



## ORIGINAL RESEARCH ARTICLE

## 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 Menispermaceae (2 species each). Some novel traditional uses of certain plants as medicines for treating malarial fever were also recorded. The medicinal plants with botanical name and collection number are arranged in alphabetical order followed by the family, local name growth form parts used and mode of administration. This study generates first-hand information on antimalarial plants used in the region. Present study is a precursor for a detailed pharmacological analysis to ensure scientific validation.

**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 anopheles 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 28°52'- 28°46' N Latitude and 79°55'- 82°15' 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

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following the method adopted by the earlier workers (Raghavaiah, 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

Botanical name & Collection Number	Family	Local Name	Growth form	Parts used and mode of Administration
<i>Abrus precatorius</i> L. (258064)	Fabaceae	Gomachi	Climber	1 teaspoonful of seed powder with honey given twice a day for one week.
<i>Acorus calamus</i> L. (258050)	Araceae	Buch	Herb	50 ml of rhizome decoction is given twice a day for one week.
<i>Andrographis paniculata</i> (Burm.f.) Nees (258031)	Acanthaceae	Bhuineem	Herb	50 ml of whole plant decoction is given twice a day for 15 days
<i>Anisomeles indica</i> (L.) Kuntze (258006)	Lamiaceae	Ban Tulsa	Herb	Leaf poultice is applied 3-4 times a day on forehead for lowering the fever
<i>Annona squamosa</i> L. (258009)	Annonaceae	Sharifa	Tree	25 ml seed decoction is given thrice a day for one week
<i>Aristolochia indica</i> L. (258008)	Aristolochiaceae	Isharmul	Climber	50 ml of root infusion is given thrice a day for one week
<i>Azadirachta indica</i> A.Juss. (258005)	Meliaceae	Neem	Tree	100 ml of stem bark decoction thrice a day for 15 days
<i>Calotropis procer</i> (Aiton) Dryand. (258020)	Asclepiadaceae	Aakao	Shrub	5 gm root bark powder is given with honey thrice a day for 10 days
<i>Costus speciosus</i> (J.König) Sm. (258042)	Costaceae	Jangali adrak	Herb	50 ml of rhizome decoction is given twice a day for one week
<i>Datura metel</i> L. (258072)	Solanaceae	Jangali aalu	Climber	30 ml of tuber decoction is given thrice a day for 10 days
<i>Enicostema littorale</i> Blume (258063)	Gentianaceae	Nay	Herb	100 ml of leaf infusion is given thrice a day for 10 days
<i>Hyptis suaveolens</i> (L.) Poit. (258028)	Lamiaceae	Ban tulsi	Herb	Leaves poultice is applied 4-5 times a day on forehead for 15-20 days
<i>Leonotis nepetifolia</i> (L.) R.Br. (258045)	Lamiaceae	Gumara	Herb	Leaf tea is given thrice a day for 15 days
<i>Leucas cephalotes</i> (Roth) Spreng. (258046)	Lamiaceae	Chota Gumara	Herb	100 ml leaf infusion is given thrice a day for one week
<i>Mallotus philippensis</i> (Lam.) Mull. Arg. (258037)	Euphorbiaceae	Sinduri	Tree	50 ml of stem bark decoction is given twice a day for 15 days
<i>Momordica dioica</i> Roxb. ex Willd. (258010)	Cucurbitaceae	Kakoda	Climber	50 ml of root infusion is given thrice a day for one week
<i>Semecarpus anacardium</i> L.f. (258021)	Anacardiaceae	Bhilama	Tree	100 ml of stem bark decoction given thrice a day for 15 days
<i>Solanum nigrum</i> L. (258042)	Solanaceae	Makoi	Herb	50 ml of boiled leaf decoction is given thrice a day for 15 days
<i>Solanum torvum</i> Sw. (258062)	Solanaceae	Janglai bhata	Shrub	10 ml of fresh leaf juice is taken orally twice a day for 15 days.
<i>Tiliacora racemosa</i> Colebr. (258035)	Menispermaceae		Climber	50 ml of root infusion is given thrice a day for 10 days
<i>Tinospora cordifolia</i> (Willd.) Miers. (258062)	Menispermaceae	Giloy	Climber	100 ml of fresh leaf juice is given twice a day for 10 days.
<i>Trichosanthes tricuspidata</i> Lour. (258032)	Cucurbitaceae	Indrayan	Climber	50 ml of fruit infusion is given 4-5 times a day for 15 days
<i>Vitex negundo</i> L. (258066)	Verbenaceae	Nirgudi	Shrub	20 ml of leaf decoction is given thrice a day for 15 days.

## 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 (3 species), 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.

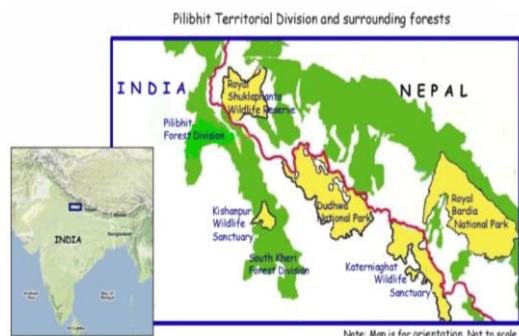


Figure 1: Map of Pilibhit Tiger Reserve

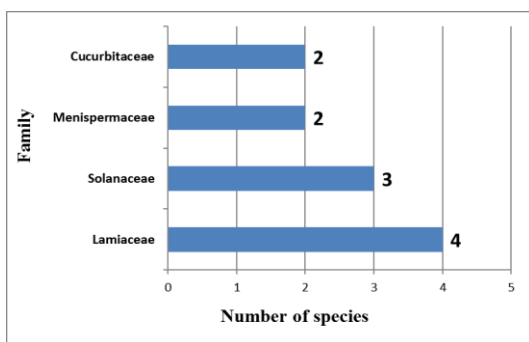


Figure 2: Dominant family of the study area

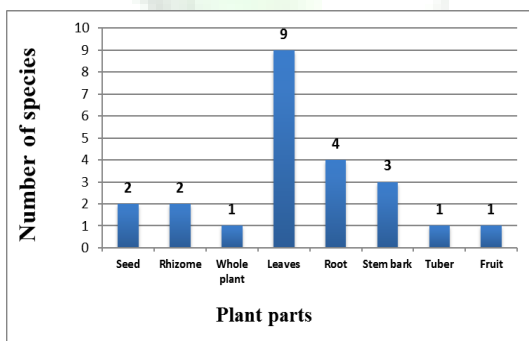


Figure 3: Plant parts used for treating malarial fever in Pilibhit Tiger Reserve.

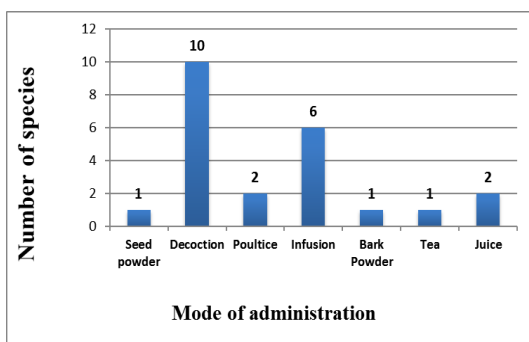


Figure 4: Mode of administration used in herbal healthcare system.

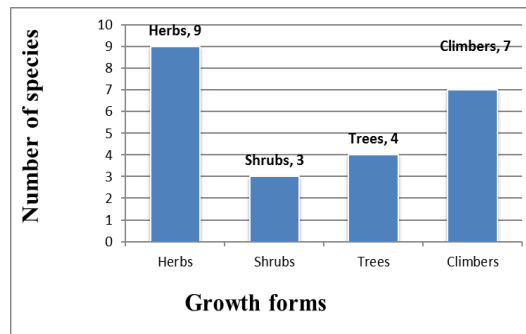


Figure 5: Growth form distribution of ethnomedicinal plants.

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 *Anisomeles indica* 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 tricuspidata*, root infusion of *Tiliacora racemosa*, 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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