

Traditional Knowledge relating to use of flora and fauna as indicators in predicting annual seasons among *Karbi* tribe of Assam

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Received 25 June 2007; revised 29 August 2008

There exist a sound Indigenous Knowledge System (IKS) among *Karbis* relating to prediction of annual seasons using flora and fauna and physical factors as indicators. Floral characters include leaf fall, formation of new leaves, flowering, fruiting and ripening, formation of tubers, etc. while faunal characters include courtship and mating, egg laying and hatching, aggressiveness, appearance of a particular species and many more. Physical factors comprise of moon, temperature, wind, rainfall, day length, etc. A Folk Calendar consisting of 12 months based on these indicators have been practicing among the people since time immemorial. *Karbi* New Year however, commences from 1st February, which has already received official recognition of the local government, Karbi Anglong Autonomous Council. Floral and faunal and physical indicators are used primarily for *jhum* cultivation such as time of selection of the plot, clearing of forest, burning of slash, tilling the soil, sowing and other activities related with *jhum* and secondly for harvesting forest resources and day-to-day activities. IKS is fast losing its ground among *Karbis* mainly due to acculturation and destruction of forests, the natural habitat where Indigenous Knowledge was born and evolved and change of habitat from hills to plains.

Keywords: *Karbi*, Biological indicators, Folk Calendar, Annual season prediction, Folk calendar, Traditional knowledge

IPC Int. Cl.⁸: A01G1/00

The *Karbis* represents one of the major tribes of Northeast India and possess rich traditions and culture unique from other tribes of the region. However, like their Northeast brethren they belong to Mongoloid race and speak a local dialect belonging to Tibeto-Burmese particularly Kuki-Chin sub-groups of languages. Further, they are believed to have migrated from the Kuki-Chin area, in and around the Chindwin river valley in Western Myanmar¹⁻⁴. Though smaller or larger settlements exist in the entire NortheEast region even in Bangladesh, at present they are largely concentrated in the two hill districts of Assam, viz. Karbi Anlong with its headquarter at Diphu and North Cachar Hills with its headquarter at Haflong. The region is largely hilly with dense forests and rough terrains and therefore, ethnobotanically least explored. The historical account of *Karbis* is largely fragmented due to lack of written history. Available evidences however, suggest forests as their natural habitat and they entirely depend on forest for all requirements

(food, medicines, fibre, raw materials, dyes, soaps, detergents, etc.). Their main mode of agriculture is still the age old *jhum* (shifting cultivation), at least in the hills. Rice is the staple food supported by wild plants (roots, tubers, leaves, flowers and fruits). They practice animistic form of religion and worship multiple Gods that often involve sacrifice of pigs, goats and fowls. Such ceremonies are performed either to cure illness or for favour of rich harvest^{1,3}. Even origin and evolution of their religion is believed to be influenced by forests.

The *Karbis* and other hill tribes as well have acquired sound knowledge of forests and its resources and also developed a database of the behaviour and characteristics of flora and fauna around them. This has led to the development of invaluable Indigenous Knowledge System (IKS) or Traditional Knowledge System (TKS), courtesy long association with forests and close observations of flora and fauna. One such IKS among *Karbis* is use of flora and fauna as indicators for predicting annual seasons and also for day to day activities such as cultivation, poaching, sowing and harvesting, etc. Accuracy of this IKS is

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exemplified by the fact that the best time for agricultural activities and harvesting forest resources has never escaped the watchful eyes of the illiterate hill *Karbis* since time immemorial, at a time when modern calendar was not heard of. Probably, close observation on vegetation and animals and careful analysis were the only survival strategies of hill tribes including *Karbis*. Physical factors such as moon, temperature, rain, day length, wind, etc. are also integral part of the Folk Calendar of *Karbis*. Studies on Traditional Knowledge (TK) are one of the important aspects of ethnobotany. There are a few reports on the sociology and ethnobotany of *Karbi* tribe¹⁻¹⁵. These reports and publications however, have no mention of IKS pertaining to use of biological indicators as well as physical factors for predicting annual seasons and for day-to-day activities. Recently, use of plant indicators for agricultural seasons has been reported amongst the *Pnar* tribe of Meghalaya¹⁶.

Methodology

Preliminary information regarding biological and physical indicators for predicting annual seasons were collected from elders in the plains, who had come down from the hills for better life. Frequent visits to rural areas were undertaken, particularly to places not well by roads with urban areas. Village elders both men and women, were consulted and requested to narrate on Folk Calendar and the flora and fauna and also physical factors associated with the calendar. During field work consent of the informants were sought by explaining the objective and importance of the work. Further, they were also assured that the research work will not have any serious implications on the existing IKS among *Karbis*. Plants and animals used as indicators were identified with the help of local guides and physically studied and photographs taken. The plants were collected and preserved as voucher specimens in the herbarium of Botany Department, Guwahati University, Guwahati¹⁷. Information was confirmed from learned persons and elders from different localities to avoid ambiguity. The report is based on first hand knowledge compiled during 2001–2005 from different parts of Karbi Anglong district.

Results

The *Karbis* possess sound IKS for predicting annual seasons and for day-to-day activities using characteristics of flora and fauna and physical factors

as indicators. Floral characters include leaf fall, formation of new leaves, flowering, fruiting and ripening, formation of tubers, etc. while faunal characters include courtship and mating, egg laying and hatching, aggressiveness, appearance of a particular species. Physical factors comprise of moon, temperature, wind, rainfall, day length, etc. The hill *Karbis* had devised Folk Calendar consisting of 12 hypothetical months, solely guided by biological and physical factors. Number of days for a month is not fixed therefore; there is high probability of overlapping of the first few days of the current month with the last few days of the previous month. The hypothetical months or periods are identified by a few conserved features of plants and animals and also physical factors. These indicators are so marked that there is a specific 'phrase' ascribed to each month or period. The *Karbi* New Year however, starts from 1st February. The local government, Karbi Anglong Autonomous Council has officially recognised the Folk Calendar and had been celebrating the New Year since 2005. Since time immemorial, the hill *Karbis* have been using this locally devised calendar for predicting annual seasons and day-to-day activities such as cultivation, harvesting foresting resources (honey, food, medicines, tubers, roots, timber, fibres, etc.), poaching, fishing, festivals, marriage and other activities. Details of *Karbi* Folk Calendar and associated floral and faunal and physical indicators along with popular phrase ascribed to the month or period are enumerated below. Local (*Karbi*) names, scientific names, and families are given. In the enumeration below, the terms *month* and *period* have been used interchangeably.

Enumeration

Thang Thang (February) *Thang, thang rit lang*

This month is characterised by flowering of *Pharche* (*Erythrina stricta* Roxb.; Fabaceae) and *Pharkong* (*Bombax malabaricum* DC.; Bombacaceae). These are the most important indicators of this period, which reminds the people of the appropriate time to look for new *jhum* land, which is clearly reflected by the phrase *Thang Thang, rit lang* (*rit*: *jhum* land; *lang*: to look for). Other important indicators of this month includes flowering of *Prandang*, *Pranso* (*Garcinia lanceaefolia* Roxb.; Guttiferae), *Jokri* (*Altingia exelsa* Noronha; Hamamelidaceae), *Marloo*, *Mirchokpip*, *Mirthere*, *Toklanksot* (*Ipomoea cymosa* Roem. & Sch.; Convolvulaceae), while *Poma* (*Toona ciliata* Roem.;

Meliaceae) and *Marthu* (*Croton joufra* Roxb.; Euphorbiaceae) starts forming new leaves.

The-re (March) *The-re, mam te*

This period is indicated by hot days and is considered as the most suitable period for drying slash produced from clearing of forest. The phrase *The-re mam te* reflects it all (*mam*: slash; *te*: to dry). Flowering of *Jangmi* (*Syzygium cumini* L.; Myrtaceae), *marthu*, *mirborung*, *theng hanso* (*Micromelum pubescens* Bl.; Rutaceae), *phree*, *te-or* (*Sapium accatum* Roxb.; Euphorbiaceae); and *mircharne* (*Mesua ferea* L.; Guttiferae) starts forming characteristic new leaves; fruits of *hanjor* (*Xanthoxylum rhetsa* DC.; Rutaceae) starts ripening, mass egg laying of a local species of fish referred as *nuhong* (Fig. 1) are also important indicators of this month.

Jangmi (April) *Jangmi, meh ri*

This period coincides with hectic courtship and nesting of all types of birds; their melodious chirping can be heard during the day. The days are hot and windy. *Tharve* (*Mangifera indica* L.; Anacardiaceae), *jangphong* (*Artocarpus heterophylla* Lamk.; Moraceae), *phang* (*Gmelina arborea* L.; Verbenaceae) starts flowering. These features are reported to reflect the best time for burning slash, which *Karbis* carry out without fail (Fig. 2). Because, these biological and physical features usually foretell a shower. It is believed that profuse flowering of *tharve* and *jangphong* foretell storm in the days that follows. A seasonal bird *Thong Kangko* appears and sing a characteristic notes *O thong kangko, botor vanpo*, read as *thong kangko* has come with new season' (*botor*:season). *Hepi* (*Solanum melongena* L.) and *birik* (*Capsicum frutescens* L.; Solanaceae) starts forming new leaves; *jangling*, *pranso*, *vekek* (*Mangifera sylvatica* Roxb.; Anacardiaceae) starts fruiting; *sojong* (*Citrus* sp; Rutaceae) starts ripening; *phurui* (*Dioscorea* sp; Dioscoreaceae) starts germinating. This coincide with cackling of *vohar* and *vorek* (both wild fowls) and indicates last part of the month. Observing these features people simultaneously sow seeds of paddy and *thengthe* (*Zea mays* L.; Poaceae) and *thoithe* (*Cucumis sativus* L.; Cucurbitaceae) and till the soil (Fig. 3). Animals such as *chetung* (tortoise), *ureng*, *kako* (*Ambystoma* sp.), *pherui* (snakes) and *chehang* (monitor lizard) start laying eggs. The days are windy so it is easy to built fire. Therefore, usual practice is people go to *jhum* land without carrying fire along with them. Fire is built by rubbing a dry bamboo split called

meh ari (*meh ri* in short) against a dry bamboo stick called *meh thengdang* (*thengdang* in short). The phrase *jangmi meh ri* refers to people looking for a suitable *meh ri* to built fire, which is a common scene of this month. Another method of building fire is by rubbing two pieces of stones against each other. This is a tedious method and usually not preferred, at least during this period. Egg laying by *vohar* and *vorek* marks the end of this month.

Aru (May) *Arupo, ram nong*

People continue to till the soil in the *jhum* land. On the other hand, people clean up previous year's *jhum* followed by sowing of seeds and tilling of soil as highlighted by the phrase *Aru, ram nong* (*ram*: old *jhum* land; *nong*: to till the soil). Chirping of *Vomongve*, a seasonal bird can be heard; germination of leftover grains in the field; *phang* continue to flower; *bengvoi* (*Holarrhena antidysenterica* Wall. Apocynaceae); *arhi* (*Callicarpa arborea* Roxb.; Verbenaceae) (Fig. 4), *chingnan* (*Schima wallichii* Choisy; Ternstroemiaceae), *tantuli* (*Tamarindus indica* L.; Caesalpiniaceae) start flowering; *pranso* ripens (Fig. 5), are important features of this month. The most reliable indicator of this period is marked profuse vegetative growth of *hankedok*, which constitute the handiest vegetable for people working in the *jhum* field. Important animal indicator of this month includes appearance of moth stage of an ant called *hanghoi* in large number. The moth is very delicious and often consumed; also often used as fish bait.

Vosik (June) *Vosik, hen-up kardik*

The most important indicator of this month is blooming of an undershrub *Mirvosik*. Bamboo (*Dendrocalamus hamiltonii* Nees et Arn. ex Munro; Poaceae) starts forming new shoots and therefore, it is a common scene people peeping through bamboo stands looking for the shoots for consumption. The phrase *Vosik, hen-up kardik* reflect this activity (*hen-up*: bamboo shoots; *kardik*: to peep). *Sopleple* (*Leea umbraculifera* Cl.; Leeaceae) an important lac host starts forming new leave; *keng-et* (*Willoughbeia edulis* Roxb.; Apocynaceae) and *jangphong* fruits (Fig. 11), *vekek* ripens; *voputpo*, a seasonal bird appears and their melodious notes can be heard throughout the day. These are trusted indicators of the month. *Thijok* (Deer) and *phakleng* (wild pigs) give birth to young ones; *vorek* and *vohar* start hatching and the chickens can be seen feeding on *laha aso* (lac insects). In other words appearance of

laha aso is considered as indicator for hatching of *vorek* and *vohar*. *Thengthe* and *thoithe* start flowering. Also, this period is characterized by rapid regeneration of phang (bamboo stands) forming large canopies and which often cause shading to crops (Figs. 6 & 10). People clearing such undesirable bamboo stands is considered activity during this period (Fig. 11, inset). This act of clearing is called *phang kechek* (*phang*: bamboo stand; *kechek*: to break canopy). By this time most people completes tilling their land as well as sowing. Flowering of another floral indicator *paipe*, a local grass indicates end of tilling and sowing of crops. The *Karbis* believe that seeds sown after the blooming of this grass do not reach maturity.

Jakhong (July) Jakhong, hen-up Kardong

This period is indicated by the rapid growth in height of bamboo shoots (Fig. 7), which is explained by the phrase *jakhong, hen-up kardong* (*hen-up*: bamboo shoots; *kardong*: marked vertical growth). People are free from *jhum* related work and therefore, they get busy collecting bamboo shoots for immediate consumption and storage. *Bik-bik* (*Blatus cochinchinensis* Lour.; Melastomaceae) starts fruiting; *jangphong, tharve, keng-et, marloo, tampejuk* (*Bacuarea sapida* (Roxb.) Muell.-Arg.; Euphorbiaceae) and *jangmi* ripens. Weeding starts and after a hard day's work, people enjoy by consuming various fruits including *thengthe* and *thoithe*, a common scene of this period. A local species of frog starts croaking; and *Vosobiku*, a seasonal bird starts singing.

Pai Pai (August) Pai pai, sok mandu lut jai

Ripening and harvesting of an early variety of a local cultivar, called *soksu* (*ahu*) marks the arrival of this month. People can usually be seen carrying paddy in the *mandu*, a small farm house in the *jhum* and the phrase *pai pai, sok mandu lut jai* aptly reflects this scene (*mandu*: farm house; *lut jai*: to carry inside). Also, this is the first phase of harvesting of the season. Flowering and fruiting of most plants come to completion. Late variety of upland paddy *chubok* starts flowering, *phong* (*Artocarpus chaplasi* Roxb.) and *ingtat* (*A. lakoocha* Roxb.; Moraceae) ripens; birds like *Vo ingkek* (heron), *Vo terank* (heron) and *vokek* (parrot) start hatching. Very often their siblings can be seen feeding on the ripening fruits of the aforesaid plants. *Bonghom* (*Cucumis pepo* DC.; Cucurbitaceae) starts fruiting; roaring of leopards in

the forests can often be heard. Snakes and spiders become very aggressive, which coincide with their breeding period. For this, people usually remain cautious while moving in the forests.

Chiti (September) Chiti, hen-up ahi

The advent of this period is indicated by the fruiting of *okhi seeming* (*Spondias mangifera* Willd.) (Anacardiaceae) (Fig. 12) and is considered as the most appropriate time for poaching deer. Because the animal is very fond of the fruit and is trapped or shot by poachers, who wait in hiding nearby. Leopard continues to roar and snakes and spiders still remain aggressive. Ripening of *soprim* (*Psidium guajava* L.; Myrtaceae) and harvesting of *laha* are also reliable indicators of this period. This period is best suited for preparing a special item of fermented bamboo shoots referred as *hen-up ahi*. The shoots are cut into fine pieces and stored in bamboo baskets called *hor hi* (Fig. 8) for fermentation. This is reported to increase flavour of the food. In olden days, even pork and *bonghom* are stored along with *hen-up* to enhance aroma and taste of the meat and the fruit. Preparation of *hen-up ahi* is associated with celebration of harvesting festival by performing traditional dance called *Hacha Kekan* or *Hen-up Ahi Kekan*. This dance is highly honoured as bamboo shoots constitute an important source of food, next to paddy. Today, however, this festival is losing its shine mainly due to change of habitat and modernization.

Phre (October) Phre, sokthe

Chubok, an upland cultivar of paddy starts ripening and this feature has long been used as traditional indicator of this month which is exemplified by the phrase *phre, sokthe* (*sok*: paddy; *the*: ripens). *Tamir* (*Pennisetum typhoideum* Rich.; Poaceae) and *tumduk* (*Coix lacryma-jobi*; Poaceae) flowers; *nempo* (*Seasamum indicum* DC.; Pedaliaceae) flowers and fruits. These features foretell arrival of a shower referred as *Arnam dam arve*, which is usually expected after *Durga Puja*. The *Karbis* believe that all Gods come down to the earth to see Their people and return to Their abode with a shower (*Arnam*: God; *dam*: to go; *arve*: rain). Flowering of *thebo* (*Ficus glomerata* Roxb.; Moraceae) and *thekek* (*Cajanus cajan* Mill.; Fabaceae) are also considered as good indicators for their day-to-day activities. *Vo kathaiso*, a seasonal bird is often seen sitting in long rows on house top and leafless branches. During this month, granary usually become exhausted

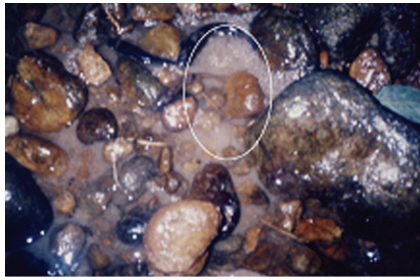


Fig.1 Mass egg laying by *Nuhong*



Fig.2 *Mam kekai*



Fig.3 *Rit Kenong*



Fig.4 *Arhi (Calicarpa arborea Roxb.)*



Fig.5 *Pranso (Garcinia lanceaefolia Roxb.)*



Fig.6 *Phang in jhum land*



Fig.7 *Hen-up kardong*



Fig.8 *Hen-up ahi*

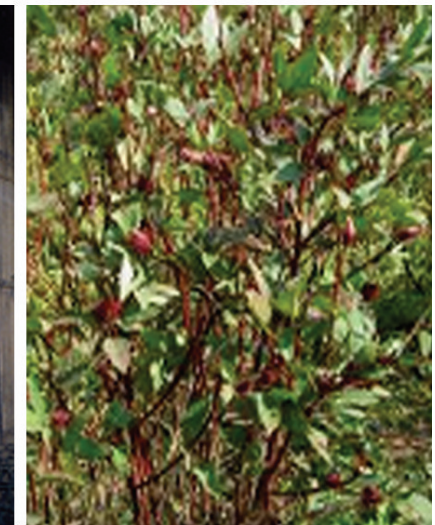


Fig.9 *Hanserong (Hibiscus sabdariffa L.)*



Fig.10 Sowing seeds in *Ram*



Fig.11 *L.umbraculifera C.B.Clarke*



Fig.12 *Spondias mangifera Willd.*

and common people often suffer from hunger because *chubok* (paddy) is still a month away for harvesting. It is reported that *nilo* (unusual high temperature) and heavy rain or appearance of notorious weed, pest, etc. during this month foretell possibility of a misfortune called *akhim* (famine) in the coming days.

Phaikuni (November) Phaikuni, sokbui pangni

Arrival of this precious month is predicted by the ripening and harvesting of *chubok* and stacking of the same is big heaps called *sokbui*. Simultaneously, harvesting of paddy starts in the plains. *Sokbui pangni* literally means stacking of unthreshed paddy (*sok*: paddy; *pangni*: to stack). It is reported that ripening and harvesting of *chubok* is sufficient to predict to commencement of this month. Aggressive feeding of paddy by *vokek* in unharvested field is a common scene of this period. Fruiting of *phongrong* (*Castanopsis indica* A. DC.; Fagaceae) is an indicator worth mentioning. *Hanserong* (*Hibiscus sabdariffa* L.; Malvaceae) (Fig. 9), *tamir*, *marloo* and *thengbon* (*Dolichos lablab* L.; Fabaceae) ripens. Aerial parts of aroids, zingibers and dioscoreas die or wither during this period. This factor is used as an indicator for maturity of tubers or rhizomes and harvesting of the same.

Matijong (December) Matijong, sokbbui chejong

Stacking of unthreshed is almost complete and *sokbui* small or big is evident in all houses (in plains) or *jhum* fields (in hills) even from distant places. People can commonly be heard comparing the sizes of *sokbui* of their neighbours which is corroborated by the phrase *Matijong sokbui chejong* (*sokbui*: paddy stack; *chejong*: to point). Vegetation remains dry. Intense activity of threshing paddy is a common feature in the countryside. People carrying *nempo*, *pholo* (*Gossypium herbaceum* L. Malvaceae) and other minor *jhum* products from *jhum* field to their villages is also a common scene associated with this month.

Arkoi (January) Arkoi, sok roi

Hectic activity of carrying bundles of paddy from *jhum* field to native village is reported to indicate the arrival of this month as the phrase *Arkoi, sok roi* says it all (*sok*: paddy; *roi*: to carry). In olden days, completion of carrying paddy from the field is celebrated by performing the traditional dance called *Hacha Kekan* (Festival of Harvest), also regarded as cultural identity of *Karbis*. *Bechurang* (fermented rice) specially prepared for the occasion is used to solemnise the festival¹²,

Today, however, this festival is hardly performed, which is a cause of concern for the society. As for biological indicators, defoliation of *poma*, defoliation of *marthu* as well as formation of buds is considered important features of this month. Flowering of *vekek* marks end of this month.

Most of the indicators enumerated above are reported to be reliable and its use is still vibrant among the hill *Karbis*. Of the hundreds of indicators known to them, only those which have remained faithful since decades have been discussed in the paper. It is pertinent to mention that the Folk Calendar is strictly based on floral and faunal characters of hilly areas and may not necessary be applicable in the plains.

Conclusion

All ethnic tribes of the world use flora and fauna as indicators for predicting annual seasons though indicators may vary from region to region. This local knowledge in fact is the most precious asset of these people and have intelligently exploited to their maximum benefit. Another implication of this local knowledge is judicious exploitation of natural resources *vis a vis* its conservation. For example, aroids, zingibers and dioscoreas are harvested only when aerial parts have withered. Because this coincides with ripening of tubers or rhizomes, thus, enabling people to save a portion of it as seedling for next season. These indicators have never failed to deliver the goods to the users, particularly ethnic tribes. *Karbis* even practice taboo on killing of herons during the month *pai pai* when *Artocarpus* spp. fruits and ripens. Because during this period female herons are wingless and inside tree trunks with young ones and are looked after by male herons. Fruits of the above mentioned plants constitute the main source of food for the birds. Thus, killing of male herons is tantamount killing the mother and young herons. The practice of using biological as well as physical indicators for predicting annual seasons and for day-to-day activities is still vibrant among the hill *Karbis*, while in the plains this knowledge is used mostly for day-to-day activities.

IKS is fast losing its ground among *Karbis* mainly due to acculturation and destruction of forests, the natural habitat where IK was born and evolved. Switching to wet cultivation from *jhum* also contributed to the decline of this knowledge system

because the central theme of IKS revolves around predicting annual seasons for *jhum* activities and harvesting forest resources. The steady influx of people from the hills to the plains for better livelihood is proving to be the last nail in the coffin for IKS.

Acknowledgement

Authors are grateful to all informants for their assistance and hospitality during field study. They include Mrs Kajir Rongpipi (Dokmoka), Dilip Sing Inghi (Diphu), Dok Phangcho (Kro Kengdang), Lindok Rongpi and Bidya Sing Rongpi (Vangjong Rongpi), Phura Borgaonbura (Hamren), Longki Rongpi and Kangbura Rongpi (Monjuli). Thanks are also due to DATACOMP for computer works.

References

- 1 Lyall CJ, *The Mikirs*, (Spectrum Publications, Guwahati, 1908.
- 2 Dutt KN, *Assam District Gazetteer—United Mikirs and North Cachar Hills*, (Karbi Anglong and North Cachar Hills), (Government of Assam, Guwahati), 1979.
- 3 Bhattacharjee T, *Sociology of the Karbis*, (BR Publishing Corporation, Delhi), 1986.
- 4 Phangcho PC, *Karbi Anglong and North Cachar Hills—A study of geography and culture*, (Tika, Karbi Anglong), 2001.
- 5 Borthakur SK, *Medicinal Flora of Karbi Anglong (Mikir Hills, Assam) with Special Reference to Ethnobotany*, PhD Thesis, (Gauhati University, Guwahati), 1980.
- 6 Borthakur SK, Less known medicinal uses of plants among the tribes of Karbi Anglong (Mikir Hills), Assam, *Bull Bot Surv India*, 18 (1-4) (1976a) 166-171.
- 7 Borthakur SK, Traditional weaving implements among the Mikirs (Karbis) of Assam, *Indian Mus Bull*, 11 (2) (1976b), 46-50.
- 8 Borthakur SK, Certain plants in the folk-lore and folk-life of the Karbis (Mikirs) of Assam, In: *Glimpses of Indian Ethnobotany*, (Oxford & IBH, Calcutta), 1981b, 170-181.
- 9 Borthakur SK, Studies in Ethnobotany of the Karbis (Mikirs): Plant masticatories and dyestuffs, In: *Glimpses of Indian Ethnobotany*, (Oxford & IBH, Calcutta), 1981b, 182-189.
- 10 Jain SK & Borthakur SK, Ethnobotany of the Mikirs of India, *Econ Bot*, 34 (3) (1980) 264-272.
- 11 Sarkar S, *Studies on Herbaceous Plants of Karbi Anglong district of Assam with reference to their Taxonomy and Economic Utilization*, PhD Thesis, (Gauhati University, Guwahati), 1993.
- 12 Saklani A & Jain SK, *Cross-Cultural Ethnobotany of North East India*, (Deep Publications, New Delhi), 1994.
- 13 Teron R & Gogoi P, Indigenous means of communication amongst social dignitaries of the hill Karbis, *Indian J Traditional Knowledge*, 1 (3) (2004) 294-298.
- 14 Teron R, Bottle Gourd: Part and Parcel of Karbi culture, *Indian J Traditional Knowledge*, 4 (1) (2005) 86-90.
- 15 Teron R, Hore D, The traditional alcoholic beverage of the Karbi tribe in Assam, *Nat Prod Rad*, 5 (5) (2006) 377-381.
- 16 Samati H & Begum SS, Plant Indicators for agricultural seasons amongst Pnar tribe of Meghalaya, *Indian J Traditional Knowledge*, 5 (1) (2006) 57-59
- 17 Jain SK & Rao RR, *A Handbook of Field and Herbarium Methods*, (Today and Tomorrow Publishers, Delhi), 1977.