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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/23298
DOI URL: http://dx.doi.org/10.21474/IJAR01/23298

ISSN (O): 2320-5407
ISSN (P): 3107-4928

RESEARCH ARTICLE

DOCUMENTATION OF ETHNOBOTANICAL PLANTS USED IN THE PREPARATION OF APONG, A TRADITIONALLY PREPARED RICE BEER BY THE MISHING TRIBAL COMMUNITY OF MAJULI DISTRICT

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Manuscript Info

Manuscript History
Received: 15 February 2026
Final Accepted: 18 March 2026
Published: April 2026

Key words:-
Apong, Mishing community, ethnobotany, Quantitative indices.

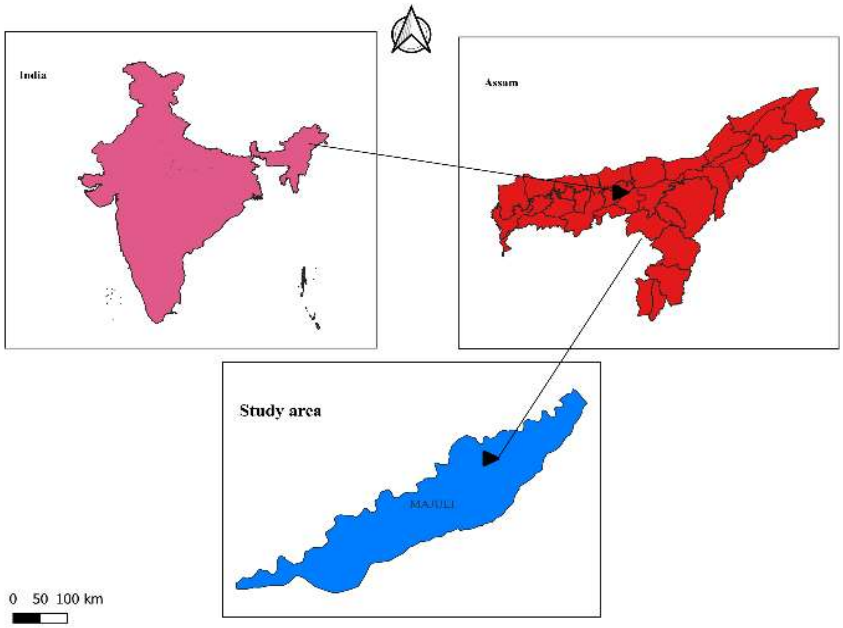
Abstract

The main objective of this article is to document ethnobotanical plant species used in the preparation of a traditionally prepared rice beer, Apong,within the Mishing community of Majuli District. Apong in the Mishing community is mainly of two types -Po:ro Apong and Nogin Apong.A total of 48 ethnobotanical plant species is documented from three Mishing inhabitant villages of Majuli district, and quantitative ethnobotanical indices such as relative frequency of citation (RFC) and Use value (UV) were used to determine the cultural importance and utilisation pattern of the recorded plant species. Quantitative indices revealed that *Oryza sativa* L. has the highest RFC (1.0) and UV(1.6), followed by *Dryopteris filix-mas* (L.) Schott RFC (1.0) and UV (1.5), indicating its greater cultural and utilisation significance in starter cake preparation.

Introduction:-

From time immemorial, the Mishing tribal community, dwelling mostly in parts of Assam and Arunachal Pradesh, has a record of producing and consuming homemade alcoholic beverages known as Apong (Mili &Sundriyal, 2023; Yein et al.,2022). The Mishing, being the second largest tribal community residing in Assam, basically settled in the upper Brahmaputra valley. Apong, a traditionally prepared rice beer, plays a pivotal role in the socio-cultural life of the Mishing tribal community in Assam(Gogoi,2013). Apong, a traditional alcoholic rice beer, is commonly used by tribal communities across Northeast India, mainly Arunachal Pradesh and Assam(Gogoi, 2013). The Mishing are the earliest tribal community in Assam to use Apong as a traditional alcoholic beverage (Baruah2007&Tanti,2010). Apong is viewed as a social legacy among the Mishing. Women mostly take part in its preparation. It is prepared from fermented rice and E'pob as the starter cake. Apong is used in everyday occasions from birth to death, marriage or in any type of joyous occasion. On public occasions, it is used as a refreshing beverage. Any religious customs are seen to be incomplete without offering Apong to the respective gods. Apong in the Mishing community is of two types: Po:ro Apong and Nogin Apong, and the differentiation is based on its colour and Processing (Lalmuanpuii et.al.,2021). Nogin Apong is considered to be a nutritious and energy drink, while Po:ro apong is seen as a drink of great cultural importance(Garh,2022).Po:ro apong is traditionally known as Sai mod as it is prepared from fermented sticky variety of rice, later mixed with ash of rice husk and straw and mixed uniformly with Apo pitha known as E'pob. Nogin apong is, however, prepared with fermented rice and uniformly mixed with E'pob. It

is a whitish liquor extracted by hand from fermented rice. Three main glutinous rice varieties are used to prepare Apong, viz., bao,amdang and guni (Mili,2023). The present study aims to identify plant species incorporated in the preparation of E'pob as a starter cake, which is essential in initiating the process of fermentation in Apong preparation.



Study area:-

Majuli lies in the alluvial tracts created by the river Brahmaputra and Luit. It lies between the longitude of 93º37/ to 94º50/ North and the latitude 23º40/ to 27º10/ East. The average rainfall of the area is 1783 mm. It is a newly formed district of Assam. The total area of the Majuli district is 552.68 Sq. Km.(Hazarikaet. al., 2020).

Methodology:-

Field survey and data collection:-

An ethnobotanical field survey was conducted in 3 randomly selected villages of the Majuli district from April 2024 to October 2024. Data were collected using key informants with special emphasis on elderly women that plays pivotal role in apong preparation within the Mishing community. Information regarding plant species used, parts used, their role, and preparation techniques of starter cake were documented through semi-structured interviews, informal discussions and transect field walks. Data from 28 informants were collected during the survey of the age group 40-70 years. Prior informed consent was taken before the interview. Ethical guidelines were strictly followed, the confidentiality of respondents was maintained, and the ethnobotanical information was documented respectfully without any intention of commercial exploitation.

Plant collection and identification:-

Plant species used in the preparation of Apong were collected with the assistance of local key informants from the forest, agricultural fields, and home gardens. Plant species are identified using relevant taxonomic literature, Flora of Assam (Kanjilal et .al), The Flora of British India (Hooker) and Flora of Majuli(Islam 1990). The scientific names are authenticated using online databases such as World Flora Online (WFO) and Plants of the World Online (POWO), to ensure updated botanical nomenclature. Herbarium sheets were prepared and submitted to the herbarium of Jengraimukh College.

Quantitative ethnobotanical analysis:-
The collected ethnobotanical data are analysed using indices such as Relative Frequency of Citation (RFC) and Use Value (UV) to evaluate the cultural significance and utilisation pattern of plant species in Apong preparation. The application of quantitative ethnobotanical indices strengthens the ethnobotanical evaluation of traditionally used species.

Relative frequency of Citation:-
RFC can be calculated using the Formula
RFC=FC/N

Where:-
FC = Number of informants mentioning a particular plant species.
N = Total number of informants interviewed
The RFC ranges between 0 and 1; a higher value indicates higher cultural importance and recognition in the community.

Use Value:-
Use Value was calculated to determine the relative importance of each plant species based on the use reports by the informants.
Use Value can be calculated by using the formula
UV=ΣU/N

Where:-
ΣU=Total number of use reports of a particular plant species
N=Total number of informants interviewed
Higher use value indicates wide application of a particular plant species and greater ethnobotanical significance in the preparation of Apong.

Data analysis:-
The documented ethnobotanical data were arranged in the form of a table and arranged according to scientific name, family, plant part used, RFC and UV were assessed for their traditional importance in the apong preparation and fermentation process.

Preparation Techniques:-
Preparation of Starter cake E'pob:-
E'pob, or the starter cake for the preparation of the alcoholic beverage, is prepared from rice, preferably glutinous. At first, the rice is cleaned and soaked in cold water for about 2-3 hours. The soaked rice is pounded to a fine powder in a wooden pestle and mortar known in the vernacular language as Ki: per and E'gi. E'pob acts as a microbial culture for the fermentation of rice to produce an alcoholic beverage. Preparation of apong is mainly confined to the women of the community. The process of preparation takes time. Rice is the key ingredient of the process, along with many plant species. In the early days, more than 50 plant species were used, but now the number is reduced to 20-30. The leaves of various plant species are first collected and cleaned. The leaves are then properly dried in the sun or kept over the fireplace. Once completely dried, the leaves are pounded with a wooden pestle and mortar into powder. Rice powder is mixed too and pounded well to a paste-like consistency. An old culture, E'pob, is also added as a source of microbial spawn. Oval shaped small size cakes are made. The E'pob can be stored in a dry place for 1-2 months. The newly prepared E'pob are then spread on a sieve of bamboo surface covered with paddy straw and leaves of Rukji (*Dryopteris filix-mas* (L.) Schott). It is then sun-dried for 2-3 days. The best starter cakes are then stored in an earthen pot plugged with rukji leaves (*Dryopteris filix-mas* (L.) Schott) to protect them from insects and pest infection.

Preparation of Nogin Apong:-
Apong is an indispensable part of the Mishing community and is the locally prepared rice beer. It is basically prepared from cooked rice with several herbs. Typically, two types of Apongare are commonly known among the community, i.e., Po:ro and Nogin Apong. The process of preparation for both is different. For preparation of the Nogin Apong, the rice(Mostly non-glutinous) is cleaned and fully cooked, and then it is spread over a bamboo mat till it cools completely. The cooked rice is smashed properly with a hand, and considering the amount of the cooked

rice, the best quality E'pob or starter cake is crushed and mixed uniformly with the rice. After mixing, it is transferred to an earthen pot with a banana leaf placed inside. The mouth of the pot is plugged with paddy straw and is kept undisturbed for at least 6-7 days. It generally takes 10-15 days for complete fermentation to take place in summer. Nogin apong preparation process is simpler than po:roapong. Water is poured over the fermented rice and is later consumed.

Preparation of Po:roApong:-

Dry paddy straw and paddy husk put over the straw are first burnt partially, and the ash obtained is stored in a container. Cooked rice (Any rice, non-sticky, is mostly preferable) is spread on a bamboo mat till it completely cools down. The rice is mixed evenly with the burnt ash, and the rice is smashed properly with hands to produce a black mass. E'pob or starter cake is ground into fine powder and added to the rice-ash mixture. The mixture is kept spread on a wooden mat overnight, or it can be transferred into an earthen pot. The compound is then stored in an earthen pot. The mouth of the earthen pot is plugged with dried paddy straw, leaves or rukji. It generally takes 10-15 days for proper fermentation to occur in summer. Once the fermentation is completed, the po:roapong is separated using a funnel-shaped bamboo strainer known as Ta: suk. The base of the Ta: suk is placed with a bunch of straw. The po:roapong is added over the Ta: suk, and water is poured over it. The filtrate obtained is now called apong and is collected in a container, while the fermented rice grains are collected in the basket. Po: ro apong mostly tastes sweet and bitter and is mostly preferred by Mishing folk.

Results:-

Sl.no	Scientific Name	Vernacular name	Family	Plant parts used	RFC	UV
1	*Paderia foetida* L.	Vedailota	Rubiaceae	Whole plant	0.7	1.0
2	*Phlogacanthus thyrsiformis* (Roxb.ex Hardw.) Mabb.	Titaful	Acanthaceae	Leaves	0.4	1.0
3	*Asparagus racemosus* Willd	Satmul/Engi	Asparagaceae	Roots	0.8	1.0
4	*Artocarpus heterophyllus* Lam.	Kothal pat/balang	Moraceae	Leaves	0.9	1.0
5	*Saccharum officinarum* Linn.	Tabad/kuhiar	Poaceae	Stem	1.0	1.0
6	*Tinospora* Miers	Nil kof	Menispermaceae	Leaves	0.7	1.0
7	*Vitex negundo* L.	Posotia	Lamiaceae	Leaves	0.8	1.1
8	*Oldenlandia corymbosa* Linn.	Jaluk bon	Rubiaceae	Leaves	0.9	1.2
9	*Ananas comosus* (L.) Merr.	Anaras Pat	Bromeliaceae	Leaves	0.9	0.9
10	*Chromolaena odorata* (L.) R.M.King & H.Rob.	Ram nam	Asteraceae	Leaves	1.0	1.0
11	*Piper longum* L.	Pipoliguti	Piperaceae	Fruit	0.7	1.1
12	*Centella asiatic*a L.	Dangor Manimuni	Apiaceae	Leaves	0.9	1.2
13	*Hydrocotyle sibthorpioides* Lam.	Horu Manimuni	Araliaceae	Whole plant	0.9	1.3
14	*Aschasma loroglossum* (Gagnep.)K.Larsen	Koifur	Scytosiphonaceae	Roots	0.6	0.8
15	*Litsea salicifolia* (Roxb. ex Nees) Hook.f.	Digloti	Lauraceae	Leaves	0.7	0.9
16	*Swertia chirayita* (Roxb.) Buch.-Ham. ex C.B. Clarke	Chirota	Gentianaceae	Leaves	0.5	0.3
17	*Elsholtzia ciliata* (Thunb.) Hyl.	Bontulsi	Lamiaceae	Leaves	0.9	1.3
18	*Monoon longifolium* (Sonn.) B.Xue & R.M.K. Saunders	Debdaru	Annonaceae	Leaves	0.6	0.7
19	*Elettaria cardamomum* (L.) Maton	Elachi	Zingiberaceae	Leaves	0.5	0.8
20	*Zanthoxylum oxyphyllum* Edgew.	Prothoma	Rutaceae	Leaves	0.7	0.6
21	*Alstonia scholaris* (L.) R. Br.	Chotiyana	Apocynaceae	Leaves	0.7	0.6

22	*Leucas aspera* (Willd.) Link	Durunbon	Lamiaceae	Whole plant	1.0	1.3
23	*Acmella paniculata* (Wall.exDC.)R.K. Jansen	Marsang	Asteraceae	Seed, Leaves	1.0	1.3
24	*Drymaria cordata* (L.) Wild. ex Schult.	Laijabori	Caryophyllaceae	Leaves	0.8	1.3
25	*Ageratum conyzoides* L.	Gendhali bon	Asteraceae	Flower, Leaves	0.9	1.3
26	*Piper nigrum* L.	Jaluk	Piperaceae	Seed, Leaves	0.9	1.2
27	*Tabernaemontana Divaricata* (L.) R.Br. ex Roem. & Schult.	Kothonaphul	Apocynaceae	Leaves	0.7	0.8
28	*Codiaeum variegatum* (L.) Rumph. ex A.Juss.	Croton	Euphorbiaceae	Leaves	0.6	1.0
29	*Cinnamomum tamala* (Buch.-Ham.) T.Nees & C.H.Eberm.	Tezpat	Lauraceae	Leaves	0.6	1.2
30	*Gomphostemma parviflorum* Wall. ex Benth.	Bhedaitita	Lamiaceae	Leaves	0.6	1.1
31	*Scoparia dulcis* L.	Seni bon	Plantaginaceae	Leaves	0.7	1.2
32	*Zanthoxylum nitidum* (Roxb.) DC	Tezmoi	Rutaceae	Leaves	0.8	0.8
33	*Zanthoxylum oxyphyllum* Edgew.	Mejenga	Rutaceae	Leaves	0.9	1.1
34	*Flemingia strobilifera* (L.) W.T.Aiton	Makhioti	Fabaceae	Leaves	0.8	1.0
35	*Mikania scandens* (L.)Willd	Rinji	Asteraceae	Leaves	1.0	1.3
36	Azadirachta indica A.Juss.	Moha neem	Meliaceae	Leaves	0.4	0.9
37	*Alpinia nigra* (Gaertn.) Burtt	Tora	Zingiberaceae	Leaves	0.7	1.0
38	*Guilandian bonduc* L.	Leta guti	Fabaceae	Leaves	0.7	1.0
39	*Termalia arjuna* (Roxb.) Wight &Arn.	Arjun tree	Combretaceae	Bark	0.8	1.1
40	*Hellenia speciosa* (J.Koenig) S.R.Dutta	Kustho	Costaceae	Leaves	0.9	0.8
41	*Houttuynia cordata* Thunb	Mosundari	Saururaceae	Leaves	0.9	1.3
42	*Bergera koenigii* L.	Narasingha	Rutaceae	Leaves	0.9	1.3
43	*Ocimum tenuiflorum* L.	Tulsi	Lamiaceae	Leaves	0.8	1.3
44	*Oroxylum indicum*(L.)Benth.ex Kurz	Bhatghila/Bhattita	Bignoniaceae	Leaves	0.7	1.0
45	*Psidium guajava* L.	Madhuriam/Madur i	Myrtaceae	Leaves	1.0	1.3
46	*Zingiber officinal*e L.	Taake /Ada	Zingiberaceae	Leaves	1.0	1.3
47	*Oryza sativ*a L.	Saul	Poaceae	Grain	1.0	1.6
48	*Dryopteris filix-mas* (L.) Schott	Rukji/Bihlongoni	Dryopteridaceae	Leaves	1.0	1.5

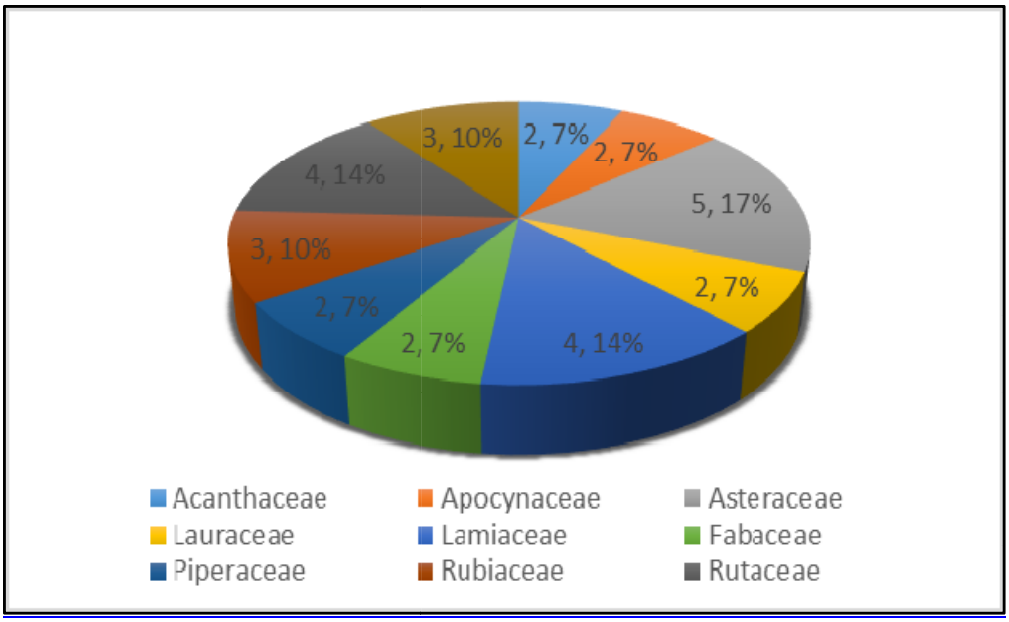


Figure 1: Family-wise distribution of plant species recorded during the survey

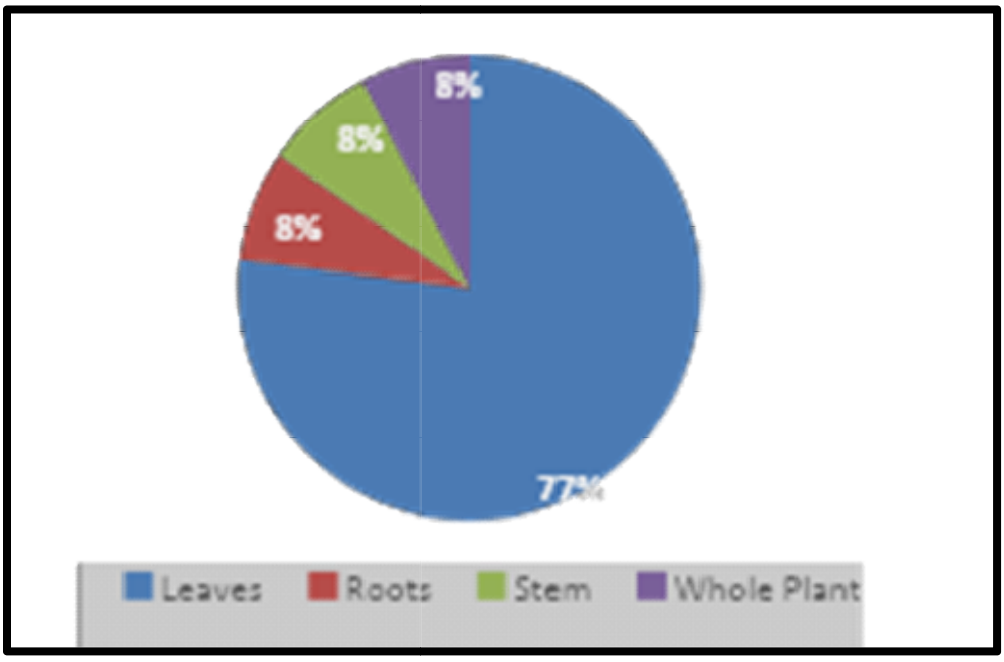


Figure 2: Distribution of utilised plant parts used in apong preparation

Discussion:-

The present study recorded 48 plant species belonging to 30 families used in the preparation of E'pob (Starter cake) by the Mishing community of Majuli, Assam. The taxonomic makeup exhibited uneven family-wise distribution. As illustrated in Figure 1, Asteraceae(17%) and Lamiaceae (14%)were the most dominant families, followed by Rutaceae, Zingiberaceae, and Rubiaceae. This pattern represents high taxonomic diversity with low redundancy. Analysis of plant parts shows the highest predominance of leaves, followed by roots, bark, whole plant. The preference for leaves can be attributed to their high availability, easy accessibility, easy harvest and rich phytochemical composition. Quantitative ethnobotanical indices, such as Relative frequency of citation (RFC), Use

value (UV), were employed to assess the importance and utilisation of the documented plant species. The RFC value ranged between 0.4 and 1.0, which shows the variation and differences in the use of plant species during the preparation process. Several species, such as *Dryopteris filix-mas* (L.) Schott, *Oryza sativa* L., *Zingiber officinale* L., *Psidium guajava* L., *Leucas aspera* (Willd.) Link, *Acmella paniculata* (Wall. Ex DC.) R.K.Jansen recorded the highest RFC value (1.0). These plant species are therefore widely known and indicates its prominent role in Apong preparation. Use value (UV) indicates the variation in the use pattern of the documented plant species. The use value ranges between 0.3 and 1.6, and the highest use value is recorded in plant species *Oryza sativa* L., followed by *Dryopteris filix-mas* (L.) Schott. The present study includes ethnobotanical knowledge and environmental observations to document plant species associated with the preparation of Apong in the community. Most of the documented plant species are collected from their wild habitat, indicating their high dependence on the environment. Species such as *Dryopteris filix-mas* (L.) Schott, *Oryza sativ*a L., show high RFC and UV value, indicating their higher recognition and multiple utility among the informants. Due to higher utility, environmental pressure, such as habitat destruction owing to floods and erosion, plant species with higher RFC are mostly vulnerable. Thus, these plant species are not only culturally important but are ecologically sensitive that needs immediate conservation attention.

Conclusion:-

The present study highlights the utilization some of the plant species in traditional Apong preparation by the Mishing tribal community of Majuli district of Assam, indicating the close relationship between indigenous knowledge and local biodiversity. The application of quantitative indices such as use value and relative frequency index also reflects the cultural significance, availability and multiple utility of plant species. A comparative analysis with other tribal communities, such as Karbi, Bodo, and Ahom, reflects the use of some similar plant species (Borah et.al., 2021). Among the Mishing community, two major types of Apong are made, namely Po:ro and Nogin Apong. In contrast, the Bodo community prepares “Jou”, while the Dimasa tribe prepares “Judima”. Similarly, other tribes such as Karbi and Deori prepare rice beers from locally available herbs and traditional fermentation methods. The preparation process of all these rice beers involves rice as a base, while the variation lies in the composition of starter cakes, fermentation duration, filtration process and the cultural significance (Saikia & Bori 2020).

Although the rice beer preparation is common in most tribal communities of north east India, the uniqueness of the Mishing community lies in the preparation of starter cake, the use of plant ash and its strong cultural influence. These reflect the deep cultural identity preserved by the Mishing community over generations. Most of the plant species documented are procured from their wild habitat, which indicates a strong reliance on the natural ecosystem. The involvement of various plant species in the fermentation process might have potential roles such as antimicrobial function, fermentation enhancement, and flavour. Further phytochemical and microbial validation is needed to ascertain their roles. The documentation of indigenous plant species is necessary for conservation and promotion of sustainable utilisation of the local plant resources. However, the gradual decline in knowledge of plant species may pose a threat to the continuity of the tradition. Subsequent documentation will provide scope for its conservation and may contribute to livelihood enhancement while safeguarding cultural heritage.

Acknowledgement:-

This study was carried out among the Mishing tribal community of Majuli district without any external funding. The author is highly grateful to the invaluable support and Knowledge shared by the locals during the investigation.

Conflict of interest:-

The author declares that there is no conflict of interest.

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