhyangro* (*Jhankri*'s two headed drum) during *Gurupuja*.
53. A Rai *Bijuwa* facing to the altar during *Gurupuja* ceremony which is decorated with ceremonial offering at his house.
54. Lepcha men in traditional dresses.
55. Lepcha women in traditional dresses.



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56. Folkdance of Lepcha people.
57. Lepcha people participating in archery competition.
58. Lepcha people-showing the ceremony of *Muk-Zik-Rum-Feet* (worshipping of mother nature).
59. Buddhist priests (lamas) at the religious ceremony at Rambhi village.
60. Buddhist priest (lama) conducting religious rites at Kambal village.
61. A group of Bhutia women participating in a cultural show at Kalimpong.
62. A group of Bhutia men participating at the cultural show at Kalimpong.
63. Gorkha women in traditional dresses celebrating *Dashai* (autumn festival at Kalimpong).
64. A couple in traditional dresses taking part in *Dashai* festival at Kalimpong.
65. An aged Gorkha man dancing the tune of *Damphu* (traditional single headed drum) at *Dashai* festival at Darjeeling.
66. An aged Gorkha man participating on the *Dashai* festival with his *madal* (two headed drum) at Darjeeling.
67. Confluence of river Teesta and Rangit- an ideal place for *Manghe sankrati* (traditional winter festival).
68. Worshipping the river Teesta in their traditional way during *Manghe sankrati*.
69. Women enjoys on swinging (traditional amusement) during *Manghe sankrati*.
70. Bridge under construction over Rambhi river-engineered indigenously.
71. Recording of ethnobotanical information from herbal healer and experienced village folk at Kambal village.
72. Specimen collection at Makum village.
73. Recording of traditional knowledge from an experienced village folk at Kambal village.



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74. Lama (spiritual healer) of Tangta with his assistant.
75. Baidhya Chewang Pakhrin-an orthopaedic specialist of traditional medical system hails from 16th miles, Kalimpong.
76. Patients under the treatment of Baidhya Chewang Parkrin at his private Chikitsalaya(hospital).
77. A Buddhist priest (lama)-Dinchen Rinpoche who also practices herbal medicines at his *Gumba* (monastery) at Mungpoo.
78. A herbal healer of spiritual power at Solak village.
79. Wild edible fruits at the markets of Kurseong town.
80. Sales of the dried medicinal plant parts.
81. *Cyathea spinulosa* Wall.ex Hook.
82. *Gleichenia glauca* (Thunb.) Hook.
83. *Abies densa* Grief. ex Parker
84. *Juniperus recurva* Buch.-Ham.ex D.Don
85. *Taxus baccata* L.subsp. *wallichiana* Zucc.
86. *Aconitum bisma* (Buch.-Ham.) Rapaics at flowering and fruiting condition.
87. *Aconitum spicatum* (Bruhl) Stapf.
88. *Clematis montana* Buch.-Ham. ex DC.
89. *Thalictrum chelidonii* DC.
90. *Stephania glabra* (Roxb.) Miers.
91. *Holboellia latifolia* Wall. var. *angustifolia* (Wall.) Hook.f. & Thoms.
92. *Mahonia napaulensis* DC.



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