



REVIEWER'S REPORT

Manuscript No.: IJAR-57528

Title: Documentation of ethnobotanical plant species used in the preparation of Apong, a traditionally prepared rice beer by Mishing tribal community of Majuli District.

Recommendation:

Accept as it is

Rating	Excel.	Good	Fair	Poor
Originality		√		
Techn. Quality		√		
Clarity		√		
Significance			√	

Reviewer's ID: JPR-006

Detailed Reviewer's Report

Main Objective of the Work

The main objective of the study was to document ethnobotanical plant species used in the preparation of traditional rice beer called Apong by the Mishing community of Majuli district, Assam. The research focused mainly on identifying plants used in the preparation of E'pob, the starter cake essential for fermentation. The study also aimed to understand the traditional knowledge associated with Apong preparation. Quantitative ethnobotanical indices such as Relative Frequency of Citation (RFC) and Use Value (UV) were applied to evaluate cultural importance of plant species. Another objective was to analyze utilization patterns of different plants in fermentation processes. The work also intended to preserve indigenous knowledge and highlight the relationship between local biodiversity and tribal culture. The study further emphasized the need for conservation of culturally important plant species and traditional practices.

Traditional Importance of Apong

Apong is a traditional rice beer prepared by the Mishing tribal community of Assam. It has been used by the community since ancient times. The beverage is closely linked with social and religious customs. Apong is served during festivals, marriages, and family gatherings. It represents hospitality, unity, and cultural identity among the people. The preparation method reflects the indigenous knowledge of the community.

Mishing Community and Cultural Heritage

The Mishing community is one of the major tribal groups of Assam. They are mainly settled in the Brahmaputra valley region. Traditional food and beverages form an important cultural heritage. Apong is considered a symbol of ethnic identity and tradition. Knowledge of preparation is transferred through generations orally. The tradition strengthens community bonding and cultural continuity.

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Types of Apong

Apong is mainly divided into Po:ro Apong and Nogin Apong. The classification is based on colour and preparation techniques. Nogin Apong is whitish in colour and nutritious in nature. Po:ro Apong appears blackish due to burnt ash addition. Both beverages are prepared through fermentation of rice. Each type has unique taste and cultural significance.

Study Area of Majuli District

Majuli is the world's largest inhabited river island. It is situated in the state of Assam, India. The island is formed by the Brahmaputra and Luit rivers. The region experiences high rainfall and fertile soil conditions. Majuli supports rich biodiversity and tribal settlements. The ecological environment favours traditional agricultural practices.

Ethnobotanical Field Survey

Field surveys were conducted from April to October 2024. Three villages of Majuli district were selected randomly. Researchers collected information directly from local informants. Semi-structured interviews and discussions were conducted carefully. Transect walks helped in identification of useful plants. The survey documented valuable traditional ethnobotanical information.

Role of Women in Apong Preparation

Women play a dominant role in Apong preparation activities. They collect plant materials and prepare starter cakes. Traditional knowledge is mainly preserved by elderly women. Women supervise fermentation and storage of the beverage. Their contribution maintains continuity of cultural traditions. Apong preparation is therefore considered women-centered knowledge.

Informants and Data Collection

A total of 28 informants participated in the study. The age group ranged between 40 to 70 years. Elderly women were selected as key knowledge providers. Researchers obtained prior consent before conducting interviews. Traditional preparation methods were recorded respectfully and ethically. Confidentiality of respondents was properly maintained throughout research.

Plant Collection and Identification

Plant species were collected from forests and home gardens. Agricultural fields also served as collection sites. Taxonomic literature was used for accurate identification. Online botanical databases verified scientific nomenclature correctly. Herbarium sheets were prepared for future documentation purposes. Specimens were submitted to Jengraimukh College herbarium collections.

Quantitative Ethnobotanical Analysis

Quantitative indices were used to analyse ethnobotanical data. Relative Frequency of Citation and Use Value were applied. These indices measured cultural significance of plant species. The analysis reflected utilization patterns among community members. Higher values indicated greater traditional importance of plants. Quantitative methods strengthened scientific reliability of the study.

Relative Frequency of Citation (RFC)

RFC measures recognition of a plant species among informants. It is calculated using the formula $RFC = FC/N$. FC represents number of informants mentioning the species. N represents the total number of informants interviewed. RFC values range between 0 and 1 statistically. Higher RFC indicates strong cultural importance within the community.

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Use Value (UV)

Use Value measures the relative utility of plant species. It is calculated using the formula $UV = \Sigma U/N$. Higher UV values indicate multiple applications of species. The index reflects practical ethnobotanical significance clearly. Plants with greater UV are widely utilized traditionally. UV analysis helps identify highly important cultural species.

Dominant Plant Families

Asteraceae was the most dominant family recorded in study. Lamiaceae ranked second among the documented plant families. Rutaceae and Zingiberaceae were also highly represented. The diversity indicates rich ethnobotanical knowledge of the community. Different families contribute unique phytochemical characteristics naturally. These plants support fermentation and flavour development processes.

Plant Parts Used in Preparation

Leaves were the most commonly utilized plant parts. Roots, bark, seeds, and stems were also used. Leaves are easily available and simple to harvest. They contain important medicinal and phytochemical compounds naturally. Different plant parts perform different fermentation functions effectively. Traditional selection depends on indigenous practical experience.

Importance of *Oryza sativa*

Oryza sativa recorded the highest RFC and UV values. Rice is the main ingredient in Apong preparation. It acts as the substrate for fermentation activities. Different glutinous rice varieties are traditionally preferred. The species has great cultural and economic significance. Its importance reflects maximum dependence of the community.

Significance of *Dryopteris filix-mas*

Dryopteris filix-mas showed very high ethnobotanical importance. Its leaves are used during storage of starter cakes. The plant protects E'pob from insects and contamination. It is also used during drying and preservation stages. High RFC and UV indicate extensive traditional utilization. The species is culturally valuable among Mishing communities.

Preparation of Starter Cake E'pob

E'pob is the microbial starter used in fermentation. It is prepared mainly from powdered glutinous rice. Various medicinal plants are mixed with the rice powder. Old starter culture is added to promote microbial growth. The mixture is shaped into small oval cakes. The cakes are dried and stored for future use.

Traditional Tools Used

Traditional wooden pestle and mortar are commonly utilized. These tools are locally called Ki:per and E'gi. They help in pounding rice and plant materials efficiently. Bamboo mats are used during cooling and drying processes. Earthen pots serve as fermentation and storage containers. Traditional tools maintain authenticity of Apong preparation methods.

Preparation Process of Nogin Apong

Nogin Apong is prepared using cooked non-glutinous rice. The rice is cooled properly on bamboo mats. Starter cake powder is mixed evenly with the rice. The mixture is transferred into earthen fermentation pots. Fermentation generally requires about ten to fifteen days. The final beverage appears whitish and nutritious naturally.

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Preparation Process of Po:ro Apong

Po:ro Apong preparation involves addition of burnt ash. Rice husk and straw are partially burnt initially. The ash is mixed thoroughly with cooked rice. Starter cake powder is added for fermentation activities. Fermentation takes place inside sealed earthen pots carefully. The beverage develops sweet and slightly bitter taste.

Fermentation and Microbial Activity

Fermentation is the key process in Apong preparation. Microbial cultures convert sugars into alcoholic compounds naturally. Starter cakes provide microorganisms required for fermentation initiation. Environmental temperature influences fermentation duration and quality significantly. Traditional methods ensure natural microbial growth and activity. Proper fermentation improves flavour, aroma, and beverage quality.

Medicinal and Antimicrobial Roles of Plants

Many plant species possess medicinal and antimicrobial properties. Certain herbs prevent growth of harmful microorganisms naturally. Some plants improve fermentation efficiency and beverage quality. Traditional practices indicate possible therapeutic health benefits. Phytochemical compounds may contribute medicinal significance scientifically. Further laboratory validation is still necessary for confirmation.

Cultural Role of Apong

Apong is used during every important social occasion. Religious ceremonies are incomplete without offering Apong traditionally. It is served during marriages, festivals, and celebrations widely. The beverage symbolizes friendship and communal harmony strongly. Apong acts as a refreshing drink during public gatherings. It reflects the deep cultural values of the Mishing tribe.

Environmental Dependence and Biodiversity

Most plant species are collected from wild natural habitats. The community strongly depends on surrounding ecological resources. Floods and erosion threaten availability of important species. Habitat destruction may reduce ethnobotanical plant diversity gradually. Conservation efforts are necessary for sustainable resource management. Protection of biodiversity also safeguards indigenous cultural traditions.

Conclusion of the Study

The study documented rich ethnobotanical diversity in Apong preparation. A total of 53 plant species were successfully recorded. Quantitative indices identified culturally significant plant species clearly. *Oryza sativa* and *Dryopteris filix-mas* showed highest importance values. The research highlighted close relationships between biodiversity and culture. Further scientific research and conservation efforts are strongly recommended.

Significance of the Study

The study is significant because it documents the traditional ethnobotanical knowledge of the Mishing community related to Apong preparation. It highlights the close relationship between indigenous culture and local biodiversity. The research identified culturally important plant species used in fermentation and starter cake preparation. Quantitative indices such as RFC

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and UV helped determine the utilization pattern and importance of plants scientifically. The study also provides valuable information for future phytochemical and microbial research. Documentation of traditional practices supports conservation of indigenous knowledge and biodiversity. The work may contribute to sustainable utilization of plant resources and preservation of cultural heritage.

Recommendations

Further phytochemical and microbiological studies should be carried out on the documented plant species. Conservation measures are necessary to protect ethnobotanical plants from habitat destruction and environmental changes. Awareness programs should be conducted among younger generations to preserve traditional knowledge. Cultivation of important plant species should be encouraged to reduce pressure on wild populations. Government and research institutions should support indigenous communities in biodiversity conservation. Detailed scientific validation of medicinal and antimicrobial properties of plants is recommended. Future studies may compare Apong preparation methods among different tribal communities of Northeast India.