

## Plants used traditionally to treat Malaria by tea-tribes in Nagaon district of Assam, India

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### Abstract

This paper represents the ethnobotanical knowledge of the tea-tribes of Nagaon district, Assam for the treatment of Malaria. The tea tribes of Assam were brought by the British colonial planters is a cluster of different communities of India dominated of the present day Jharkhand, Odisha, West Bengal, Telangana, Karnataka and Chhattisgarh. Back in the days due to lack of proper medical facilities the tea tribes had to be dependent on the traditional herbal practices. Through the present survey uses of 24 species of medicinal plants from 24 genera under 19 families have been documented. Recorded plants are listed along with their botanical names, family, Assamese name, tribal name, parts used for preparation and mode of administration.

**Key words:** Ethno-medicine, Malaria, Tea tribes, Nagaon district, Assam

### INTRODUCTION

The science of Ethnobotany deals with the study of relationship between man and plants and their uses for human welfare (Dash 1998). Although, now-a-days, allopathic chemically synthetic drugs are the most widely accepted throughout the world but according to a WHO estimate, nearly 80% of the world's population relies on the herbal medicinal practices even today (Kamboj 2000). Traditionally numerous plants are known to use as remedy to the diseases of man and to his pets because of the lesser side effects besides being cheap and easily available (Gupta & Raina 1998). About 35,000 to 70,000 plant species are used for medicinal purposes worldwide (Farnsworth & Soejarto 1991). In India, it has been estimated that 3000 species out of 15,000 species of vascular plants possess medicinal properties (Panigrahi & Murti 1989). So, the ethnobotanical studies play an important role in the medicinal and economical value, especially in the life of traditional people, all over the world. Northeast India, including Assam, is the house of innumerable tribal people and a considerable fraction of whom practice their traditional knowledge for the curing of their diseases (Bhattacharyya *et al.* 2015; Gogoi & Das 2015; Borgohain *et al.* 2016; Das & Paul 2016)

Malaria is a deadly disease and is generally transmitted by infected female *Anopheles* mosquitos. The mosquito bite introduces the parasite *Plasmodium* sp. from the mosquito's saliva into the victim's blood (WHO 2014). The parasite reaches the liver cells where they grow and reproduce. There are five species of *Plasmodium* which can infect and spread in humans. While, most deaths are caused by *P. falciparum*, the *P. knowlesi* rarely causes disease in humans. Because *P. vivax*, *P. ovale* and *P. malariae* generally less

infectious. Symptoms of Malaria are headache, fever, fatigue, vomiting, jaundice, coma, and ultimately lead to death (Caraballa 2014). The disease is highly prevalent in the Tea Gardens of North-East India.

The tea tribes are mostly the workers by their profession and were brought by the British colonial planters during 1860 – '90s from the *Chhotanagpur* plateau and some parts of the present Jharkhand, Odisha, West Bengal, Telangana, Karnataka and Chhattisgarh. The British colonial did not appoint doctors and due to limited opportunity to advanced medical facilities in the tea gardens, so, the workers had to rely on the herbal medicines. Workers of Tea Gardens in Nagaon District of Assam in India are belonging to many communities/ tribes including Bhumij, Bhuyan, Garh, Goala, Kalindi, Kaul, Kharia, Kumar, Kurmi, Munda, Orang, Oriya, Santhal, Sundi and Telanga having rich knowledge in traditional medicine. They live inside tea-estates in colonies or villages called '*Basti*'.

### Study area

The study area, Nagaon district of Assam in India covers an area of about 3,831 square kilometers (1,479 square miles) and is considered amongst one of the largest district of Assam. The Nagaon district, with its central coordinates 26.3500° N and 92.6667° E, is bordered by Sonitpur district and Brahmaputra in the North, in the East lies the district of East Karbi Anglong and Golaghat and towards South lies West Karbi Anglong and North Cachar hills. Geologically, the soil is sandy alluvium and the climate is of general monsoon type. The monsoons last from April to May. As compared to the other districts of Assam, the climate of the Nagaon district is of extreme type. The average altitude is 60.6 m. The annual average maximum temperature is 30.4° C and the minimum temperature is 19.8° C. Also the average rainfall is about 1750 mm per annum (Anonymous 2013).

## MATERIALS AND METHODS

The present study deals with an extensive ethnobotanical survey, carried during July 2014 to September 2015 in different tea estates of Nagaon district. Randomly selected 32 villages (*Basti*) in different tea estates of Nagaon district has been covered. The village chiefs and the recognized medicine men were interviewed using a structured questionnaire to record their common health issues and their awareness on Malaria (Martin 1995; Jain 1989). Before documentation a Prior Informed Consent (PIC) has been signed by the village chief or the informants. The various details of the plants used by them against Malaria were recorded including the symptoms and mode of uses etc. as explained by them. The detailed study was also made on the mode of usage of the concerned medicine, used parts of the plants, methods of preparation and the various concoctions and decoctions used by them for the concerned purpose. And it was followed by collection of the plant samples and the concerned parts used for the preparation of the concerned medicine. The concerned parts include bark, berries, flowers, leaves, rhizome, roots, seeds or stem and are followed by identification of the plants by using the flora Kanjilal *et al.* (1934-1940) and online databases like [www.efloraindia.nic.in/efloraindia/taxonList](http://www.efloraindia.nic.in/efloraindia/taxonList) and then confirmed their identity by matching at GUBH and in Nowgong College Herbarium. Nomenclature of plants were updated using [www.theplantlist.org](http://www.theplantlist.org). Voucher specimens were processed into mounted herbarium sheets following Jain and Rao (1977) and were deposited in the Herbarium of the Nowgong College, Nagaon. Also, the recorded information was cross-checked with other informants in the same or in different gardens.

## RESULTS AND DISCUSSION

The study has revealed that the tea tribes of Nagaon district have deep knowledge and provide an excessive use of phytomedicines and this is possible because of their long experience and practices. The study recorded 24 species of medicinal plants belonging to 24 genera and 19 families for treating Malaria (Table 1) out of which *Tinospora sinensis*, *Nyctanthes arbor-tristis*, *Azadirachta indica*, *Glycosmis pentaphylla*, *Rauwolfia serpentina* and *Justicia adhatoda* were the most commonly used plants and were recorded as much effective. Acanthaceae, Apocyanaceae, Oleaceae, Rutaceae and Zingiberaceae were the most dominant families with 2 genera and 2 species each.

**Table 1.** Plants used by the tea-tribes living in the Nagaon district of Assam for the treatment of Malaria.

Scientific name [Family]; Voucher no.	English name	Local name [Ass = Assamese; Trib = Tribal]	Part used	Mode of use
<i>Achyranthes aspera</i> Linnaeus [Amaranthaceae]; RBNG-03	Prickly Chaff flower	<i>Ubhotkata</i> (Ass); <i>Apamargo</i> , <i>Aapang</i> , <i>Satkhonda</i> (Trib)	Root	Pieces of roots stitched into a garland and worn till cured
<i>Aegle marmelos</i> (Linnaeus) Correa [Rutaceae]; RBNG-02	Wood apple	<i>Bel</i> (Ass, Trib)	Leaf	Paste of 9 tender leaves, with a pinch of black pepper powder, taken for 7 days in empty stomach
<i>Alstonia scholaris</i> (Linnaeus) R. Brown [Apocynaceae]; RBNG-05	Indian devil tree	<i>Satian</i> (Ass); <i>Satiana</i> , <i>Ranigamari</i> (Trib)	Stem	30 gm of stem paste taken for 5 days in empty stomach in the morning
<i>Andrographis paniculata</i> (Burman f.) Nees [Acanthaceae]; RBNG-12	Andrographis, King of bitters	<i>Kalmegh</i> (Ass); <i>Bhui-neem</i> , <i>Sirata</i> (Trib)	Whole plant	20 gm of sun dried whole plant soaked overnight in 50 ml of water and given for 3 days in empty stomach in the morning
<i>Azadirachta indica</i> A. Jussieu [Meliaceae]; RBNG-20	Margosa tree	<i>Mohaneem</i> (Ass); <i>Neem</i> (Trib)	Leaf	15 ml of leaf extract, mixed with 15ml rhizome extract of <i>Curcuma longa</i> and a pinch of salt is taken in empty stomach in the morning
<i>Boerhavia diffusa</i> Linnaeus [Nyctaginaceae]; RBNG-38		<i>Purnanava</i> (Ass, Trib), <i>Pananua</i> (Ass);	Whole plant	Paste of 50 gm of plant is given for 6 – 7 days
<i>Carica papaya</i> Linnaeus [Caricaceae]; RBNG-07	Papaya	<i>Amita</i> (Ass); <i>Popita</i> (Trib)	Latex	6 – 7 drops is mixed with 10 – 15 young leaves of <i>Azadirachta indica</i> , grinded and consumed for 3 days in empty stomach in the morning
<i>Centella asiatica</i> (Linnaeus) Urban [Apiaceae]; RBNG-17	Indian pennywort	<i>Bor manimuni</i> (Ass); <i>Manimuni</i> (Trib)	Whole plant	30 – 50 ml of plant extract is consumed until cure
<i>Curcuma longa</i> Linnaeus [Zingiberaceae]; RBNG-13	Turmeric	<i>Halodhi</i> (Ass); <i>Haldhi</i> (Trib)	Rhizome	25 – 30 ml extract is given orally for 7 days
<i>Dillenia indica</i> Linnaeus [Dilleniaceae]; RBNG-11	Elephant apple	<i>Ou tenga</i> (Ass); <i>Chalta tenga</i> (Trib)	Fruit	Fruits boiled in water and the extract is given orally for 5 – 6 days
<i>Glycosmis pentaphylla</i> (Retzius) DC. [Rutaceae]; RBNG-16	Orangeberry, Ginberry	<i>Bon nemu</i> (Ass, Trib)	Leaf and Stem	Paste of 8 – 10 leaves is given 2 times daily for 3 days OR Stem is cut into pieces and stitched in a garland and worn for 5 – 7 days
<i>Jasminum grandiflorum</i> Linnaeus [Oleaceae]; RBNG-50	Royal jasmine	<i>Jyoti phul</i> (Ass); <i>Chameli</i> (Trib)	Root	15 gm of root is grinded with 5 – 6 leaves of <i>Rauwolfia serpentina</i> and given for 3 – 5 days in empty stomach
<i>Justicia adhatoda</i> Linnaeus [Acanthaceae]; RBNG-04	Adhatoda	<i>Vahak</i> (Ass); <i>Vasak</i> , <i>Vasanti</i> (Trib)	Leaf	20 ml of leaf extract taken in empty stomach for 3 days
<i>Nyctanthes arbor-tristis</i> Linnaeus [Oleaceae]; RBNG 15	Night jasmine	<i>Sewali</i> (Ass); <i>Sephali</i> (Trib)	Leaf	5 – 6 young leaves are pasted with a pinch of <i>Piper nigrum</i> fruit-powder and given for 5 – 7 days in empty stomach

Scientific name [Family]; Voucher no.	English name	Local name [Ass = Assamese; Trib = Tribal]	Part used	Mode of use
<i>Ocimum tenuiflorum</i> Linnaeus [Lamiaceae]; RBNG-35	Holy basil	<i>Koliya tulosi</i> (Ass); <i>Tulsi</i> (Trib)	Leaf	20 gm leaves grinded and mixed with 2 – 3 gm <i>Piper nigrum</i> fruit powder and taken for 7 days in empty stomach
<i>Olax nana</i> Wallich ex Bentham [Olacaceae]; RBNG-22		<i>Jaundice gos</i> (Trib)	Leaf	6 – 7 leaves for adults and 2 – 3 leaves for children are grinded and then taken for 5 days in empty stomach in the morning
<i>Oroxylum indicum</i> (Linnaeus) Kurz [Bignoniaceae]; RBNG-27	Indian trumpet tree	<i>Bhatgila</i> (Ass); <i>Bonsutli, Bhatgila</i> (Trib)	Bark	30 gm of bark is soaked in water for overnight; then it is mashed and filtered and the filtrate is given for 3 days in the morning
<i>Paederia foetida</i> Linnaeus [Rubiaceae]; RBNG-37	Skunkvine, Stinkvine	<i>Bhebeli lota, Padurilota</i> (Ass); <i>Padralot</i> (Trib)	Leaf	7 – 8 leaves are cooked with rice and are given for 7 days
<i>Phyllanthus fraternus</i> Webster [Phyllanthaceae]; RBNG-39	Gulf leaf-flower	<i>Mati amlokhi</i> (Ass); <i>Bhui aola</i> (Trib)	Whole plant	15 gm paste of the plant is given twice daily until cured
<i>Piper nigrum</i> Linnaeus [Piperaceae]; RBNG-43	Black pepper	<i>Jaluk</i> (Ass); <i>Gul morich</i> (Trib)	Dried fruit	Used as an additive in various preparations
<i>Rauwolfia serpentina</i> (Linnaeus) Bentham ex Kurz [Apocynaceae]; RBNG-44	Indian snake-wort	<i>Sarpagandha</i> (Ass, Trib); <i>Genda phulia</i> (Trib)	Root	15 – 20 gm paste of root is taken for 3 days in empty stomach in the morning
<i>Tinospora sinensis</i> (Loureiro) Merrill [Menispermaceae]; RBNG-24	Tinospora	<i>Amarlota, Sagunilota</i> (Ass); <i>Amarlot, Choidoguni, Guduchi</i> (Trib)	Stem	15 cm stem is cut into pieces, soaked in water and the water is taken in empty stomach for 3 days
<i>Trichosanthes dioica</i> Roxburgh [Cucurbitaceae]; RBNG-42	Pointed gourd	<i>Potol</i> (Ass, Trib)	Root	2 - 3 gm of root is grinded and mixed with half a cup of water is given for 3 – 5 days; overdose is harmful
<i>Zingiber officinale</i> Roscoe [Zingiberaceae]; RBNG-14	Ginger	<i>Aada</i> (Ass); <i>Adrak</i> (Trib)	Rhizome	15 gm rhizome is grinded with equal amount of <i>Curcuma longa</i> with a pinch salt is given for 3 days in empty stomach

During this study a number of unique preparations used for the treatment of Malaria have been listed. Among the commonly used plants parts, the most frequently used are the leaves (8 species), followed by roots (4 species), whole plant (4 species), stem (3 species), fruit (2 species), rhizome (2 species), bark (1 species) and latex (1 species). The various preparations from the plant parts are either in the form of concoction, decoction, extract or juice, paste and powder which is taken along with pepper powder, rice, salt or water. Most of the preparations are taken in empty stomach in the morning. This study also revealed that for the medication against Malaria the tea garden workers mostly use the plants which are bitter and having a peculiar taste or pungent smell.

Majority of the recorded plants are collected by them from the wild. However, plants like *Piper nigrum*, *Curcuma longa*, *Zingiber officinale*, *Azadirachta indica*, *Carica papaya*, etc. are commonly cultivated plants and for those they need not to purchase from the market. Most of the other plants they use to treat malaria are common in vegetation.

With the Government initiatives, health services in these remote basties are gradually improving. Communication and transport systems and facilities are also improving and, there is every possibility, these collected knowledge on ethnomedicines will be lost from the society. So, it is the high time to survey and procure stored ethnobotanical knowledge of these people for their future verification and effective utilization.

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