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Wild Edible Plants and Their Utilization in Traditional Recipes of Tripura, Northeast India

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Abstract: The article deals with the status of wild edible plants and their traditional utilization as diet recipes by different ethnic communities of Tripura. Field study was carried out in the Baramura Hill ranges of newly formed Khowai district. Total 41 species of 36 genera and 22 families of wild edible plants were documented through semi-structured interviews and preference ranking methods among three ethnic groups viz. Tripuri, Molsom and Rupini of Tripura. Eight different types of traditional recipes were identified which mostly prepared by 41 wild edible plants. Among the traditional recipes, *Gudak* and *Chakhwi* were found to be most preferred diet compliments among the communities. These wild edible plants also traditionally used as medicine and major food supplements by those ethnic communities.

Key words: Wild edible plants • Traditional dishes • Ethnic communities of Tripura

INTRODUCTION

Wild edible plants are the precious gift of our nature and most of the ethnic communities are strongly depends on it for their day-to-day life [1-3]. Food plants are not only supplement to the food quantity, but also an important option during starvation for survival and thus makes significant contribution to the human nutrition throughout the year [4, 5]. There are total 450 tribal communities in India, out of which more than 50% (225 ethnic communities) inhabiting in Northeastern India [6]. The rich ethnic communities of Northeast India have immense traditional knowledge on the utilization of forest and plant parts especially as food products in multi varied ways of application [7]. However, the century old traditional knowledge system for utilization of wild plants is depleting very quickly [8, 9]. Modern scientific researchers are also trying to value these traditional food items to fill the gaps between growing population and food production. These natural products are coming from wild sources and their herbal properties unknowingly flow in diverse ethnic preparations. Such preparation must be variable with the local availability plant resources, forest types, geographical area and more specifically by different culture and tradition of ethnic groups in Northeast India.

Survey and documentation of wild edible plants and their utilization for food have been conducted in several parts of the country [6, 10, 11]. In Tripura, Several studies been conducted on documentation of traditionally used medicinal plants [12-20]. There were no works that investigate the utilization of wild edible plants for making traditional recipes used by different ethnic communities of Tripura. Therefore, present study design was planned to document wild edible plants used by different ethnic community for the preparation of different traditional recipes.

MATERIALS AND METHODS

Study Area: Tripura is a landlocked hilly state having a geographical area of 10,491 km² is the second smallest state among the eight northeastern states of India. The state Tripura accounts 31% of tribal population of the state's total population. There are 19 ethnic groups viz. Tripuri, Jamatia, Reang, Noatia, Chakma, Bhil, Bhutia, Chaimal, Garo, Halam, Khasia, Kuki, Lepcha, Lushai, Mag, Munda, Orang, Santhal and Uchai residing in this state. Each group has their own unique language, culture and food habit [21]. It is rich with floristic diversity and falls under the biogeographic zone of North East B hills.

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The vast forest cover extends up to 57.73% of the state total geographical area [22]. The flora comprises 379 tree species, 320 shrubs, 581 herbs 165 climbers, 16 climbing shrubs, 35 ferns and 45 epiphytes [23].

The present study was carried out in the villages of Baramura hill ranges under Khowai districts of Tripura. The location of villages situated in forest pockets, remote areas having poor infrastructure and late service delivery. The villages where the survey were conducted viz. Belphang Bari, Twishikam, Sinai Kami, Gantha Rung Para, Barduwal Kami, Khamthing Para, Kelreng, Krishnahai Para, Bikram Malsom Para, Debthang Para, Sirtok Para and Joint hill etc (23°46' 16.69" to 23°46' 56.95" and 091°29' 56.52" to 091°38' 44.14"). The main occupation of villages is cultivation, piggery, making bamboo mats and agarbati stick preparation etc. were seen. The communities of selected study areas are ethnically diverse in terms of their tradition and culture.

The Study Community: For the present study, three ethnic communities were selected viz Tripuri (Debbarma), Rupini and Malsom. The Tripuri tribe (Debbarma), called old Tripuris, also known as Tripura's or Tipra's; speaks in their own language called '*Kokborok*'. They have first migrated in this territory and could introduce as aboriginal largest tribal's community of Tripura. Due to social transitions in all spheres of life mostly in the field of cultivation, socio-cultural life, economic life, educational and health consciousness and elite role now they treated as superior tribal community among the tribes of Tripura. Malsom and Rupini are belongs to sub groups of Halam community. Ethnically Halam belong to the Cocase-Mongoloid origin of Kuki-Chin tribes. Their language is also more or less similar to that of Tibeto-Burman family.

Ethnobotanical Data Collection and Analysis: Study was carried out during the year of March 2012 to March 2013. Overall, 113 informants (42% male and 68% female) were chosen on the basis of their willingness to participate in the interview; which comprises of 31% Tripuri (Male- 19, Female-16), 36% Rupini (Male-12, Female-29) and 33% Malsom (Male-17, Female-20). The age of local informants ranges from 19 to 106 years.

The information mainly related to wild edible plants obtained through household surveys, semi-structured interviews and informal discussions with the experienced and elderly tribal people from three ethnic communities [24]. Interviewers were asked to know about the plant's

vernacular name(s) of plant, part (s) use, kind of traditional recipes preparation. The preferences of choice was identify for a particular plant to understand the application of plants as vegetables in an around the village. In order to determine the choice value of traditional dishes of a community by combining the data of it each component plant species choice values. The choice value of a species determined by informant consensus method considers the preference for specific use [25, 26]. The value ranges from (0 – 1) determines cultural significance of a plant species for a particular use category by ethnic peoples themselves existing within a tradition. Choice Value Index (CVI) = n_{is} / n (Where, n_{is} = number of informants who consider species is most preferred and n = total number of informants covered in this study). The value '0' represent a species have no importance in a community, '1' is the highest choice value within an ethnic community.

Plant Collection: Plants specimens identified during the field visits were crosschecked against different informants to validate the information. The collected plants and data entries were noted by respective collection number. Species identification was confirmed by Flora of Tripura State [23]. All the specimens were preserved following the standard herbarium methods [24]. Identified voucher specimens were deposited in herbarium of Department of Botany, Tripura University (TUH).

RESULTS

Wild Edible Plant Diversity: During the field survey, 41 species of wild plants were documented that belonging to 36 genera and 22 families. Out of these edible plants 4 species each belongs to family Araceae and Dioscoreaceae; 3 species each from Zingiberaceae, Poaceae, Cucurbitaceae, Rutaceae and Solanaceae; 2 species each from Asteraceae, Nymphaeaceae and Fabaceae; 1 species each from family Amaranthaceae, Araliaceae, Papilionaceae, Umbelliferae, Athyriaceae, Convolvulaceae, Musaceae, Pontederiaceae, Lamiaceae, Bignoniaceae, Portulacaceae and Caryophyllaceae (Fig 1, Table 1). Life forms indicated that herbs were dominating (54%) followed by climber (22%), trees (15%) and shrubs (7%).

Plant Parts and Composition: Out of these edible plants, 22% species was used as fruity vegetable, 17% species consumed as whole plant, 12% species as leafy vegetable,

Table 1: List of wild edible plants used for traditional recipes of Tripura.

Sl.No.	Scientific name	Local Dialect	Family	Parts Used
1	<i>Amorphophallus bulbifer</i> (Roxb) Bl.	Batema (K) Batet (M)	Araceae	Stem, Leaf, Rhizome and Flower
2	<i>Alpinia allughas</i> (Retz.) Roscoe	Tharai (K)	Zingiberaceae	Stem
3	<i>Amaranthus spinosus</i> L.	Kuttuila Busa (K)	Amaranthaceae	Tender shoot
4	<i>Amomum</i> spp.	Aairi(K)	Zingiberaceae	Inflorescence / Rhizome
5	<i>Brassaiopsis griffithii</i> C.B. Clarke	Chapok (K)	Araliaceae	Flower
6	<i>Bambusa tulda</i> Roxb.	Wandal (K)	Poaceae	Shoot
7	<i>Coccinia grandis</i> (L.) Voigt	Tala Kachu Bwlai (K)	Cucurbitaceae	Leaf
8	<i>Colocasia esculenta</i> (L.) Schott.	Mwitu, Lati (K)	Araceae	Whole plant
9	<i>Canavalia gladiata</i> (Jacq.) DC	Baikang (K)	Papilionaceae	Fruit
10	<i>Centella asiatica</i> (L.) Urban	Samsata (K/M)	Umbelliferae	Whole plant
11	<i>Curcuma zedoaria</i> Rosc.	Biring (K)	Zingiberaceae	Stem
12	<i>Dendrocalamus longispathus</i> Kurz	Rupai (B)	Poaceae	Shoot
13	<i>Dioscorea bulbifera</i> L.	Tha Borok (K)	Dioscoreaceae	Tuber
14	<i>Dioscorea hamiltonii</i> H.K	Ganga(K)	Dioscoreaceae	Tuber
15	<i>Dioscorea pentaphylla</i> L.	Tha Bolong (K)	Dioscoreaceae	Tuber
16	<i>Dioscorea glabra</i> Roxb.	Tha Borchuk (K)	Dioscoreaceae	Tuber
17	<i>Diplazium esculentum</i> (Retz.) Sw.	Muikhonchuk (K)	Athyriaceae	Tender shoots
18	<i>Enhydra fluctuans</i> Lour.	Alencha (K)	Asteraceae	Whole plant
19	<i>Euryle ferox</i> Salisb.	Makhna(B)	Nymphaeaceae	Seed
20	<i>Entada phaseoloides</i> (L.) Merr.	Gila (B)	Fabaceae	Tender pod, seeds
21	<i>Glycosmis arborea</i> (Roxb.)DC.	Arai Bwlai (K)	Rutaceae	Leaf
22	<i>Homalomena aromatica</i> Schott.	Gandrwi(K)	Araceae	Stem
23	<i>Hodgsonia macrocarpa</i> (Bl.) Cogn	Pilekulu	Cucurbitaceae	Mature seed
24	<i>Ipomoea aquatica</i> Forsk.	Kamli Basak (K)	Convolvulaceae	Stem and Leaf
25	<i>Lasia spinosa</i> (L.) Thw.	Shir Gantha (K)	Araceae	Whole plant
26	<i>Musa acuminata</i> Colla	Thailik Bwfang (K), MuikhonKhut (M/ R)	Musaceae	Inflorescence and Stem
27	<i>Melocana baccifera</i> Trin.	Wathwi (K)	Poaceae	Shoot
28	<i>Murraya koengii</i> ex L.	Curry Bwlai (K)	Rutaceae	Leaf
29	<i>Monochoria hastate</i> (L.) Solms.	Chichiri (K)	Pontederiaceae	Whole plant
30	<i>Momordica cochinchinensis</i> (Lour.) Spreng.	Bolongni Kangro(K)	Cucurbitaceae	Fruits
31	<i>Nymphaea nouchali</i> Burm. f.	Safla bubar (K)	Nymphaeaceae	Flower and stem
32	<i>Neptunia prostrata</i> (Lamk.) Baill.	Panilajuk (K)	Fabaceae	Root
33	<i>Ocimum americanum</i> L.	Banta(K) / Bana(R) banta (M)	Lamiaceae	Leafs and twigs
34	<i>Oroxylum indicum</i> Vent.	Takha Rwing (K)	Bignoniaceae	Fruits
35	<i>Portulaca oleracea</i> L.	Atka Bwslai (K)	Portulacaceae	Whole plant
36	<i>Polycarpon prostratum</i> (Forssk.) Ashers and Schweinf.	Bwk hate (K)	Caryophyllaceae	Whole plant
37	<i>Solanum torvum</i> Sw.	Khamkha Sikam (K / M)	Solanaceae	Fruits
41	<i>Zanthoxylum limonella</i> (Dennst.)Alston	Mwiching Bwlai (K)	Rutaceae	Leaves

*K- Kokborok (Tripuri and Rupini), M- Malsom, B- Bangla.

10% species as tuber and shoot each, 7% species as stem vegetable, 5% species as twig vegetable and rest other species as flower/ inflorescence and root/ rhizome, (Table 1). Several species viz *A. bulbifer* (stem, leaves, rhizome and tuber either processed or raw) and *C. esculenta* (stem, leaves, rhizome and inflorescent) etc. were utilized as whole plant. These plants used to prepare parched traditional recipes with dry fish adding common spices. Species viz. *B. tulda*, *D. longispathus*, *M. acuminata*, *M. baccifera* used in five different traditional

recipes, *A. allughas*, *D. bulbifera*, *O. americanum* used in three recipes, eight number of species used in two consecutive recipes and rest other 27% species used for prepare single traditional recipe (Table 1).

Enumeration of Traditional Recipes: Eight different types of traditional recipes were observed to use preferably. Most of the listed plant species used for preparing *Gudak* (19 species) followed by *Berma bwtwi* (17 species), *Ser* (14 species),

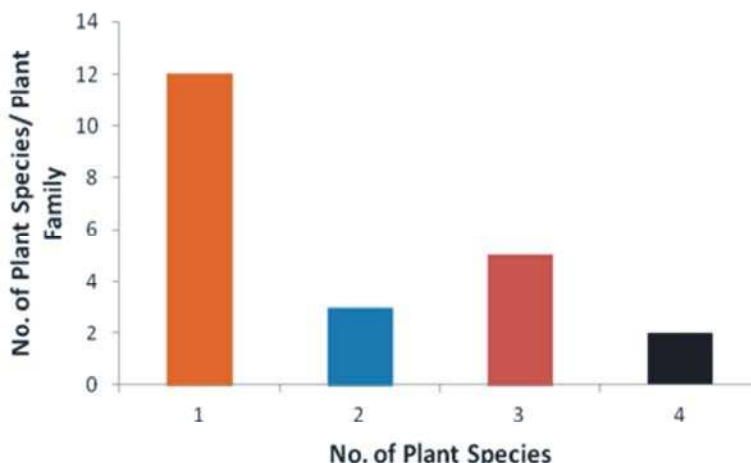


Fig. 1: Number of plant species within each plant family identified at Baramura hill frienge villages of Tripura. Families with 4 species (Araceae, Dioscoreaceae); 3 species (Cucurbitaceae, Poaceae, Rutaceae, Solanaceae, Zinziberaceae); 2 species (Asteraceae, Fabaceae, Nymphaeaceae); 1 species (Amarenthaceae, Araliaceae, Athyriaceae, Bignoniaceae, Caryophyllaceae, Convolvulaceae, Lamiaceae, Musaceae, Papilionaceae, Pontederiaceae, Portulacaceae, Umbelliferae).

Thok mwi (14 species), *Chakhwi* (14 species), *Awandru* (10 species), *Mwiborok* (7 species), *Moisdeng* (5 species). *Gudak* and *chakhwi* found common in all Tripuri, Rupini and Malsom community followed by *Berma bwtwi* and *Moisdeng* (Table 1). Other than these *Mwiborok* or *Hontali* and *Awandru* dishes were used more frequently by the Tripuri (Debbarma) community. It was also been observed that majority of these dishes are cooked without using cooking oil. Following are the traditional methods for preparation of different recipes:

Recipe 1: *Gudak* (Figure: 4A): It is a most prominent dish among all ethnic groups of the state. Method of preparation in all these communities was more or less same and only varies in wild species contents and their local dialect. However, it has popularly known as *Gudak* (*Kokborok*), in Molsom dialect it is called *Anronok*. To prepare the recipe species like *A. allughas*, *A. spp.*, *B. griffithii*, *B. tulda*, *C. esculenta*, *C. gladiata*, *D. longispathus*, *E. ferox*, *E. pursaetha*, *H. macrocarpa*, *L. spinosa*, *M. acuminata*, *M. baccifera*, *O. indicum*, *S. torvum*, *S. indicum*, *S. tuberosum*, *Z. limonella* were cut into small pieces and boiled along with onion, dry fish, salt and maximum quantity of green chili. When it is fully cooked soup removed separately, raw onions are smashed and soup added again. This dish is very pungent in taste and it is very popular among the ethnic communities. Currently some other non-tribal peoples of the state also adopted it as well.

Recipe 2: *Chakhwi* (Figure: 4B): The dish used by Tripuri, Rupini and Molsom community, prepared by using ash water (alkaline water). The preparation method of the recipe adopted by these communities is same. Alkali water can be prepared from ashes of premature bamboo, dry upper layer of banana pseudostem, coconut leaves and fibrous husk using a traditional bamboo made porous, cone shaped device *Chakhwikhok* (Tripuri) or *Changalpho* (Molsom). At first ash matter of bamboo (or other sources) positioned in *Chakhwi khok* or *Chiyakhuk* and container placed below, then water poured slowly on it. Poured water by penetrating ash exposed through pointed section by drips alkaline water. Now, the alkaline water filtered to use it finally. Preparation of the recipes was very simple, addition of some normal water with this traditional leached out alkali water in the ratio of 1: 0.25 liters. Then chooped food plant specieses *A. bulbilfer*, *A. allughas*, *B. tulda*, *C. asiatica*, *D. longispathus*, *E. fluctuans*, *G. arborea*, *M. baccifera*, *M. hastate*, *S. torvum*, *S. indicum* and *S. tuberosum* along with onion, dry fish, salt, green chili and boiled pulses. For better taste, 3-4 number of lemon leaves also added. Instead of pulses, rice flour may use. When vegetables are almost cooked, cups of liquid rice flour added. Then garnished in tempered oil and spices for the finishing.

Recipe 3: *Berma bwtwi* (Figure: 4C): It is another popular recipe prepared by the ethnic tribes of Tripura. Name of the recipe comes from its main ingredient dry fish. The term *Bermabwti* consist of two words *Berma*

means dryfish *Bwtwi* means the recipe. The preparation of the dish is very simple wild edible plants viz. *A. spinosus*, *B. tulda*, *C. asiatica*, *C. zedoaria*, *E. fluctuans*, *G. arborea*, *H. aromatica*, *Ipomoea aquatica*, *M. baccifera*, *M. hastate*, *S. paniculata* and *Z. limonella* cut into small pieces and boiled with dry fish, green chili, onion, pinch of turmeric powder and salt (according to the taste), soup retained in maximum quantity. Some 4-5 pieces of crushed raw garlic added for better taste.

Recipe 4: Moisdeng (Figure: 4D): Burn dry fish, green or dry red chili, smash and mixed it together in a bowl then chop the onion and all wild plant components *A. bulbifer*, *H. aromatica*, *N. prostrata*, *O. americanum* into small pieces and mixed it with smashed green chili and dry fish. Leaves of *O. americanum*, roots of *N. prostrata*, stem of *H. aromatica* used best suitable for the dish. Another delicious ingredient of *Moisdeng* is processed cake prepared from the tuber of *A. bulbifer* popularly known as *Batema / Bated*. The tuber chopped into small pieces and boiled with alkaline water. After cooking properly gradually smashing to making cakes and dried into sun.

Recipe 5: Awandru (Figure: 4E): Wild edible plants *A. allughas*, *C. asiatica*, *D. bulbilfera*, *D. hamiltonii*, *D. pentaphylla*, *D. glabra*, *M. acuminata* and *M. baccifera* cut into small pieces and boiled along with garlic, onion, dry fish, salt and green chili. The liquid paste of rice flour with water added when raw ingredient

plants are almost cooked and stirred simultaneously. Then crushed garlic flakes (5-7 numbers) added and boil upto 5-10 minutes.

Recipe 6: Mwiborok: In case of preparing Mwiborok, ingredient plants *B. tulda*, *D. longispathus*, *D. bulbilfera*, *D. hamiltonii*, *D. pentaphylla*, *D. glabra* and *M. baccifera* cut into small pieces and cooked mild heat. Dry fish, green chili, onion, turmeric powder and salt also added at the time of boiling. Sometimes fresh fish is use to prepare the recipe. This is not so familiar recipe prepare only when fishes are available.

Recipe 7: Ser (Figure: 4F): To prepare this dish the plants like *A. spinosus*, *Amomum spp.*, *B. griffithii*, *C. grandis*, *Diplazium. esculentum*, *E. fluctuans*, *G. arborea*, *I. aquatica*, *M. hastate*, *N. nouchali*, *P. oleracea*, *S. torvum*, *Solanum indicum*, *S. tuberosum* and *S. tuberosum* simply fried in oil along with onion, green chili, turmeric and salt. This recipe is very rarely prepared some 2-3 months a day.

Recipe 8: Thok mwi (Figure: 4G): It is a popular dry traditional recipe almost prepared by all ethnic communities in Tripura. The wild originate plants viz. *B. griffithii*, *C. esculenta*, *H. aromatica*, *M. acuminata*, *N. prostrata* and *O. americanum* cut into small pieces and fried using oil. Other common spices as onion, garlic, green chili and ginger are add for the better smell and pungency. After few minutes, some water poured and kept under low flame. For better taste, soup has been totally dried up.

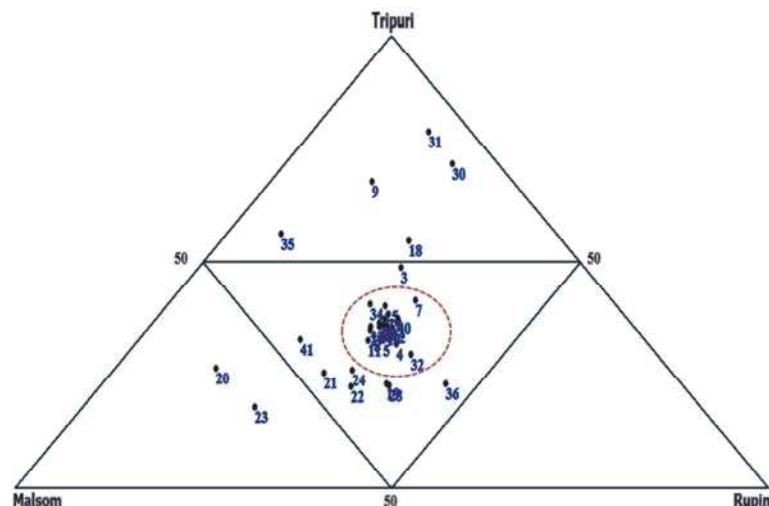


Fig. 2: Ternary plot shows the species compactness i.e. species used by three tribal communities in a higher affinity clumped at the center, where as species run on the vertex is a symbolized a particular tribe.

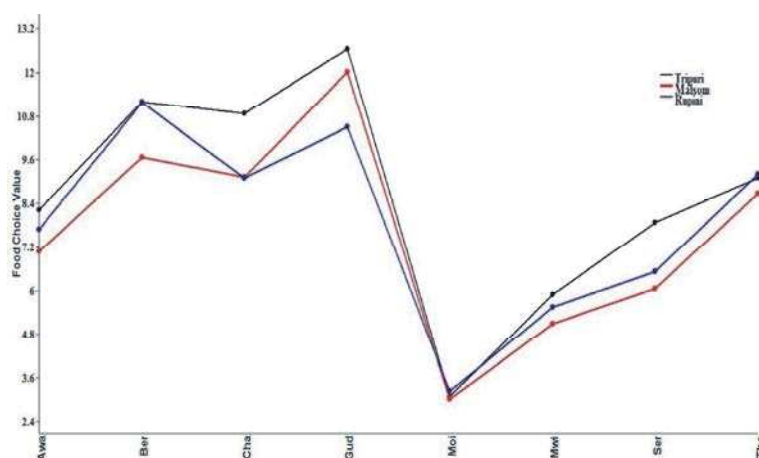


Fig. 3: Food Choice Values of traditional recipes prepared by ethnic communities of Tripura.



Fig. 4: Different traditional dishes prepared by the ethnic communities of Tripura.

DISCUSSION

Significance of Traditional Recipe: Traditional recipes are mostly prepared from wild plant and play vital role in community nutrition. Diverse plants are available in the nearby forest, so the communities use plants resources in a simplest way. The affinity of choices in food

consumption was almost similar in Tripuri and Rupini. instead of their diverse tradition and culture. It may due to intermixing of cultures, mixed habitation and resource sharing between two groups in the area. But, the species composition for each recipe was not fixed. The food choices of traditional recipes consumption in Molsom tribes are quite different other than Tripuri and Rupini.

The species like *C. grandis*, *E. fluctuans*, *M. acuminata*, *N. prostrata* and *P. prostratum* were preferably used by Tripuri tribes. Whereas, *E. ferox* and *H. aromatica* mostly preferred by Rupini tribes. Nevertheless, species like *G. arborea*, *H. macrocarpa*, *Z. limonella* used by the Malsom community with a quite higher affinity other than Tripuri and Rupini. Several species viz. *A. bulbilfer*, *A. allughas*, *B. griffithii*, *B. tulda*, *C. zedoaria*, *D. longispathus*, *D. bulbilfera*, *D. hamiltonii*, *D. pentaphylla*, *D. glabra*, *D. esculentum*, *M. acuminata*, *M. baccifera*, *O. indicum* and *S. torvum* etc. were frequently used by all the three communities. Those are the major ingredients of *Gudak*, *Moisdeng*, *Thok mwi*, *Chakhai*, *Mwiborok* etc. like traditional recipes (Figure 3).

Species' Choice Value Index: The terms "choice value" usually are used to refer the importance of certain plants in a particular tradition. The choice value index (CVI) explains the stretch of the uses among the number of informants who quote each species for a specific use. CVI is an adept way for accent those wild species with an elevated conformity of the survey culture as to be acquainted communal facts of the ethnic people [27]. Through the present study, CVI were computed to measure the intellectual values of each wild edible plants species between diverse cultural and intra cultural values in different studied areas. Based on the traditional use of all wild edible plants Tripuri community mostly preferred *M. acuminata*, *M. baccifera*, *S. torvum*, *S. tuberosum* followed by *O. americanum*, *S. indicum* and *D. glabra* whereas quite lesser amount of *I. aquatica*, *E. pursaetha* and *H. macrocarpa*. Rupini community mostly preferred *E. ferox*, *M. baccifera*, *M. acuminata*, *D. esculentum* followed by *D. longispathus* and *M. hastata* but small quantity of *E. pursaetha*, *H. macrocarpa* and *P. oleracea*. Among the Malsom community, they are highly choice about *D. bulbilfera*, *D. pentaphylla*, *M. hastata*, *C. asiatica* followed by and a smaller amount of *C. gladiata*, *M. cochinchinensis* and *N. nouchali*.

Most of the information given in the present commination was derived through field format based data collection methods interviewing with old aged people familiar to local wild plants and their utilization. The study showed that these wild plants were essential to the ethnic communities for their daily diet supplements. Because, these wild edible species supplies enough protein, carbohydrate, fat, vitamin and mineral requirements to the ethnic people [28, 29]. Major component of 'Chakawi' which used by the leaves of *M. hastata*, which reported

to contain about 47.4 - 89.4% protein [30-33]. Local people collect these plants not only for their self-consumption, but they also sell it in village market for household income. However, unsatisfactory return by trading those plants not meeting their daily livelihood requirements. Since poor market channels, absent of value addition and cultivation techniques for large scale production. The demands of those wild edible vegetables still mostly come from uncontrolled wild collection. It was observed that some of these wild edible plants were also used as traditional medicine. Species like *A. allughas*, *A. bulbifer*, *E. fluctuans*, *G. arborea*, *L. spinosa*, *N. prostrata*, *Z. limonella* etc. [34, 35] traditionally used by these ethnic communities [12-20]. The communities used bamboo (*B. tulda*, *D. longispathus* and *M. baccifera*) traditionally for making household utensil, construction materials, fiber of *M. acuminata* and bark of *O. indicum* used to making roof. However, *M. acuminata*, *P. oleracea*, *S. paniculata* etc. used for fodder purposes by those community.

CONCLUSION

The study reveals that the state Tripura is grace of customary wild plant utilization. These wild plants and their utilization as diet recipes were found unique. The food habits of these three communities are more or less analogous, but the traditional knowledge varying in form of plant composition, proportion methods and uses. It was observe that local inhabitants were dependent on natural vegetation present in their surroundings. However, over utilization of wild plant may affect the local diversity and lower possibilities of availability of those species in their natural habitats. Therefore, wild edible plants need to use in a sustainable manner and should be incorporate immediately under managed cultivation or homestead agroforestry system. Introduction of suitable agro techniques for commercial production of these wild plants, market development and linkage among shareholders are required. In addition, emphasis on mass cultivation of *A. bulbifer*, *M. acuminata* and *Dioscorea spp.* and Bamboo species should take on priority basis because these species has enough prospects and comparatively first growing. The dormant tuber of *A. bulbifer* remained below ground for long period and best source for food supplement during famine. Rapid multiplication ability of *M. acuminata* even on degraded areas can be used for commercial restoration of fallow land and income generation. Moreover, bamboo has the ability to grow and spread easily on-degraded

areas over other plants spread [32], hence this trait of bamboo should be taken for immediate food and other economic product generation programme. Further, more exploration is suggested for dietary profiling, antioxidant prospective, phyto-chemical analysis for essential components in traditional recipe resources and additional ethno-botanical surveys in other parts of the state, should be imparted immediately to record other valuable species and rare utilization by the ethnic community.

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