

INDIGENOUS FERMENTED FOOD BEVERAGES OF DARJEELING HILLS AND SIKKIM: PROCESS AND PRODUCT CHARACTERIZATION

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Abstract. Various types of indigenous fermented food beverages are commonly prepared and consumed by different ethnical groups of people in Darjeeling hills and Sikkim for long centuries. Kodo ko Jannar, makai to jaanr, and distilled part of fermented starchy materials calls raksi are common alcoholic food both use for entertainment and socio-cultural practices. Alcoholic fermentation is done by using traditionally cultured mixed inocula call marchaa being practiced by certain communities. Consumption pattern, per capita consumption and process technology and characterization of these beverages have been documented.

INTRODUCTION

Making and use of fermented food beverages are of widespread interest enhancing the pleasure of eating (Darby 1979). Fermented foods and beverages everywhere provide some 20-40% of our food supply (Campbell - Platt 1994). Indigenous fermented food beverages constitute an integral part of dietary-culture of the various ethnical people of Darjeeling hills and Sikkim in India. These beverages are considered as nutritious and have high caloric contents.

In Darjeeling hills and Sikkim, variety of fermented foods of locally available agricultural produces are prepared and consumed (Tamang *et al.* 1988, Tamang 1993). Custom of serving fermented beverages to guests in these regions had been well described in some of the historical documents (Hooker 1854, O' Malley 1907, Riskey 1928). Similar products of fermented beverages have been reported from Ladakh and Lahul-Spiti (Bhatia *et al.* 1977).

Production of indigenous fermented

food beverages of these regions has remained a traditional family art practiced at household in crude manner. Statistical data on the production, consumption, authentic documentation on process technology, equipment uses and socio-economy are not available. The research is aimed to study the process technology and product characterization food beverages in Darjeeling hills and Sikkim.

MATERIALS AND METHODS

Field data collection

Information on traditional food processing technology was collected through the use of questionnaires and interviews lasting atleast 1 h using survey format (Table 1). The 431 landholding families comprising of different communities and castes were selected randomly from rural areas of three hill sub-divisions of Darjeeling district (170 houses) and four districts of Sikkim (261 houses). The characteristics of process technology, equipments used and socio-cultural importance the products were sought.

Table 1. Survey format on consumption of indigenous fermented food beverages in the rural areas of Darjeeling hills and Sikkim

Name of Place	:			
Name of informant	:			
Approximate population	:			
Date of interview	:			
Information sought	:			
Fermented beverage	Local name	Feeding frequency (daily/weekly/monthly/occasional)	Amount consume (g/capita/d)	House Preparation or Market Purchase
Method of Preparation :				
Mode of consumption :				
Socio-cultural importance :				

Target group

Three major ethnical communities of these regions were included in the survey mainly the Napolis with different castes, the Bhutias and the Lepchas.

Per capita consumption

Fermented food beverage consumed in a meas by each person was weighed directly by portable pan balance (Ishida, Germany). Amount of consumption was calculated as g per capita per day consumption. Feeding

Table 2. Types of indigenous fermented food beverages consume in the rural areas of Darjeeling hills and Sikkim

Fermented beverage	Substrate	Consumption pattern (%)	
		Darjeeling hills	Sikkim
Common fermented food beverage			
Kodo to Jaanr	Finger millet	75.3	81.6
Bhaate Jaanr	Rice	47.7	49.4
Makai ko Jaanr	Maize	38.4	57.3
Lesser-known fermented food beverage*			
Gahun to Jaanr	Wheat		
Jaun to Jaanr	Barley		
Simal tarul ko Jaanr	Cassava root		
Faapar ko Jaanr	Buck Wheat		
Distilled liquor			
Raksi	<i>Cereal:</i> rice, maize, finger millet, barley, wheat	58.6	74.2
	<i>Root/tuber:</i> Cassava, potato, canna		
	<i>Wild plants:</i> Rhododendron flowers		

* consumption of lesser-known fermented beverages is less than 10%

frequency of each family was also recorded. Consumption pattern, production at household/market purchase were analysed in percentage.

RESULTS AND DISCUSSION

Information collected from the survey was prepared into five categories: (i) types of indigenous fermented food beverages, (ii) technology of processing, (iii) equipments use, (iv) consumption pattern and (v) socio-cultural importance of the products.

Types of Indigenous Fermented Food Beverages

Indigenous fermented food beverages commonly as well as occasionally prepare and consume in Darjeeling hills and Sikkim are listed in Table 2.

Traditional Process Technology

Marchaa

Marchaa is not a food but is a mixed inocula used as a starter culture for preparation of various indigenous fermented

food beverages. Marchaa is dried, round to flattened, creamy white to dusty white, solid ball like starter. Size of marchaa varies from 1.9 to 11.8 cm in diameter, with the weight ranging from 2.3 to 21.2 g.

Synonym of marchaa in local dialects

Khesung (Limbu), *Bharama* (Tamang), *Bopkha/Khabed* (Rai), *Phab* (Bhutia), and *Buth/Thanbum* (Lepcha).

Method of Preparation

Traditional method of marchaa preparation is shown in Fig.1. During traditional method of marchaa preparation, glutinous rice (*Oryza Sativa* L.) is soaked in water for 6-8 h at ambient temperature. Soaked rice is crushed in the foot driven heavy wooden mortar and pestle. In 1 kg of grinded rice, ingredients added are roots of guliyo jara (*Plumbago zeylanica* L.); 2.5 g; leaves of bheemsen paate (*Buddleja asiatica* Lour), 1.2 g; 'sengrekenna' flowers, 1.2 g; ginger, 5.0 g; red dry chilli, 1.2 g; and old marchaa powder, 10.0 g. The mixture is then made into paste by adding water and

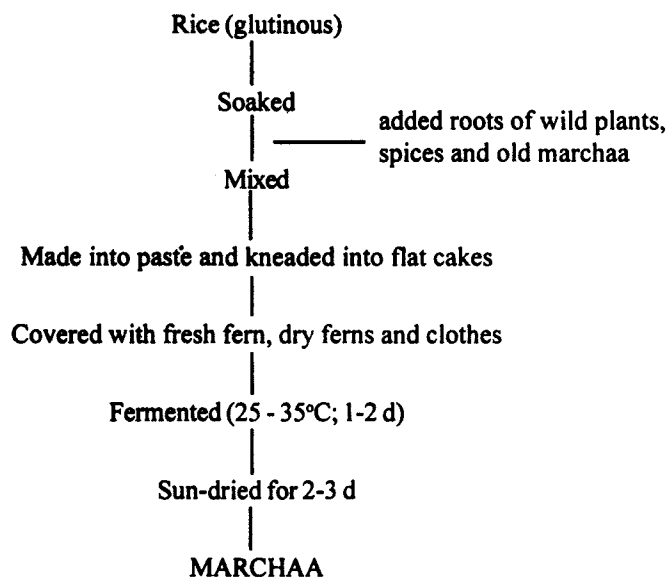


Fig 1. Flow sheet of traditional method of marchaa preparation practised by the Limbu women at Aho village in East Sikkim and Kashyong village in Kalimpong.

kneaded into flat cakes of different sizes, and wrapped in fresh fronds of ferns, locally call *pire unioon (Athyrium nagripis)*, covered with dry ferns and sack clothes. These are placed on the ceiling floor made up of bamboo stipes usually above the Kitchen, and fermented for 1-2 days. After completion of desired stage of fermentation, marchaa is sun dried for 2-3 days and stored for use. Traditionally marchaa makers believe that addition of wild herbs give more sweetness to the product, and addition of spices is to get rid of devils that may spoil the product.

Similar Product

Bakhar (North-Western India), Ragi (Indonesia), Nuruk (Korea), Bubod (The Philippines), Loogpang (Thailand) and Chiu-yueh (China)

Kodo Ko Jaanr

Kodo ko Jaanr is the most popular fermented beverage in these regions. Finger millet [*(Eleusine coracana (L) Gaertn.)*, locally call kodo is the substrate for kodo ko Jaanr. Kodo is sown in June and is harvested

in December. Some of the indigenous local varieties of kodo of these regions are 'mudke', 'nangrey', 'fyakre', 'nangkatwa', etc. Hybrid varieties of finger millet such as PR-202, HR-374 and VL-101 have also been introduced in these regions.

Synonym of kodo ko jaanr

Mandokpenaa thee (Limbu), *Sampicha ummaak* (rai), *Naarr paa* (Gurung) *Saangla chi* (Tamang), *Chirs Shyaabu* (Sunwar), *Paadaare haan* (magar), *Gyaar chyyaang* (Sherpa), *Minchaa chhyaang* (bhutia), and *Mong Chee* (Lepcha).

Method of preparation

The flow sheet of jaanr preparation is shown in Fig 2. During traditional preparation of kodo ko jaanr, seeds of finger millet are cleaned, washed and cooked for about 30 min in an open cooker. Excess water is drained off and spread on bamboo mat locally call 'mandro'. Powdered marchaa (0.5-2.0%) is sprinkled over cooked seeds, mixed thoroughly and packed in a bamboo basket

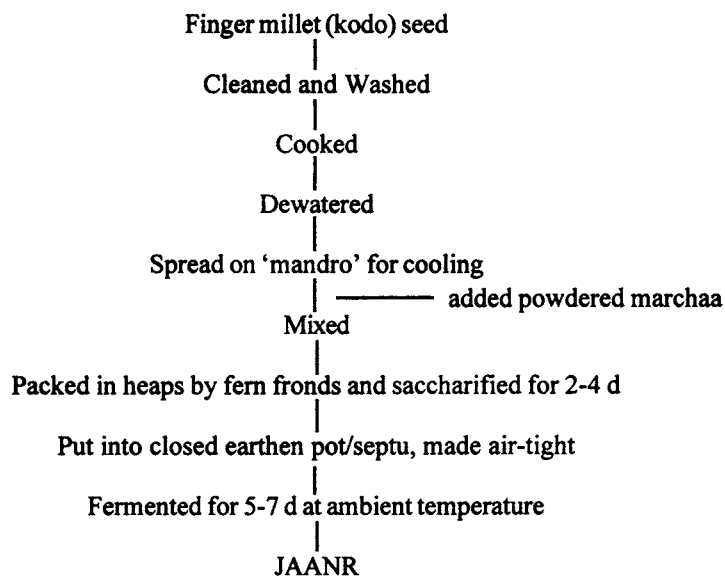


Fig 2. Flow sheet of traditional method of kodo ko jaanr preparation followed at Namchi village in South Sikkim and Algarah Village in Kalimpong.

lined with fresh fern fronds (*Pteris* sp.) or banana leaves or canna leaves, covered with sack clothes, and kept for 2-4 days at room temperature. This incubation period is the saccharification of the substrates during which sweet aroma is emitted out. The saccharified mass is transferred into an earthen pot or into specially made bamboo basked call 'septu' linked with plastic bag and made it air-tight, and fermented for 3-4 days during summer and 5-7 days in winter at room temperature. Sour taste and unpleasant flavour of jaanr is unacceptable to consumers. Good quality of jaanr has slightly acidic, swwt taste and mild alcoholic flavour. Prolonged fermentation makes the product bitter in taste and more alcoholic.

Mode of consumption

Unlike fermented beverages of the Oriental countries, jaanr is consumed in an unique way in the Himalaya. Little amount of water is poured onto a vessel call toongbaa, usually 500-600 g of fermented mass of kodo is kept and warm water is added upto the edge of the toongbaa. After 10-15 min, it is sipped through a narrow bamboo straw call 'Pipsing' having a hole in a side near the bottom to avoid passing of grits. Water can be added 2-3 times after sipping up the liquor.

Guests are served with toongbaa in these regions along with fried meat or pickles.

Thick liquid pressed from the fermented mass is filtered using 'chhapani' under pressure. Such liquor is believed to be good tonic for ailing persons and postnatal women. After consumption, grits of kodo are used as fodder for pigs and cattle.

Bhatte Jaanr

Bhaate jaanr is a sweet-sour alcoholic paste fermented rice food beverage with distinct flavour and aroma. Rice (*Oryza sativa* L.) is the substrate for bhaate jaanr. Both local and hybrid varieties of rice are grown in lower altitude of these regions.

Synonym of bhatte jaanr

Tak thee (Limbu), *Kok umaak* (rai), *Kaiyan paa* (Gurung), *Kaan chi* (Tamang), *Kameshyaabu* (Sunwar), *Chho haan* (magar), *Ja thon* (newar), *Dacchhang* (Sherpa), *Laayakaa chhyaang* (Bhutia), and *Jo chee* (Lepcha).

Method of preparation

Cooked glutinous rice is spread on bamboo mat and powdered marchaa (1.0 - 2.0%) is sprinkled, mixed well and saccharified in a vessel or an earthen pot for

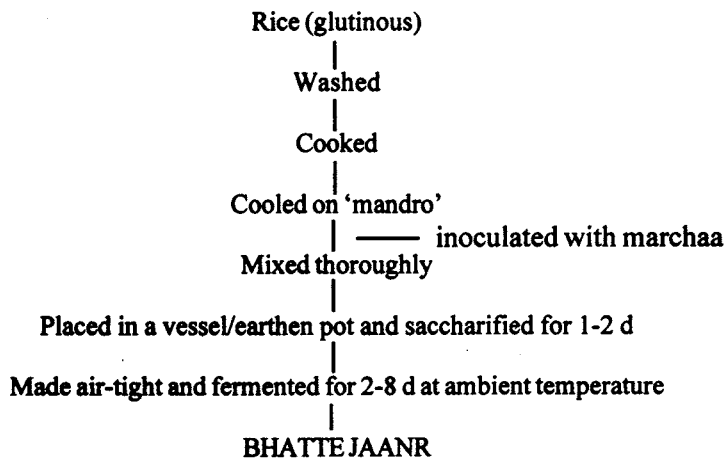


Fig 3. Flow Sheet of bhatte jaanr preparation followed at Aho village in East Sikkim.

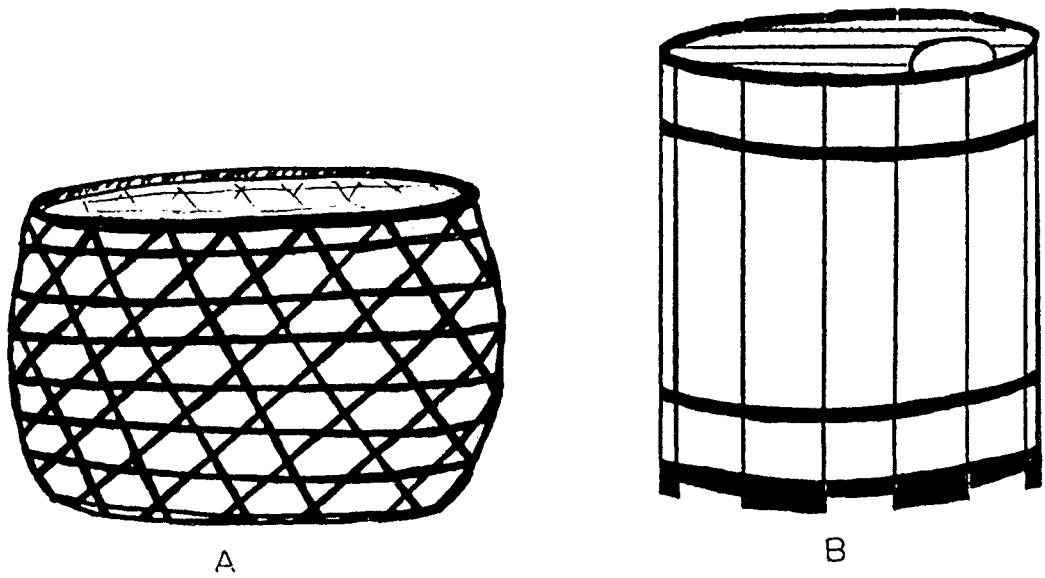


Fig. 4. (a) Bamboo-made septu, and (b) wood-made septu

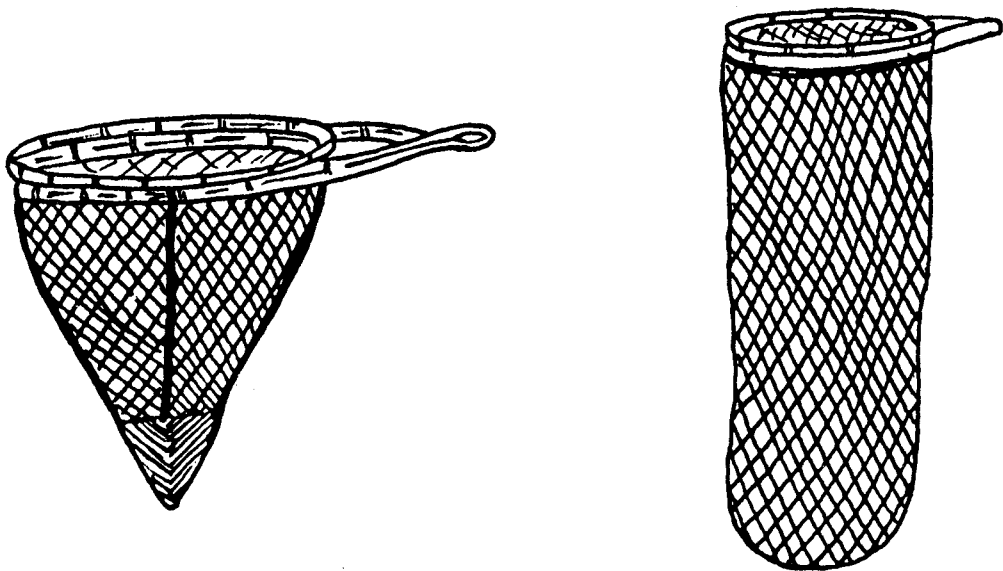


Fig 5. Chappani made up of bamboo stripes

1-2 days, made it air-tight and fermented for 2-3 days in summer and 7-8 days in winter (Fig 3).

Mode of consumption

Thick paste of bhatte jaanr is made by stirring the fermented mass with the help of hand-driven wooden/bamboo-made stirrer, and is consumed directly. Sometimes, bhatte jaanr is stored in an earthenware crock for a week or more after desired fermentation is completed. A supernatant liquid portion is collected at the bottom which is called nigaar. Nigaar is yellowish-white liquor drunk directly with or without water. It is more alcoholic and slightly acidic in taste.

Similar Product

Tape ketan (Indonesia), *Lao-chao* (China), *Yakju* (Korea), *Krachae* (Thailand).

Makai ko Jaanr

Makai ko jaanr is also common to some of the places of these regions where maize is cultivated. Maize (*Zea mays* L.) is the substrate for makai ko jaanr. Both local and improved varieties are grown in these regions.

Synonym of makai ko jaanr

Makai thee (Limbu), *yobbhacha umaak* (Rai), *Makhain paa* (Gurung), *Maagnila Jheen* (Tamang), *Aakan Shyaabu* (Sunwar), *Makai haan* (Magar), *Kahni thon* (Newar), *Lichee chhyaang* (Sherpa), *Kinya chhyaang* (Bhutia), *Kanchung chee* (Lepcha).

Method of Preparation

Dry maize seeds are grinded and dehusked. The bigger grinded granules of maize call 'chekhla' are taken for makai ko jaanr preparation. 'Chekhla' are washed, cooked and inoculated with powdered marchaa (1.0-2.0%). Saccharification and fermentation method of makai ko jaanr are same as bhaate jaanr.

Mode of consumption

Makai ko jaanr is drunk directly by mashing the fermented grits and filtering, with addition of desirable amount of warm water.

Gahun ko Jaanr and Jaun ko Jaanr

Gahun ko jaanr is fermented wheat beverage, and jaun ko jaanr is fermented barley-based beverage. Method of preparation of these beverages is same as kodo ko jaanr. These products are drunk directly by filtering the fermented grits. Sometimes, gahun ko jaanr is mixed with kodo ko jaanr and filled up in toongba and consumed.

Simal Tarul ko Jaanr

Simal tarul ko jaanr is a sweet-sour alcoholic food prepared from cassava roots. Roots of cassava (*Manihot esculenta* Crantz) is used as substrates for this beverage. Two indigenous varieties; local red and white cassava are grown in these regions.

Method of properties

Roots of red varieties of cassava are washed continuously for 2-3 days in running stream to intoxicate the substrate, peeled, cut into pieces (5-10 cm), steamed, cooled and inoculated on all surfaces with powdered marchaa (1.0-1.5%). Jaanr is produced as usual way.

Mode of consumption

This fermented product is eaten directly. Liquor is prepared by smashing the fermented mass and filter, and is drunk directly.

Similar Product

Simal ko tarul is very similar to the Indonesian tape ketella.

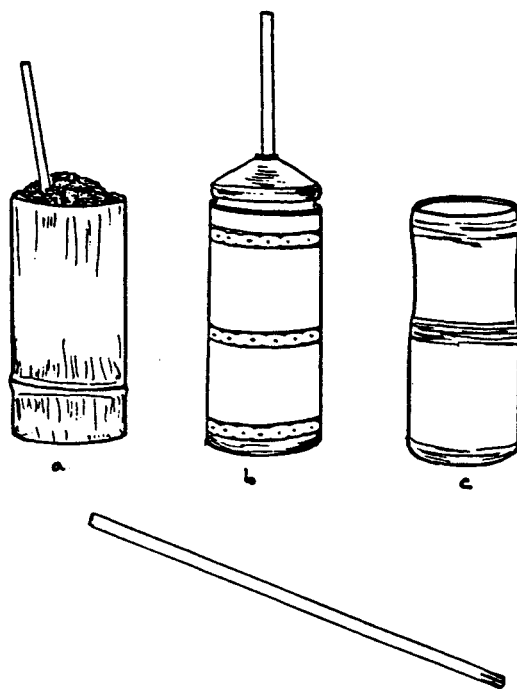


Fig 6. Toongbaa made up of (a) bamboo vessel, (b) wood in decoration, (c) mud, (d) pipping to sip jaanr from toongbaa



Fig 7. Raksi distillation apparatus showing distillate being collected into a small metallic vessel kept above tripet-stand inside the main cylindrical container

Table 3. Feeding frequency of common fermented beverages of Darjeeling hills and Sikkim

Feeding times	Darjeeling hills				Sikkim			
	KJ	BJ	MJ	Raksi	KJ	BJ	MK	Raksi
Daily	36.5	6.8	36.5	18.3	37.6	5.9	37.6	10.6
Weekly	23.0	12.3	23.0	8.3	28.9	12.1	28.9	33.4
Monthly	4.8	5.7	4.8	5.1	5.8	3.8	5.8	5.9
Occasional	11.0	22.9	11.0	26.9	9.4	27.7	9.4	24.3

Data expressed in percentage

KJ, kodo ko jaanr; BJ, bhaate jaanr; MK, makai ko jaanr

Raksi

Raksi is a clear, distilled wine with characteristic aroma prepared from fermented starchy materials mostly bhaate jaanr. Fermented masses of finger millet, maize, wheat, barley, buckwheat, potato, canna, cassava roots and flowers of *Rhododendron* are also distilled to get raksi.

Synonym of raksi

Sijongwaa aara (Limbu), *Aarakha/Hemma* (Rai), *Paa* (Gurung), *Aerak* (Tamang), *Rindho* (sunwar), *Aayala* (Newar), *Dhise* (Magar), *Aarak* (Sherpa), *Aarak* (Bhutia), and *aarok* (Lepcha).

Method of preparation

Fermented starchy materials are distilled in a big cylindrical vessel continuously for 2-3 hours. Distillate is collected in a small collecting vessel which is raksi and is bottled for drinking. At the top of the distilling vessel, cool water is kept as condenser and is replaced for 3-5 times after it becomes boiled. Raksi prepared after replacing condensing water for 3 times is known as 'theen pani raksi' which contains high alcohol and is traditionally prepared for religious occasions. Raksi prepared after replacing the condensing water for 5 times is known as 'panch pani raksi'.

Table 4. Amount of consumption of fermented beverages in rural areas of Darjeeling hills and Sikkim

Beverage	Darjeeling hills	Sikkim
g/capita/day		
kodo ko jaanr ^a	208.5 (175.5-262.2)	265.1 (178.2-339.0)
Bhaate jaanr	49.5 (25.5-63.4)	49.3 (21.7-70.1)
Makai ko Jaanr	54.3 (32.3-80.0)	35.6 (21.0-64.6)
ml/capita/day		
Raksi	118.6 (57.4-222.4)	157.8 (86.1-280.5)

Data represent the mean percentage of samples surveyed from three hill-sub-division of Darjeeling hills and four districts of Sikkim.

Ranges are given in parentheses.

^a Whole weight of fermented finger millet kept in each toongbaa was taken, only the extract is drunk.

Equipment uses during traditional beverage preparation

Septu

It is a container to store jaanr, and is made up of bamboo stripes or woods. Septu is commonly used in marriages. (Fig. 4 a&b).

Mandro

It is a mat made up of bamboo used to cool the cooked substrates before fermentation. Size of mandro varies from 1 m broad to 2 m long.

Chhapani

It is a filter made up of bamboo tripes used to filter the fermented mass (Fig. 5).

Toongbaa

Toongbaa or dhungro is a vessel in which kodo jaanr extract is sipped through a narrow bamboo straw call 'piping'. Toongbaa is made up of wood or bamboo or sometime earthen ware. Usually wooden toongbaa is decorated and is provided with lid. (Fig. 6)

Raksi Distillation Apparatus

The traditional raksi distillation apparatus is made up of metallic vessels. In main cylindrical vessel measuring 40 cm x 30 cm x 25 cm, fermented grits are steamed continuously above which a small vessel with cold water used as condenser is placed. The distilled part of jaanr is collected in another metallic vessel placed on triplet-stand call 'odhan' inside the main cylindrical vessel. This apparatus can distil 10-15 kg of jaanr at a time. (Fig.7)

Consumption Pattern

Table 2 shows the consumption pattern of fermented food beverages in the rural areas of Darjeeling hills and Sikkim. Alcoholic beverages are traditionally consumed by the matwali castes meaning alcohol drinkers of

the non-Brahmin Nepali community mostly Limbu, Rai, Gurung, Magar, Tamang, Sunwar, Newar and Sherpa; the Bhutia and the Lepcha. Feeding frequency of these beverages are shown in Table 3.

Amount of per capita daily consumption of fermented beverages was calculated (Table 4).

Total annual consumption of kodo jaanr in Darjeeling hills was 40178.7 ton and in Sikkim was 35748.7 ton; bhaate jaanr was 9538.8 ton in Darjeeling hills and 6648.1 ton in Sikkim; makai jaanr was 10463.8 ton in Darjeeling hills and 4800.7 ton in Sikkim. Survey data indicate that in rural areas majority of people prepare fermented beverages (57.6% in Darjeeling hills and 76.7% in Sikkim) at home for consumption comparable to market purchase.

Socio-Cultural Importance

Fermented food beverages have strong ritual importances and are deep-rooted in the cultural heritage of the various ethnical groups of people in Darjeeling hills and Sikkim. In these regions social activities require provision and consumption of appreciable quantities of alcoholic beverages. Jaanr and raksi are essential to solemnize marriage ceremony of non-Brahmin Nepalis, the Bhutia and the Lepcha. Fermented beverages are offered to perform the 'pitri puja/kul puja', the religious practise to pray family God. Among the Lepcha jaanr is essential to perform various cultural functions such as 'lirum', 'sejum' and 'namsung'. Kodo jaanr filled in toongbaa and rice-made raksi are among the important materials to perform the ritual practise of the Limbu call 'tonsin mundhum'. During death ceremony fermented beverages are served and used, mostly seen among Sherpa and the Bhutia. Spirit possession by the Limbu priests call 'phedangma' and 'bijuwa' need freshly distilled raksi.

CONCLUSION

The alcoholic food beverage fermentation is prepared only by using traditionally prepared starter culture call marchaa in these regions. Brewing and malting of the substrates for making beverages are uncommon to these places. Starter culture and fermented beverages are mostly prepared by rural women for long centuries. Production of marchaa is restricted to the Limbu and Rai castes of the Nepali and the Lepcha. This art of technology is protected as hereditary trade and passes from mother to daughters. The traditional food beverage fermentation is labour-intensive and low-cost technology in these regions.

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