Chapter 4

Materials and Methods
MATERIALS AND METHODS

4.1 Study site:

The present work is primarily based on thorough field survey in the study sites located in and around Ayodhya Hills, of Purulia district of West Bengal (Fig.2,3 and Plate 6), a precise account of which is given in the following.

Ayodhya Hills spreads over an area of about 320 sq km covering four Blocks of the district, viz. Jhalda, Baghmundi, Balarampur and Arsha Blocks. The word ‘Ayodhya’ is derived from a Dravidian word ‘Ajhaida’ (Ajhai=large, Da=daha) i.e. there was a large abyss (daha). In Ayodhya hill there are 70 localities containing 15-20 thousands inhabitants, two Gram Panchayats- Ranga and Ayodhya, a library, an office of Comprehensive Area Development Corporation, Ayodhya Hills Hospital, Water Project etc. With a height of 2200 feet, Ayodhya Hills assumes the shape of the letter ‘L’ to cover a length of 32 miles and width of 10 miles. The tribal communities settled in and around Ayodhya Hills are designated as Paharia, Santhal, Birhor, Munda, Bhumij and Ghashi. To these tribal communities of Purulia district, Ayodhya Hills is sacred. In santhali language the word ‘buru’ denotes ‘pahar’ (rock) like Gaga buru, Garga buru, Matha buru, Chemtu buru etc.

Several concealed streams and brooks have emerged from Ayodhya Hills like Kansai, Rupai, Kerensai, Saharjuri, Samarbishi, Bandu, Chatuhasa, Kumari, Lekragara, Kulbera, Shakha, Shova, Bamni, Kadrugara, Machkanda, etc making way through the associations of herb, climber, shrubs and trees.

Keeping parity with the objective of studying direct man-plant relationship, field surveys were conducted in such parts of Ayodhya Hills which are rich in tribal populace as well as biodiversity (Table 6).

The study-schedule followed in this work covers two interrelated disciplines i.e. ethnobotany and taxonomy for execution of which extensive field work (Plates 7-9). The data thus generated from these two disciplines have been compiled and systematically presented in the Chapter 5 entitled “RESULTS”.

In addition to documentation of traditional knowledge species wise consumption and use of non-timber forest produce / products for income generation were also perspectives of concern during field work. The ethnobotanical and taxonomic methods followed in this work are stated separately in the following.
4.1.1 Ethnobotanical studies:

For ethnobotanical studies, the principles and practices communicated in the work of Jones (1941), Shultes (1960, 1962), Croom (1983), Jain (1987, 1989), Rao (1989), Bellany (1993), Chadwick and Marsh (1994) and Cotton (1996) were adopted and a questionnaire and data collection sheet were prepared while collecting data during field work emphasis was given on documentation of traditional knowledge regarding use of Non timber forest produce so as to assess the dependence of ethnic communities on the non timber forest products (NTFPs) and its conservational implications.

Demographic data related to tribes of Ayodhya Hills were noted from Census of India (2001). The tribes selected for the present study were Santhal, Paharia, Bhumij, Munda and Birhor residing in or close to forests covering different parts of Ayodhya Hills. The author being aware of “Article 8(J): Traditional Knowledge” of CBD initiated the work sharing the moral responsibility to respect, preserve and maintain the Traditional Knowledge (TK), promote the same with the approval and involvement of the holders and share equitably the benefits if any arises from it.

The focus of the present study was kept on the traditional knowledge of the indigenous tribal communities about the sustainable use of phytoresources especially concerning medicinal plants in their surroundings. Plants used by them in worship, mythology, taboos, magico-religious practices, ceremonies etc. were also given adequate attention, since cultural activities have an age-long strong traditional integration with conservation of biodiversity.

Field trips were planned in such a way so as to cover the study site at different seasons since 2008 (Table 6). During field trip time was spent to come in close acquaintance with the local chiefs, priests, vaidyas i.e. herbal doctors, elderly people especially middle aged women to gather data with their full consent (as per the guidelines laid down in CBI ) about their knowledge. related to use of different trees, herbs, shrubs, vines etc. as source of food, forage, fibre, floss, medicines, dyes, gums, leaf plates, pole wood, incense etc. (Plates 1-10) following standard ethnobotanical method (Rao, 1989) and recorded in the questionnaire, a sample of which is given herewith. Different types of data collecting sheets were used, viz. for plant used by tribals for purpose other than timber, for traditional healers, and ethnomedicinal uses of plants.

Regarding medicinal uses and properties, the data once recorded were cross checked through frequent visits and subsequent interaction with at least 3-4 informants in each case. The names and precise address of herbal practitioners along with their
photographs have been documented for ensuring protection of their Intellectual Property Rights (IPR).

The medicinal uses which were recorded from primary sources were further referred to pertinent literature (Chopra et al., 1949, 1956, 1958, 1969; Wealth of India, 1948, 1976; Tarafdar 1983 a,b,c; Jain,1991; Pal and Jain, 1998; Kirtikar and Basu, 2003) to detect whether the uses are already in record or are novel. The information from secondary sources was also recorded to enable assessment of the use potential of the plants in the surroundings of tribal hamlets. An exploration of socio-cultural characteristics and the activity of tribal communities was done through interviews and surveys, which helps to reveal implication of NTFPs in such aspects.

### DATA COLLECTING SHEET FOR ETHNobotanical STUDIES

1. Name of the local informant:  
   Sex:
2. Address: (Specific with name of village/town & Block):
3. Occupation:
4. Date:  
   Collection No.
5. Name of the Species about which the information is recorded:  
   (along with family and class i.e. Monocot/Dicot)
6. Local name (s)
7. Locality wherefrom specimen was collected
8. Name of the disease/ailment cured: (mention the local name of the ailment also and the associated sufferings of the patient so as to make medical diagnosis easier).
9. Height of the plant:  
   (Small, medium, tall, very tall etc.)
10. Flowering and fruiting time:
11. Flower colour:
12. Smell/aroma:
13. Ecological/Field notes:
14. Availability/Status: Common/Rare/Threatened
15. Plant parts used in medicine/ as source of food/ others (to be specified)  
   Root / Stem / Twig / Leaves/ Root-bark / Stem-bark / Exudates:
   Flower/ Fruit/ Seed:
16. Information regarding wild edible (eaten raw/ dried/ boiled and cooked/fried/ pickled/)
17. How is the plant used for medicine? Fresh/Dried/Boiled
18. Method(s) of preparation: (Infusion/decoction/leachate/ /juice or sap/gum/resin extracted/Powdered/made into pills/ extracted with cold water/ with hot water/ boiled water/ extracted with country liquor/ other methods)
19. Mode of administration/ application of medicine.  
   (oral/eaten/chewed/brushed/swallowed/as soft or hot drink/external [lotion, ointment, balm etc.],inhalation, body contact/possession/ magnetization/ gargle/fomentation/smearing/ application on scalp/retention below pillow/ etc):
20. Dosage:
21. How is the medicine stored and how long?
22. Any other information: e.g. prohibitions etc.
4.1.2 Taxonomic studies:

During field work the specimens of plants related to the documented traditional knowledge and ethnic non timber uses were considered for taxonomic studies. Necessary guidelines and field equipments and specific information/data-collecting sheets were used, a specimen copy of each of which is enclosed. Since many of the species of the forest community under study are quite rare much emphasis was given on observations and notes during field study instead of plucking or damaging them for herbarium preservation. When the species was common and adequate to afford collections, then specimens were collected from them for herbarium preservation and taxonomic work. Standard herbarium sheets measuring 42 x 12 cm were used for mounting specimens after proper pressing, drying and poisoning. With each specimen a label inscribing place and date of collection, field number, and certain important phenotypic characters which usually disappear on preservation, was affixed (Plates 10-13). Such specimens were submitted to the Ecotaxonomy Laboratory of the department of Botany of Burdwan University (B.U.) for preservation. Specimens of all concerned species collected during field survey were taxonomically studied.

The samples (material) used for taxonomic descriptions were the whole plant, stem, leaves, flowers, fruits and seeds. Dry flowers collected from the specimens own collections, were immersed in boiling water for a brief period for softening. In some cases, wherever possible, fresh materials were worked out. Each material was placed on clean glass slide and dissected. To the dissected part a few drops of aqueous glycerin solution (10%) were added and covered with cover slips for observation under binocular stereoscopic dissecting microscope (Brand-Olympus 84122). For preliminary observations on nodes, pubescence of plant parts, leaf-margins, venation type etc. hand lens and ordinary simple microscopes were used. For certain critical observations on sections of ovary, nature of ovule and seed, trichome type etc. compound light microscopes were used (Brand-Magnus MLX-D x 527955). Much care was taken while preparing line drawings of the vegetative and reproductive parts of the specimens worked out (Figs. 26-30). All measurements were taken in metric system. The plants were identified accurately using pertinent literature and checking up with authentic specimens preserved in the Central National Herbarium (CAL) at Indian Botanic Garden, Howrah, West Bengal. The specimens, thus studied in respect of each species have been referred to under Exsiccatae. Nomenclature of each species has been checked with that given in the latest publications (Prains, 1913; Bennet, 1987; Guha Bakshi, 1984; Murti and Panigrahi,
Materials and methods

1999; Camble et al. 1988; Bhattacharyya and Sarkar, 1988). Family citations have been confirmed with Mabberley, 2008). Comprehensive artificial keys to the concerned families, genera and species were prepared to facilitate ready identification. Standard abbreviations were used as and when required some of which have been placed in Table 2.

The systematic account starts with the comprehensive key to identification of the families. Its presentation is followed by keys to the identification of genera in cases. Artificial keys to the identification of species are presented for genera including more than one species. The systematic account of each species presented here incorporates the original citation (protologue), vernacular name(s), basionyms when pertinent, other familiar synonyms, morphological descriptions, information about flowering and fruiting periods, field notes, Indian distribution, local status, uses from primary and secondary sources, observation on use and specimens examined (exsiccate).

**DATA COLLECTION SHEET (FOR TAXONOMIC INFORMATION)**

<table>
<thead>
<tr>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of the plant species</td>
</tr>
<tr>
<td>Local name                                     : ..........................................................</td>
</tr>
<tr>
<td>Common English name                            : ..........................................................</td>
</tr>
</tbody>
</table>
| Scientific name                                : ..........................................................
| Family                                         : .......................................................... |
| Botanical description of the plant            |
| Plant’s cycle                                  : Annual / Biennial / Perennial |
| Type of growth                                 : Herb / sub-shrub / shrub / Tree /
| climber                                        |
| Height (cm)                                    : .................................................. |
| Plant’s cycle                                  : Spreading / Soporiferous / Erect / Creeping |
| Local status                                  |
| Name of the area(s) of availability            : .......................................................... |
| Local status                                  |
| Propagation                                   |
| Means of propagation                          : Seed / rhizome/tuber/bulb etc. |
Table 6. A record of field visits during the tenure of the present work.

<table>
<thead>
<tr>
<th>Months</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>Region surveyed</th>
<th>Tribal Villages and Forest areas in and around where botanization was done</th>
</tr>
</thead>
<tbody>
<tr>
<td>February</td>
<td></td>
<td>19-21</td>
<td></td>
<td>R5,R4</td>
<td>V14, V8,V9,V23</td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>3-6</td>
<td>22-25</td>
<td></td>
<td>R4,R3</td>
<td>V19, V18,V15, V34,V6, V3</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td></td>
<td>5-7</td>
<td></td>
<td>R4,R1</td>
<td>V36, V16</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>11-14</td>
<td></td>
<td></td>
<td>R2,R3</td>
<td>V1, V11</td>
<td></td>
</tr>
<tr>
<td>June</td>
<td></td>
<td>23-26</td>
<td></td>
<td>R2</td>
<td>V4, V33</td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>5-7</td>
<td>18-20</td>
<td></td>
<td>R3,R4</td>
<td>V22, V32</td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>21-24</td>
<td></td>
<td></td>
<td>R4</td>
<td>V34, V17</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>2-4</td>
<td></td>
<td></td>
<td>R1,R2,R3,R4,R6</td>
<td>V20,V29,V1,V12,V15,V27,V25,V18</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td></td>
<td>10-13</td>
<td></td>
<td>R2</td>
<td>V10, V35</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>25-30</td>
<td>28-30</td>
<td></td>
<td>R2,R3,R4</td>
<td>V28,V21,V7,V13,V30,V26</td>
<td></td>
</tr>
</tbody>
</table>

Table 7. Legend of region codes.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Regions</th>
<th>Legend of Region Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Arsa</td>
<td>R1</td>
</tr>
<tr>
<td>2.</td>
<td>Ayodhya</td>
<td>R2</td>
</tr>
<tr>
<td>3.</td>
<td>Bagmundi</td>
<td>R3</td>
</tr>
<tr>
<td>4.</td>
<td>Balarampur</td>
<td>R4</td>
</tr>
<tr>
<td>5.</td>
<td>Jhalda</td>
<td>R5</td>
</tr>
<tr>
<td>6.</td>
<td>Sinbhum</td>
<td>R6</td>
</tr>
</tbody>
</table>

Table 8: Legend of tribal villages and forest area codes.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tribal villages and Forest areas</th>
<th>Legend of Area Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Baganditola</td>
<td>V1</td>
</tr>
<tr>
<td>2.</td>
<td>Bamunjora</td>
<td>V2</td>
</tr>
<tr>
<td>3.</td>
<td>Banbhuti</td>
<td>V3</td>
</tr>
<tr>
<td>4.</td>
<td>Baria</td>
<td>V4</td>
</tr>
<tr>
<td>5.</td>
<td>Bela</td>
<td>V5</td>
</tr>
<tr>
<td>6.</td>
<td>Bersa</td>
<td>V6</td>
</tr>
<tr>
<td>7.</td>
<td>Bhupatipally</td>
<td>V7</td>
</tr>
<tr>
<td>8.</td>
<td>Bidighati</td>
<td>V8</td>
</tr>
<tr>
<td>9.</td>
<td>Charida</td>
<td>V9</td>
</tr>
<tr>
<td>10.</td>
<td>Charka hill</td>
<td>V10</td>
</tr>
</tbody>
</table>
Table 8: Legend of tribal villages and forest area codes.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tribal villages and Forest areas</th>
<th>Legend of Area Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Chatni</td>
<td>V11</td>
</tr>
<tr>
<td>12.</td>
<td>Chetni</td>
<td>V12</td>
</tr>
<tr>
<td>13.</td>
<td>Chitaha</td>
<td>V13</td>
</tr>
<tr>
<td>14.</td>
<td>Echari</td>
<td>V14</td>
</tr>
<tr>
<td>15.</td>
<td>Ghatbera</td>
<td>V15</td>
</tr>
<tr>
<td>16.</td>
<td>Kantadih</td>
<td>V16</td>
</tr>
<tr>
<td>17.</td>
<td>Khukri</td>
<td>V17</td>
</tr>
<tr>
<td>18.</td>
<td>Khuntar</td>
<td>V18</td>
</tr>
<tr>
<td>19.</td>
<td>Kolabera</td>
<td>V19</td>
</tr>
<tr>
<td>20.</td>
<td>Kourang</td>
<td>V20</td>
</tr>
<tr>
<td>21.</td>
<td>Madla</td>
<td>V21</td>
</tr>
<tr>
<td>22.</td>
<td>Majhidi</td>
<td>V22</td>
</tr>
<tr>
<td>23.</td>
<td>Manibera</td>
<td>V23</td>
</tr>
<tr>
<td>24.</td>
<td>Matha forest</td>
<td>V24</td>
</tr>
<tr>
<td>25.</td>
<td>Muria</td>
<td>V25</td>
</tr>
<tr>
<td>26.</td>
<td>Necre</td>
<td>V26</td>
</tr>
<tr>
<td>27.</td>
<td>Parbaid</td>
<td>V27</td>
</tr>
<tr>
<td>28.</td>
<td>Pathar bandh</td>
<td>V28</td>
</tr>
<tr>
<td>29.</td>
<td>Pathar dihi</td>
<td>V29</td>
</tr>
<tr>
<td>30.</td>
<td>Purudi</td>
<td>V30</td>
</tr>
<tr>
<td>31.</td>
<td>Ranga</td>
<td>V31</td>
</tr>
<tr>
<td>32.</td>
<td>Rangadih</td>
<td>V32</td>
</tr>
<tr>
<td>33.</td>
<td>Rangadihidera</td>
<td>V33</td>
</tr>
<tr>
<td>34.</td>
<td>Tilagora</td>
<td>V34</td>
</tr>
<tr>
<td>35.</td>
<td>Upper dam (Top hill area)</td>
<td>V35</td>
</tr>
<tr>
<td>36.</td>
<td>Urma</td>
<td>V36</td>
</tr>
</tbody>
</table>

Table 9. Abbreviations used in the text

<table>
<thead>
<tr>
<th>Abbreviations</th>
<th>Full form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cm</td>
<td>Centimeter</td>
</tr>
<tr>
<td>Diam</td>
<td>Diameter</td>
</tr>
<tr>
<td>Dist.</td>
<td>District</td>
</tr>
<tr>
<td>Ed.</td>
<td>Edition</td>
</tr>
<tr>
<td>et al.</td>
<td>et aliorum</td>
</tr>
<tr>
<td>f.</td>
<td>form/forma</td>
</tr>
<tr>
<td>Fig.</td>
<td>figure</td>
</tr>
<tr>
<td>Fl. &amp; Fr.</td>
<td>Flowering and Fruiting</td>
</tr>
<tr>
<td>M</td>
<td>Meter</td>
</tr>
<tr>
<td>Mm</td>
<td>Milimeter</td>
</tr>
<tr>
<td>ssp.</td>
<td>subspecies</td>
</tr>
<tr>
<td>syn.</td>
<td>synonymon</td>
</tr>
<tr>
<td>var.</td>
<td>Variety</td>
</tr>
<tr>
<td>Vern. Name</td>
<td>Vernacular name</td>
</tr>
<tr>
<td>Vill.</td>
<td>Village</td>
</tr>
</tbody>
</table>
4.2 Studies on Inter-tribal relationship based on Traditional Knowledge (TK) about use of phytoresources:

For cluster analysis, 5 tribal communities studied here have been treated as Operational Units and each of 125 species has been considered a two state unit character or variable since the knowledge of each community about the use of each species (IK) considered to exist in two alternative forms or states i.e. either known [or ‘Yes’] or unknown [or ‘No’]. Response of each tribe to each of the species was coded in a data matrix as ‘1’ and ‘0’ respectively for two alternative states i.e. use known [Yes] or use not known [No]. The data thus recorded were (Table 3) further utilized in finding the overall similarities or rather the natural relationship (distance between tribes in relation to their TK) and putting them in clusters using the concept of ‘Euclidean Distance’ for measuring distance and ‘Complete Linkage’ for amalgamation or linkage. The software Statistica version 5.0 was used for the purpose which provides a common technique for data analysis to assign a set of observations into subsets (clusters) so that observations in the same cluster are similar in some sense. Of the different linkage or amalgamation rules to determine when two clusters are sufficiently similar to be linked together, the complete linkage (furthest neighbor) rule has been used. In this method the distances between clusters are determined by the greatest distance between any two objects in the different clusters i.e., by the “furthest neighbors”(Hill and Lewicki, 2007; Electronic Version: Stat Soft, Inc., 2011).

The Euclidean distance was determined by using the following formula:

$$ \text{Distance (X, Y)} = \sqrt{\sum_{i=1}^{n} (V_{xi} - V_{yi})^2} $$

Where, \(d (X, Y)\) is the distance between the units X and Y, n is total number of characters, \(V_{xi}\) the character-state value of X for character ‘I’ and \(V_{yi}\) is the character-state value of Y for character ‘I’.

A vertical ‘Hierarchical Tree Plot’ was obtained where the vertical axis denotes the linkage distance and the horizontal axis denotes the objects, i.e. the tribes. In the graph, at each node where a new cluster was formed, the criterion distance at which the respective elements were linked together into the new single cluster, was read out and recorded.
4.3 Livelihood perspectives of non-timber forest produce:
Tribal hamlets were visited from time to time for gaining experience regarding their dependence on NTFPs and their way of life was observed (Plates31-35). During field survey no less than 71 persons belonging to Santhal, Munda, Paharia, Birhor and Bhumij communities were interrogated regarding use of non-timber forest produces (raw material of forest plant origin) subsequent to which the following data-sheet was filled in on the spot.

<table>
<thead>
<tr>
<th>Data sheet for recording NTFP-based income generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Name:      Sex:       Age:</td>
</tr>
<tr>
<td>2. Tribe</td>
</tr>
<tr>
<td>3. No. of family members</td>
</tr>
<tr>
<td>4. Village</td>
</tr>
<tr>
<td>5. Plant part(s) collected</td>
</tr>
<tr>
<td>6. Purpose</td>
</tr>
<tr>
<td>(a) Own consumption</td>
</tr>
<tr>
<td>(b) Sale in the local market</td>
</tr>
<tr>
<td>(c) Sent outside for sale</td>
</tr>
<tr>
<td>7. Processing:</td>
</tr>
<tr>
<td>(a) Raw</td>
</tr>
<tr>
<td>(b) Processed</td>
</tr>
<tr>
<td>8. Availability</td>
</tr>
<tr>
<td>9. Monthly income from NTFPs.</td>
</tr>
</tbody>
</table>

4.4 Animal resources in use:
During field study some observations were also made on animal resources linked in general with the lives of tribal communities. Gathering of plant parts and hunting of wild animals in special occasions, were found to be a part of the lives of indigenous communities of forested areas. However the Birhors, the monkey eating tribals settled in the Ayodhya Hills of West Bengal depend mainly on animal resources. In view of this animal resources linked with the lives of Birhor community were recorded an account of which was prepared with the scientific and vernacular names of the species concerned, their systematic positions and uses (Table 11).
Plate 7. Different forest office which were visited during field work

Plate 7a
Jhalda Forest Range Office, Purulia

Plate 7b
Matha Forest Range Office, Purulia

Plate 7c
Balarampur Forest Range Office, Purulia

Plate 7d
Ghatbera Forest Range Office, Purulia
Plate 8. Some moments of field work both in forest and tribal hamlets

Plate 8a. Field work in Ghatbera forest area.

Plate 8b. The Sikari man (Birhor) is describing (with dry skin of monkey) the process of monkey hunting with net at Bersa village.

Plate 8c. Field data collection in Bagmundi forest area

Plate 8d. During collection of information about the use of NTFPs from Paharia women at Tilagora forest area.

Plate 8e. A moment with Bhumij women at Tilagora forest area.

Plate 8f. While collecting information about edible use of wild plants from Birhor men at Bersa village.
Plate 9. Moments of documentation of indigenous knowledge from different herbal practitioners.

Plate 9a. Documentation of medicinal uses of various plants from Sri Baneswar Mandi - a renowned herbalist of Ghatbera village

Plate 9b. Knowledge documentation from Paitu Hansda - a herbalist of Khunta village

Plate 9c. Moment of documentation about various plant parts used as crude drugs for preparation of folk medicines from local haat at Kourang village.
Plate 11. Herbarium specimens

Plate 11a. *Boswellia serrata*

Plate 11b. *Terminalia chebula*

Plate 11c. *Ficus benghalensis var. krishnae*

Plate 11d. *Ficus racemosa*
Plate 12. Herbarium Specimens

Plate 12a. *Woodfordia fruticosa*

Plate 12b. *Helicteres isora*

Plate 12c. *Holarrhena pubescens*

Plate 12d. *Bauhinia purpurea*
Plate 13. Herbarium specimens

Plate 13a. *Mallotus philippinensis*
Plate 13b. *Lagerstroemia parviflora*
Plate 13c. *Smilax perfoliata*
Plate 13d. *Asparagus racemosus*
Plate 14. Herbalists who were consulted for ethnomedicinal documentation

**Plate 14a**

Name: Kalha Murmu  
Age: 70  
Address: Vill- Banbhuti, Dist- Purulia  
**Expert in the treatment of:** Urinary infection.

**Plate 14b**

Name: Sitaram Murmu  
Age: 55  
Address: Vill+Post- Ranga; Thana- Bagmundi. Dist- Purulia  
**Expert in the treatment of:** Sexual disorder (Female), Malaria, Jaundice, Dog biting, Poisonous insect biting, Veterinary diseases.

**Plate 14c**

Name: Sulachana Murmu and Ghontu Murmu  
Age: 70, 65  
Address: Vill.- Ayodhya, Dist.- Purulia  
**Expert in the treatment of:** Snake bite, urinary infection, gynecological disorders.
Plate 15. Herbalists who were consulted during ethnomedicinal documentation

Name: Bijoy Rajak
Age: 65
Address: Vill.- Echari, Po. Balarampur, Dist. Purulia
Expert in the treatment of: Epilepsy, snake bite, Jaundice, sexual disorders (Female), Pain in bone, bleeding from nose, thyroid, blood sugar.

Name: Dhananjoy Sing Sardar
Age: 83.
Address: Vill.- + Post.- Chorida, Dist.- Purulia

Name: Binay Rajak
Age: 73.
Address: Vill.- Bela. Thana- Balarampur, Dist.- Purulia
Expert in the treatment of: Gastric ulcer, blood pressure, piles, sexual disorders, bone setting, asthma, non fertility.

Name: Mongol Sing Babu
Age: 85
Address: Matha village, Po. Matha Forest
Expert in the treatment of: Snake bite, blood pressure, Jaundice.
Plate 16. Herbalists who were consulted during ethnomedicinal documentation

**Name:** Baneswar Mandi  
**Age:** 83  
**Address:** Vill.- Parbaid, Post- Ghatbera, Dist.- Purulia  
**Expert in the treatment of:** Blood dysentery, fever, gynecological disorders, migraine, diabetes, cardiac problem, TB

**Name:** Monotosh Sohis  
**Age:** 45  
**Address:** Vill.- Patharbandh, Thana : Balarampur, Dist. Purulia  
**Expert in the treatment of:** Chicken pox, asthma, epilepsy, eczema, non fertility, sexual disorders, veterinary ailments.

**Name:** Vajahari Tudu  
**Age:** 75  
**Address:** Vill.- Echari, Dist.- Purulia  
**Expert in the treatment of:** Epilepsy, veterinary diseases.
Plate 17. Herbalists who were consulted during ethnomedicinal documentation

**Name:** Kasim Sardar  
**Age:** 79  
**Address:** Vill.- Kourang, Thana- Arsa, Dist.- Purulia  
**Expert in the treatment of:** Fever, dysentery, arthritis.

**Plate 17a.**

**Name:** Najir Sing Sardar  
**Age:** 67  
**Address:** Vill.- Kourang, Thana- Arsa, Dist.- Purulia  
**Expert in the treatment of:** Urinary infection, jaundice.

**Plate 17b.**

**Name:** Duboraj Mahato  
**Age:** 59  
**Address:** Vill.- Kourang, Thana - Arsa. Dist.- Purulia.  
**Expert in the treatment of:** Red urine, burning sensation in body, Jaundice, dysentery.

**Plate 17c.**

**Name:** Ram Mahato  
**Age:** 67  
**Address:** Vill.- Kourang. Dist.- Purulia  
**Expert in the treatment of:** Gastric ulcer.

**Plate 17d.**
Plate 18. Herbalists who were consulted during ethnomedicinal documentation.

Name: Bharat Mahato  
Age: 80  
Address: Vill.- Kourang, Dist.- Purulia  
Expert in the treatment of: Snake bite, urinary infection.

Name: Vaskar Mahato  
Age: 58  
Address: Vill.- Kourang, Dist.- Purulia  
Expert in the treatment of: Diabetes, pox, asthma, arthritis.

Name: Aditya Laya  
Age: 33  
Address: Vill.- Baganditola, Po. Ayodhya  
Dist.- Purulia  
Expert in the treatment of: TB, asthma.

Name: Gour Pada Pramanik  
Age: 70  
Address: Vill.- Baganditola, Po. -Ayodhya  
Dist.- Purulia  
Expert in the treatment of: Malaria, urinary infection.
Plate 19. Herbalists who were consulted during ethnomedicinal documentation

Name: Sirkanta Bersa
Age: 72.
Address: Vill.- Chatni, Thana.- Bagmundi, Dist.- Purulia

Name: Gurucharan Banda
Age: 43
Address: Vill.- Manas muria, Thana: Bersa

Name: Somechand Sikari
Age: 43
Address: Vill.- Baria, Po. Pathardih, Dist.- Purulia

Name: Asish Ghatoari
Age: 32.
Address: Thana- Balarampur. Dist.- Purulia
Plate 20. Herbalists who were consulted during ethnomedicinal documentation

Name: Rasaraj Mahato
Age: 75
Address: Vill.- Chitahah. Thana- Balarampur Dist. -Purulia.
Expert in the treatment of: Gynecological disorders,

Name: Gopal Chandra Sohis
Age: 63.
Address: Vill.- Purudih, Po.- Necre. Dist.- Purulia.

Name: Nobin Murmu
Age: 68.
Address: Vill.- Echari. Dist. Purulia
Plate 21. Herbalists who were consulted during ethnomedicinal documentation

Name: Kalipada Paharia  
Age: 75,  
Address: Vill.- Tilagora, Dist.- Prulia  

Name: Bishnucharan Das  
Age: 72  
Address: Vill.- Ghatbera, Dist.- Purulia  

Name: Rama Kanta Garai  
Age: 68.  
Address: Vill.- Bela gram. Thana- Balarampur  

Name: Sanatan Paharia  
Age: 40.  
Address: Vill.- Tilagora. Dist.- Purulia.  
Plate 22. Herbalists who were consulted during ethnomedicinal documentation

**Plate 22a.**

**Gorachand Sohis**

- **Name:** Gorachand Sohis
- **Age:** 70.
- **Address:** Vill.- Purudih. Dist.- Purulia.
- **Treats patients of:** Fever, scabies, gynecological disorders.

**Plate 22b.**

**Madiram Sing sordar**

- **Name:** Madiram Sing sordar
- **Age:** 70
- **Address:** Vill.- Ghatbera, Dist.- Purulia
- **Expert in the treatment of:** Blood dysentery, arthritis, gynecological disorders.

**Plate 22c.**

**Budheswar Sing sardar**

- **Name:** Budheswar Sing sardar
- **Age:** 77.
- **Address:** Vill.- Saibordih, Thana- Balarampur Dist.- Purulia.
- **Expert in the treatment of:** Gastric ulcer, diarrhoea, arthritis, TB.

**Plate 22d.**

**Paitu Hansda**

- **Name:** Paitu Hansda
- **Age:** 75.
- **Address:** Vill.- Khunta, Dist.- Purulia
- **Expert in the treatment of:** Liver problem, arthritis, gynecological problems.
Plate 23. Herbalists who were consulted during ethnomedicinal documentation

**Name:** Bishnucharan Hansda  
**Age:** 67.  
**Address:** Vill.- Khunta. Dist.- Purulia  
**Expert in the treatment of:** Arthritis, liver problem.

**Name:** Jiben Tudu  
**Age:** 60.  
**Address:** Vill.- Ranga. Dist.- Prulia  
**Expert in the treatment of:** Dyspepsia, jaundice, diabetes, skin diseases.

**Name:** Dhaman Murmu  
**Age:** 65.  
**Address:** Vill.- Chitaha. Dist.- Purulia  
**Expert in the treatment of:** Dysentery, Diarrhoea. Sexual disorder (Both male and Female)
Plate 24. Herbalists who were consulted during ethnomedicinal documentation

**Name:** Shankar Soren  
**Age:** 57.  
**Address:** Vill.- Bidighati. Dist.- Purulia.  
**Expert in the treatment of:** Urinary infection, TB, fever, veterinary diseases.

**Name:** Radhu Hembrome  
**Age:** 55.  
**Address:** Vill.- Bidighati. Dist.- Purulia.  
**Expert in the treatment of:** Malarial fever, dysentery, snake bite, epilepsy.

**Name:** Subodhini Soren  
**Age:** 35.  
**Address:** Vill.- Manibera. Dist.- Purulia.  
**Expert in the treatment of:** Blood dysentery, urinary infection, jaundice.
Plate 25. Herbalists who were consulted during ethnomedicinal documentation

Name: Biswanath Soren
Age: 61.
Address: Vill.- Manibera. Thana.- Bagmundi.
Dist.- Purulia.

Expert in the treatment of: Jaundice, urinary infection, sexual disorder (both male and female).