

Ethnobotanical appraisal of the Hill-Tiwas of Assam, India

Robindra Teron^{1,#} and S. K. Borthakur²

¹Department of Life Science and Bioinformatics, Assam University::Diphu Campus, Diphu, Karbi Anglong, 782 460, Assam, India

²Department of Botany, Gauhati University, Guwahati – 780 014, Assam, India

[#]Corresponding author, E-mail: robin.teron@mail.com

[Received 30.05.2014; Revised 03.06.2014; Accepted 07.06.2014; Published 30.06.2014]

Abstract

Ethnobotanical appraisal of the Hill-Tiwas of Assam is reported here for the first time. The study design included group discussions, interviews and personal observations of plants in use. Use of 176 plants under 143 genera and belonging to 72 families is presented through a systematic study conducted during the period from 2007 to 2012. The present communication is expected to highlight ethnobotanical heritage of the Hill-Tiwas and also serve as valuable reference to researchers who wish to undertake further investigation on ethnobotany of the Tiwas. Such study serves well in documenting traditional knowledge of the group concerned and their ethnobotanical heritage. Follow up investigations are required to document plant use pattern of the Hill-Tiwas. Urgency for the study stems from the fact that the Tiwas practice oral tradition and ethnobotanical knowledge is mostly confined to elders and these concerns, compounded by rapid loss of biodiversity and influence of other cultures, the whole body of traditional knowledge of the Hill-Tiwas stand to lose before being documented and scientifically evaluated.

Key words: Hill-Tiwas, ethnobotany, traditional knowledge, conservation, *wanchoa*

INTRODUCTION

Human interactions with environment are highly complex those involve around facilitating or mobilizing his ever increasing demands for more resources. The study of interactions of man with plants is called *Ethnobotany* (Harshberger 1896). It is highly interdisciplinary subject having linkages to many disciplines (Manilal 1989; Padhy *et al.* 2005). Study of plant used by aboriginal tribes constitute pioneer phase of development in Ethnobotany. Notable reports on selected tribes from India including the Northeastern region include Santhals (Bodding 1925-1927, 1940), Miris (Hajra & Baishya 1997), Karbis (Jain & Borthakur 1980; Teron & Borthakur 2008), Assamese, Manipuri, Naga (Islam 1996; Rao 1997; Jamir 1999), Mishing (Singh & Ahmed 1996), Garo (Vasudeva & Shanpru 1997), Khasi and Jaintia (Joseph & Kharkongor 1997) and Meitei (Singh & Singh 1996). Despite large body of research reports, ethnobotany of the Hill-Tiwas of Assam remained unreported and the present communication (albeit an appraisal) is an effort to fill-up this knowledge gap.

Tiwas are one of the scheduled tribes in Assam, Northeast India. Their original home is believed to be in the Tibet region, but their migration to the plains is shrouded with mystery (Sarma Thakur 1985). In Assam, they have been living in both the hills and plain areas. Tiwas are primarily agriculturists; rice is the staple food and locally brewed rice beer called *chu* is a

popular alcoholic drink. Tiwas are expert in bamboo, cane and wood works but there is not enough evidence to suggest their excellence in blacksmithy in olden days (Sarma Thakur 1985). Tiwas observe elaborate festivals, which are closely linked with the worship of different deities. Documentation of ethnobotanical knowledge and practices of the Hill-Tiwas are objectives of the present communication. The study is based on simple ethnobotanical hypothesis that 'the Hill-Tiwas are exposed to different bioresources and therefore, they have developed a repository of traditional knowledge and practice of plant use pattern different from the plains Tiwas'. Though this report is an appraisal of plant use it is expected to highlight ethnobotanical heritage of the Hill-Tiwas and serve as a ready reference to researchers who wish to undertake further investigation on ethnobotany of the Tiwas. Such study serves well in documentation of traditional knowledge of the group concerned and their ethnobotanical lore.

The study area: Tiwas have been living in both the plains and hills areas in Assam state. Concentrations of the Plains-Tiwas are prominent in Nagaon, Morigaon and Kamrup districts, while the Hills-Tiwas are mainly confined to westernmost part or Hamren subdivision of Karbi Anglong district. Tiwas living in the hills of Karbi Anglong district constitute the Hill-Tiwas. Prominent villages include Umdoba, Morten, Khumrei Khora, Khyabat, Ulukunchi, Selangkunchi, Umswai, Bor Rongkhohi, Marchong, Boramli, Langer-dang, Ghelani and Tumpreng.

MATERIALS AND METHODS

Ethnobotanical study was undertaken during 2007 to 2012 among the Hills-Tiwas in the Hamren subdivision of Karbi Anglong district of Assam (Fig. 1). The present study has been conducted in the villages Umdoba, Morten, Khumrei Khora, Ulukunchi, Umswai, Boramli, Khyabat, Bor Rongkhohi, Ghelani and Tumpreng. Verbal consent of community elders was obtained in accordance with ethics of ethnobiological research (ISE 2006). The study design included group discussions, interviews and personal observations of plants in use. In each village group discussion was organized involving people of different age groups. Participants were asked to name plants used in their daily life including habitat, collection, utilization, folk beliefs, cultural value, etc. The next day, with the assistance of informants, the plants mentioned

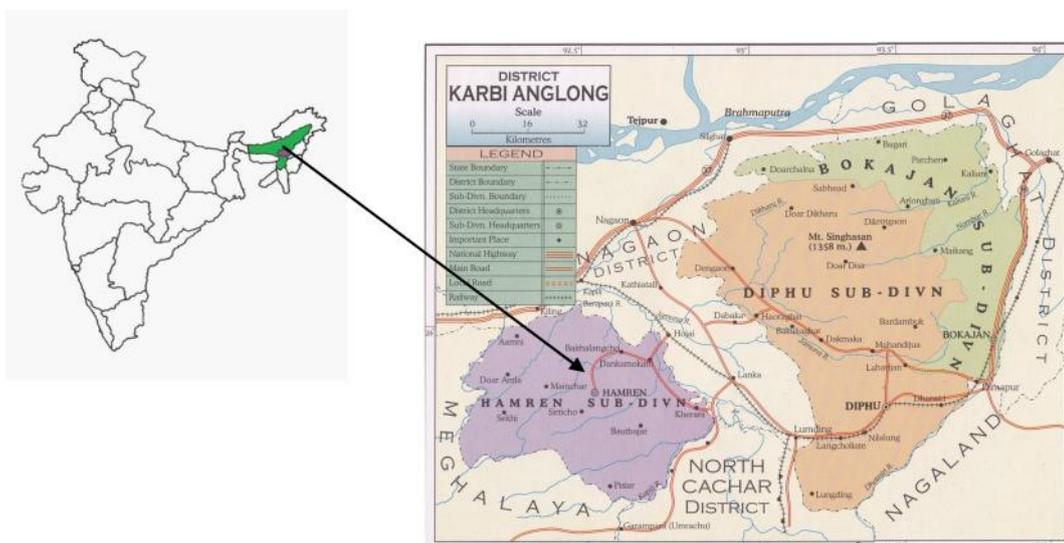


Fig. 1. Map of Karbi Anglong district showing area of the present study (Source: ABD's School Atlas)

by them were collected from homestead gardens and natural habitats. Stress was given to interview groups like priests, medicine men or healers and women elders to document ethnobotanical knowledge and practices specialized by these groups (for example rituals, ethnomedicines, women specific knowledge and practices, etc). First author attended many festivals of the Hill-Tiwas to further record uses of plants in their socio-cultural life. Data collection technique also included village walks and walk along forest transects with key informants. Information collected as above was substantiated to the possible extent through personal observations by camping in different study sites and by attending different socio-religious occasions of the people. All information (local names of plants in Tiwa dialect, parts used, methods of use and/or processing, taboos, rituals, and other relevant data) were recorded in field diary for analysis of data. Plant specimens collected were identified with the help of available literature (Hooker 1875-1897; Prain 1903; Kanjilal *et al.* 1934-1940; Balakrishnan 1981& 1983) and processed according to Jain & Rao (1977).

RESULTS AN DISCUSSION

The present ethnobotanical appraisal of the Hill-Tiwas recorded the use of 176 plants under 143 genera and belonging to 72 families (52 Dicotyledonous; 11 Monocotyledonous; 1 Gymnosperm; 8 Pteridophytes). Ninety-nine plants are used as food, 30 plants as medicines, 10 species in treatment of animals, 04 species as ichthyotoxic plants, 26 plants in socio-religious practices (14 sacred plants and 16 for taboos), 32 plants in material culture (construction and tools 11; crafts 09; textiles 05; dyes 07, and cosmetics and detergents: 03), and one species in preparation of ash solution (Fig. 2). Increase over the number of plants is because of use of the same plant in different categories. Seventeen plants used as medicines are also consumed as food. Uses of 93 plants (food 20, beverages 15, ethnomedicines 09, ethnoveterinary 06, ethichthyotoxic plants 04, socio-religious practices 25 and material culture 23) has been found significant while 63 plants are used for more than one purposes. Follow-up investigations are required to document ethnobotany heritage and plant use of the Hill-Tiwas. Urgency for study stems for the fact that the Tiwas practice oral tradition and with ethnobotanical knowledge mostly confined to elders, and these concerns compounded by rapid loss of biodiversity and influence of other cultures, the whole body of traditional knowledge of the Hill-Tiwas stand to lose before being documented and scientifically evaluated.

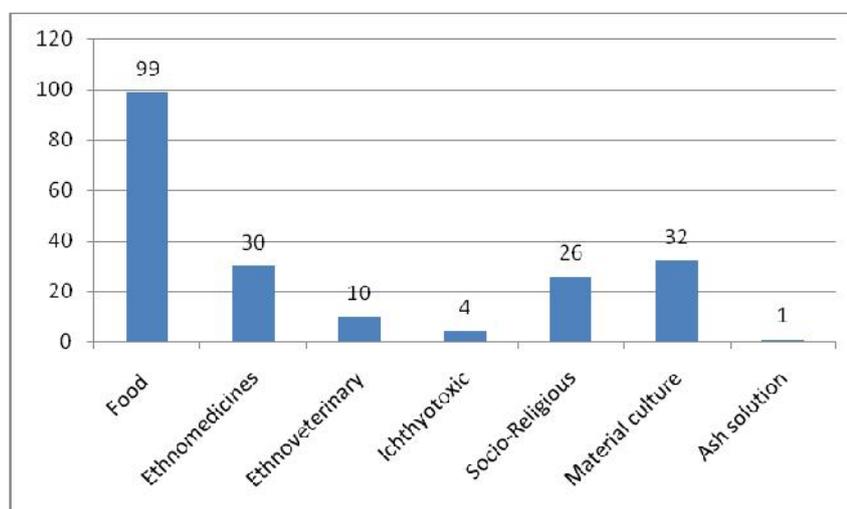


Fig. 2. Histogram showing distribution of plant use categories among the Hill-Tiwas

Agricultural practices

Agriculture forms the main source of sustenance for the Hill-Tiwas, a strategy also prevalent among fellow tribes of the region like the Karbis and Pnars. Slash and burn or *Jhum* is the chief mode of agriculture; the Plain-Tiwas however, practice wet cultivation. A plot of land is cleared of vegetation and on drying the slash is burnt. Hill-Tiwas are early risers; they set out for work early in the morning and usually return home before dusk. They grow multiple crops of which paddy is the main crop besides maize, cucurbits, beans, yams, aroids, sesame and other minor products (Fig. 3). Crops are grown mainly for consumption; excess produce (particularly turmeric, chili, cucurbits, sesame and aroids) are sold in local markets to generate cash income (Fig. 4). Today, agroforestry with bamboo, ginger, turmeric, broom grass, pineapple and betel nuts is very popular and people have been earning good returns from such practices (Fig. 3). This recent trend in agriculture however, can have implications on forest cover as more and more forest land will be cleared for agroforestry. Wet cultivation is also practiced but to very limited extent in low lying areas and valleys. Practice of homestead gardens is not popular and many plants of daily requirements are grown in *jhum* fields or collected from wild habitats. Many families do not achieve sufficient produce from agriculture to feed the whole year and this demands utilization of wild plant resources for subsistence. Livestock rearing is common but mainly for domestic purposes.

Diversity of food plants

Wild plants form major component of food basket of the Hill-Tiwas. They still profess traditional food habits unmindful of the developments around them. Certain cuisines are unique with cultural significance. Oil is seldom used in cooking instead foods are prepared with locally prepared ash solution or *khar* and dried fish. Traditionally dishes are flavored with local herbs such as *Allium tuberosum* Roxburgh, *Eryngium foetidum* Linnaeus, *Ocimum killiancharicum* Guerke and *Sesamum indicum* Linnaeus. Methods of preparation of foods are varied. Present survey recorded 99 plants consumed by the Hill-Tiwas (Fig. 2). Food-plants were further grouped as famine food (11) which is consumed as alternative to staple food (i.e. *Oryza sativa* Linnaeus), vegetables (63) consumed alone or as snacks or with rice, edible fruits (26), spices and condiments (08) and plants used in preparation of alcoholic beverage (05). It was noticed that the use of wild plant foods is not alternative to staple foods but a supplement to the latter thus, consumption of wild plant foods is inherited as a component of their culture.

Boiling is the most common method of preparation of food items where in plants alone or with other items are simply cooked in water. Some foods like aroids, yams, cassava, banana inflorescence and *Amomum subulatum* Roxburgh are eaten roasted. Foods prepared by roasting are highly revered for its aroma and taste. Baking is another method of food preparation. Plants along with other ingredients are wrapped with banana or turmeric leaves and buried in hot ember of fire or in hot ashes. Spices and herbs, mushrooms and *Rotheca serrata* (Linnaeus) Steane & Mabberley dried fish, etc are common items prepared by baking. Sometimes plants are dried under the sun or over fire and stored for future use. Foods like bamboo shoots, tubers and roots (aroids, yams, cassava) are preserved for future use by drying. Of all the methods of food preparations, cooking in bamboo tube is the most unique method. Foods are put into a bamboo tube; the mouth is closed and then cooked over fire. Recipes of aroid leaves, mushrooms, *Amomum subulatum* Roxburgh inflorescence and *Diplazium esculentum* (Retzius) Swartz (a fern) leaves are often prepared by this method. The aroma of fresh bamboo tube adds flavor to the recipe and for this it is highly revered. It is pertinent to mention that tea and rice are often boiled in bamboo tubes.

Plants used in preparation of alcoholic beverage

Rice beer or *Chu* is a common soft drink of the Hill-Tiwas; it is also offered to traditional deities during rituals. Starter cakes are prepared from rice and plants ingredients. Rice is soaked in water and pounded with leaves of *Makcharaphang* (*Croton joufra* Roxburgh) in wooden mortar with pestle; from the powdered mass starter cakes are made. Sometimes leaves of *Amomum koenigii* J.F. Gmelin and bark of *Acacia pennata* Willdenow are also used as substitute for *C. joufra*. Often the beer is distilled in a crude *stil*. Tiwa folk use many other plants to increase the strength of the beer or alcohol. However, these plants, which may be categorised as adulterants, are not used in the preparation of beer meant for rituals or household consumption. Such adulterant plants are added during the preparation of fermentation cakes and include *Artocarpus heterophyllus* Lamarck, *Carica papaya* Linnaeus, *Rotheca serrata* (Linnaeus) Steane & Mabberley, *Clerodendrum viscosum* Ventenat, *Justicia gendarussa* Burman f., *Vernonia* sp., *Mikania micrantha* Kunth, *Moringa oleifera* Lamarck, *Phlogacanthus thyriformis* (Roxburgh ex Hardwicke) Mabberley, *Ricinus communis* Linnaeus, *Saccharum officinarum* Linnaeus, *Solanum ferox* Linnaeus and *Solanum melongena* Linnaeus.

Healthcare practices and Ethnomedicines

During the present study 30 species of plants were recorded which are important elements of the local pharmacopoeia of the Hill-Tiwas. All parts (roots, stem, bark, leaves, fruits and whole plants) are used in the preparation of herbal prescriptions. Decoction, maceration, whole plant and paste are common forms of herbal prescriptions. Fever, dysentery, diarrhea, arthritis, eye sore and flu are common diseases prevalent in the study area. According to traditional Tiwa religion, diseases are the manifestation of Gods and evil spirits and propitiation is said to appease them which in turn will cure the patients. The common causes of disease include non-propitiation of Gods in time, violation of taboos, influence of deities of sacred groves, etc. Further, it is believed that diseases caused by Gods are not cured by modern medicines or herbs and can be cured only by invoking the concerned deity. When the cause of the disease could not be ascertained, a wise man is summoned to perform divination (*Mongola*) in order to ascertain the cause of the illness. The wise man performs the ritual and by virtue of his divinity predicts the cause of the ailment and accordingly advises the family to observe rituals for recovery of the patient. Divination is also practiced in cases of loss of property and missing person or cattle.

Hill-Tiwas mostly rely on traditional Magico-religious practices and ethnomedicines, knowledge of which has been inherited from their ancestors orally, to manage all forms of ailments and disease conditions. Patients go to hospital only when local medicine-man fails to cure them. Wide array of plant and animal parts or their products are components of Tiwa traditional medicines. Village elders, both men and women possess knowledge of medicinal plants but medicine men or *Ojha* are considered more knowledgeable.

Use of charms is a common practice to cure minor ailments such as cuts, eye and ear sores, dog bite, snake bite, headache, sprains, stomach ache, spider bite and itches caused by caterpillars. The charms include verses associated with legend of deity who is considered as responsible for and/or capable of managing the problem. For this, charms is practiced by select persons who are believed to have mastered the secret verses or *mantras* associated with a deity. Plants or its products are physically applied locally in case of sprains, skin diseases, headache, ear and eye diseases, fracture, snake, dog and pig-bites, bee stinging, etc. Sometimes medicine man use charms before actual application of plant medicines. Oral application involves oral administration of the medicinal plants. Diseases such as gastrointestinal problems, fever, urinary trouble, body ache, antidotes, etc are treated through oral administration of plant products.

For the treatment of such diseases the dose may be a solution, paste or tablet or powder. The quantity and number of doses depend on severity of the ailment as advised by the medicine man. Aroma therapy is commonly practiced for infants and children but in certain cases for adults also. Plant or animal parts are tied to the body or made into beads and tied around neck. For example, scales of pangolin or cocoons of an insect are tied to the neck of children to control sialorrhoea or continuous salivation (Fig. 5). Root-bark of *Aristolochia indica* Linnaeus is also used to cure this problem. Aroma therapy for curing jaundice is often practiced among all communities of Karbi Anglong district. Leaves or rhizome of sweet flag (*Acorus calamus* Linnaeus) is tied to the waist to relieve constipation in children and adults. Folk attribute disturbed sleep to evil spirits; for this a piece of cloth or cocoons of eri is burnt and the smoke is claimed to ensure pleasant sleep. Bathing patients with water treated with Neem (*Azadirachta indica* A. Jussieu) is practiced for small pox.

Ethnoveterinary and ethnoichthyotoxic plants

Hill-Tiwas use plants to manage certain diseases of domestic animals. Dysentery, poisoning, cuts and insect parasites are major problems of animal health. Folks reported that deities of sacred groves and even household deities can also cause disease to domestic animals and in such situation the concerned deities are propitiated for recovery of the animals. Present survey recorded six plants, namely *Cannabis sativa* Linnaeus, *Cuscuta reflexa* Roxburgh, *Dillenia pentagyna* Roxburgh, *Kaempferia galanga* Linnaeus, *Lygodium japonicum* (Thunberg) Swartz and *Prunus domestica* Linnaeus, which are said to be used for treating ailments of domestic animals including poultry. It was observed that less attention is given towards the problems of animal health, probably because livestock is not considered as means of economy and sustenance.

Tiwa folk use five plants [*Albizia* sp., *Catunaregam nutans* (Roxburgh) Tirvengadam, *Derris elliptica* Bentham, *Mimosa himalayana* Gamble, and *Persicaria hydropiper* (Linnaeus) Delarbre] for fishing. These plants are pounded and mixed in water to stupefy fishes. Community fishing is important component of the Tiwa social culture. Now-a-days it is rarely practiced but the Hill-Tiwas preserve this legacy by performing community fishing during *wanchoa* festival.

Plants used in Socio-Religious practices

Observation of rituals in honor of deities and ancestors are integral part of traditional Tiwa religion. They also observe *Krianu* (taboos) on plants. Violation of taboos will annoy the deity concerned and cause harm to individual or the family, it is believed. Tiwas, particularly *Chela* (priests) practice strict taboos as compared to other members of the society. Fourteen plants are used in rituals and such plants are considered sacred; its use is based on beliefs that the plants are associated with the legend of the concerned deity. *Callicarpa arborea* Roxburgh, *Cyathea gigantea* (Wallich ex Hooker) Holttum, *Dendrocalamus hamiltonii* Ness et Arnott ex Munro, *Inula cappa* (D. Don) DC. and *Lagenaria siceraria* (Molina) Standley are important sacred plants. Hill-Tiwas observe taboos on 16 plants. Three plants namely *Alstonia scholaris* (Linnaeus) R. Brown, *Ficus religiosa* Linnaeus and *F. benghalensis* Linnaeus are regarded as most forbidden by all Tiwas; these plants are forbidden to take inside the house. Priests observe taboo on consumption of *Musa* spp., *Benincasa hispida* (Thunberg) Cogniaux and *Zanthoxylum rhetsa* (Roxburgh) DC.

Plants used in material life

Plants form the basis of material culture of the Hill-Tiwas. All requirements in life are supplemented with plants and its products. Twelve species (though not exhaustive) have been



PLATE – I: **Fig. 3.** Jhum field of Hill-Tiwas; with broom grass as intercrop (Agroforestry); **Fig. 4.** Tiwa women sell agri-produces in Umsowai market, Karbi Anglong district; **Fig. 5.** Cocoon of insect tied around the neck of infant to control sialorrhea; **Fig. 6.** Endangered fern *Dipteris wallichii*; **Fig. 7.** A Tiwa man serves *chu* with *tran* during *wanchoa* festival; **Fig. 8.** Hill-Tiwas make *maiphur* to store paddy; **Fig. 9.** Stack of *maiphur* in granary of Hill-Tiwas; **Fig. 10.** Tiwa women at looms; **Fig. 11.** *Samadi*, Bachelors' Dormitory of Hill-Tiwas; **Fig. 12.** Bachelors participate in *wanchoa*; **Fig. 13.** Mass rice pounding during *wanchoa* of *Marchongwali* subclan; **Fig. 14.** Participants perform fishing and bamboo dance during *wanchoa* of *Makrowali* subclan.

recorded to be used for construction purposes and tools. *Waphang* (*Dendrocalamus hamiltonii* Nees *et* Arnott *ex* Munro) is the most extensively used plant resource having applications in almost all aspects of life from birth to death. *Singliphang* (*Terminalia myriocarpa* Van Heurck. Müller-Argoviensis) is considered most durable in house construction while *Imperata cylindrica* (Linnaeus) Raeuschel is used for thatching. Bamboo-skin slips are used as cordage in all constructions. Tiwas also use leaves of an endangered fern called *Ruthup tengkhia* [*Dipteris wallichii* (R. Brown) Moore] for thatching their huts (Fig. 6).

Craft is pristine hobby of the Tiwas. Crafts of different types are prepared from bamboo, cane and wood. *Gamariphang* (*Gmelina arborea* Roxburgh) is the most preferred wood for making crafts; the wood is soft and can be easily managed with crude tools at their disposal. One of the most remarkable crafts among the Hill-Tiwas is the *tran*, a bamboo container for serving rice beer. The wall of the craft is coated with latex of *Kajiphang* (*Ficus benjamina* Linnaeus) to make it impermeable to beer and water. Serving beer with *tran* is mandatory during community festivals and also considered as an asset of a family (Fig. 7). *Kusuri* is another craft of immense cultural importance; it is made by joining the ends of bark of *Silikaphang* (*Terminalia chebula* Retzius). The craft is used for making *maiphur*, container for storing paddy. Knowledge of making *maiphur* has immense cultural importance. A bunch of *kunchi* (thatch grass) is tied at one end and then placed inside the *kusuri*; straw is placed along the wall and paddy is poured till the brim of the *kusuri*. The other end of the *kunchi* is pulled and tied (Figs. 8 & 9). *Kusuri* comes in different volumes to accommodate specific quantity of paddy (for example 20 kg or 40 kg).

Textiles and dresses and dyes are important cultural indicators of the Tiwas. Women are expert weavers and weave clothes for both men and women. Expertise of weaving is considered as a qualification for becoming desired bride. Garments are woven on looms locally referred as *Matihai*; the loom has warp directly placed on the ground (Fig. 10). *Khulphang* (*Gossypium herbaceum* Linnaeus) and eri silk are the main sources of yarns or fibers for looms. Traditional costumes are adorned with beautiful motifs and designs of flora and fauna and other objects. Plants often depicted on costumes include *Dillenia indica* Linnaeus, *Entada phaseoloides* (Linnaeus) Merrill, *Musa x sapientum* Linnaeus, and *Diplazium esculentum* (Retzius) Swartz. Leaves of *Pohomajulai* (*Mussaenda macrophylla* Wallich) are made into paste and rubbed on weaving implements to reduce friction. Besides, motifs of certain animals like elephant, crab, monkey, drongo, stag, peacock, Gandhi bug and rhino are made on garments.

Yarns and garments are dyed with black, blue, yellow, pink and red colour, which are extracted from different plant and animal sources. Common dye-yielding plants include *Baccaurea ramiflora* Loureiro, *Breynia* sp., *Eclipta prostrata* Linnaeus, *Garcinia cowa* Roxburgh, *Impatiens balsamina* Linnaeus, *Morinda angustifolia* Roxburgh and *Shorea robusta* Gaertner *f.* Red dye is extracted from scale lac (*Coccus lacca* Kerr, 1782). Plants are also source of cosmetics and detergents. Pericarp of *Khoborguthi* (*Sapindus saponaria* Linnaeus) is pounded and used as detergent for washing clothes. Alkaline solution extracted from ash of *Dendrocalamus hamiltonii* Nees *et* Arnott *ex* Munro is used as hair wash and also as detergents. Inflorescence of *Khum kheja* (*Pandanus fascicularis* Lamarck) is fragrant and often kept in *chaphakho* (wardrobe) to make clothes fragrant. Paste of leaves of *chondoko* (*Impatiens balsamina* Linnaeus) is used for tattooing the body.

Bachelors' Dormitory and the Wanchoa festival

Wnachoa is one of the important festivals of the Hill-Tiwas. This festival is observed when the tenure of bachelors' cooperative group called *Banthatjingya* completes. Bachelors'

dormitory is vibrant among the Hill-Tiwas; this practice touches upon their origin, religion, culture and traditional institutions. It is binding on all boys to attend bachelors' dormitory in one's lifetime and participate in *wanchoa* festival. *Changdolo* heads the *Banthatijingya*; he is assisted by his deputies called *Changmiji*, *Hurma*, *Khuramul* and *Khurasah*. The office of bachelors' cooperative group is called *Samadi* and built on raised platform (Fig. 11). The tenure for a bachelors' group as sanctioned by the *Pisai* (village chief) is five years which means *wanchoa* is observed at the end of every five years.

Wanchoa is purely the hobby of bachelors and the *Pisai* (village chief) is only an advisor. The festival continues for three days commencing always on Sunday. During the festival rituals are observed in front of the *Samadi* to invoke local deities such as *Saribhai Kuru Lambha*, *Saribaina*, *Mathine* and *Barakhondeo*; twigs of *Khummelang* (*Callicarpa arborea* Roxburgh) are used on the occasions. Participants in traditional attires make merry and dance to the rhythm of folk songs and music; participants carry agricultural produce such as pineapple, cucumber, maize, brinjal, etc as a mark of exhibition of agricultural produces (Fig. 12). The greatest attraction, among others things is the *Chenthor* and *Sirki*, wooden crafts for spinning yarns. Bachelors carry the craft on their shoulders; rotate the wheels in a rhythmic fashion and sing folk songs and dance (Fig. 12). In the *wanchoa* observed by *Marchongwali* subclan of the Hill-Tiwas, participants perform mass pounding of rice grains (Fig. 13). In another type of *wanchoa* observed by *Makrowali* subclan, participants showcase bamboo dance and perform community fishing camouflaged in *tengkhia boro* [*Cyathea gigantea* (Wallich ex Hooker) Holttum] (Fig. 14). It may be mentioned that *Wanchoa* is observed among the Hill Tiwas only.

Conservation of plants resources

Though no specific practice for conservation of biodiversity was observed but beliefs, traditions and resource use patterns of the Hill-Tiwas have elements of sustainability. Their traditional animistic religion recognizes natural habitats (vegetation, river, hill, lake) as the abode of deities. The fear of being inflicted by incurable diseases dissuades people from destruction of sacred sites. Such cultural beliefs indirectly helped in conservation of certain species in their habitats. *Mindai Fader*, *Chokorbura*, *Sari Bhai*, *Losuri*, *Umdoba*, *Senaini*, *Khumduba*, *Kulachumphor* and *Longkhang* are popular sacred groves of the Hill-Tiwas. They have been maintaining germplasm of many indigenous crop varieties and cultivars through preservation of their traditional agriculture practices and beliefs despite superior varieties being available at the counter. Another pro-conservation practice is domestication of important plants. Culturally important plants with rare distribution are planted in home gardens. This reduces the need to travel in forests frequently and also ease the pressure on wild populations. But, the practice with *Inula cappa* DC. is unique; though the plant is available in the wild it is planted in almost all houses as the plant is considered highly sacred. Harvesting of plant resources is also guided by traditional beliefs: tubers and roots are generally harvested only after aerial parts have withered, which they consider as an indicator for maturity. Wild aroids are generally collected from previously collected populations as it is more palatable than the unharvested populations. Such collection practice contributes towards management and conservation of different aroid germplasms. Resource utilization based on cultural beliefs helps in conservation of natural resources by acting as natural deterrents against over exploitation.

CONCLUSION

The present communication is the first systematic study on ethnobotany of the Hill-Tiwas of Assam. They practice distinct plant use patterns different from the Plains-Tiwas, which is largely attributed to resource availability. Follow-up investigations are required to document

ethnobotany heritage and plant use of the Hill-Tiwas; this will help to document their traditional knowledge and may provide leads for new plant resource of national and global significance. Urgency for the study stems from the fact that the Tiwas practice oral tradition and ethnobotanical knowledge is mostly confined to elders and these concerns are compounded by rapid loss of biodiversity and influence of other cultures. In such a situation the whole body of traditional knowledge of the Hill-Tiwas stands to lose before being documented and scientifically evaluated. Loss of biodiversity will also bring about change in plant use pattern. Assessment of exchange of ethnobotanical knowledge of Tiwas with fellow ethnic groups the Karbis and Pnars inhabiting the same geographical area can throw light on the dynamism of traditional knowledge and cultural relationships among them.

Acknowledgements

Authors are indebted to the Hill-Tiwa people for participating in the research and disclosing their ethnobotanical knowledge for documentation. They thank local guides for their assistance and hospitality during field study. Special thanks to the trusted guide and interpreter Shri Ram Sing Teron a Karbi man but also well versed in Tiwa language. Authors appreciate comments and suggestions of anonymous reviewers.

LITERATURE CITED

- Balakrishnan, N.P. 1981 & 1983. *Flora of Jowai*. Botanical Survey of India, Howrah.
- Bodding, P.O. 1925 – 1927. Studies in Santal medicine and connected folklore, II Santal Medicine. *Mem. Asiat. Soc. Bengal* 10(2): 133 – 426.
- Bodding, P.O. 1940. Studies in Santal medicine and connected folklore. *Memiors Asiat. Soc. Bengal* 10: 427 – 502.
- Hajra, P.K. & Baishya, A.K. 1997. Ethnobotanical notes on the Miris (Mishings) of Assam plains. In Jain SK (Ed.) *Contribution to Indian Ethnobotany*, Scientific Publishers, Jodhpur. Pp. 161 – 168.
- Harshberger, J.W. 1896. The purposes of ethnobotany. *Bot. Gaz.* 21: 146 – 158.
- Hooker, J.D. 1875 – 1897. *Flora of British India*. Vols. I-VII, L. Reeve & Co. Ltd., Kent, England.
- ISE 2006. ISE Code of Ethics (with 2008 additions). International Society of Ethnobiology. Online: <http://ethnobiology.net/code-of-ethics/>
- Islam, M. 1996. Ethnobotany of certain underground parts of plants of North Eastern Region, India. *J. Econ. Tax. Bot. Adl. Ser.* 12: 338 – 343.
- Jain, S.K. & Rao, R.R. 1977. *A Handbook of Field and Herbarium Methods*, Today's and Tomorrow Publishers, New Delhi.
- Jain, S.K. & Borthakur, S.K. 1980. Ethnobotany of the Mikirs of India. *Econ. Bot.* 34(3): 264 – 272.
- Jamir, N.S. 1999. Ethnobotanical studies among Naga tribes in Nagaland. In: *Biodiversity North East India Perspective*, eds. B. Kharbuli, D. Syiem & H. Kayang, North Eastern Biodiversity Research Cell, North Eastern Hill University, Shillong. Pp. 128 – 140.
- Joseph, J.A. & Kharkongor, P.A. 1997. A preliminary ethnobotanical survey in Khasi and Jaintia Hills, Meghalaya. In: *Contribution to Indian Ethnobotany*, ed. S.K. Jain, Scientific Publishers, Jodhpur. Pp. 187 – 194.

- Kanjilal, U.N.; Kanjilal, P.C.; Das, A.; Purkayastha, C. & Bor, N.L. 1934 – 1940. *Flora of Assam* (5 Volumes), Govt. of Assam Press, Shillong.
- Manilal, K.S. 1989. Linkages of ethnobotany with other sciences and disciplines. *Ethnobotany* 1: 15 – 24.
- Padhy, S.; Dash, S.K. & Padmavati, A. 2005. Ethno-Astrology. I. Introducing a new Sub-discipline. *J. Hum. Ecol.* 17(3): 197 – 200.
- Prain, D. 1903. *Bengal Plants*, 2-Volumes, W & Co. Printer & Publisher, Calcutta.
- Rao, R.R. 1997. Ethnobotanical studies on some Adivasi tribes of North East India with special reference to the Naga people. In: *Contribution to Indian Ethnobotany*, ed. S.K. Jain, Scientific Publishers, Jodhpur. Pp. 209 – 223.
- Sarma Thakur, G.C. 1985. *The Lalungs (Tiwas)*. Tribal Research Institute, Guwahati.
- Singh, K.P. & Singh, H.B.K. 1996. Superstition in botanical folklore with reference to Meitei culture. *Econ. Tax. Bot. Addl. Ser.* 12: 367 – 372.
- Singh, J.; Bhuyan, T.C. & Ahmed, A. 1996. Ethnobotanical studies on the Mishing tribes of Assam with special reference to food and medicinal plant. *J. Econ. Tax. Bot. Addl. Ser.* 12: 350 – 356.
- Teron, R. & Borthakur, S.K. 2008. Traditional Knowledge relating to use of flora and fauna as indicators in predicting annual seasons among *Karbi* tribe of Assam. *Indian J. Trad. Knowl.*, 8(4): 518 – 524.
- Vasudeva, M.K. & Shanpru, R. 1997. Some plants in the life of Garos of Meghalaya. In Jain SK (Ed.) *Contribution to Indian Ethnobotany*, Scientific Publishers, Jodhpur: Pp. 179 – 186.