



# Systematic documentation of traditional knowledge related to pork preparation by tribes at Tripura, India and its health benefit

Sudip Bhattacharjee

Department of Library and Information Science, MBB University, Agartala - 799 004, Tripura, India

\*[sudipbht12@gmail.com](mailto:sudipbht12@gmail.com)

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## Abstract

Tripura, a small and land lock north-eastern state of India, has nineteen different tribal communities. Meat such as pork is a crucial component of the diet and culture in Tripura *and* it is consumed in various forms, including smoked, boiled *and* fried from ancient time. These traditional products of Tripura hold great potential to capture the market, but the product has not been documented adequately. A survey was conducted in this study among different tribal communities of Tripura, and five most popular traditional pork items have been documented in this study. Comprehensive data was gathered regarding various traditional meat preparations, including the preparation techniques and general consumption patterns associated with these products. The study also examined the socioeconomic values and cultural traditions linked to these items. The prevention of the potential disappearance of these ethnic meat delicacies can only be achieved by enhancing their availability and market value. The traditional methods of preparation and significance of different pork items such as *wahanmui*, *wahan mosodeng*, *wahan bai muya chakhwi*, *wahan bai laiphang chakhwi* *and* *wasung o wahan penjak* were documented here. This study was performed through direct interview and observation. This study recommends the need to upgrade, preserve *and* document the indigenous knowledge. In addition, several health benefits of rice cake products have been discussed. The implementation of food science interventions, such as optimizing preparation methods, improving hygiene standards *and* enhancing packaging, holds the potential to create a profitable local business in this sector and attract consumers from across the country.

**Keywords:** Ethnic delicacies, Food habit, Pork Preparation

## 1. Introduction

Northeast India is known for its diverse culture and rich culinary traditions, which include a variety of meat-based dishes. The region is home to several indigenous communities that have their own unique food habits and preferences (Sangma *et al.*, 2023). Meat is an essential part of the diet in Northeast India, and it is consumed in various forms, including pork, beef, chicken, and fish. The consumption of meat in Northeast India is deeply rooted in the culture and lifestyle of the people. Food expenditure estimates reveal that in North-eastern India, 16.5% of the total food expenditure is allocated to meat-based products, which is much higher in comparison to other parts of India (Mahajan *et al.*, 2015). Meat-based dishes are a common sight at social gatherings, festivals, and ceremonies, and they are often prepared using traditional cooking methods and spices that are specific to the region.

Similarly, Tripura is a semi-land-locked state of India located in the Northeast part, also known for its rich cultural heritage and diverse cuisine (Anonymous, 2020-21). The state has a significant population of nineteen different indigenous communities, and meat is a staple food in their diet. The nineteen different indigenous communities are *Debbarma (Tripuri)*, *Reang*, *Jamatia*, *Noatia*, *Uchui*, *Chakma*, *Mog*, *Garos*, *Munda*, *Halam*, *Lepcha*, *Kuki*, *Chaimal*, *Khashia*, *Lushai*, *Santal*, *Bhutia*, *Bhil*, *Orang*. Pork and chicken are the most commonly consumed meats in Tripura, followed by beef and mutton (Joshi and Blah, 2013; Debbarma *et al.*, 2020). The techniques and processes utilized for these preparations have been handed down from ancient times, showcasing not only their skill and creativity but also their ability to maintain the balance of life and the ecosystem (Singh *et*

al., 2007). Besides incorporating locally available vegetables, herbs, and spices, traditional meat dishes are diversified by using a variety of ingredients in different combinations with various kinds of meat. The preparation method is contingent upon factors such as material availability, climate, culture, and overall understanding of the process and techniques (Kadirvel *et al.*, 2018).

Although traditional meat products have been found documented for North-Eastern states such as Mizoram, Manipur, Sikkim, Nagaland, Assam, and Arunachal Pradesh, there has been insufficient scientific documentation for ethnic products of Tripura, except very few (Bhattacharjee, 2021). Traditional methods of preparation involve smoking or boiling, with the addition of customary spices like ginger, garlic, cumin, and coriander. The meat holds significant importance in the social and religious ceremonies of Tripura, playing a vital role in the culture and lifestyle of its people (Debbarma *et al.*, 2020). Research on the meat consumption patterns and preferences of the Tripuri community in Tripura reveals that pork is the most favoured meat, followed by chicken and fish. Preserving the culinary heritage of the region is essential, given the significance of meat in Tripura's traditional cuisine (Datta *et al.*, 2017). The nutritional analysis indicates that meat in Tripura is rich in protein, essential amino acids, and minerals such as iron and zinc (Pal *et al.*, 2019). Hence, the food habit of those tribal communities reflects the cultural heritage of the state. The tribal communities cook different types of food and used various ingredients. There was no documented evidence of their indigenous food preparation pattern. But, after modernization also those tribal communities try to keep their knowledge generation to generation (Bhattacharjee, 2021). They used to cook various items, among which the most popular items include *Mui Borok*, *Gudok*, *Wahan Mosdeng*, *Panch Phoron Taarkari*, etc. *Mui Borok* refers to the traditional cuisine of Tripura. It often includes meat dishes prepared with minimal spices and simple cooking techniques (Mahajan *et al.*, 2015). Pork or chicken is a commonly consumed meat in this region and is used in various preparations (Govindasamy *et al.*, 2018). *Gudok* is a popular curry made with chicken. *Wahan Mosdeng* is a classic Tripuri dish made with chicken. It is prepared by marinating chicken with a paste made from roasted green chilies, garlic, ginger, and salt. The marinated chicken is then cooked until tender, resulting in a spicy and flavorful dish (Mahajan *et al.*, 2015). *Panch Phoron Taarkari* is a mixed vegetable curry that often includes pieces of meat, such as chicken or pork. The dish is prepared using the traditional *Panch Phoron* spice mix, which consists of equal parts of fenugreek seeds, nigella seeds, cumin seeds, black mustard seeds, and fennel seeds. The meat and vegetables are cooked together with the spice mix, creating a hearty and aromatic curry (Pal *et al.*, 2019). There is a need to apply principles of food science to optimize preparation methods and documented the method of food preparation through a scientific approach. This study aims to fill this

gap by exploring the various meat-based dishes consumed in the region, the traditional cooking methods used, and the cultural significance of meat in the daily lives of people in Tripura (Singh *et al.*, 2007; Tamang, *et al.*, 2019). The findings of this study will provide valuable insights into food habits and cultural practices and contribute to the understanding of the region's culinary traditions.

## 2. Materials and methods

The survey and observation method is used to carry out the study. The respondents were selected from the different districts of Tripura. Six districts were selected out of a total of eight districts of the state Tripura, which includes Chota Surma village of Dalai District, Brindaban para and Mandai village of West Tripura District, Patichari and Rajapur of South Tripura District, Jampuijala village of Sepahijala District, Damchhara village of North Tripura District and Killa village of Gomati District. The area of the respondents was selected keeping the view of representation of different tribes groups. Further, initially random survey was conducted with informal interactions with the respondents to ensure their comfort in their local language and to know the most popular and indigenous items of pork that are used commonly by them at different cultural celebration. From six districts, total 6 numbers of respondents interacted formally after getting their prior informed consent. The survey focused on gathering detailed information about the popular traditional or ethnic meat products in the districts, including their preparation methods and consumption patterns whereas proper observation was carried out to record the method of preparation. Further, the study explored the socioeconomic values and traditions associated with these products.

## 3. Results and discussion

The traditional cuisines of the tribes in Tripura are prepared by their customs, with the knowledge of the traditional preparation methods typically transmitted through practice and oral tradition from one generation to another. Several studies have revealed that the tribal community in Tripura also shares some common practices with little local variation in pork meat preparation. From the survey total of five common traditional pork preparations were identified based on the similarity of ingredients used. Though, pork preparation is also followed by these groups as a common practice but with little local variation. Based on the similarities, five common traditional meat products of the state Tripura, India has been catalogued and documented explicitly below.

### 3.1. *Wahanmui*

It is a cherished meat dish among the indigenous people of Tripura. It is prepared by various communities using pork. *Wahanmui* holds a significant place in their culinary tradition. It is a staple dish consumed daily, esteemed not only for its rich flavour but also for the myriads of health

benefits it offers. To elevate its taste and nutritional profile, a diverse array of ingredients is meticulously added to the pork during its preparation. These additions not only enhance its flavour but also contribute to its overall healthiness. The different ingredients required to prepare *Wahanmui* is listed at Table 1.

**Table 1.** Ingredients of *Wahanmui*

Sl. No.	Common name	Part/ form/ condition used	Quantity
1	Raw pork	Small pieces	250gm
2	Mustard oil	Processed	20 ml
3	Onion	Pieces	35gm
4	Chilli	Powder/ paste	10gm
5	Ginger	Paste	3gm
6	Garlic	Paste	3gm
7	Turmeric	Powder	2gm
8	Cumin seed	Whole/ Powder	5gm
9	Coriander	Powder	2gm
10	Green cardamom	Whole	1gm
11	black pepper	Powder	5gm
12	Cloves	Whole	4/5 no.
13	Cinnamon	Powder	3gm
14	Potatoes	Pieces	100gm
15	Salt	Processed	2gm/ As required

**Method of preparation:** To prepare *Wahanmui*, first the pork is chopped into small pieces and cleaned thoroughly. Then, it is boiled with added salt in a big vessel for at least half an hour. After boiling the meat pieces, a mixture of paste of ginger, garlic, chili, and pasted onion is prepared and mixed with boiled meat pieces along with powder of turmeric, cumin, coriander, green cardamom, cloves, cinnamon, and black pepper. Then the mixture is fried in a vessel containing heated mustard oil for at least 10 minutes. Thereafter, salt and potatoes are also mixed with the ingredients properly and started cooking (Fig.1). Finally, water (as required) and salt for taste are added and stirred well for at least 40 minutes to get the final *Wahanmui* (Fig. 2).



**Fig. 1.** *Wahanmui*, cooking from flesh of pig



**Fig. 2.** Prepared *Wahanmui* after mixed with ingredients

**Significance:** Cumin, coriander, green cardamom, cloves, cinnamon, and black pepper play a very important role in our health and add a functional feature to the dish (Kumar *et al.*, 2021). Cumin and cinnamon are good sources of iron and manganese, which are essential for a healthy metabolism. Black pepper, cloves, and green cardamom are rich in antioxidants that help protect the body's cells from damage and help regulate blood sugar levels (Aghasi *et al.*, 2018).

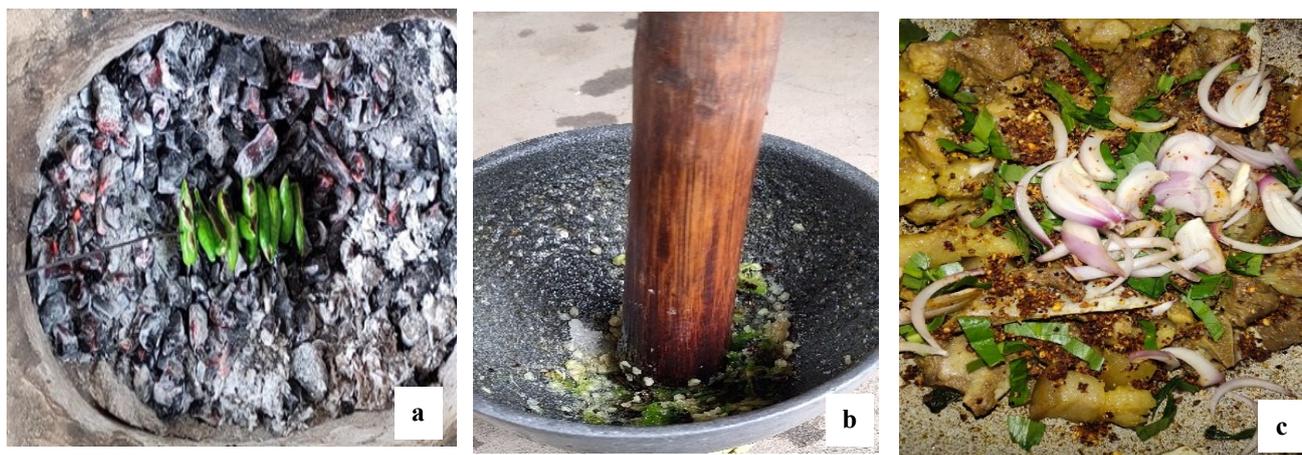
### 3.2. *Wahan mosodeng*

*Wahan mosodeng* known as a beloved dish among various communities in Tripura, not only boasts health benefits but also emanates a delightful aroma reminiscent of charcoal. Though the pattern of cooking is same among most of the communities, but most of the time, different tribes add different vegetables at last with prepared *Wahan mosodeng* before serve. The different ingredients required to prepare *Wahan mosodeng* is listed at Table 2.

**Table 2.** Ingredients of *Wahan mosodeng*

Sl. No.	Common name	Part/form/condition used	Quantity
1	Raw pork	Small/ Medium pieces	250gm
2	Onion	Whole	50gm
3	Green Chilli	Whole	20gm
4	Ginger	Paste	10gm
5	Coriander	Whole	5gm
6	Salt	Processed	4/5gm/as required

**Method of preparation (Plate 1):** To prepare *Wahan mosodeng*, first the pig flesh is chopped into small pieces and cleaned thoroughly. Then, it is boiled with added salt in a big vessel for at least 45 minutes. After boiling the meat pieces, remove them from the vessel and allow them to cool. Meanwhile, green chillies are charred over hot coals using a sieve. Subsequently, the charred chillies are combined with ginger paste, chopped onions, and coriander leaves in a pot (Fig. 4). Once the meat has cooled, it is carefully mixed in with clean hands until thoroughly combined. Finally, *Wahan mosodeng* is ready to serve.



**Plate 1.** Preparation of *Wahan mosodeng*: a. Green chillies are charred over hot coals; b. Charred chillies are combined with ginger paste, chopped onions, and coriander leaves in a pot; c. Prepared *Wahan mosodeng*

**Significance:** Green chillies contain capsaicin, which can increase metabolism and promote fat burning. Coriander leaves are known for their beneficial effects on digestion (Kumar, 2020). This can help relieve gas, bloating, and promote healthy bowel movements. Ginger has immune-boosting properties and may help strengthen the immune system (Mashhadi *et al.*, 2013).

### 3.3. *Wahan bai muya chakhwi*

*Wahan bai muya chakhwi* is a popular culinary delight, representing a traditional recipe hailing from Tripura. It involves the preparation of pork meat using a traditional soda called *chakhwi*, a practice observed across various communities. Notably, bamboo shoots and lemon leaves are distinctive elements incorporated into this gastronomic tradition. The different ingredients required to prepare *Wahan bai muya chakhwi* is listed at Table 3.

**Method of preparation:** The process begins with the preparation of the “traditional soda”, achieved by pouring hot water through the *chakhwi khok*, a traditional handcraft or bamboo tool designed specifically for the preparation of “traditional soda” (Fig. 3). The *chakhwi khok* acts as a filter, removing impurities from the water with the ashes of chopped banana tree.



**Fig. 3.** Pouring hot water through *chakhwi khok*

Additionally, finely chopped bamboo shoots measuring 1-2 centimetres and ginger are incorporated into the mixture. Meanwhile, the pork meat is chopped into small pieces and thoroughly cleaned. Subsequently, the prepared “Traditional soda”, cleaned pork meat pieces, green chillies, salt, and chopped ginger are combined and brought to a boil for 10 minutes. Following this initial cooking period, bamboo shoots are added to the mixture, and the curry is allowed to simmer for an additional 20 minutes. Next, rice flour paste is introduced into the curry, which is then stirred slowly to create a streaky consistency. Finally, freshly chopped lemon leaves are added to the curry, imparting a final burst of flavour and aroma. Once completed, the *Wahan bai muya chakhwi* (Fig. 4) is ready to be served, showcasing the intricate flavors and traditional techniques synonymous with Tripura cuisine.

**Significance:** Lemon leaves contain Vitamin C, which is known to support immune function and help prevent illnesses (Aghasi *et al.*, 2018; Kumar, 2020). Bamboo shoots are low in calories and fat while being a good source of dietary fiber, vitamins (such as vitamin C and vitamin B6), and minerals (such as potassium and manganese) (Nongdam and Tikendra, 2014).

**Table 3.** Ingredients of *Wahan bai muya chakhwi*

Sl. No.	Common name	Part/ form/ condition used	Quantity
1	Traditional soda	Processed/prepared	100ml
2	Raw pork	Small pieces	250gm
3	Lemon leaves	Whole	3gm
4	Bamboo shoots	Pieces	50gm
5	Green chilli	Powder/paste	20gm
6	Ginger	Paste	5gm
7	Rice	Paste	50gm
8	Salt	Processed	5gm/ As required



Fig. 4. Prepared Wahan bai muya chakhwi

### 3.4. Wahanbai laiphang chakhwi

Wahanbai laiphang chakhwi (Fig. 5) is yet another beloved culinary delight among the tribes of Tripura. Rooted in tradition, this dish incorporates banana stem alongside pork, reflecting the cultural heritage of the region. It holds a prominent place in various gatherings, including functions and marriage ceremonies, and is also a staple in their everyday cuisine. The different ingredients required to prepare Wahanbai laiphang chakhwi is listed at Table 4.



Fig. 5. Prepared Wahanbai laiphang chakhwi

Table 4. Ingredients of Wahanbai laiphang chakhwi

Sl. No.	Common name	Part/form/condition used	Quantity
1	Traditional soda	Processed/prepared	100ml
2	Raw pork	Small pieces	250gm
3	Lemon leaves	Whole	5gm
4	Banana stem	Pieces	200gm
5	Green chilli	Powder/ paste	20gm
6	Rice	Paste	50gm
7	Salt	Processed	5gm/ As required

**Method of preparation:** The process begins by preparing the “Traditional soda” in the same manner as before, utilizing the ashes of the chopped banana tree and pouring hot water through the *chakhwi khok*. Following this, the white parts of the banana stem are delicately cut into small pieces and set aside for further use. Simultaneously, the pork meat is chopped into pieces and combined with the prepared “traditional soda”, small banana stem pieces, green chillies, salt, and chopped ginger. This mixture is then placed into a boiling pot for 15 minutes. Next, the prepared rice flour paste is added to the mixture, and it is stirred slowly and continuously. Finally, fresh lemon leaves are added to the curry, providing the finishing touch to the *Wahanbai laiphang chakhwi*, a dish that encapsulates the rich Flavors and cultural heritage of Tripura.

**Significance:** Banana stem is a good source of essential nutrients, including vitamins like vitamin C and vitamin B6, as well as minerals such as magnesium and calcium (Hikal *et al.*, 2022). It also helps in reducing cholesterol levels, while potassium helps maintain proper heart function and blood pressure whereas, lemon leaves support immune functions (Kumar, 2020).

### 3.5. Wasung o wahan penjak

*Wasung o wahan penjak* holds a special place as a favoured pork dish among the tribes of Tripura. Its roots trace back to the early days, particularly during *jhum* cultivation periods, when people would commonly prepare this dish. Notably, *Wasung o wahan penjak* stands out for its unique cooking method that abstains from the use of oil, contributing to its reputation as a wholesome and nutritionally conscious choice. This traditional cooking technique has been faithfully passed down from one generation to the next within the tribal community, underscoring its cultural significance and enduring popularity. The different ingredients required to prepare *Wasung o wahan penjak* is listed at Table 5.

Table 5. Ingredients of Wasung o wahan penjak

Sl. No.	Common name	Part/form/condition used	Quantity
1	Raw pork	Small pieces	250gm
2	Bamboo tree	35-50 cm long	As required
3	Banana leaves	Whole	2/3 no.s
4	Onion	Pieces	35gm
5	Green chilli	Powder/ paste	10gm
6	Ginger	Paste	3gm
7	Garlic	Paste	3gm
8	Turmeric	Powder	2gm
9	Salt	Processed	2gm/as required

*Method of preparation:* This method is started by cutting the bamboo into sections measuring 35-50 cm, ensuring there is a requirement of ample space for the pork and accompanying ingredients needs to be inserted (Plate 2a). Further, meticulously chopped pork is made into small pieces after thorough cleaning. Thereafter chopped onion, ginger and garlic paste, green chillies, salt, and turmeric powder are mixed with the pork, ensuring thorough mixing.

With delicate precision, stuff the bamboo cavity with this flavourful pork mixture, adding just the right amount of water to create a tantalizing curry within. Thereafter, the hole of the bamboo vessel is sealed tightly with lush banana leaves, trapping the essence of the ingredients within. The bamboo is now placed over the fire, allowing the curry to cook within (Plate 2b). This traditional method results in a uniquely flavourful dish, *Wasung o wahan penjak* (Plate 2c) characteristic of the culinary heritage of Tripura.

*Significance:* Onions contain dietary fiber and prebiotics that can support digestive health and promote the growth of beneficial gut bacteria (Slavin, 2013). Green chillies contain capsaicin, which can increase metabolism and promote fat burning. Garlic may have anticancer properties, and Turmeric contains curcumin known for its potent anti-inflammatory properties (Chongtham *et al.*, 2011; Kunnumakkara *et al.*, 2023).

The traditional food in Tripura provides a showcase of the rich tapestry of flavours, ingredients, and culinary traditions. The state's cuisine reflects its cultural heritage, natural resources, and the ingenuity of its people. Exploring the diverse gastronomic offerings of Tripura provides a delightful journey into the region's history, traditions, and multicultural influences. Meat is a crucial component of the diet and culture in Tripura, and it is consumed in various forms, including smoked, boiled, and fried. The traditional products of Tripura hold great potential to be incorporated into the cuisine of restaurants across Northeast India, attracting customers from diverse cultural and social backgrounds (Haileselasie, 2012). By applying principles of food science, it is possible to optimize preparation methods through a scientific

approach. These methods can be documented and replicated at various food establishments and processing units worldwide (Mao & Hynniewta, 2000; Kumar, 2020). Moreover, enhancing the overall quality of traditional meat products by improving hygiene parameters and packaging procedures is essential. It is crucial to raise awareness among the local population about maintaining total quality management during the preparation of these products (Govindasamy *et al.*, 2018).

The ethnic meat products found in Tripura offer a promising business opportunity for the local people, particularly if efforts are made to scale up production through commercialization while maintaining quality standards and providing adequate training. Proper labelling and packaging of the products can facilitate entry into the export market (Kadirvel *et al.*, 2018; Tamang *et al.*, 2019). However, scaling up production will require the use of equipment and machinery that comply with the regulations of the Food Safety and Standards Authority of India (Anonymous, 2019-20). Effectively branding the products to highlight their nutritional benefits, functional significance, and regional authenticity will increase their visibility and market penetration. Establishing connections with marketing agencies is also necessary to generate demand for such products in the market (Dwivedi *et al.*, 2021; Rehman *et al.*, 2022). This comprehensive approach, involving food science, quality control, branding, and marketing, can contribute to the successful integration of Tripura's traditional products into the wider culinary landscape, benefiting both the local economy and consumers. Further research is highlighted to explore the nutritional and cultural significance of pork in the region.

#### 4. Conclusion

Tripura's traditional identity embodies a rich blend of flavours, heritage, and culinary expertise, offering a gateway to the intricate and diverse cultural. With a focus on meat as a cornerstone of Tripura's diet and culture, there exists an immense opportunity to leverage food science principles to enhance preparation methods, ensuring both quality and hygiene standards are met. This not only opens avenues for local businesses but also



**Plate 2.** Preparation of *Wasung o wahan penjak*: a. Chopped bamboo pieces; b. Bamboo pieces kept on fire; c. *Wasung o wahan penjak*

presents prospects for broader market integration, tapping into the diverse culinary landscape of Northeast India and beyond. By embracing comprehensive strategies encompassing quality control, branding, and marketing, Tripura's ethnic meat products will find their place on the global stage, enriching both the local economy and culinary experiences worldwide in a healthy way. Further, present research into the nutritional and cultural significance of these traditional foods will undoubtedly deepen our understanding and appreciation of Tripura's culinary heritage. Moreover, incorporating pork into traditional dishes alongside ingredients such as bamboo, banana stem, and a myriad of aromatic spices including ginger, garlic, and turmeric, not only tantalizes the taste buds but also offers abundant number of positive effects of health benefits. These ingredients are rich in essential nutrients, antioxidants, and anti-inflammatory properties, contributing to overall well-being and satisfaction.

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