Preliminary study on Ethno-medicinal plants used for treating malarial fever in Pilibhit Tiger Reserve, Uttar Pradesh, India.

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Abstract: Present study provides significant information on ethno-medicinal plants used for treating malarial fever by the Tharu tribe of Pilibhit Tiger Reserve. The ethno-medicinal data was collected by using prescribed questionnaire. A total 30 informants were critically interviewed for data collection. A total of 23 plant species representing 22 families were found to be commonly used to treat malarial fever. The families most represented were Lamiaceae (4 species) followed by Solanaceae (3 species), Cucurbitaceae and Menisper... 

Key words: Ethnomedicinal; Tharu; Malaria; Pilibhit Tiger Reserve

Introduction
The causal organism of malaria is a single celled protozoan parasites belonging to the genus Plasmodium and transmitted to man through the anophelines mosquito. It is one of the major fatal diseases in the world, especially in the tropics and is endemic in some 102 countries with more than half of the world population at risk (Symth, 1994). Malaria has a great morbidity and mortality than any other infectious diseases of the world (World Malarial Report, 2005; Smith, 1978; World Health Organization, 2000). It is caused by five species of parasite that affects humans. All the parasites belong to the genus Plasmodium: Plasmodium falciparum, P. vivax, P. ovale, P. malariae, P. knowlesi. Out of these five species, P. vivax and P. falciparum are the most dangerous species causing malaria in India. As per World Health Organization estimates there are 300- 500 millions cases globally and 1.5-2.7 millions death occur due to malaria each year, 90% of which are in Africa and most deaths (77%) occur in children under the age of five (WHO, 2013).

The ethnobotanical studies are often significant in revealing locally important plant species especially for the discovery of crude drugs. Right from its beginning, the documentation of traditional knowledge, especially on the medicinal uses of plants has provided many important drugs of modern day (Flaster, 1996). Many communities still prefer herbal medicine for treating many ailments, even where western care is available (Asfaw et al., 1999; Addis et al., 2001). More than 50,000 medicinal plants are reported to be used in the world for treating various ailments (Govaerts, 2001; Shippmann, 2002). The growing public interest and awareness of natural medicines have led the pharmaceutical industry and academic researchers to pay more attention to medicinal plants (Day, 1998). Medicinal plants have been used in the treatment and prevention of malaria in various parts of the world (Phillipson et al., 1987).

The Pilibhit Tiger Reserve (PTR) is situated between 28º52'- 28º46' N Latitude and 79º55'-82º15' E Longitude in the foothills of Himalaya adjoining Shukla Phanta Wildlife Reserve, Nepal. The Tharu tribe is the dominant primitive tribe of the Pilibhit Tiger Reserve and dependent on forest resources for their livelihood. In Terai region of Eastern UP the spreading of vector borne diseases become uncontrolled especially during rainy seasons (Qayum et al., 2013). The study was undertaken with an aim to document the medicinal uses of the plant species known to Tharu tribe of Pilibhit Tiger Reserve, Uttar Pradesh, India for treating malarial fever.

Materials and Methods
Extensive field survey in different remote areas of Pilibhit Tiger Reserve was undertaken to document the medicinal plants used for treating malarial fever (Figure 1). Such plants are enumerated alphabetically in (Table 1). The ethnomedicinal data was collected by means of interviews using prescribed questionnaire...
following the method adopted by the earlier workers (Raghavaih, 1956; Raizada, 1966; Jain 1988). Interviews and discussions were carried out using a local dialect for easy communication with the participants. A total 30 traditional healers, 26 men and 4 women were interviewed to collect information on herbal preparations. Voucher specimens were collected for making herbarium sheets by standard method (Jain and Rao, 1976). The collected specimens were identified by the published literature and local flora (Hooker, 1822 - 1883; Cooke, 1901-1908; Duthie, 1903-1929; Gamble and Fisher, 1915-1936, Kanjilal, 1933, Srivastava, 1976, 1993 and Srivastava et al., 1987) and finally housed in herbarium of CSIR- National Botanical Research Institute, Lucknow (LWG).

### Table 1: List of plant species used for treating malarial fever in Pilibhit Tiger Reserve

<table>
<thead>
<tr>
<th>Botanical name &amp; Collection Number</th>
<th>Family</th>
<th>Local Name</th>
<th>Growth form</th>
<th>Parts used and mode of Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Abrus precatorius</em> L. (258064)</td>
<td>Fabaceae</td>
<td>Gomachi</td>
<td>Climber</td>
<td>1 teaspoonful of seed powder with honey given twice a day for one week.</td>
</tr>
<tr>
<td><em>Abrus calabura</em> L. (258050)</td>
<td>Araceae</td>
<td>Buch</td>
<td>Herb</td>
<td>50 ml of whole plant decoction is given twice a day for one week.</td>
</tr>
<tr>
<td><em>Andrographis paniculata</em> (Burn.f.) Nees (258031)</td>
<td>Acanthaceae</td>
<td>Bhuineem</td>
<td>Herb</td>
<td>50 ml of rhizome decoction is given twice a day for 15 days.</td>
</tr>
<tr>
<td><em>Annona squamosa</em> L. (258009)</td>
<td>Annonaceae</td>
<td>Shanzila</td>
<td>Tree</td>
<td>Leaf poultice is applied 3-4 times a day on forehead for lowering the fever.</td>
</tr>
<tr>
<td><em>Aristolochia indica</em> L. (258008)</td>
<td>Aristolochiaceae</td>
<td>Ishamul</td>
<td>Climber</td>
<td>25 ml seed decoction is given thrice a day for one week.</td>
</tr>
<tr>
<td><em>Aegle marmelos</em> (L.) J.F. Mill. (258005)</td>
<td>Meliaceae</td>
<td>Neem</td>
<td>Tree</td>
<td>50 ml of root infusion is given thrice a day for one week.</td>
</tr>
<tr>
<td><em>Calotropis procera</em> (L.) Dryand. (258020)</td>
<td>Aselepiadaceae</td>
<td>Aakao</td>
<td>Shrub</td>
<td>5 gm root bark powder is given with honey thrice a day for 10 days.</td>
</tr>
<tr>
<td><em>Costus speciosus</em> (Aiton) Dryand. (258042)</td>
<td>Costaceae</td>
<td>Jangali aadrak</td>
<td>Herb</td>
<td>50 ml of rhizome decoction is given twice a day for 15 days.</td>
</tr>
<tr>
<td><em>Datura metel</em> L. (258072)</td>
<td>Solanaceae</td>
<td>Jangali aalu</td>
<td>Climber</td>
<td>30 ml of tuber decoction is given thrice a day for 10 days.</td>
</tr>
<tr>
<td><em>Eucalyptus citriodora</em> Blume (258063)</td>
<td>Meliaceae</td>
<td>Nay</td>
<td>Herb</td>
<td>100 ml of leaf infusion is given thrice a day for 10 days.</td>
</tr>
<tr>
<td><em>Hyptis suaveolens</em> (L.) Poit. (258028)</td>
<td>Lamiaceae</td>
<td>Ban tulsi</td>
<td>Herb</td>
<td>Leaves poultice is applied 4-5 times a day on forehead for 15-20 days.</td>
</tr>
<tr>
<td><em>Leucaena leucocephala</em> (Roth) Spreng. (258046)</td>
<td>Lamiaceae</td>
<td>Gumara</td>
<td>Herb</td>
<td>Leaf tea is given thrice a day for 15 days.</td>
</tr>
<tr>
<td><em>Mallotus philippensis</em> (Lam.) Mull. Arg. (258037)</td>
<td>Euphorbiaceae</td>
<td>Sinduri</td>
<td>Tree</td>
<td>100 ml leaf infusion is given thrice a day for one week.</td>
</tr>
<tr>
<td><em>Nicandra paniculata</em> Roxb. ex Wild. (258010)</td>
<td>Cucurbitaceae</td>
<td>Kaloda</td>
<td>Climber</td>
<td>50 ml of stem bark decoction is given twice a day for 15 days.</td>
</tr>
<tr>
<td><em>Sesamum indicum</em> L.f. (258021)</td>
<td>Anacardiaceae</td>
<td>Bhilama</td>
<td>Tree</td>
<td>100 ml of root infusion is given thrice a day for one week.</td>
</tr>
<tr>
<td><em>Solanum nigrum</em> L. (258042)</td>
<td>Solanaceae</td>
<td>Makoi</td>
<td>Herb</td>
<td>100 ml of rhizome decoction given thrice a day for 15 days.</td>
</tr>
<tr>
<td><em>Solanum tuberosum</em> L. (258062)</td>
<td>Solanaceae</td>
<td>Jangali bhata</td>
<td>Shrub</td>
<td>10 ml of fresh leaf juice is taken orally twice a day for 15 days.</td>
</tr>
<tr>
<td><em>Tilia cordata</em> L. (258035)</td>
<td>Menispermaceae</td>
<td>Climber</td>
<td>50 ml of root infusion is given thrice a day for 10 days.</td>
<td></td>
</tr>
<tr>
<td><em>Tinospora cordifolia</em> (Willd.) Miers. (258062)</td>
<td>Menispermaceae</td>
<td>Gily</td>
<td>Climber</td>
<td>100 ml of fresh leaf juice is given twice a day for 10 days.</td>
</tr>
<tr>
<td><em>Tripteronthus trilobatus</em> Lour. (258032)</td>
<td>Cucurbitaceae</td>
<td>Indrayan</td>
<td>Climber</td>
<td>50 ml of fruit infusion is given 4-5 times a day for 15 days.</td>
</tr>
<tr>
<td><em>Vitex negundo</em> L. (258066)</td>
<td>Verbenaceae</td>
<td>Nigadi</td>
<td>Shrub</td>
<td>20 ml of leaf decoction is given thrice a day for 15 days.</td>
</tr>
</tbody>
</table>

### Results and Discussion

A total of 23 plant species from 16 families were identified for treating malarial fever in Pilibhit Tiger Reserve. The plants mostly belong to the families Lamiaceae (4 species), Solanaceae (3 species), Menispermaceae and Cucurbitaceae (2 species each), while the rest of the plants belong solitarily as many as 12 families (Figure 2). The most possible reason for dominance of Lamiaceae may be more prevalence of the species belonging to this family in the study area. The leaves were the most frequently used (9 species) plant parts in herbal preparation followed by roots (4 species), stem bark (3species), seeds and rhizomes (2 species each) as shown in Figure 3. It revealed that leaves were the mostly preferred part of the plant for preparing the medicine. This is because the leaves of several plant species are easily available raw material in all seasons used for treating same ailment. Same result was got by (Parente and Rosa, 2001) that shows more emphasis on the preparation of medicinal tea (51%), baths (39%) and other forms. It also revealed that a high
percentage of the plant parts used is aerial i.e. (65.21%) and only 34.79% preparations required whole plant or underground part of the plant. High use of aerial parts for treating the malarial disorders is good for the conservation of the local flora that will not pose any threat to these valuable plants.

Figure 1: Map of Pilibhit Tiger Reserve

Figure 2: Dominant family of the study area

Figure 3: Plant parts used for treating malarial fever in Pilibhit Tiger Reserve.

Figure 4: Mode of administration used in herbal healthcare system.

Figure 5: Growth form distribution of ethnomedicinal plants.

The mode of administration of the plants used in treating the ailments were decoction (10 species), infusion (6 species), juice and poultice (2 species each) and seed powder, bark powder and tea (1 species each) as shown in Figure 4. Most of the remedies described in this study area administered orally as water-based concoctions. This is in agreement with the findings of Adekunle (2008), Musa et al., (2011) and Maroyi (2013). Analysis of growth forms of the medicinal plants used by the local people in the study area indicates that they are distributed across various habitats. The most frequently used were herbs with (9 species) followed by climbers (7 species), trees (4 species) and shrubs (3 species) (Figure 5). Extensive use of herbs and climbers in preparation of herbal medicine might be linked to their availability throughout the year as they are relatively drought resistant and are not affected by seasonal variations. In present study the source of plants used was mainly from wild resources i.e. 90% same result was get by Amorozo, (2002) and reported (56.2%) ethnomedicinal plants from wild. Lesser the use of cultivated plant indicates that the land is mainly used for the cultivation of cereal crops such as rice, wheat and other crop as the main sustenance of the people.

Medicinal plants as narrated by informants showed that elder men and illiterate people have better knowledge compared to younger generations, literates and females. These observations correlate well with studies conducted elsewhere (Sharma et al., 1992; Gedif and Hahn, 2003; Muthu and Ignacimuthu, 2005; Upadhyay et al., 2007; Panghal et al., 2010). The majority of the informants reported that they keep their knowledge secret and that knowledge has mainly been transferred vertically from father/mother to child mainly a son.

Doses are differing from patient to patient and same patient from time to time based on the cause and effectiveness of the drug. Doses were mainly taken twice a day because people are present at home on the morning and evening. The mode of administration of the drug is mostly preferred
orally in almost all cases except *Antigonon leptopus* and *Hyptis suaveolens*. The present study revealed that many of the herbs used by the tribal people for treatment of various ailments are very common and easily available everywhere at low cost and hence affordable. Their mode of preparation and mode of administration are also simple, convenient and without any side effect. The present observation puts into record some novel traditional uses of certain plants as medicines, e.g., fruit infusion of *Trichosanthes triscuspidata*, root infusion of *Tilia cordata*, leaf tea of *Leonitis nepetifolia* and root bark powder of *Calotropis procera* are given orally for treating the malarial fever. From the study it revealed that the tribal communities have a very sound knowledge about the use of local flora for treating malarial disease. These uses further authenticated by using pharmacological tools.

**Conclusion**

In Pilibhit Tiger Reserve, traditional healers play an important role in primary healthcare. The age old traditional knowledge on the application of plants based medicine are still widespread in the study area. This is probably because of the frequent outbreak of malaria and the non-accessibility of modern health care facilities due to remoteness of the villages. The use of medicinal plants for the treatment of malaria is cheaper with no side effects. Moreover, herbal drugs are more compatible to human body constitution and suits to the local and cultural need of people. The traditional way of preparing drug maintains drug purity. The essence of substance is never destroyed and is always present in balance amount, as nature might have prescribed it. The plants showing antimalarial activities needed in-depth study to ensure the efficacy of plant based formulation to treat malarial fever.

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**References**


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