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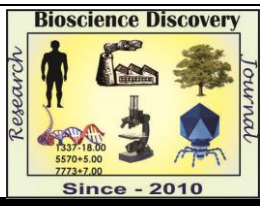

Study on indigenous knowledge and approach for conservation of *Brucea mollis* Wall. ex Kurz- an RET plant of NE India

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Abstract

North East India is rich in biodiversity and endemism that are threatened by growing population and climate change. Loss of species has potential impact on traditional knowledge. The present study was conducted in different parts of the district Karbi Anglong, during August, 2014 to April, 2016 with an objective to elucidate the ethnobotanical uses of *B. mollis* among the ethnic groups. The traditional knowledge about the use of the plant, parts used methods of preparation and administration, possible threats and potent factors for endemism have been studied. The data were collected through observations, interviewing fifty (50) respondents using semi structured questionnaire. It was found that the young generation is unaware about the plant and the traditional knowledge associated with the plant is confined only to the elderly persons who are mostly traditional healer (TH), farmers or local herb dealers (LHD). They are mostly illiterate and are not aware about the importance of their knowledge and conservation of plants. Potent threats for the plant are unsustainable harvest, destruction of habitats due to grazing, deforestation and other anthropogenic factors. Apart from these, inefficient pollination and seed dispersal mechanism and low seed germination rates are possible factors for restricted distribution of the species under study.

INTRODUCTION:

It is important to study ethnobotany because it is related to sustainable rural development of a region. Ethnobotany can be used to know the dynamics of traditional ecological knowledge as an effort for biodiversity conservation (Pieroni *et al*., 2014).

North East India is bestowed with natural resources, including many species of medicinally important plants. Each ethnic groups of this region has their own knowledge about the uses of plants including medicinal uses. In present days medicines are either modern or traditional. Modern medicines are based on scientific inputs but the traditional medicines are based on recipes inherited from generation to generation, mostly orally, following local traditions and beliefs. Although efficacies are often slow yet traditional medicines have some benefits: they are cheaper, easy to get, easy to digest and do not have side effects (Bodeker, 2000; Martin, 2004).

Brucea mollis Wallich *ex* Kurz is a bitter shade loving shrub occurring on gentle hill slopes as forest undergrowth. It is an endemic medicinal plant restricted to northeast India except Mizoram and Tripura. In Assam the plant grows in different parts of Karbi Anglong District only. The species is also listed as endangered plant in Arunachal Pradesh and Assam in the CAMP workshop held during March

2003 at Guwahati to assess the threat status of prioritized Medicinal plants northeast India. *B. mollis* has been listed as NT (Near Threatened) plant species of Meghalaya by IUCN (Anonymous, 2003). The percentage of its global presence is estimated to be 5-10. It has potent antimalarial activity (Prakash *et al.*, 2012). Apart from this the plant also exhibits amebicidal, antiplasmodicidal, antifeedant, antigiardial, cytotoxic, insecticidal, pesticidal, antiviral and antileukemic activities (Liu *et al*., 2009; Bharati *et al*., 2012; Chen *et al*., 2013).
Ethnic groups of Karbi Anglong are rich in wide knowledge of medicinal plants. Since they are dependent on forest resources for meeting their livelihood they have developed an inherent interest to preserve medicinal plants and to use traditional medicines. But now a days there is a shift in their perception regarding medicine as they accessible to modern medicines. Fruit or root decoction of *Brucea mollis* has long been used by the local people for the treatment of fever (Barthakur, 1976). Although use of *Brucea mollis* is now no longer remain popular against antibiotics or over the desk medicines yet it is still used in some localities of the area. Therefore, it is imperative to assess the traditional wisdom among the people of Karbi Anglong and to develop awareness about their traditional healing heritage. The medicinal credentials of *B. mollis* are very high as it has long been used in the area. There is scope for cultivation of this important plant which will also help for conservation of biodiversity. Indigenous knowledge can contribute to resolve the problems pertaining to sustainability (Benz *et al*., 2000; Byers *et al*., 2001; Philip & Gentry, 1993). Documentation of traditional knowledge on *B. mollis* is yet to be accomplished. It is with this objective that the present study on *B.mollis* was taken up.

METHODOLOGY:

Ethnobotanical study was carried out on *B.mollis* in different parts of the district Karbi Anglong, during August, 2014 to April, 2016 to decipher information about the use, dosage, preparation method, administration procedures, awareness among people etc. Data collected were based on observation, oral interview using semi structured questionnaire.

Study area: Karbi Anglong District is situated in between 25^0 33' to 26^0 35' N Latitude and 92^0 10' to 93^0 50' E Longitude covering the central part of Assam. The district comprises of low hills and flat plains and is covered with dense tropical forest. The study was carried out in different parts of the district but mainly concentrated in the three prime habitats for *B. mollis* i.e. Diphu, Manja and Lahorijan Forest Ranges.

Fig 1: Location of study

Ethical approach: The purpose of the study was explained to the respondents and prior consent was taken.

Administration of questionnaire:

A combination of qualitative and quantitative approach was used to collect information. Ethnobotanical data were obtained through interview from respondents using open questionnaire. Number of respondents was 50. The respondents include traditional healers, local herbal dealers, farmers, government service holder and traders.

The questionnaire was divided into two parts- demographic information about the respondents and his/her knowledge about the plant and its uses.
The study also includes observation on the population of the plant to work out the potential threats for the plant and factors responsible for the restricted distribution of the plant.

RESULTS AND DISCUSSION

The 50 respondents interviewed were categorized into three communities- 1) Tribal community consisting of tribal ethnic groups (58%), 2) Assamese community consisting of Assamese people born and brought up and living in Karbi Anglong or immigrate from other part of Assam inhabit there (24%), 3) Other community consist of people of other ethnic origin inhabit there (18%). The demographic survey of the respondents is represented in Table 1. The plant is popularly known as 'quinine' among the ethnic communities. Some also called it 'Bapkehu'. All the respondents who know the plant has inherited the knowledge from their ancestors. The plant is not cultivated by anyone.

Table 1: Demographic structure of the respondents

Parameter	Specification	N(%)
Community	Tribal community	58
	Assamese	24
	Other Community	18
Gender	Male	64
	Female	36
Occupation	Herbal healers	18
	Farmer	14
	Local herbal dealers	30
	Trader	18
	Government service	20
Education	Illiterate	34
	Elementary Education	24
	School	14
	Graduate	28

They use to collect it from natural habitats whenever required. The availability of the plant is reported to be scarce and not available throughout Karbi Anglong.
Ethnic people uses fresh fruit or root decoction of *Brucea mollis* when they suffer from fever of any kind including malaria. They use to take one or two fresh fruit as per the severity of infliction. To prepare the root decoction they take 4-5 cm of root, remove the bark carefully, wash it, crushed and then boiled in a glass of water for half an hour. Sometimes instead of decoction infusion is used. One or two tablespoonful of the decanted liquid is taken twice or thrice daily depending on the severity of the fever. Overdose of root decoction is reported to cause temporary paralysis. However, such adverse effect is usually treated with fruit juice of *Garcinia pedunculata* and *Averrhoa carambola.*
The study exhibits that only 12% people do not use herbal medicines for treating any ailments in the district. Other 88% people depend on herbal medicines for treatment of their ailments. Among the people only 46% know about *B. mollis* and the rest 54% even do not know about the plant. Out of the 46% of the people knowing about the plant only 41% have either used by themselves or for one or other member of a family or friend for the treatment of fever. Only one case of side effect of overdose of *B. mollis* has been reported which comprises of 5% of total respondents. Among the respondents 100% TH knows about the plant and its uses. 33% of them also informed that *B. mollis* is also used for stomach ache in very low dose. Among the farmers only 30% are aware about the plant and its uses. 47% local herb dealers (LHD) know the plant and its uses. 40% Government service holder (GSH) though know about the plant but do not know its proper uses. None of traders included in the study recognized the plant (Fig 2).

Fig 2: Respondents awareness rate about *B. mollis*

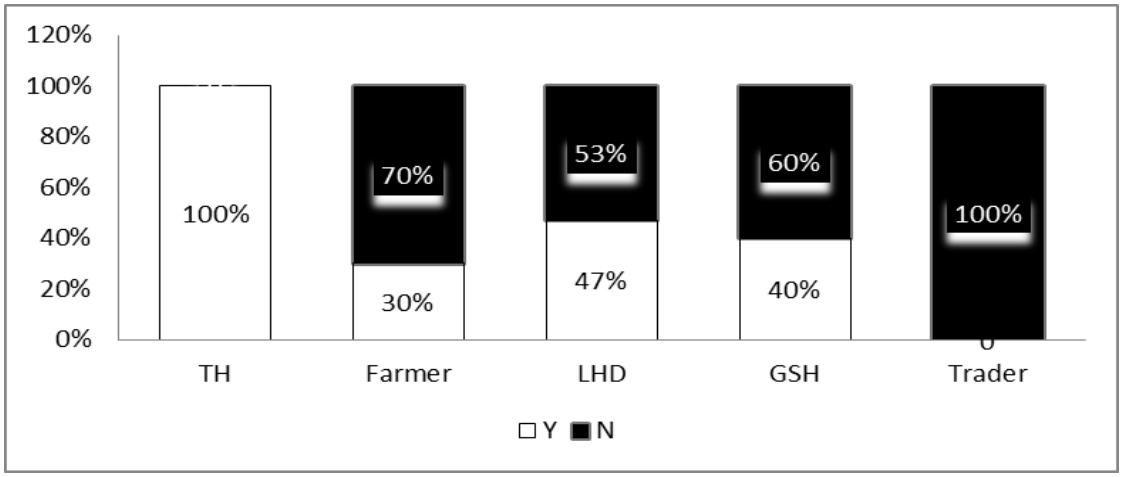
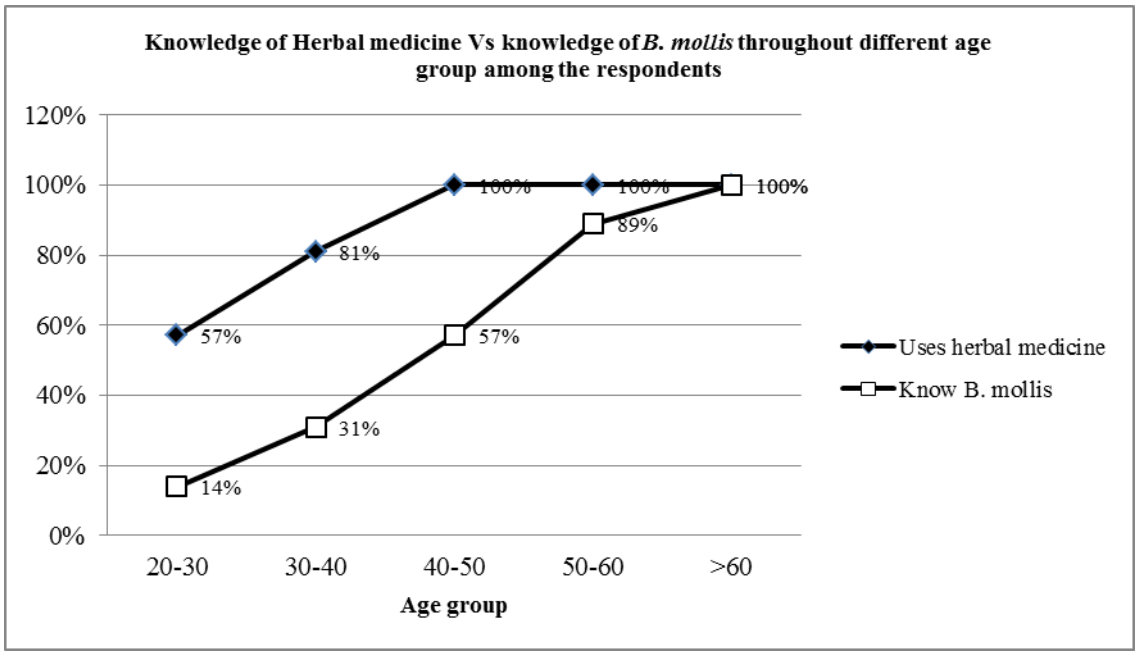


Fig 3: Respondents awareness rate about Herbal medicine Vs *B. mollis*.



The study exhibits that younger ones are less aware of the plant *B. mollis*. Among the people interviewed aged above 50 are well familiar with herbal medicines and *B. mollis*. But the knowledge about the plant drastically diminishes among people in age group 20-40. Most of them though use herbal medicines but they do not identify the plant *B. mollis* (Fig 3).

The study also finds that deforestation, climate change, unsustainable harvesting, grazing and destruction and other anthropogenic factors are the potent threats for *B. mollis*. During the study it was observed that the inefficient pollination and seed dispersal mechanism with low seed germination rate may act as potent factors for restricted distribution of the plant.

Present study finds that the indigenous knowledge of the plant is only restricted to the old generation. Young generation is having less knowledge of their traditional heritage. They do not recognize *B. mollis* and even know its uses and benefits.

From the study few causes of loss of traditional knowledge about *B. mollis* among young generation could be work out. They are not interested in traditional knowledge as they perceive that this form of knowledge is not so useful to deal with the new socio-economic and cultural conditions they face nowadays. They are of the opinion that now a days various modern medicines are available to treat ailments. Moreover the population of the plant is not so abundant, and ongoing climatic changes and anthropogenic pressure also threats the population.

Deforestation is a major cause of loss of habitat of may medicinal plants. Climate change also plays a crucial role in the growth and development of the plant. *B. mollis* is a shade loving plant often grows in hill slopes. Climate change due to deforestation may results in loss of the favorable conditions for growth of the plant. The plants which are occurring along roadsides are more susceptible for over exploitation, unsustainable harvesting, fuel wood collection, grazing and destruction by animals. Apart from these several anthropogenic pressure like human settlement, expansion of agricultural fields, expansion of new market area causing pollution are also acting as threats for *B. mollis*.

Pollination biology of *B.mollis*, which comprises a part of another study conducted by the present investigators, also observed that the pollination mechanism of the species is not very efficient. The pollination mechanism is ambophillic and is transitional between insect and wind pollination (Listabarth , 1993; Peeters & Totland, 1999; Culley *et al*., 2002; Jong *et al*., 2005; Mangla & Tandon, 2011; Yamasaki & Sakai, 2013). Seed dispersal mechanism is also not well developed. Seeds are usually fall near the plant and get germinated. Low seed germination rate may act also as potent factors for restricted distribution of the plant (Patil *et al*., 2011; Pardhe *et al*., 2011; Rane *et al.* 2012,).

Recommendations for conservation:

Further it is necessary to maintain regular systematic monitoring to keep updated information on the population size, distribution & its trends. Researches and workshops should arrange regularly to generate awareness about traditional knowledge and species identification among youth. Tissue culture, construction of gene sanctuary, protected area management, harvest management plans, restoration, recovery and rehabilitation of the habitat are few strategies that can be undertaken by researcher and scientific community in future for conservation of this endemic plant.

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