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RESEARCH ARTICLE

Diversity of crop in traditional jhum cultivated land practiced by the indigenous people of Tripura, Northeastern India

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Abstract

Jhum cultivation is a significant source of economic stability in Northeast India. Present study deals with the diversity of crops in jhum land, practiced by the ethnic people of Tripura. Jhum cultivation is a source of mixed and multiple cropping, so the larger agricultural crop diversity is observed in jhum cultivated land than on the sedentary farms in the plain lands. Field visits, open-ended surveys, and purposive samplings were employed to achieve the objectives. A total of 85 number of cultivators interacted during the study. In the present study a total of 64 species of crop plants were documented from 24 different families. Out of 24 families Cucurbitaceae with 12 species constituted dominant family which was followed by Fabaceae with 6 species, Solanaceae with 5 species, Araceae, Poaceae, Apiaceae and Malvaceae with 4 species. Among the 64 studied species, 47 species were used as vegetables, 6 species each of fruit and cereal, 5 species as spices and 1 species as pulses. 10 crop plants are used as food as well as medicine.

Key words: Jhum cultivation; Multiple cropping; Crop diversity; Fallow period; Organic farming; Tripura.

1. Introduction

Shifting cultivation, commonly referred to as 'Jhum' cultivation, is among the most ancient agricultural practices which originating as far back as the Neolithic era (7000-8000 B.C.) (Tripathi et al., 2017; Layek et al., 2018; Wapongnungsang et al., 2021). It is the leading agricultural practice for tribal communities across many tropical regions (Yadav, 2013; Tripathi et al., 2017; Wapongnungsang et al., 2021) and it is practiced in different regions across the globe, including Indonesia, Philippines, Vietnam, Brazil, Congo, Central Africa, the Manchurian highlands, Korea and Southwestern China (Layek et al., 2018; Wapongnungsang et al., 2021). In the North eastern region of India the history of shifting (jhum) cultivation is as old as human civilization in the region. Across the hilly terrains of the region, it is a primitive practice of cultivation (Borthakur, 1992). Plants are essential for livelihood. The surrounding environment has shaped human culture since ancient times, leading people to utilize the natural resources available to them for food, drug, and accommodation (Cox, 1994; Balunas and Kinghorn, 2005; Gurib-Fakim, 2006). Throughout the history of agriculture, approximately 7000 plant species have been used for food purpose, yet only about 2,000 of these have been domesticated till now, and just 150 plant species are grown commercially. Interestingly, just 30 plant species are known to supply around 90% of the world's nutritional requirements, with only three crops i.e. wheat, rice, and maize - contributing to 60% of the global food supply (DePasquale, 1984; Kinghorn, 2001; Payyappallimana, 2010). Around half of the global population depends on the agriculture for their livelihood. Most people in the North-east region are engaged in agricultural activities. Jhum cultivation is a primitive agricultural technique commonly used in the hilly areas of Northeast India (Bhuyan and Teyang, 2015). Various crop varieties are cultivated in the jhum cultivated lands, and there is a necessity of focused research on the diversity of crops in such regions, especially in inaccessible villages, where rich diversity of the crop is found and improved hybrid seeds and farming techniques are limited (Farnsworth et al., 1985; Fabricant and Farnsworth, 2001). As opposed to monoculture, in jhum cultivation practices, numerous crop plants are harvested in the same plot of land or area i.e. multiple cropping or mixed cropping (Mukheerje, 2001; Payum et al., 2014). Shifting cultivation helps to maintain the nutrients of soil in the cultivated land. Fallow period is very important time to restore the soil nutrients. But, now-a-days due to high population growth fallow period has been decreasing day by day. Jhum cultivation holds significance as it is considered environmentally friendly due to its reliance on organic farming methods; this cultivation is often a form of weed and pest control. It may also help in decreasing the occurrence of soil-borne diseases. The Jhum cultivators, commonly referred to as *Jhumias*, are supposed to be self-reliant as far as their food requirement is concerned (Bhuyan and Teyang, 2015). Jhum cultivation is highly practiced in hilly regions of Northeast India with exception to the plain lands of Assam and Tripura and the valley areas of Manipur (Bhuyan, 2019).

2. Material and method

2.1 Study area

This study was conducted across the hilly areas of Tripura (Figure 1). Tripura experiences a tropical climate and receives abundant rain during the monsoon season. It is a small hilly state of North-Eastern India, spread over 10,491.69 km². It extends from 22°56' N to 24°32' N and 91°09' E to 92°20' E. Its maximum extent measures about 184 km from North to South, and 113 km East to West (Kar and Datta 2015). The state features three distinct climates: tropical savanna, tropical monsoon, and humid subtropical. Summer temperatures in the state ranges from 21 to 38 °C and winter

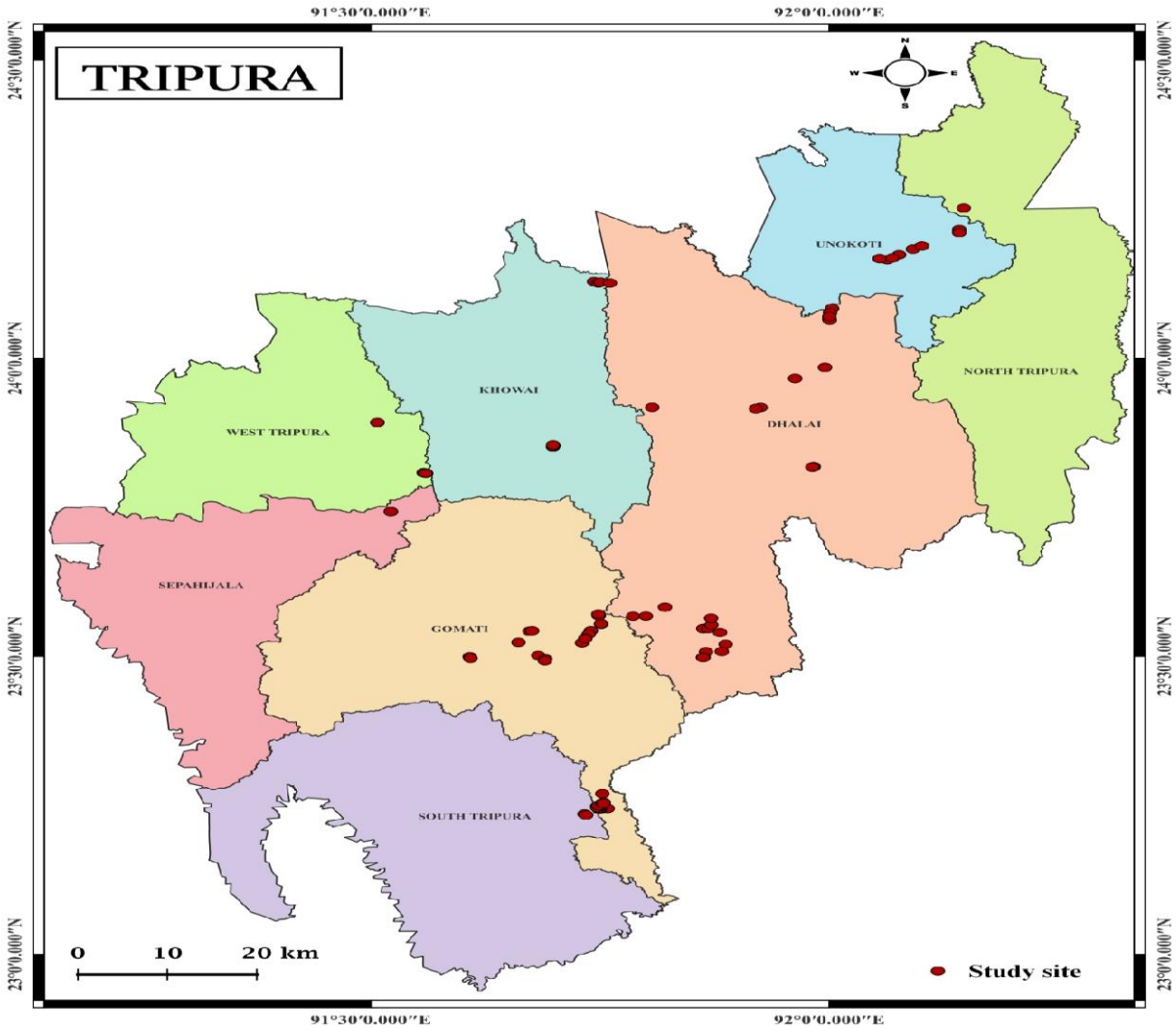

Figure 1. Map showing different jhum cultivated lands of Tripura.

temperatures range from 13 to 27 °C. The annual rainfall ranges from 1922 and 2855 mm (Majumder et al., 2012). In Tripura, jhum cultivators belong to the tribal communities, mainly Tripuri, Reang, Jamatia, Chakma and Halam who used shifting cultivation for decades to meet their survival and financial demands.

2.2. Data collection and analysis

Plants were observed during the jhum cycle of the year 2021-24 (January – October) to record and collect the plant species growing on the various jhum lands of Tripura. Photographs of different stages of Jhum field and crop species were taken. The study was conducted through extensive field work in the villages to reach out the farmers of the study area. In order to achieve the goal, open-ended interviews were used. In open-ended questions processes, there is a greater chance of capturing the wide variety of possible responses (Singer and Couper, 2017). Interview with the farmers were conducted by using a semi-structured questionnaire and the guided field-walk method (Martin, 1995). The specimens which were collected from the jhum cultivated land processed using usual taxonomic methods of drying and mounting. The specimens were identified with the help of existing literature (Deb, 1981 and 1983) and online sources such as Plant of the world online (POWO). The accepted names of the plants were verified in the standard online sources (POWO, 2025) and have been preserved in the herbarium of Department of Botany, Tripura University, Tripura.

3. Result and discussion

In the present study, several cultivated crops were documented from the various jhum lands of Tripura which indicates the crucial role of the locally grown plant varieties in fulfilling the fundamental needs of the tribal people (Figure 2). Interviewed a total number of 85 cultivators during the study and documented 64 crop plant varieties (Table 1). It was observed that 34 crops were herbs, followed by 19 climbers, 9 shrubs and 2 trees respectively (Figure

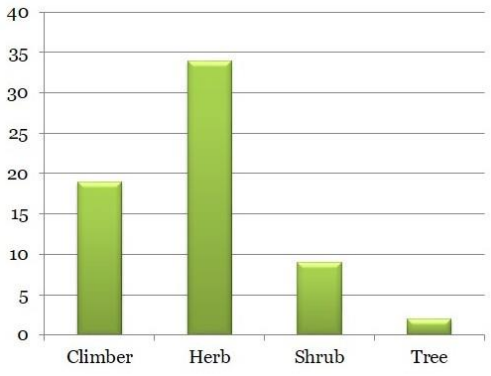

Figure 2. Growth habit category of cultivated plants of different jhum lands of Tripura

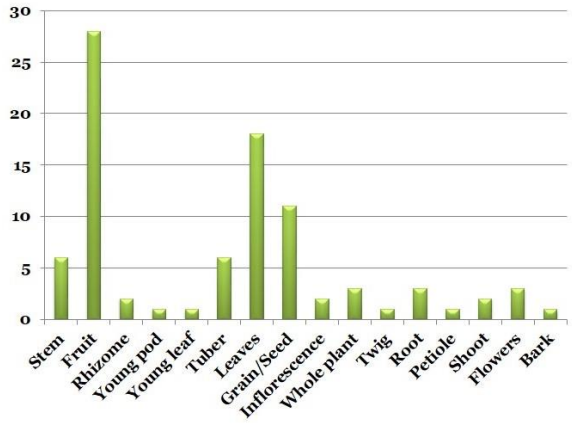

Figure 3. Different plant parts used for food and medicine.

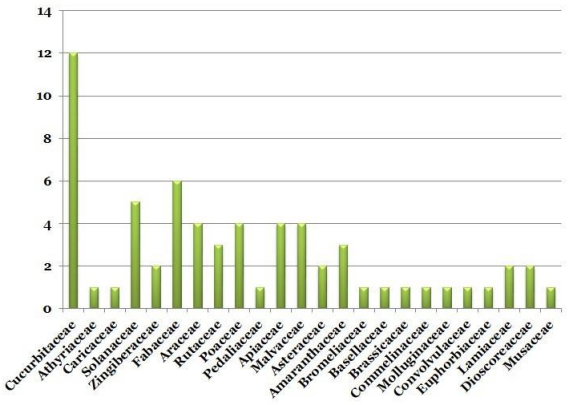

Figure 4. Number of cultivated crop plants per family of different jhum lands of Tripura.

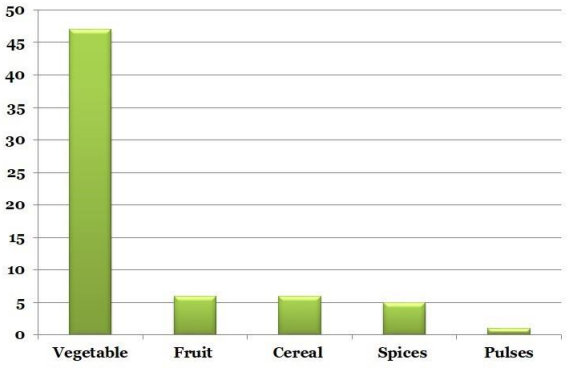

Figure 5. Used category of different jhum cultivated crops.

3). 28 crop plants were cultivated for fruits, followed by 18 for leaves, 11 grain/ seed crops, 6 each of stem and tuber crops, 3 each of whole plant, root and flower crops, 2 each of rhizome and inflorescence crops, 1 each of young pod, young leaf, twig, and petiole crop. 10 crops are used as food as well as medicine (Figure 4). According to family - wise distribution; 12 crops were Cucurbitaceae, 6 Fabaceae crops, 5 Solanaceae crops, 4 each of Araceae, Poaceae, Apiaceae, Malvaceae crops, 3 each of Amaranthaceae and Rutaceae crops, 2 each of Zingiberaceae, Asteraceae, Lamiaceae and Dioscoreaceae crops, and 1 each of Athyriaceae, Caricaceae, Pedaliaceae, Bromeliaceae, Basellaceae, Brassicaceae, Commelinaceae, Molluginaceae, Convolvulaceae, Euphorbiaceae, Musaceae crops (Figure 5). In the category of vegetables and spices, 47 varieties of vegetables were recorded, 6 varieties each of fruits and cereals, 5 varieties of spices were recorded and 1 species of pulses was recorded (Figure 6).

The findings of this study indicate that greater crop diversity in multiple cropping under jhum agricultural practices has been observed, as recorded by several researchers, including Dikshit and Dikshit (2004), who documented only 22 major crop species from Northeast India. Similarly in 2009, Tangjang reported 20 species in the shifting (jhum) field of Notch tribe of Arunachal Pradesh. Bhuyan et al (2012) recorded 39 species of crop plants which are from 14 different families among Adi tribe of East Siang District, Arunachal Pradesh. Bhuyan and Teyang (2015) also reported 60 crop plant species from 25 different families among Nocte and Wancho tribe in Tirap and Longding District of Arunachal Pradesh, which is a part of Eastern Himalaya. Payum et al (2021) recorded 43 crop plants from the Upper portion of Siang District of Arunachal Pradesh. Debbarma et al (2025) recorded 8 tree species and 35 crop species from young aged i.e. 1–2 years old shifting cultivation lands of Atharamura hill range of Tripura.

4. Conclusion

Jhum agricultural practices hold potential for conserving and preserving diverse crop varieties and genetic resources, in contrast to monoculture farming. Multiple cropping helps maintain balanced nutrient cycles, offers natural protection against pests and crop diseases i.e. in jhum cultivation fertilization and other plants food supplies, medicines, fodder, as well as essential vitamins and minerals were not required. The jhum cultivation practice in Tripura includes as many as 64 crop varieties, which provide leafy vegetables, cereals, pulses, seeds or grains, medicinal food, and species in a single plot of land or area. An in-depth study on jhum cultivation is essential, focusing on aspects such as nutrient recycling process, soil quality, constituents of nutrition, and patterns of soil utilization. Our findings highlight the remarkable diversity of jhum-cultivated land, which supports multiple cropping within a single field. It acts as a reservoir of indigenous knowledge, contributes to food security, generates income, and plays a vital role in preserving traditional crop varieties and ensuring their sustainability for future generations. So, it is extremely important to conserve this vast crop diversity for its continued use as food, medicine and other purposes in the future. It is also important to emphasize the development of effective marketing opportunities for jhum crops, including proper harvesting, processing, transportation, and trade, through the establishment of committees that actively involve the *jhumias*. The government bodies also have to provide facilities to improve the social and livelihood conditions for the *jhumias*.

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Author's contributions

PB and SJ conducted field work, interviews and collected data. PB analyzed the data, created the figures and prepared the draft manuscript. SK and AD assisted in preparation of initial draft manuscript. AB created the map of Tripura showing different jhum cultivated lands. BKD conceptualize the idea and finalized the draft manuscript.

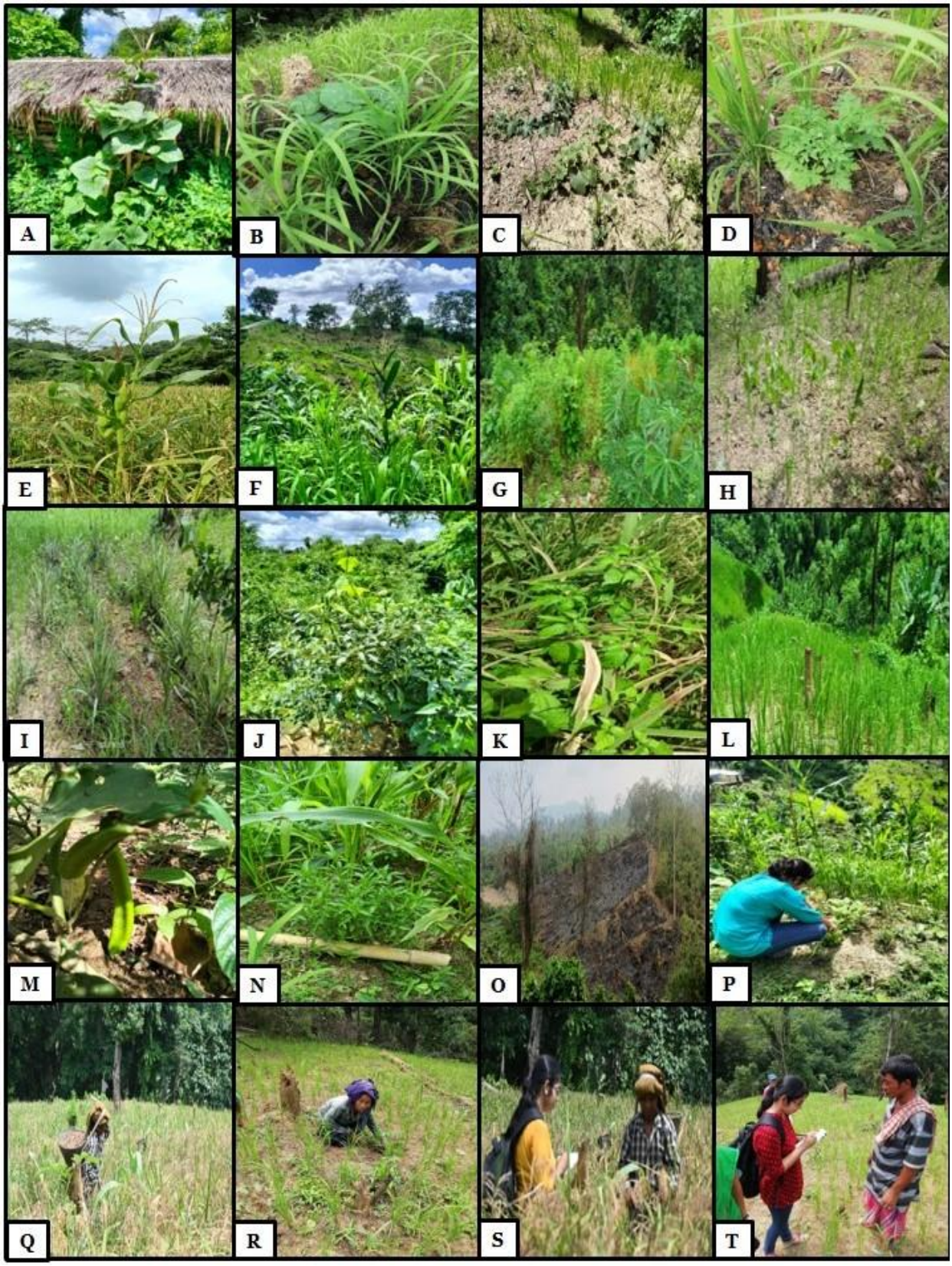

Figure 6. Pictures of different jhum lands A) *Cucumis sativus*; B) *Cucurbita moschata* and *Oryza sativa*; C) *Benincasa hispida* and *Oryza sativa*; D) *Momordica charantia* and *Oryza sativa*; E) & F) *Zea mays* and *Oryza sativa*; G) *Sesamum indicum* and *Manihot esculenta*; H) *Colocasia antiquorum* and *Oryza sativa*; I) *Ananas comosus* and *Oryza sativa*; J) *Capsicum frutiscence* and *Oryza sativa*; K) *Capsicum anuam* and *Oryza sativa*; L) *Musa balbisiana* and *Oryza sativa*; M) *Canavelia gladiata* and *Zea mays*; N) *Ocimum americanum*, *Zinziber officinalis* and *Oryza sativa*; O) A burned jhum land; P) Sample collection; Q) & R) Jhumia working in jhum land; S) & T) Interaction with the jhumias.

Table 1. Cultivated crops from the various jhum lands of Tripura and their usage.

SN	Scientific name	Family	Local name	Part used	Used as	Food/Medicine	Growth habit
1	*Cucurbita moschata* Duchesne	Cucurbitaceae	Chakmura (K), Kumro (B)	Stem, fruit	Vegetable	Food	Climber
2	*Cucurbita pepo* L.	Cucurbitaceae	Chakmura (K), Kumro (B)	Stem, fruit	Vegetable	Food	Climber
3	*Benincasa hispida* (Thunb.) Cogn. (cultiver1)	Cucurbitaceae	Khakolo (K), Chalkumor (B)	Fruit	Vegetable	Food	Climber
4	*Benincasa hispida* (Thunb.) Cogn.(cultiver2)	Cucurbitaceae	Khakolo (K), Chalkumor (B)	Fruit	Vegetable	Food	Climber
5	*Cucumis sativus* L.	Cucurbitaceae	Chosa (K), Sosa (B)	Fruit	Vegetable	Food	Climber
6	*Momordica charantia* L.	Cucurbitaceae	Gangla (K), Uchhe (B)	Fruit	Vegetable	Food	Climber
7	*Diplazium esculentum* (Retz.) Sw.	Athyriaceae	Muikhomchok (K), Dheki shak (B)	Leaves	Vegetable	Food	Herb
8	*Carica papaya* L.	Caricaceae	Kowaiphal/Kokiya (K), Pepe (B)	Fruit	Vegetable	Both	Shrub
9	*Capsicum annuum* L.	Solanaceae	Moso (K), Lonka (B)	Fruit	Vegetable	Food	Herb
10	*Capsicum frutescens* L.	Solanaceae	Moso bilati (K), Lonka (B)	Fruit	Vegetable	Food	Herb
11	*Solanum melongena* L.	Solanaceae	Phantok (K), Begun (B)	Fruit	Vegetable	Food	Shrub
12	*Luffa acutangula* (L.) Roxb.	Cucurbitaceae	Foro (K), Jhinge (B)	Fruit	Vegetable	Both	Climber
13	*Zingiber officinale* Roscoe	Zingiberaceae	Haching (K), Ada (B)	Rhizome	Vegetable	Both	Herb
14	*Curcuma longa* L.	Zingiberaceae	Swtui (K), Holdi (B)	Rhizome	Vegetable	Food	Herb
15	*Lablab purpureus* (L.) Sweet	Fabaceae	Kosoi (K), Shim (B)	Young pod, Grain/Seed	Vegetable	Food	Climber
16	*Amorphophallus bulbifer* (Schott) Blume	Araceae	Batima (K), Ol kochu (B)	Young leaf, tuber, stem	Vegetable	Food	Herb
17	*Colocasia esculenta* (L.) Schott	Araceae	Muitu (K), Kochu (B)	Tuber, stem	Vegetable	Food	Herb
18	*Citrus limon* (L.) Osbeck	Rutaceae	Musami (K), Musambi (B)	Fruit	Fruit	Food	Shrub
19	*Cucumis melo* L.	Cucurbitaceae	Thaisumu (K), Chinar/ Bangi (B)	Fruit	Fruit	Food	Climber
20	*Citrullus lanatus* (Thunb.) Matsum. & Nakai	Cucurbitaceae	Momphol (K), Tormuj (B)	Fruit	Fruit	Food	Climber
21	*Zea mays* L.	Poaceae	Mogodam (K), Bhutta (B)	Grain/Seed	Cereal	Food	Herb
22	*Sesamum indicum* L.	Pedaliaceae	Sepeng (K), Til (B)	Grain/Seed, Leaves	Cereal	Food	Herb
23	*Setaria italica* (L.) P.Beauv.	Poaceae	Maisui (K), Kaon chal (B)	Grain/Seed	Cereal	Food	Herb
24	*Oryza sativa* L. (var. 1)	Poaceae	Mai (K), Dhan (B)	Grain/Seed	Cereal	Food	Herb
25	*Oryza sativa* L. (var. 2)	Poaceae	Mai (K), Dhan (B)	Grain/Seed	Cereal	Food	Herb
26	*Psammogeton involucratus* (Roxb.) Mousavi, Mozaff. & Zarre	Apiaceae	Khundrupui (K), Bon dhaniya (B)	Leaves, Grain/Seed	Cereal	Food	Herb
27	*Abelmoschus esculentus* (L.) Moench	Malvaceae	Muirimi/Murima (K), Bhindi (B)	Fruit	Vegetable	Food	Shrub
28	*Acmella oleracea* (L.) R.K.Jansen	Asteraceae	Osandoi (K)	Leaves	Vegetable	Both	Herb
29	*Acmella paniculata* (Wall. ex DC.) R.K.Jansen	Asteraceae	Osandoi (K)	Leaves	Vegetable	Both	Herb
30	*Amaranthus tricolor* L.	Amaranthaceae	Denta (K), Lal shak (B)	Whole plant	Vegetable	Food	Herb
31	*Ananas comosus* (L.) Merr.	Bromeliaceae	Amtoi/Androso (K), Anarash (B)	Fruit	Vegetable	Food	Herb
32	*Basella alba* L.	Basellaceae	Muifrai (K), Pui shak (B)	Twig, inflorescence	Vegetable	Food	Climber
33	*Mutarda nigra* (L.) Bernh.	Brassicacae	Harua (K), Sorshe (B)	Leaves, Grain/Seed	Vegetable	Food	Herb
34	*Cajanus cajan* (L.) Huth	Fabaceae	Muimaising/Khakleng (K), Arhar (B)	Young fruit, leaf, Grain/Seed	Vegetable	Both	Shrub
35	*Canavalia gladiata* (Jacq.) DC.	Fabaceae	Baikang (K), Makhan shim (B)	Fruit	Vegetable	Food	Herb
36	*Centella asiatica* (L.) Urb.	Apiaceae	Samsata (K), Thankuni (B) (B)	Whole plant	Vegetable	Both	Herb
37	*Chenopodium album* L.	Amaranthaceae	Butua dalok (K), Betho shak (B)	Leaves	Vegetable	Food	Herb
38	*Colocasia esculenta* (L.) Schott	Araceae	Khama (K), Kochu (B)	Root	Vegetable	Food	Herb
39	*Commelina benghalensis* L.	Commelinaceae	Chichirimini (K), Kanchhera shak (B)	Leaves	Vegetable	Food	Herb
40	*Corchorus olitorius* L.	Malvaceae	Nailla (K), Pat shak (B)	Leaves	Vegetable	Food	Herb
41	*Coriandrum sativum* L.	Apiaceae	Dhaniabwlai (K), Dhone pata (B)	Leaves	Spices	Food	Herb
42	*Glinus oppositifolius* (L.) Aug.DC.	Molluginaceae	Bwkhate (K), Gime shak (B)	Shoot	Vegetable	Food	Herb
43	*Hibiscus sabdariffa* L.	Malvaceae	Mukhrikaireb (K), Mestha (B)	Leaves, fruit	Vegetable	Both	Shrub
44	*Homalomena aromatica* (Spreng.) Schott	Araceae	Gandwrwi (K), Gondhi kochu (B)	Petiole	Vegetable	Food	Herb
45	*Ipomoea batatas* (L.) Lam.	Convolvulaceae	Jinga-thaktwi (K), Misti alu (B)	Root, tuber, shoot	Vegetable	Food	Climber
46	*Manihot esculenta* Crantz	Euphorbiaceae	Thabachu (K), Shimul alu (B)	Root, tuber, Leaves	Vegetable	Food	Herb
47	*Momordica cochinchinensis* (Lour.) Spreng.	Cucurbitaceae	Kangrong (K), Kakrol (B)	Fruit	Vegetable	Food	Climber
48	*Ocimum americanum* L.	Lamiaceae	Banta (K), Bon tulasi (B)	Leaves	Spices	Food	Herb
49	*Phaseolus vulgaris* L.	Fabaceae	Foro (K), Bin (B)	Grain/Seed	Pulses	Food	Climber
50	*Trichosanthes cucumerina* L.	Cucurbitaceae	Poitha (K), Chichinga (B)	Fruit	Vegetable	Food	Climber
51	*Vigna unguiculata* (L.) Walp.	Fabaceae	Sabai (K), Borboti (B)	Fruit	Vegetable	Food	Climber
52	*Zanthoxylum rhetsa* (Roxb.) DC.	Rutaceae	Mwiching (K)	Leaves	Spices	Food	Tree
53	*Hibiscus acetosella* Welw. ex Hiern	Malvaceae	Mwkhwrwi kwswm (K)	Leaves, flowers and fruits	Vegetable	Both	Shrub
54	*Elsholtzia blanda* (Benth.) Benth.	Lamiaceae	Lok banda/ Mwilok badar (K)	Leaves, flowers and fruits	Spices	Food	Herb
55	*Physalis angulata* L.	Solanaceae	Thaithop (K), Bon tepari (B)	Fruit	Fruit	Food	Herb
56	*Lagenaria siceraria* (Molina) Standl.	Cucurbitaceae	Mwilok (K), Lau (B)	Fruits, leaves, stem	Vegetable	Food	Climber
57	*Amaranthus viridis* L.	Amaranthaceae	Danta (K), Notey shak (B)	Whole plant	Vegetable	Food	Herb
58	*Clausena heptaphylla* (Roxb. ex DC.) Wight & Arn.	Rutaceae	Saah tokkhi / Tokkhisini (K)	Bark, Fruit	Fruit	Both	Shrub
59	*Dioscorea bulbifera* L.	Dioscoreaceae	Thaa duk (K), Bon alu (B)	Tuber	Vegetable	Food	Climber
60	*Dioscorea polystachya* Turcz.	Dioscoreaceae	Thaa naaru (K), Bon alu (B)	Tuber	Vegetable	Food	Climber
61	*Musa balbisiana* Colla	Musaceae	Thalik (K), Guti kola (B)	Inflorescence, fruit, stem	Fruit, Vegetable	Food	Herb
62	*Petroselinum crispum* (Mill.) Fuss	Apiaceae	Dhonia (K), Parsley (B)	Leaves, Grain/Seed	Spices	Food	Herb
63	*Solanum torvum* Sw.	Solanaceae	Khangkha (K), Bon begun (B)	Fruit	Vegetable	Food	Shrub
64	*Sesbania grandiflora* (L.) Poir.	Fabaceae	Bokul bubar (K), Bok phul (B)	Flowers	Vegetable	Food	Tree

Declaration of Conflict of interest

The authors have no conflict of interest.

References

Balunas MJ and Kinghorn AD. 2005. Drug discovery from medicinal plants. Life Sciences 78 (5): 431-41.

Borthakur DN. 1992. *Agriculture of north eastern region*. BeeCee Prakashan, Guwahati.

Bhuyan SI, Tripathi OP, Khan ML, Yumnam J and Mondal J. 2012. A survey of Traditional crop species diversity and its conservation in Jhum fields among -Adi- tribe of Boleng area in East Siang of Arunachal Pradesh. *Biodiversity Researches in North East India*. Pp. 35-44.

Bhuyan SI and Teyang T. 2015. Crop Diversity in Traditional Jhum Cultivated Land Practiced by Ethnic Nocte and Wancho of Eastern

Himalaya. International Journal of Advanced Research in Science, Engineering and Technology 2 (1): 365-375.

Bhuyan R. 2019. A Review Note on Shifting Cultivation in Northeast India amidst Changing Perception. Dhaulagiri Journal of Sociology and Anthropology 13: 90-95.

Cox PA. 1994. The ethnobiological approach to drug discovery: Strength and Limitations. In: Chadwick DJ and Marsh J (Eds.): *Ethnobotany and search for new drugs*. John Willey & Sons, New York. Pp 25-41.

Deb DB. 1981-1983 .*The Flora of Tripura State*. Vols. 1-2. Today and tomorrow's Printers and Publishers, New Delhi.

Debbarma R, Tripura K, Das S and Deb S. 2025. Crop diversity, soil quality and traditional management practices in a young aged shifting cultivation land of Tripura, Northeast India. Vegetos. https://doi.org/10.1007/s42535-025-01213-1

DePasquale A. 1884. Pharmacognosy: The oldest modern science. Journal of Ethnopharmacology 11 (1): 1-16.

Dikshit KR and Dikshit JK. 2004. Shifting cultivation studies in India: a review. Man Environment 29 (2): 37–69.

Fabricant DS and Farnsworth NR. 2001. The Value of Plants Used in Traditional Medicine for Drug Discovery. Environmental Health Perspectives 109 (1): 69-75.

Farnsworth NR, Akerele O, Bingel AS, Soejarto DD and Guo Z. 1985. Medicinal plants in therapy. Bulletin of World Health Organization 63 (6): 965–981.

Gurib-Fakim A. 2006. Medicinal Plants: Traditions of yesterday and drugs of tomorrow. Molecular Aspects of Medicine 27: 1-93.

Kar S and Datta BK. 2015. A glimpse of the traditional uses of plants by Koloi subtribe of Tripura. J. Botan. Soc. Bengal 69 (2): 147-152.

Kinghorn AD. 2001. Pharmacognosy in the 21st century. Journal of Pharmacy and Pharmacology 53(2): 135-148.

Layek J, Das A, Ramkrushna GI, Panwar AS, Verma BC and Roy A. 2018. Improving rice production under shifting cultivation: a case study. In: Anup Das, KP Mohapatra, SV Ngachan, AS Panwar, DJ Rajkhowa,Ramkrushna GI and Jayanta Layek (Eds): *Conservation Agriculture for Advancing Food Security in Changing Climate*. Today & Tomorrow's Printers and Publishers. 1:143-153.

Majumdar K, Shankar U and Datta BK. 2012. Tree species diversity and stand structure along major community types in lowland primary and secondary moist deciduous forests in Tripura, North east India. J For Res 23(4): 553–568. https:// doi. org/ 10. 1007/ s11676-012-0295-8

Martin G. 1995. *Ethnobotany: A Methods Manual*. WWF International, UNESCO and Royal Botanic Gardens, Kew/Chapman and Hall, London.

Mukheerje PK. 2001. Evaluation of Indian Traditional Medicine: Drug Information Journal 35: 623-632.

Payyappallimana U. 2010. Role of Traditional Medicine in Primary Health Care: An Overview of Perspectives and Challenges. Yokohama Journal of Social Sciences 14(6): 724-743.

Payum T, Das AK and Shankar R. 2014. Nutraceutical folk food plants used among indigenous people of east Siang district of Arunachal Pradesh, India. American Journal of Pharmatech Research 4: 697-704.

Payum T, Tayeng K, Mili R and Langkam M. 2021. Crop diversity in jhum cultivation: A case study of Upper Siang District of Arunachal Pradesh, India. Archives of Agriculture and Environmental Science 6 (2): 234-239.

POWO. 2025. Plant of the World Online. Board of Trustees of the Royal Botanic Gardens, Kew, UK. https://powo.science.kew.org/.

Singer E and Couper M. 2017. Some Methodological Uses of Responses to Open Questions and Other Verbatim Comments in Quantitative Surveys. Methods, Data, Analyses 11 (2): 115-134. DOI: 10.12758/mda.2017.01.

Tangjang S. 2009. Traditional slash and burn Agriculture as a historic land use practice. A case study from the ethnic Nocte in Arunachal Pradesh, India. World journal of Agriculture Sciences 5(1): 70-73.

Tripathi SK, Vanlalfakawma DC and Lalnunmawia F. 2017. Shifting cultivation on steep slopes of Mizoram, India. In: Cairns M. (Eds.): *Shifting Cultivation Policies: Balancing Environmental and Social Sustainability*. CAB International Wallingford, UK. Pp 393–413.

Wapongnungsang, Ovung EY, Upadhayay KK, Tripathi SK. 2021. Soil fertility and rice productivity in shifting cultivation: impact of fallow lengths and soil amendments in Lengpui, Mizoram northeast India. Heliyon 7:e06834. https://doi.org/10.1016/j.heliyon.2021. e06834.

Yadav PK. 2013. Slash-and-burn agriculture in north-east India. J Expert Opin Environ Biol 2: 2–5.