Fishing Gears and methods used for Traditional fishing in Chirang District of Assam, North-East India

[1]P. Narzary, [1]N. Basumatary and [1,2]*B. K. Khangembam

[1]Department of Zoology, Bodoland University, P. O. Rangalikhata, Debargaon,
Kokrajhar - 783370 (India)
[2]Fish Biology Lab., Department of Zoology, Tripura University, Suryamaninagar,
Tripura (W), Tripura-799022 (India)
*Corresponding Author email: kbronson173@gmail.com

Abstract

Traditional fishing gears and methods are significant for many rural fishing communities of Assam, India as fish provides affordable protein for nutrition, and a source of livelihood. The diversity and characteristics fishing gears and methods used traditionally by the different fishing communities in Chirang district, Assam was evaluated. Surveys were conducted in five villages *viz.*, Tukrajhar No. 1, Boro Ladanguri No.1, Rowmari, Simlaguri and Hatisar FV in which 133 respondents participated. Twenty-five different types of fishing gears were recorded under different categories: Scooping Gears (4), Lift Nets (2), Traps & pots (2), Brush Park (4), Wounding gears (4), Hook & Lines (3), Entangling gear (1), Drag Net (1), Encircling gear (2) and Dewatering Gears (2). The *Jekai & Kobai, Sen, Koka, Kewali Je, Bwrsi danda* were the most commonly reported whereas *Ontai jabnai* was found to be unique and exclusively by the Bodo fishers of Indo-Bhutan bordering area of the Chirang district. Local materials such as bamboo, jute, indigenous plants etc. were used as raw material in most traditional gears. This study has highlighted the rich diversity of traditional fishing gears and methods of the region which may useful for the preservation of this traditional knowledge system.

Key words : Fishing gears, Traditional fishing, Chirang Jekai & Kobai, Ontai Jabnai.

The North-East India has abundant fisheries resources including 19,150 km of rivers and streams, of which Assam alone has of 5,050 km of rivers and their tributaries[17]. Among the North-Eastern States of India, Assam is regarded as one of the top fish producing states[13]. Hence, fish and fisheries resources of Assam plays a significant role in providing cheap protein for consumption and as a source of income. Diverse hand-made fishing gears and methods are traditionally used by the local fishers in the region. Fishing gears are the tools used in the aquatic bodies to capture different sizes of fishes[6,32]. There are various reports on the traditional fishing gears from various places and communities of North-

East India. In Assam, such reports were available on the Mishing community of the Northern bank of Brahmaputra River[15], Kaibarttas of the Nalbari district[18], and the Bodo tribes of Kokrajhar[6]. There are also reports from different regions of Assam such as the Karbi Anglong district[21], Brahmaputra Valley[5], Chatla floodplain area of Barak Valley[29], Beki River of Barpeta[22], Barak Valley of Southern Assam[30], Sone beel, Assam[10], Rural Kamrup[4], Cachar district[26], and Kumri Beel of the Goalpara district[19]. However, no report is available on the fishing gears found in the Chirang district of lower Assam although traditional fishing is an important and common activity in many rural communities of the district.

The Chirang district of Assam is situated in the foothills of the great Himalaya bordering Bhutan in the lower Assam and is under the Bodoland Territorial Region (B.T.R). The region is blessed with numerous water bodies such as Aie and Champabati River covering almost 480 Ha of land[16]. The major tribal communities found the region includes the Bodo, Rabha and Garo. Besides there are other communities such as Rajbongshi, Santhalis, Bengali muslims, etc. Fishing is an age-old practice in the region which provides both nutritional and economic benefit for the local rural communities in the region. Varieties of traditional handmade fishing nets and bamboo traps are utilized by the local fishing communities in the region, which forms an identity of the region and are inherited through generations. Documenting these techniques are important for their preservation. Hence, the aim of this paper is to identify and study the different types of traditional fishing gears and methods used by the different communities of the Chirang district of Assam.

Study area :

This study was conducted in the Chirang district of lower Assam (Fig. 1). Located in the foothills of the Himalayas bordering Bhutan, the district is under the Bodoland Territorial Region (B.T.R). It covers an area of 1,169.9 km^2 and lies in between 26.58° N to 90.61° E. Surveys were conducted in five villages of the Chirang district *viz.*, Tukrajhar No. 1, Boro Ladanguri No. 1, Rowmari, Simlaguri and Hatisar FV. Out of these, two villages viz. Boro Ladanguri No.1 and Rowmari falls under the Bijni revenue circle. Whereas, Tukrajhar No.1 and Hatisar FV falls under the Bengtol revenue circle and Simlaguri falls under the Sidli revenue circle of the Chirang district of Assam. (Fig. 1).

Survey and collection of data :

The study was conducted through extensive surveys from December 2021 to June 2022 through personal interviews involving semi structured questionnaires and photo documentation. Information regarding local name, dimensions, the raw materials required for making the gear, area and mode of operation, target fish species, man power required, etc. were collected from the respondents. All the recorded fishing gears were categorized and grouped following Chakravartty and Sharma[12] and Dutta *et al.*[15]. The dimensions and mesh size of the fishing nets were measured using standard methods. Briefly, the mesh size was calculated by dividing a standard length (*i.e.* 10 cm of net kept at completely square
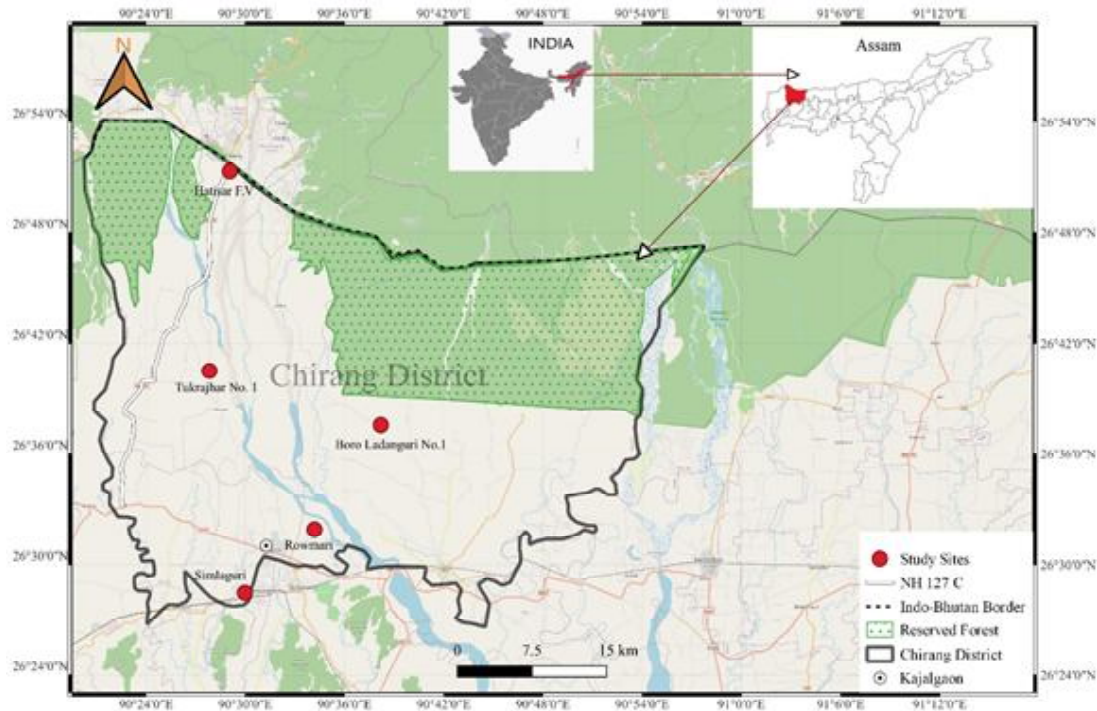
Figure 1 Map showing the study areas in Chirang district of Assam, Northeast India

mesh orientation) by the number of meshes present in this standard length. Plants species used (if any) in some gears were collected and identified with the help of plant taxonomist at Bodoland University Botanical Herbarium (BUBH), Kokrajhar, Assam, India.

Altogether 133 respondents (83 male and 50 females) took part in the survey (Table 1). Majority (55.64%) were engaged in fishing and related activities as their main source of income. The respondents belonged to different communities such as Bodo, Rabha, Garo, Rajbongshi, Santhalis, Bengali Muslims, etc. from the study region.

In the present study, 25 different types of fishing gears have been recorded which were grouped into different categories such as Scooping Gears (4), Lift Nets (2), Traps & pots (2), Brush Park (4), Wounding gears (4), Hook & Lines (3), Entangling gear (1), Drag Net (1), Encircling gear (2) and Dewatering Gears (2). These are described in details as follows.

Scooping gears :

These are single operated active gear used to quickly scoop the fish out of the water by a swift action. Mostly utilized in the beels, ponds, and flooded paddy fields, four different types of this gear were observed in this study. The *Abaidangi/ Khorahee* is a concave basket

Table-1. Ethnographic data of the informants participating in the study

Sl. No.	Parameters		No. of respondents	%
1	Gender	Male	83	62.41
		Female	50	37.59
2	Age group	30-40	48	36.09
		40-50	36	27.07
		50-60	34	25.56
		Above 60	15	11.28
3	Educational qualification	Illiterate	11	8.27
		Class 1-8	34	25.56
		Class 8-10	40	30.08
		Class11 to Graduation	48	36.09
4	Occupation	Fisheries & Allied Activities	74	55.64
		Agriculture	45	33.83
		Employee (Govt./private)	14	10.53

Figure 2 (a) *Abaidangi/ Khorahee* (b) *Lov je* (c) *Khora jal* (d) *Sen Gota* (e) *Koka* (f) *Goi Hasung*

or bowl-shaped gear (Fig. 2a) mainly used in the monsoon season, and it target fishes such as small indigenous fish species (SIFs) like *Puntius* sp., *Channa* sp., eels, etc. The *Gitchera/Chalonee* is a saucer shaped round sieve made of bamboo splits, with a diameter of 80-120 cm. It is usually applied below a patch of floating weeds (e.g., water hyacinth) in beels, ditches and ponds. The fish taking shelter underneath the aquatic weeds are swept off using the gear. Mainly used during monsoon and winter seasons, the common target fish species are eels, murrels, perches etc. The *Thela jal* is a type of scooping gear (length: 120-140 cm and width of the base:120 cm) made of a triangular bamboo frame on which a mosquito net or polyamide mesh of mesh size around 0.1-0.15 cm is tied on. Often performed in shallow water, it is pushed submerged for some distance and then swiftly lifted to collect the fish. The *Jekai & Kobai* are a pair of fishing gears used together. The *Jekai* is triangular shaped and made of bamboo matting, whereas the *kobai* is a harvesting pot used for storing the collected fishes caught with the *Jekai*. Used exclusively by the female fishers, the *Jekai* has an open mouth made from bamboo splits. A short handle is used to operate it with the help of a string or rope attached to its base. The water surrounding the gear is disturbed by vigorous stomping, which allows the startled fish to be swept with the gear through periodical scooping.

Lift nets :

 Lov je and *Khora jal* were the two types of lift net recorded in this study. The former is square shaped (mesh size 0.36-0.40 cm) in which the four corners held with two flexible bamboo slits held in a diagonal manner (Fig 2b). The net is periodically submerged and lifted up using a long bamboo handle. The *Khora jal* is another type of lift net with a triangular bamboo frame (length 7.6-9.1 m, width 4.6-5.2m, mesh size 1.1-1.2 cm, Fig 2c).

Traps and pots :

 The *Sepa/Sen* and the *Koka* were two gears recorded under this category. The *Sepa* is spindle or cuboidal shaped trap made of bamboo splits. The inlet tunnels (1-4) are designed to lure the fish for an easy entry after which it cannot exit. Two types of *Sepa* were recorded *viz*. *Sen temai* (cuboidal shaped with 2-4 inlets tunnels and measuring up to 0.77-0.85 m in length) and the *Sen gota* (spindle shaped consisting of a single inlet tunnel and measuring approximately 0.77- 0.91 m in length, Fig 2d). The *Koka* is a conical shaped elongated bamboo trap (about 1.52- 1.83 m in length and 1.07-1.37 m circumference circular mouth) set to trap fish taking short migrations during the autumn season (Fig 2e). Generally, some aquatic weeds and grasses are used to conceal this gear set against water current in small canals.

Brush park :

 These are passive gears used to catch fish (such as catfish, zig zag eels, crabs, shrimps, *Channa* sp. etc.) by luring the fish to take shelter in them. This type of gear is generally operated in the pre-winter and winter seasons in the slow flowing shallow rivers, rivulets and streams. Four types of brush parks (Hasung, *Hagra jutumnai, Katol hwnai* and *Ontai jabnai*) were recorded in this study. The *Hasung* is a hollow structure made of the trunk of an old betel nut palm (*Areca catechu*)

or bamboo (0.76-0.91 m length and 0.31-0.46 m circumference), made by joining two halves. Fishes take shelter in it when submerged in ponds, beels, ditches, slow flowing small rivers for about 6-10 days which are then collected. Depending on the material used, two types were found: *Goi Hasung* (Fig. 2f) and *Ouwa Hasung* made of made of old betel nut trunk and old bamboo trunks, respectively. Generally, a higher catch was reported compared to the *Ouwa Hasung*. Another type of brush part recorded in the study was the *Hagra jutumnai* (1.52-1.83 m in length and 0.91-1.22 m in circumference). Long grasses (such as *Desmostachya bipinnata, Saccharum bengalense, Saccharum spontaneum, Streblus asper,* etc.) or branches of bamboo tied together and then submerged in shallow slow flowing rivers for at least a week after which it is harvested. During harvesting, a net is usually rolled all over it to prevent the fish from escaping. *Katol hwnai*, on the other hand, are brush parks made from branches of plants (bamboo, *Streblus asper* etc.), long grasses (*Chrysopogon zizanioides, Saccharum spontaneum*), macrophytes (*Eichhornia*), etc. (Fig. 3a). However, the *Ontai jabnai* recorded in this study use boulders in place of the plants which are generally used in case of the conventional brush parks. It was also found to be exclusively used in shallow rivers, rivulets, or streams.

Wounding gear

These are the active gears consisting of sharp and pointed objects or prongs which are used to target fish to disable or strike it. The operation of these gears requires certain skills. Four types of wounding gears were recorded in this study: *Jabtu/Jakra, Shika kongkai, Bwrla & Kebjang and Kushia suli.* The *Jabtu* consists of a long wooden handle (length 1.52-2.13 m) in which a set of multiple sharp prongs (8-10) made of wood or iron rod is attached at one end. The *Shika kongkai* is a long-curved knife with sharp serrated edges on a long wooden handle used to hunt larger fish that comes near the edge of the water bodies. Locally, the *bwrla* means the bow and the *kebjang* means the arrow in Bodo (Fig. 3b) and it is used to target slow-moving fishes near the margin of the small water bodies. Exclusively used by the Bodo and Santhal fishers, the main target fish of this gear includes *Clarias batrachus, Zig zag* eel etc. The *Kushia suli* is a special gear for catching freshwater eels (*Monopterus cuchia*) known locally as *Kushia*. Used mainly during winter when the water level recedes, this gear consists of a pointed iron spear fixed at the apex of a wooden handle, and requires skilled operator.

Hooks & lines :

Three types of hooks and lines are found in the study. *Bwrsi danda* is an active gear resembling the conventional hook & line but with a bamboo handle. The bait includes earthworms, insect grubs and bee larvae. Mainly operated during the monsoon season in the stagnant water of small beels, ponds, etc., the commonly target fish are the *Mystus vittatus, Channa* sp. *Clarias* sp. etc. Whereas, the *Bata* is basically a line (measuring 1.22-1.52 m) with a hook fixed to a floating twig made from the stem of *Aeschynomene aspera* (Fig 3c) used for catching fish like *Channa* sp., *Anabas* sp., catfishes, etc. The *Barli dan* is similar to *Bwrsi danda*, but differ in the bait and process of operation. Specially designed to catch *Wallago attu*, the bait consists of live

fish such as *Channa stewartia, C. orientalis, C. gachua,* and are usually set overnight.

Entangling gear :

The *Pasi je* is a type of gill net used mostly in beels and made of *Guli* (sinkers)/ Plastic bottles (used as float), nylon, etc. The head ropes are provided with floats while the foot with sinkers. Two sub-types of *Pasi je* were found in the study *viz. 16 number Pasi* (Mesh size: 0.71-0.73 cm) and *20 number Pasi* (Mesh size: 0.91-0.93cm).

Drag nets :

These are active gear consisting of a rectangular/cuboidal shaped net which are dragged in the shallow waters by two or more individuals. The *Hengajal/Panti* is a large rectangular drag net attached to bamboo poles on either side for holding (Fig. 3d). The length varies from 21.34-24.38m, breadth from 1.07-1.52m and mesh size ranges between 1-1.10 cm. Mainly operated during the monsoon season in beels, ponds, etc., five to nine individuals are required to operate this gear.

Encircling gear :

These are the active gears specifically designed for capturing fish by letting the gear fall on them from the surface and enclosing them. It is operated from the marginal area of the water or from the craft. Two types of encircling gears were observed in this study. The *Polo* is a bell-shaped structure made from bamboo splits and open at both the ends with the bottom end wider than the top (Fig 3e). The circumference of the bottom varies from 0.61-1.22 m and the height of the gear varies from 0.61-0.91 m. The *Kewali je*, on the other hand, is a cast net of mesh size 0.67-0.71 cm operated by a single person (Fig 3f).

Dewatering gears :

This type of active gear is used for reducing the water level in small beels, ponds, ditches, etc. to reveal the fish present there. Two types were recorded in the study: *Sili/ Chingcha* and *Dohata*. The *Sili* is a single operated shovel-shaped dewatering tool made of tin and a bamboo pole (length: 1.83 m approx.). The *Dohata,* on the other hand, is operated by two persons and is made of a plastic/tin bucket. Two ropes held on the opposite sides of the bucket are used to move the gear in oscillatory motion for dewatering.

A diversity of traditional fishing gears and methods were found to be used by the fishers of Chirang district in this study. Among all the types of gears, highest number (04) were observed for scooping gears, brush park and wounding gears. Among the scooping gears, the *Jekai* is commonly known by different names such as *Zakhe* by the Kaibarttas of the Nalbari district[18], *Jakoi* in different regions of Assam[3,4,19,23] and *Chekki* in Meghalaya[11]. Also, the *Thela jal* was reported by different names like *Thela jal/Faloin jal* in Dubri and *Ghoka/ Pah jal* in Kamrup, Assam[3]. It is also reported from Tripura (*Pelun jal*) and Manipur (*Long thrai*) by Bhattacharjya *et al.*[11], and in Arunachal Pradesh (*Thela jal*) by Das *et al.*,[14]. Similarly, the *Sorpan* in Narmada Estuary[8] and Ukai reservoir, Gujarat[7] were other forms of the *Thela Jal* reported from elsewhere in India. This gear has also been reported from neighboring country Bangladesh as *Thela jal*[1,33]. There are however, few

Figure 3 (a) *Katol hwnai* (b) *Bwrla & Kebjang* (c) *Bata* (d) *Hengajal/Panti*
(e) *Polo* (f) *Kewali je*

reports on *Abaidangi/ Khorahee*. Similar gears were reported in few studies from Assam[3,4] and Manipur (known locally as *Kharai*) in Northeast India[11].

The lift net *Khora jal* can be compared with *Dheki Jal* (Chinese dipnet) reported from various regions of Assam[19,23,30]. The *Injao* of Manipur, Northeast India[11] and the *Khora Jal* of Bangladesh[33] is similar to the *Khora jal* reported in this study. The bamboo trap *Sepa/ Sen* is one of the most common trap that can be seen extensively in the Northeast India by different names such as the *Chepa* in Assam[12,22] and Arunachal Pradesh[14]. It is also known as the *Cepa* by the Mishing community of Northern Bank of the Brahmaputra River, Assam[15]; *Sen* by the Bodo tribe of Kokrajhar,

Assam[6], *Chai* in Tripura and *Kabo loo* in Manipur[11]. The *Kabo loo* of Manipur, however, is larger with a slightly different shape compared to the *Sepa/ Sen* of Assam. Its mid-section is circular or cylindrical in shape, and dome-shaped at both the ends.

However, compared to others, few reports are available on brush parks. The *Hasung* reported in this study is similar to the *Chunga/ Dhun* of Brahmaputra valley in Assam[5,27] and Bangladesh[33], and also the *Hasung* of the Bodo tribes, Kokrajhar[6]. However, the shape and size of different shelter traps found in Assam varies from the cylindrical shape of the *Hasung*. For instance, the *Hukuma* (Conical), *Tack* (Circular), *Dolonga* (Quadrangular) of Assam[27] and *Swmhabgra*

Jekai (Triangular) of Kokrajhar, Assam[6] are all shelter traps with different shapes and sizes. The *Katal hwnai* reported in this study can be compared with *Katal* of South-West Assam[23] and Nalbari, Assam[12], *Katal mara/ Jeng mara/ Sai mara* of the Kaibarttas of Nalbari, Assam[18], and the *Katha* fishing in Lohalia river of Patuakhali, Bangladesh[1]. The *Ontai jabnai* is a unique technique of brush park which is used exclusively by the Bodo fishers of Indo-Bhutan bordering area of the Chirang district and has not been reported elsewhere.

The most common hooks & lines recorded in the study was the *Bwrsi danda*. Similar gear was reported to be used by the Bodo tribes of Kokrajhar[6]. The gear is also reported different parts of Assam and northeast India: *Boroshi* of South-West Assam[23], *Borshi* of Sone beel[10], *Borsi* of Barak valley[29], *Boroshi* (Hajong/ Koch-Rajbongshi), *Borsi* (Rabha), *Milsi* (Garo) of Goalpara[2], *Sip barasi* of Kumri Beel of Goalpara[19], Nalbari[12], *Sip boroshi* of Beki river of Barpeta[22], and *Sip barshi* of Kulsi river, Assam[20]. However, the bait used in all these forms of hooks and lines varies from region to region. In Chirang district, earthworms, bee larvae, insect grubs etc., were the main bait organism, whereas it was grasshopper, small prawns or earthworms in case of *Sip barasi* of Assam and the *Sip/ Barshi* of Bangladesh[31,1]. Some of the other baits reported used are maida paste, boiled rice paste, frog, small fish, insects, beetle nymph, earthworm, snail flesh etc[2,17,25,30,33,34].

The *Bata* found in this study is similar to the *Nal borashi* of Mishing community of the Northern Bank of the Brahmaputra[15], *Nal barasi* of Goalpara and Nalbari[19], *Patna borshi* of Tripura[11], *Nal barshi* of Arunachal Pradesh[14], *Borsha* and *Danti Borsi* of Bangladesh[31,33]. However, the floating twig used in all these gears were different which includes *Colocasia* stem, *Nol* bamboo, *Kankulla*, dried bamboo reed, etc. The stem of *Aeschynomene aspera* was found to be the most used and preferred floating twig used in Chirang district and occasionally, *Arundo donax* was also used. This gear was found to be utilized widely by the Bodo fishers of the Chirang district.

The gill net *Pasi je* recorded in our study has been reported in many parts of India by different names[12,14,19,28]. It is also known as *Fasi jal* by the Kaibarttas of Nalbari[18], *Ural jal* in Barak valley, Assam[29] and *Kurrent jal* (Assam/Tripura) in Northeast India[11]. However, the dimensions, mesh size, floats and sinkers were found to vary with different region. For instance, the *Fash jal/ Kanke jal/ Current jal/ Chat jal* of Tripura has gravels and small stones as sinkers[34]; *Phansi jaal* of Punjab is devoid of any floaters & sinkers, but has a strong and heavy footrope which helps the net in sinking[9]. The gill net *Jali* of the Sangli district of Maharashtra uses thermocol as float[24]. The gill nets of Bangladesh were also reported to be designed species-specific for catching particular species[1,31]. Unlike the cast net recorded in our study the length, breadth and mesh sizes of these nets were also reported to vary depending their target fishes and area of operation. The mesh size of the cast nets in our study varied from 0.71 to 0.93 cm, and is specially designed to catch small indigenous fishes.

This study has documented the different traditional fishing gears and methods in the five villages of Chirang district in lower Assam for the first time. A total of 25 traditional fishing gears were recorded. Among them the most common gears were the *Jekai & Kobai, Sen, Koka, Kewali Je* and *Bwrsi danda.* The *Ontai jabnai* was a unique type of brush park used exclusively by the Bodo fishers of Indo-Bhutan bordering area of the Chirang district. Locally available natural raw materials such as bamboo pole, bamboo splits, jute ropes, branches/ stem of plants, etc were found to be extensively used for making most of these gears. However, the use of these traditional fishing gears was found to be declining. Thus, may be due to the introduction of techniques such as electric fishing, chemical poisoning etc., which are detrimental as it affect all aquatic life forms of different ages. This in turn may affect the population structure and ecological balance. Traditional fishing practices have significant contribution in providing nutritional and economic security of a community. This study may serve as a useful addition to the traditional knowledge system of Assam for its preservation.

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