Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages 14276-14293
Received 05 March 2021; Accepted 01 April 2021.

Traditional Rice Beer of Assam, North East India: Traditionalism, Ethnobiology and its Pharmacomedicinal Trends

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Abstract

Assam which is an integral part of the North East India, well recognized for its tribal ethnicity. Several tribal communities reside in Assam and also in other parts of North East India. The major ethnic groups and tribes are Ahom, Bodo, Mishing, Karbi, Rabha etc. Among various practices that are followed by the tribes, the preparation of traditional rice beer is considered as a spiritual practice and plays an important role in their socio-economic development. Although rice is the primary ingredient used in the preparation of the rice beer, the method of preparation, the herbal components used during the preparation process vary among the various tribes. These traditional rice beers that are prepared are reported to be possessed with diverse medicinal properties and therapeutic values and hence, are considered as nutraceuticals. Owing to the uniqueness in their preparation, the type of herbal components present and the subtle differences that lie among the methods of preparation, traditional rice beer brewing techniques have gained scientific attention. This review article focuses on documentation of the differential methodologies and the type of the plant products that are used in the preparation of the rice beer.

Key words: Nutraceuticals, Ethnic groups and tribes, traditional rice beer, North-east India

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1. Introduction

India is rich in biodiversity, ethnic diversity with large number of traditional knowledge and practices. The north-east region of India is a combination of hill and plain areas. It includes 8 states namely, Assam, Meghalaya, Manipur, Mizoram, Nagaland, Tripura, Arunachal Pradesh and Sikkim. Assam is the gateway to north-eastern states occupying a total area of 78,438 km^2 with a population of 31,205,576.The state lies between latitude of 24°07'N and 28°00'N and longitude of 89°42'E and 96°02'E. The total forest area of the state is 27,673 km² which is 35.3% of its total geographical area.

The state Assam has more than 23 ethnic groups like *Ahom, Bodo, Mishing, Rabha, Hajong, Karbi, Sonowal Kachari, Tiwa, Dimasa, Deori, Mech Kachari, Tai Phake, Chutia* etc. distributed geographically within the state of Assam (Fig. 1), each of them with unique cultural identity. The *Bodo* community is one of the largest linguistic groups in Assam with a majority of them residing in the Bodoland Territorial Autonomous Districts (BTAD) area of Assam. They are known to be the earliest settlers of Assam and were the first to cultivate rice and rear silk worms in Assam. They are believed to be originated from Tibet [1].

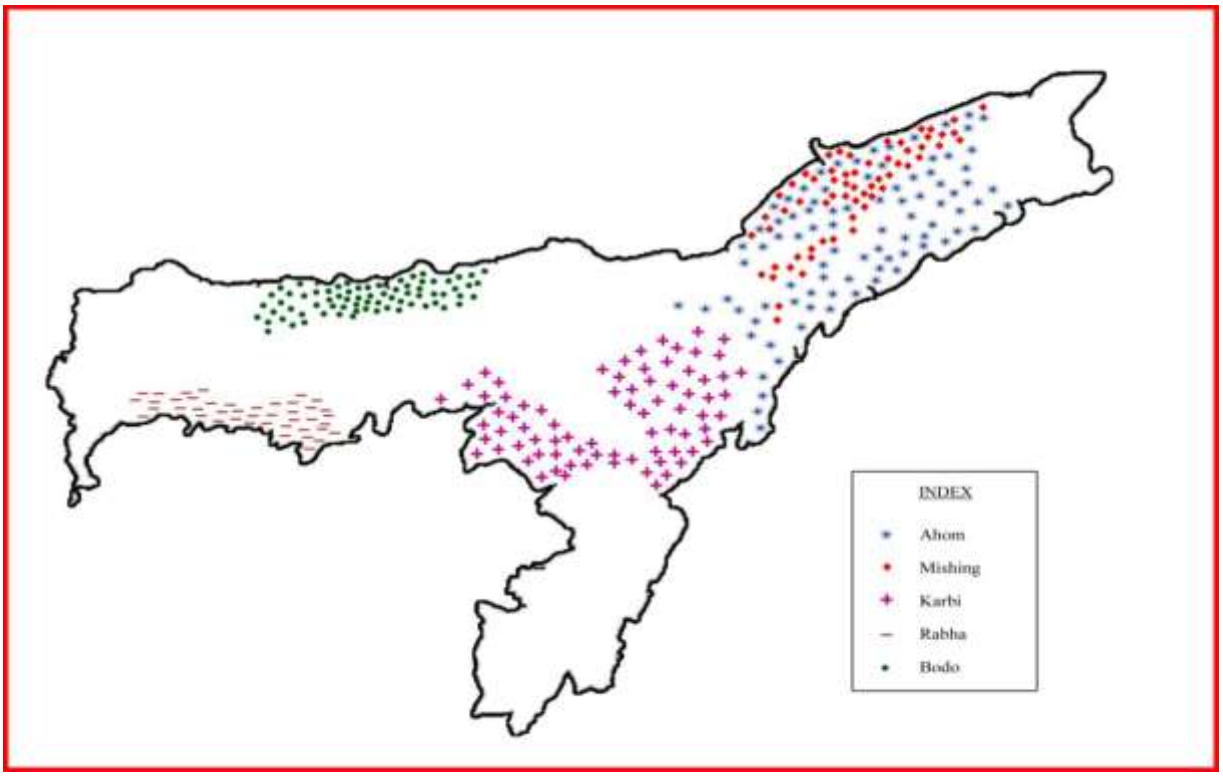

Fig. 1: Geographical distribution of the different tribes in Assam

The *Karbis* represent an important tribe of Assam inhabiting mainly in the hill district of Karbi Anglong. A large number of Karbi villages are also found in the plain areas of the state. In the plains, *Karbis* live in the districts of Kamrup (M), Morigaon, Nagaon, Golaghat, Sonitpur, Dhemaji, Lakhimpur and Cachar. The*Karbis* belong to the Mongoloid group and linguistically belong to the Tibeto-Burman group [2]. The *Tai Ahom* groups of Assam belong to Indo-mongoloids racial group and distributed in Sibsagar, Jorhat, Golaghat, Dibrugarh, Dhemaji and

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Lakhimpur district. The Tai Prince Sukapha came to Assam from Southeast Asia in 1228 AD and the Ahom group ruled till 1826 [3].The *Mishing* community, previously known as *Miri*, is the second largest tribal community after the *Bodos*. It is a scheduled tribe community, according to the Indian constitution, belonging to Mongoloid group. They are one of the plain tribes of Assam and are distributed in the areas of Brahmaputra valley especially in Dhemaji, Lakhimpur, Sonitpur and Sibsagar.The*Rabha* community is another large community of Assam scattered in the district Goalpara, Bongaigaon, Kamrup, Darrang and Barpeta.

Rice beer consumption has been a part of human history since antiquity. There are numerous examples of ancient myths that refer to alcohol. Local oral history and archaeological findings add to the evidences to suggest that alcohol consumption has been a part of Assam culture, rituals, and traditions since time immemorial [4]. Alcohol has played an important role in religion, typically seen as a gift to the divinities and closely associated with their worship. It is apparent that alcohol drinking is influenced by factors such as genetic, socio-environmental, culture, age, gender, accessibility, exposure and personality. Home fermentation and distillation is common in several tribal areas in north-eastern region of the country including Assam. Many tribal communities of the North-Eastern region of India prepare alcoholic beverages and consume it since time immemorial [5]. The preparation and consumption of this type of beverages may vary depending on the climatic conditions and the natural resources [6].

Traditional rice beers are homemade products that are distinctive to the Northeastern parts of India in which rice is used as the primary ingredient, and the naming of rice beer differs amongst different tribes such as *Jou* in *Bodo*, *Apong* in *Mishing*, *Xaaj* by the *Ahom*, *Chako* in *Rabha* and *Hor* in *Karbi*[7]. Preparation and consumption of traditional rice beer (fermented drink) is a common practice among all these tribes. The preparation processes are varied, simple and authentic, but are mostly region-specific and ethnic group specific. In addition to rice, it is a practice to use different plants and their parts that are locally available and those used as folk medicine for treatment of various diseases [5]. Apart from the variations in the composition, the methods of preparation of traditionally fermented rice beers also vary among different ethnic groups. Different tribes employ different techniques and use different plant species based on their local availability, necessity and traditional knowledge. Traditional healers use these beers and medicinal plants to cure different diseases like malaria, jaundice, cholera, rheumatism, clearing the intestinal parasitic worms etc. [8, 9].

2. Traditional rice beer preparation practice

The North-eastern people prepare rice beer completely in a traditional manner and the knowledge is transferred from one generation to the next generation. The tribal people follow fermentation technique unknowingly and have been using microbes for thousands of years to prepare rice beer. Factors that induce beer production primarily include the amylolytic and alcohol producing yeasts (*Saccharomyces cerevisae*, *Debaryomyces hansenii*), lactic acid bacteria (*Lactobacillus sp.*, *Pediococcus sp. Leuconostoc,Enterococcusand Lactococcus*) and starch degrading moulds (*Mucor*and *Rhizopus*sp) [10, 11]. In the fermentation technique, these microorganisms act as a source of enzyme, Zymaseto converting raw materials of the TRB into fermented forms. Each ethnic community uses their own unique substrates (mainly rice and plant parts) and preparation method. Different varieties of rice (*Oryza sativa*, L.) are used as the raw material for the traditional rice beer fermentation technique.

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2.1 Chemical basis of rice beer production

Chemically, the rice beer is a beverage with varied concentrations of ethanol depending on the tribe considered. Basically, ethanol is produced from the starch present in the rice in the presence of enzymes synthesized by the bacteria and the moulds present in the starter cake that involve a cascade of reactions. The pathway of biochemical reactions involved in the process of preparation of rice beer is represented in fig. 2.

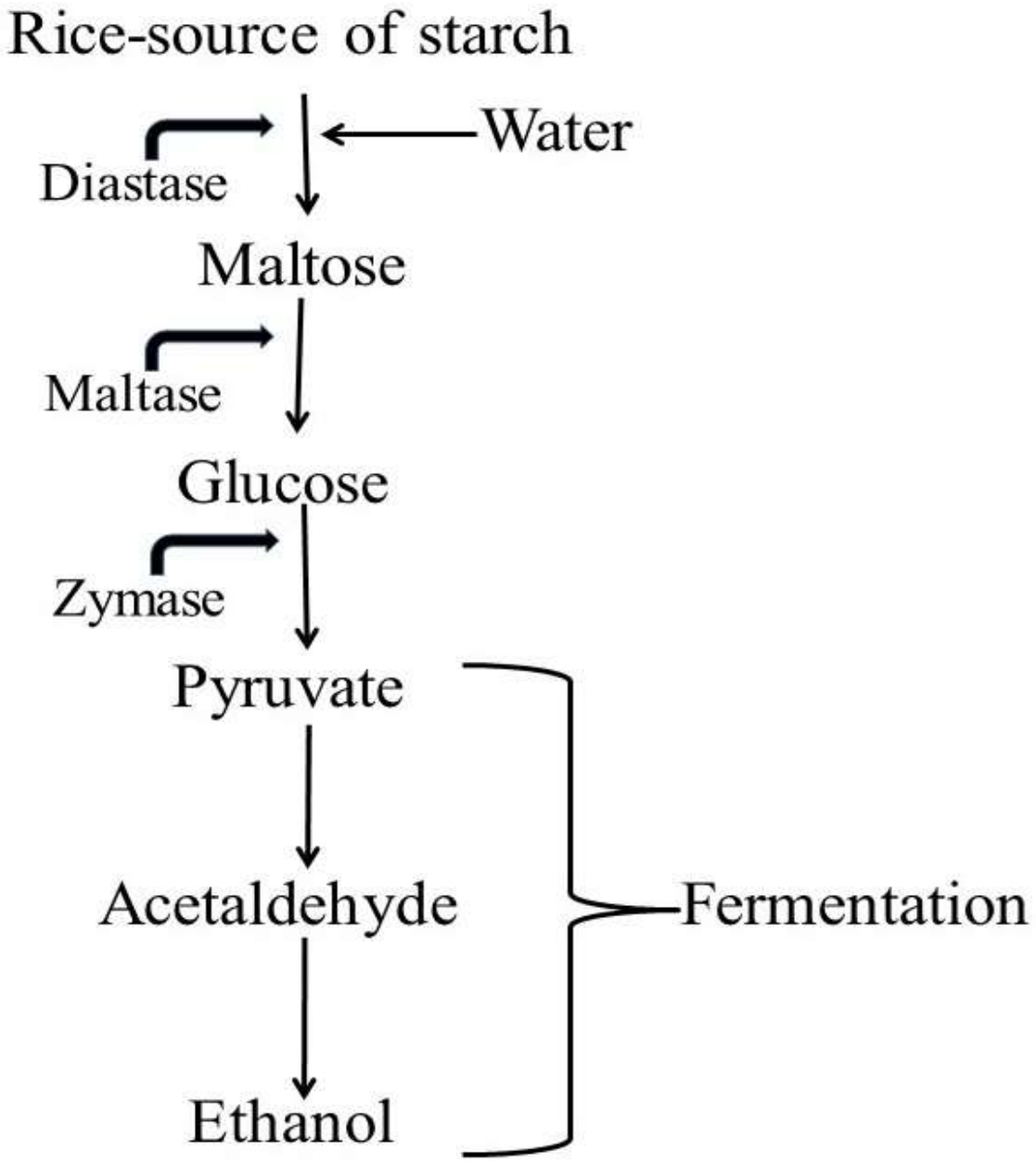

Fig. 2: Schematic representation of the reactions involved in rice beer preparation from starch of rice

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2.2Preparation of starter cake

Starter cake is the primary preparatory ingredient required for preparation of traditional rice beer. Certain plants' parts (Table: 4) are used in starter cake preparation since time immemorial of which majority of them are locally used for medicinal purpose by various tribal *Gurus* and traditional healers. Some of the required plants are collected from forest and others are collected from home yard. The collected plants are dried in shade thoroughly. The air dried plant parts are ground thoroughly in a special kind of wooden mortar with a pestle. Rice is either boiled or powdered and made into a paste by mixing it with powdered plant parts in order to prepare a rice cake (Table: 1). This rice cake is known as the starter cake (Fig. 3) and it contains microbes having fermentation ability. Leaves of *Rukji* (*Cyclosorus extensa*) are used as the cover on the starter cake. This plant is used to prevent undesired microbial contamination in starter cake preparation (Table: 1)[12].

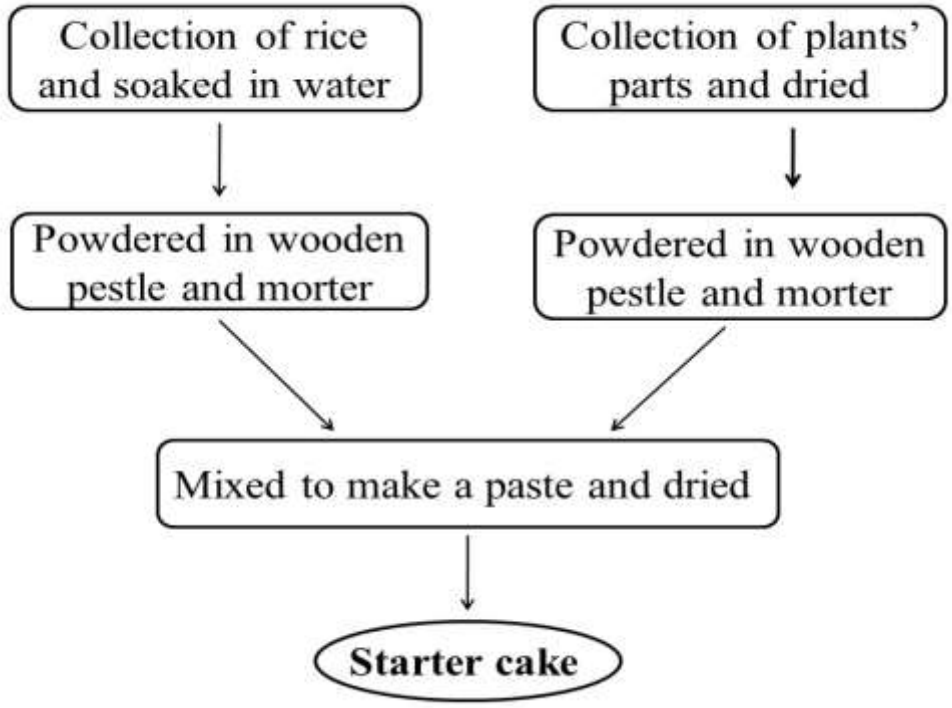

Fig. 3: Flowchart showing the common schematic preparatory procedure of starter cake of TRB

2.3 Preparation of ready to drink TRB

For preparing the ready to drink rice beer, either glutinous or non-glutinous rice is used (Table: 1). Rice is cooked or half-cooked or steam-cooked and allowed to cool down. Fermentation process is generally done in an earthen pot or aluminum pot. The boiled rice is mixed with powdered starter cake and adequate amount of water in the pot, covered with banana leaf (*Musa paradisiaca L.*) and stored in a shady place or hung over fire maintaining the required distance for incubation. The incubation period varies depending on the season and also varies

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from tribe to tribe but generally range from 1 day to 9 days. The fermented mixture is filtered and the filtrate is used for drinking (Fig. 4). Distillation process is common process to certain tribes. For distillation, water is added to the fermented mixture and kept for incubation [7, 13, 14].

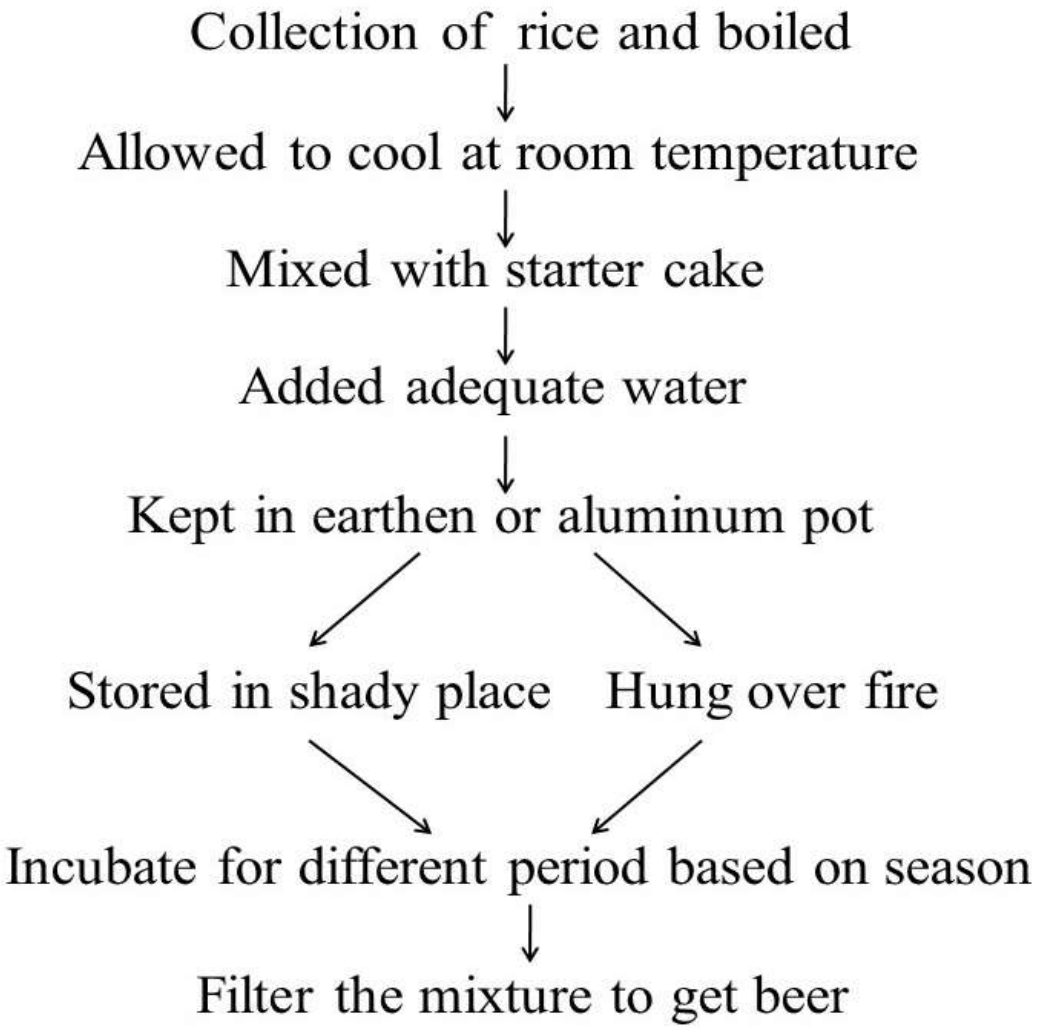

Fig. 4: Step-wise preparation of ready to drink beer

3. Distinctive features of the methodology and techniques involved in the preparation of traditional rice beer including the starter cake among the different tribes of Assam

As already mentioned, the typical method and ingredients used in traditional rice beer fermentation differ amongst the tribes. The naming of the traditional rice beer also varies from tribe to tribe and such varied local nomenclature including the specific ingredients is presented in table 1.The communities such as *Bodo* and *Ahom* significantly use the glutinous rice, the *Karbi, Mishing* and *Rabha* tribes use non-glutinous rice. Although the differences seem to be minor, yet these subtle variations and adaptations do bring about significant differences in the quality and characteristics of the rice beer.

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The *Bodo* community generally keeps 3 chilli (*Capsicum annum* L.) and 3-4 pieces of red hot charcoal in a triangular form in the mixture for better yield in the beer fermentation technique. The belief among the folk is that such practice protects the preparation from evil spirit and produce good quality *Jou*.[14]. Similarly, *Rabha* tribe use leaves of *Ricinus communis* L.and one piece of wood charcoal over the lid of an earthen pitcher (the fermentation tank) to protect the beer from effect of evil spirit [7].

The fruit of *Citrullus vulgaris* is traditionally used by *Karbi* tribes during preparation of the rice beer. A hole is made into the fruit by removing the pericarp portion. Adequate amount of *Thap* (starter cake) is inserted and the hole is properly sealed. After 3 days the sealed fruits are detached from the plants and the beer is collected[13].Similar process is done in the matured fruit of *Lagenaria siceraria* by *Rabha* tribe [14]. The detailed distinction in the procedures, ingredients used, necessary traditional utensils etc. are mentioned in the table 1 and 2.

The starter cake is the main ingredient of traditional rice beer and it plays a significant role in the quality of TRB. Schematic procedure of starter cake preparation is described in fig. 3. Though the basic skeleton of preparation of starter cake is similar, yet variations are reflected in the raw materials used, size of starter and incubation period from tribe to tribe (Table 1). In general, the *Bodo* tribe use 4 kg of soaked rice grain ground into powder and mixed with leaves of selected plants that are air dried earlier. This mixture is sieved through a bamboo sieve called "*sandri*". The incubation period of starter is 6-7days. A total of about 60 pieces of starter cake is prepared which remain quite effective for about 5-6 month [14].The starter cake *Thap*, of *Karbi* community is sun-dried for 2-5 days and it is effective for about12 months.

The *Mishing*community dry the starter cake for 3-5 days. A strike on the starter cake with the finger is a usual and traditional way of testing the quality of the cake. A '*dhop-dhop*' sound, produced upon finger strike indicates that it is well dried and is of good quality which can be processed further [15]. To prepare the starter cake, the rice and plants' parts are mixed in a ratio 1:50 to make a ball of paste weighing about 11-16g [16].Similarly, the *Ahom* tribe blend rice with dried plants in a ratio 1:50 to make a ball of 15-35g. The starter cake prepared is dried for about 4-5 days and it is called *Vekur pitha*[4].

Table 1: Comparative analysis of rice beer preparation technique of different tribal community of Assam

Tribe	Name of rice beer		Name of starter	Rice used	Number of Plants used	Materials used to dry starter cake	Size of starter	Store place	Time of incubation	
	Non-distilled	Distilled							Summer	Winter
1	2	3	4	5	6	7	8	9	10	11
Bodo	*Jou*	*Jou gwran*	*Amao*	*Bora* or *Sali*	8	Paddy straw	D-5.5cm T-0.5-1cm	Hung over fire	3 Days	6-7 Days

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Karbi	*Hor alank*	*Hor arak*	*Thap*	*Sali*	6	Bamboo shieve	D-6cm, T-0.5cm	Shady place	2-3 Days	4-5 Days
Ahom	*Xaaj-pani*	-	*Vekur-pitha*	*Bora*	14	Banana leave	D-4.5cm T-3cm	Dark place	4-5 Days	7-8 Days
Mishing	*Nogin-apong*	*Sai – mod*	*Apop*	*Bao* or *Sali*	16	Paddy straw, Rukji leaves	D-6cm T-3cm	Hung over fire	4-5 Days	8-9 Days
Rabha	*Choko*	*Phatika*	*Bakhor* or *phap*	*Ahu* or *Sali*	11	Jute straw	D-4cm T-1-1.5cm	Shady place	1-2 Days	3-4 Days

3.1 Variation in utensils and accessories used in the traditional rice beer preparation procedure in Assam

In traditional rice beer preparation technique, generally tribal women are involved. Various types of utensils and accessories are used, which are basically bamboo originated and preferably earthen pot. The differences in the type of utensils/apparatus used among the different tribes are presented in table 2.

Table 2: Utensils used by different tribes of Assam during TRB preparation

Utensils and apparatus used	***Bodo***	***Karbi***	***Ahom***	***Mishing***	***Rabha***
Wooden mortar	W*oowal*	*Long*	*Khundona*	*Kipar*	*Saam*
Pestle	G*aihen*	*Lengpum*	*Khundona*	*E'gi*	*Maangkuna*
Bamboo shieve	*Sandri*	---	*Saaloni*	*Korai*	*Saandree*
Bamboo mat	S*ongrai*	*Antar*	*Dhaari*	*Opoh*	*Jonga*
Earthen Pot	*Hani jidow*	*Hengru*	*Koloh*	*Torap (a bambooframe)*	*Daam*
Conical bamboo sieve	*Janta*	*Bhot*	---	*Ta:suk*	*Haani kwambraai*
Silver pot	*Jidow*	*Charang*	----	*(bamboo sieve*	*Bukhree*

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Earthen pot with small holes at the base	*Mwkra koro*	---	*Mola soru*	*Kelling*	*Swaarni kwambraai*

3.2 Physico-chemical differences of traditional rice beer

The physico-chemical characteristics of any traditional rice beer play an important role in determining the quality of the beer and may include various parameters. These physico-chemical characteristics vary with each community including taste, aroma, color (fig. 5), appearance etc. The traditional rice beer prepared by *Mishing tribe* is sweeter compared to the one prepared other tribes while traditional rice beer of *Bodo* contains the highest alcohol percentage of all tribes [17]. The distilled traditional rice beer of *Bodo* and *Karbi* tribe (named *Jou gwran* and *Hor arak* respectively) is transparent while the undistilled traditional rice beer of *Mishing*, *Bodo* and *Karbi* tribes are creamy white. The traditional rice beer of *Ahom* is faint yellow while distilled traditional rice beer of *Mishing* is red in color. The *Choko* of *Rabha* tribe is brown in color.

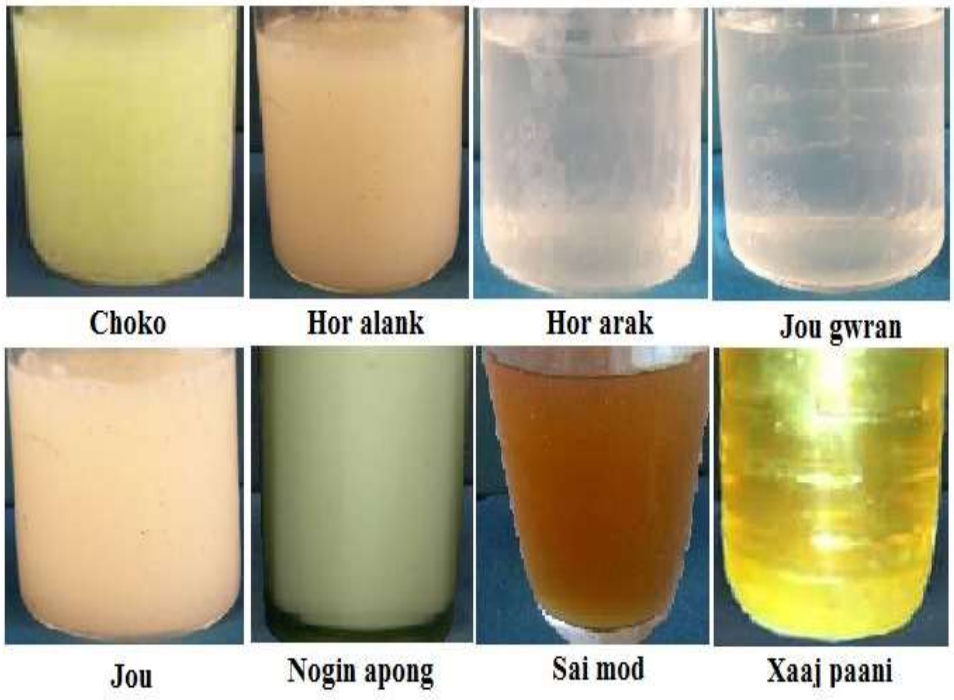

Fig. 5: Color appearance of the traditional rice beer prepared by different tribes

3.4 Health effects and medicinal value

The ethnic tribes consume traditional rice beer not only for social, cultural, ritual activity but they also consume it for nutritive value and are also believed to improve their health. The traditional rice beers of different tribes are helpful to maintain good health and for prevention of many different diseases (table 3).The herbal components of different parts of leaves, barks and other parts used in the preparation of the fermented beverage contain a variety of phytochemicals *viz*., phytoestrogens, terpernoids, carotenoids, limnoids, phytosterols, glucosinolates, polyphenols, flavonoides, iso-flavonoids and anthocyanidins. These phytoconstituents have been reported to exhibit remarkable impact in the prevention or treatment of different diseases in

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the traditional healthcare system [18]. In addition to human health, the traditional rice beer of *Rabha* community is used to improve the body strength of cattle [19].Remarkably, during cholera epidemic in 1960s and 1970s, the local *Karbi* people used their traditional rice beer to counter such communicable diseases. The medicinal importance of traditional rice beer of *Mishing, Bodo, Ahom, Karbi* and *Rabha* community is described in table 3.

Table 3: Medicinal importance of traditional beverages prepared by different tribes

Tribe	Medicinal importance
Bodo	"*Jou*" of the *Bodos* is helpful against jaundice, diarrhea, expelling worms, cholera, gastro gastrointestinal disorder, urinary disorder, clear urine, keeps body healthy and relaxes the body when taken in an appropriate quantity[8]
Karbi	Alcoholic beverage (distilled) of *Karbi* is used as medicine in cases like dysentery and pharyngitis. It is also used as a precaution against epidemic of cholera. *Horlank* is often used as preservative in dried fish[13].
Ahom	The *Xaaj pani* in *Ahom* community is used as energy booster during physical labour. It is naturally loaded with probiotics and used as therapeutics for tackling anxiety, depression, stress and to improve overall mood. It is also used as refreshing drink [4]
Mishing	The *Apong* gives energy besides its soothing effect and other medical properties to the consumer. The plants used in beer preparation are effective against gastrointestinal problem, skin disease, respiratory ailments, diabetic problems, rheumatism and jaundice [9]
Rabha	The *Rabha* people consume mixture of rice and rice beer together that is popularly known as *juguli.* It works as a tonic that promotes sleeping tendency, relieving headache, reduces body pain, and inflammation of body parts, diarrhea and urinary problem. Rice beer of the *Rabha* is highly effective in expelling bowel worms and also cures cholera [7].

The knowledge of traditional rice beer preparation is transferred from one generation to the next generation in a tribal community, that helps in retaining the valuable traditional knowledge which otherwise could be lost over the passing of years. The quality of starter cake and the type of herbal components used in its preparation dictates the characteristics of a traditional rice beer.

Selection of plants has authenticity in each community. As said earlier, the quality of starter as well as the traditional rice beer is directly dependent on the variety of plants used. Each tribe uses specific and unique plants for preparation of their traditional rice beer and such plant material used in starter preparation also varies from tribe to tribe (Table 1). Generally, *Bodo, Karbi*, *Ahom*, *Mishing* and *Rabha* tribe use 8, 6, 14, 16 and 11 numbers of plants respectively. These plants may be either used simultaneously or separately at different steps of traditional rice beer preparation. However, it is believed that these herbal constituents used in the preparation possess prognostic and preventive medicinal properties. The details of the plants used by different tribes and their medicinal importance are presented in Table. 4.

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Table 4: Plant species used by different tribes during the preparation process of TRBs along with their medicinal uses

Scientific name	Local name	Common name	Family	Parts used	Medicinal use	Used by tribes				
						Bodo	***Karbi***	***ahom***	***Mishing***	***Rabha***
Ananas comosus (L.) Merr	*Anaras*	Pineapple	Bromeliaceae	Bark, leaves	Strengthens the reproductive system in both males and females likewise. It also helps improve digestion and controls hunger levels preventing, anorexia and indigestion [20]	+	-	-	+	+
Artocarpus heterophyllus Lamk.	*Kanthal*	Jack	Moraceae	Leaf	Anthelmentic and used in skin disease [7]	+	-	-	-	-
Oryza sativa L	*Mai*	Rice	Poaceae	Grains, husk, straw	Skin disorder, diarrhea, nausea [21]	+	+	+	+	+
Musa paradisiaca L.	*Talir*	Banana	Musaceae	Leaf	Diabetics or used for bronchitis, dysentery and ulcers [22]	+	-	+	-	+
Scoparia dulcis L.	*Bongfang rakeb*	Sweet broom	Scrophulariaceae	Whole twig	Leaves and seeds are taken with water in diabetic treatment [23]	+	-	+	+	+
Plumbago zeylanica L.	*Agwrsita*	Ceylon Leadwort	Plumbaginaceae	Bark	Chronic disease of nervous system, rheumatoid arthritis, antioxidant property [24]	+	-	-	-	+
Clerode	*Lwk*	Hill	Verben	Leaf	Diabetes,	+	-	+	+	+

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ndron infortunetum L.	*hwna*	glory bower	aceae		hypertension, cough and rheumatism. [25]					
Capsicum annum L.	*Bam blu*	Chilli	Solanaceae	Fruits	Antioxidant and anti-inflammatory property. [26]	+	-	-	+	-
Croton joufra	*Marthu*	Croton or rushfoil	Euphorbiaceae	Leaf	Used to treat liver disease, fever [27]	-	+	-	-	-
Phlogocanthus thysiflorus	*Jockan*		Acanthaceae	Leaf	Fever, gastritis, cough, rheumatism [9]	-	+	-	-	-
Solanum viarum	*Hisou - kehou*	Soda apple	Solanaceae	Leaf	used to treat cancer, rheumatic arthritis, chronic asthma, leukemia, and skin diseases [28]	-	+	-	-	-
Acacia pennata	*Themra*	Climbing acacia	Mimosaceae	Bark	Used in indigestion, bleeding gum, antidote for snake poison. [29]	-	+	-	-	-
Oldenlandia corymbosa	*Banjaluk*	Diamond flower	Rubiaceae	Leaf	The plant is diuretic, stomachic, carminativeand used as livertonic. It is also used in jaundice [30]	-	-	+	-	-
Hydrocotyle sp.	*Horumanimuni*	Lawn penny wort	Apiaceae	Leaf	Abscesses, colds, coughs, hepatitis, influenza, pruritus, sore throat [31]	-	-	+	+	-
Centella asiatica	*Bormanmunii*	Asiatic penny wort	Apiaceae	Leaf	Fatigue, anxiety, depression, psychiatric disorders, Alzheimer's disease, and improving memory and intelligence [20]	-	-	+	+	-
Cissampelos	*Tubuki*	Velvet leaf	Menispermace	Leaf	Leaves are used in eye trouble, skin	-	-	+	-	-

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pareira	*lota*		ae		ailments, burns, wounds, fever and cold [32]					
Piper nigrum	*Jaluk*	Black pepper	Piperaceae	Seed	Asthma, cough, throat inflammations, digestive stimulant, indigestion, low appetite, promotion of sweating, fever, malarial fever, stress, anxiety, diuretic, urinary disorders, cholera, vomiting, obesity, detoxifying body [9]	-	-	+	+	-
Musa paradisiaca L.	*Kolpat*	Banana	Musaceae	Leaf	Diabetics or used for bronchitis, dysentery and ulcers [22]	+	-	+	-	+
Naravelia feylavica	Goropsoi	Ceylon naravalia	Ranunculaceae	Leaf	Anti ulcer activity, Antibacterial activity, Antihelmintic activity, Anti-inflammatory activity, Antioxidant activity [33]	-	-	+	-	-
Actinodaphne obovata	*Gorokhia koroi*	Pisa	Lauraceae	Leaf	Used to treat abdominal pain and diarrohea [34]	-	-	+	-	-
Leucas aspera	Durun	Thumbai	Lamiaceae	Leaf	Antifungal, prostaglandin inhibitory, antioxidant, antimicrobial, antinociceptive and cytotoxic activities [20]	-	-	+	-	-
Zanthoxylum nitidum	Tezmori	Prickly-ash	Rutaceae	Root, stem, Fruit	The stem and root extract is used in tooth-ache, stomachache and externally on	-	-	+	+	-

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					boils [25]					
Oldenlandia corymbosa	*banjaluk*	Diamond flower	Rubiaceae	Leaf	The plant is diuretic, stomachic, carminativeand used as livertonic. It is also used in jaundice [20]	-	-	-	+	-
Saccharum officinarum	*kuhiar*	Sugarcane	Poaceae	Leaf and stem	Leaves are used in constipation, jaundice and fever [9]	-	-	-	+	+
Ipoemea sp.	*bankolmou*	Morning glory	Convolvulaceae	Leaf	useful in diabetes and as galactagogue to nursing mother [35]	-	-	-	+	-
Drymeria cordata	*laijabori*	Tropical chick weed	Caryophyllaceae	Leaf	Appetizer, depurative, emollient, febrifuge, laxative and stimulant [25]	-	-	-	+	-
Lygodium flexuosum	*kopoudhekia*	Climbing fern	Lygodiaceae	Leaf	Antifungal property. [22]	-	-	+	+	-
Zanthoxylum hamiltonianum,	Tezmori	Prickly-ash	Rutaceae	Root, stem, Fruit	The stem and root extract is used in tooth-ache, stomachache and externally on boils [25]	-	-	+	+	-
Pteridium aquilinum,	*Torabaghini*	Eagle fern or bracken fern	Dennstaedtiaceae	Leaf	Leaves are antibacterial and germicidal [36]	-	-	-	+	-
Phogocanthus thyrsiflorus	*Titaphul*	Nongmangkha	Acanthaceae	Leaf and flower	Fever, gastritis, cough, rheumatism [25]	-	-	-	+	-
Piper longum	*Pipli*	Long pepper	Piperaceae	Seed	The fruits and the roots are eaten in the respiratory disorders, muscular pains, epilepsy and drowsiness. [9]	-	-	-	+	+

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 6, 2021, Pages 14276-14293
Received 05 March 2021; Accepted 01 April 2021.

Calotropis gigantea	Akhomhang	Crown flower	Asclepiadaceae	Leaf	Leaves are analgesic,antiseptic,anthelmentic,used in burns,ear and eye complaints. [7]	-	-	-	-	+
Capsicum frutescence	Bhutjolokia	Tabasca pepper	Solanaceae	Fruit	Analgesic, used in abscess and rheumatic pain [37]	-	-	-	-	+
Dennstaedtia scabra	Bisdhinkia	Dennstaedtia fern	Dennstaedtiaceae	Fronds	Used in malaria, stomach ache [7]	-	-	-	-	+
Ochthochloa coracana	Kuchibun	Goose grass	Poaceae	Leaf	Leaves are used in measles and pneumonia [7]	-	-	-	-	+

4. Conclusion

Preparation of traditional rice beer in the house holds of several tribes of the North East India has been widely practiced since ancient times. Although it is a common tradition to consume the beverage as a part of their socio-cultural development, the mode of preparation and their formulation vary from tribe to tribe and each of them is unique from the other. Traditional rice beer till today invariably remains an inevitable beverage that is served for all the social gathering of these tribes. While the primary ingredient of the traditional beverage is rice from which rice cake is prepared, yet subtle differences exist among the preparations of various tribes.

North East India being a rich hot spot of biodiversity, significant number of the tribal populations in these regions gained invaluable knowledge on the folk and traditional methods of health care practices. Such knowledge that is attained is passed on from one generation to the other only through their local practices. However, majority of such knowledge is not documented. Since these tribes gathered a great deal of knowledge on the medicinal and therapeutic properties of various plants and their products, they made sure that parts/extracts of such plants are mixed in the formulations of the starter cake preparation. However these formulations do vary with the tribe and also with the locality of tribe. Further the method of fermentation and the time of incubation vary. The phytochemical formulations in the preparation of the traditional rice beer, is believed to keep up the good health, and also act as prognostic, preventive and curative medicine for several ailments. With rapid developments in the science and technology, there is a decline in the conservation of the invaluable traditional knowledge and practices and hence there is danger of completely losing such knowledge over a period of time if not documented properly. Therefore, preserving the indigenous traditional knowledge, the local ethnic practices, culture and health care practices that are of great benefit to the upcoming generations becomes the priority of the current generation.

Acknowledgements:

The authors thankfully acknowledge the consultancy service of Dr. Kamal Sarma, Coordinator of DBT supported Advanced Level Institutional Biotech Hub (Phase-II), Pub Kamrup College, Baihata Chariali, Assam, India

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