Natural Resources for Human Health

eISSN: 2583-1194

Original Research

Received 24 July 2026
Revised 28 Aug 2026
Accepted 15 Sep 2026

Natural Resources for Human Health 2026, Vol. 6 (20s): 632–646

KEYWORDS:
Nyishi tribe, indigenous agriculture, jhum cultivation, traditional ecological knowledge, agricultural sustainability.

Indigenous Agriculture in the Hills of North-East India: A Study of the Nyishi Tribe of Arunachal Pradesh

Nilutpal Chutia[1*], Surajit Saikia[2]

[1*]Assistant Professor, Department of Economics, Gargaon College (Autonomous), Sivasagar, Assam (India), Email: nilutpalchutia@gmail.com,
ORCID id: 0000-0002-5900-7333
[2]Assistant Professor, Department of Economics, Gargaon College (Autonomous), Sivasagar, Assam (India), Email: saikiasurajit86@gmail.com,
ORCID id: 0009-0001-4048-7832

ABSTRACT: This study examines the indigenous agriculture practices of the Nyishi tribe of Arunachal Pradesh living in the high altitudes of the Kurung Kumey district of Arunachal Pradesh. The study adopts a qualitative method to examine the indigenous agriculture practice of the Nyishi tribe. The study found that Nyishi tribe has very insightful knowledge about the indigenous tools and techniques in jhum (shifting) cultivation. The study documents close association of the Nyishi tribe in their agriculture through some sustainable indigenous activities like selection of fertile soil, adaptive and pest resistance varieties of seeds, post-harvest management, indigenous seeds preservation, pest management technique, implementation of traditional tools which are suitable in the steep terrains etc. Though they are still concentrating on jhum cultivation; some of the capital-rich farmers start large cardamom cultivation and orange plantation in the slopes of the hills. The study emphasizes integrating indigenous knowledge with context-specific agricultural development for ecological and livelihood sustainability.

1. INTRODUCTION

With the advancement of modernization, the indigenous agricultural practices have increasingly been replaced by some other mechanized and modern methods of agriculture. After the green revolution, Indian agricultural practices have undergone significant changes like use of chemical fertilizers, HYV seeds, various irrigation facilities etc. (Evenson & Gollin, 2003; Hazell, 2009). Research and development have also influenced the agriculture sector to adopt some innovative technology to ensure agricultural productivity, food and nutritional security, quality export, crop and non-crop diversification, market certainty etc. (Pingali, 2012). Following the economic reform in Indian agriculture, the pace of transformation has accelerated. Now, through different online platforms farmers purchase different modern tools and techniques from agriculture (Aker, 2011). The government also plays a crucial role in accelerating the pace of transformation in Indian agriculture through different schemes. After several decades of agricultural transformation in Indian agriculture, states like Punjab, Haryana, Uttar Pradesh etc., have faced different environmental challenges like soil degradation (waterlogging, salinity and alkalinity), sedimentation, ground water depletion etc. (Singh, 2000). In addition, different studies pointed out that transformation of agriculture also lead to farmers' suicide as the farmers fail to adopt themselves in the transformation process of Agriculture. By observing the recent crisis and challenges in Indian agriculture, the Government of India has focused to start second green revolution through sustainable agriculture. However, the impact of green revolution and other kind of transformative measure in Indian agriculture have not been realized by the hill states of North-East India (Merriott, 2016; Mohanty, 2005; Nair, 2021; Ministry of Agriculture & Farmers Welfare, 2018). Still most of the tribes of this region have continued to practice indigenous methods in agriculture and maintain ecological

sustainability in agriculture. One important observation from the hill agriculture is that some selected capital rich farmers have started settled farming in the hill regions like agarwood cultivation, tea plantation, large cardamom, oil palm farming, rubber farming etc. to a significant extent (Nath et al., 2020; Mody et al., 2012; Bose, 2019; Sati & Vangchhia, 2017; Das & Das, 2020). If this process goes momentum then there will be an identity crisis and ecological instability in the indigenous agriculture of the tribal people. Although jhum (shifting) cultivation has certain disadvantages from ecological point of view, recent studies opined that the indigenous nature of jhum cultivation helps to preserve different indigenous crops, improve water use efficiency, improves land fertility naturally, preserve biodiversity, secures nutritional security, transmitted agricultural knowledge from one generation to next generation, supply organic food to the plains etc. (Deb et al., 2013; Punitha et al., 2018; Shimrah et al., 2015), Very limited studies have been conducted regarding the indigenous tribal agriculture in the high altitudes of North-East India. Dissemination of the existing knowledge of indigenous agriculture activities of the tribes living in the high altitudes of North-East India will definitely contribute to the existing literature and open a new path for the researchers, governments, NGOs, pharmaceutical industries etc., to explore this untouched area of indigenous tribal agriculture.

The Nyishi tribe is a significant and populous ethnic group that inhabits diverse agro-ecological environments in the high altitudes of North-East India of the Eastern Himalaya range. As per 2011 census the total population of Nyishi tribe is 249,824. They are the largest tribal group in Arunachal Pradesh, inhabiting mainly in the districts of Papum Pare, Kurung Kumey and Kra Daddi. Traditionally, they practice 'jhum' or shifting cultivation, an agricultural method adapted to the hilly terrain. Hunting and fishing also play a role in their subsistence. They are skilled in various handicrafts, including weaving, bamboo and cane work. The Nyishi tribe is known from their preservation of different species in their agricultural activities. One study documented 94 local plant species in the Nyishi farms of Papum Pare district (Pangging et al., 2025). Nanu and Nimasow (2024) in their study in five villages of Papum Pare district of Arunachal Pradesh found 21 ethnomedicinal species belonging to 16 families. They further mentioned that most of the species were found in the homestead gardens of Nyishi tribe. Most of the plant species have their cultural and practical importance of their community rituals. However, over the periods these traditional knowledge faces challenges from modernization, urbanization and changes in livelihood patterns (Bisht et al., 2021). Following the knowledge of different plant and herb species, the Nyishi tribe has knowledge on different insects which are used as food and for therapeutic purposes (Chakravorty et al., 2011). The studies on Nyishi tribe and their agriculture practices show that they have proper knowledge of ecological resources and their uses. However, very limited studies have covered in the issue of indigenous agriculture practices of Nyishi tribe. This study is an attempt to understand the indigenous agricultural practices of the Nyishi tribe and the transformations in the agriculture sector of Nyishi dominated places.

2. OBJECTIVES

The objectives of the present study are

- To examine the indigenous agricultural knowledge and practices of the Nyishi tribe and their cultural significance.
- To document the traditional agricultural tools, techniques, seed preservation practices, and associated rituals of the Nyishi community.

3. METHODOLOGY

Study area

The study area selected for the study was the Nyshi-inhabited high altitude area of Kurung Kumey district of Arunachal Pradesh. The selection of Kurung Kumey district was justified by its concentration of the rural Nyishi population. According to the 2011 census, 41.16 percent of the rural Nyishi population of Arunachal Pradesh resides in this district. The Sangram development block, which is predominantly inhabited by the Nyishi people, was selected for this study. Finally, from this block, four villages were selected randomly for the field survey. A brief profile of the selected villages has been presented in table 1.

Natural Resources for Human Health
eISSN: 2583-1194

Table 1: A brief profile of the selected villages

District	Block	Village	Total Population	No. of Households
Kurung Kumey	Sangram block	Byasi	97	16
		Lengro	227	37
		Rowa	304	39
		Yaki	104	18

Source: District Census Handbook, Census of India, 2011

Research approach and design

The study followed qualitative research approach with an exploratory design and ethnographic orientation to fulfill the objectives of the study. Qualitative research tools, such as in-depth interview, focus group discussion (FGD), informal interactions and observation methods were used to explore historical experiences, traditional knowledge, cultural practices and farmers' perceptions which cannot be adequately addressed by the quantitative techniques. Several previous qualitative studies were carried out effectively by different researchers employing such research tools individually or in combination of interviews, field observations and focus group discussion. (Bisht et al., 2021; Nanu & Nimasow, 2024).

Selection of participants and collection of data

A total of 30 farmers were interviewed in the sample villages to explore historical experiences, traditional knowledge, cultural practices and farmers' perceptions towards transformation. The interviews provided insights into the practices of indigenous agriculture, the generational transmission of the practices and introduction of settled farming. In addition to this, informal interactions were also conducted with the farmers of the selected tribe who were cultivating in their jhum land and settled farming area.

In order to explore the primitive methods of agriculture and sustainable practices, a focus group discussion was carried out at Byasi Village of Sangram block in Kurung Kumey district. For the discussion, 12 participants were selected from different occupational background so that they represent the diversity of the participants. During the study, effort was made to ensure the representation of the FGD and in-depth interview participants from all the selected villages. The demographic profile of the participants in the focus group discussion is presented in the table 2.

Table 2: Demographic characteristics of the participants of focus group discussion

Code of the Participants	Age	Gender	Religion	Social Group	Main Occupation/ Designation
K1	65	Male	Christian	ST	Farmer
K2	53	Male	Christian	ST	Farmer
K3	47	Female	Christian	ST	Housewife/Farmer
K4	62	Male	Christian	ST	Farmer
K5	69	Male	Christian	ST	Village Head
K6	55	Female	Christian	ST	Housewife/Farmer
K7	37	Female	Christian	ST	Housewife/Farmer
K8	48	Male	Christian	ST	Social Worker
K9	59	Male	Christian	ST	Farmer
K10	44	Female	Christian	ST	Housewife/Farmer
K11	36	Male	Christian	ST	Graduate youth
K12	71	Male	Christian	ST	Senior Citizen

Source: FGD conducted by the authors

The participants of FGD and in-depth interview were informed about the purpose of the study. Their consent was obtained before the collection of data. Moreover, the participation was voluntary and the information collected was used solely for research purposes. In addition, the participants' confidentiality has been maintained and cultural values have been respected throughout the study.

Study period and mode of communication

The study was conducted during 2024-2025. The in-depth interview, informal interactions and FGD were conducted in Hindi, as most of the participants are reasonably proficient in this language. However, hired persons from the locality were also employed, wherever necessary, to facilitate communications.

Main themes of focus group discussion and interviews

To get the information about the different dimensions of sustainable agriculture practices among the Nyishi tribe, FGD was structured with some major themes and guiding questions which are presented in table 3. Based on the themes, a structured schedule was administered for in-depth interview incorporating open-ended questions. However, opportunity has been given to the participants to provide additional comments and express their views beyond the structured questions of FGD and in-depth interview.

Table 3: Themes of FGD and guiding questions

Sl. No	Main Themes	Guiding questions
1	Methods of Agriculture	– What are the major reasons for your community's preference for jhum cultivation, and how does it contribute to social unity, traditional rituals, and the transmission of indigenous agricultural knowledge? – Why do you continue jhum cultivation instead of growing commercial crops? – Why are some people in your community shifting from jhum cultivation to permanent farming, such as large cardamom cultivation?
2	Farming Knowledge regarding Quality of Soil, Selection of Best Seeds, Post-Harvest Management etc.	– How do you select land and crops for cultivation? – How do you select and preserve seeds using traditional methods? – How do you dry harvested crops to prevent spoilage? – How do you store harvested crops, and from whom did you learn to make traditional storage containers?
3	Tools and their use in Agriculture	– What traditional tools do you use in agriculture, and how do you use them? – How did you learn to make and use these traditional agricultural tools?
4	Rituals, Festivals and Agriculture	– What rituals do you perform during jhum cultivation, and why?
5	Indigenous methods of soil fertility and Pest Protection	– How do you protect your crops from pests and diseases using indigenous methods? – What traditional methods do you use to maintain and improve soil fertility in your jhum fields?
6	Transformation of Agriculture	– How has agriculture in your community changed over time? – What are the main reasons for shifting from traditional jhum cultivation to modern or settled farming?

Source: Prepared by the authors

Organization and analysis of data

The data collected through in-depth interviews, FGD, informal interactions, and field observations were organised according to the major themes of the study. The information was analysed qualitatively to identify common patterns, differences in participants' experiences, and changes in agricultural practices. The findings were interpreted in relation to the research objectives, focusing on indigenous agricultural knowledge, cultural practices, and the transformation of traditional farming among the Nyishi community. Relevant statements from participants were used to support the findings.

4. RESULTS AND DISCUSSION

4.1 Jhum cultivation, community institutions and collective action

The Nyishi tribe predominantly practises jhum cultivation in the hilly terrain. However, terrace cultivation is also found in some areas where they mainly cultivate paddy and millets. In the homestead garden, they usually cultivate vegetables, medicinal plants, fruits etc. to fulfill their household demands. In recent times, some farmers of the Nyishi tribe focus in the cultivation of cardamom in the hilly terrain which has become one of the popular agriculture enterprises among them. Orange is also a common horticulture crops cultivated by them for commercial purposes. From the field visit and FGD with the community people, the study found a diversified agriculture system in terms of crop enterprises among the community. Under jhum, they mainly cultivate different varieties of indigenous crops. The major crops cultivated by them are listed in table 4.

Table 4: Diversified Crops cultivated by the Nyishi Community of Kurung Kumey, Arunachal Pradesh

Sl. No.	Name of the Crops	Local Name	Purpose of Cultivation
1	Different Varieties of Paddy	Aam, Aamli (Old Rice), Nincho, Rakteh	Home Consumption. Used to prepare the traditional drink Upo Pone
2	Foxtail Millets	Tami	Used for preparing Traditional Beverages for the celebration of social, cultural, and religious ceremonies. Upo (Polin)
3	Maize	Topu	Maize Flour to consume chapatti
4	Large Cardamom	Elaichi	Commercial purpose
5	Ginger	Taki	Commercial and household consumption
6	Pumpkin	Thumpe	Commercial and household consumption
7	Chilies	Nyamdak	Commercial and household consumption
8	Papaya	Honyir oo	Commercial and household consumption
9	Taro	Enyi	Commercial and household consumption
10	Sweet Potatoes	Guriya	Household consumption
11	Green Beans	Periing	Commercial and household consumption
12	Cucumbers	Mekung	Commercial and household consumption
13	Turmeric	Takie	Household consumption
14	Brinjal	Byopa	Household consumption
15	Pulses	Perring	Household consumption
16	Potatoes	Tak-yi	Household consumption
17	Orange	Komola	Commercial purpose

18	Bottle Gourd	Opum and Ojuk	Household consumption
19	Banana	Kopak	Commercial and household consumption
20	Himalayan Garlic	Ditte and Talap	Household consumption
21	Sesame	Tanam	Household consumption
22	Nefafu	Poto	Household consumption
23	Fish Mint	Heya O	Household consumption
24	Spiny amaranth	Pachu koyu	Vegetables for household Consumption
25	Mustard Leaf	Byopa	Household consumption
26	White sesame	Tanam	Household consumption
27	Crepe-ginger	Yaach baphi	Planted at homestead garden for medicinal purpose
28	Pipla	Yer	Household consumption
29	Guava	Mudri swn nana	Used as fruits and medicine
30	Black Nightshade	Hor oh	Vegetables for household consumption
31	Toothache Plant	Marshang oh	Vegetable and Medicine for household consumption
32	Star gooseberry	Nyoro	Household consumption

Source: Focus Group Discussion, Field observation

The table indicates that Nyshi community cultivates a varieties of crop, vegetables and fruits in their jhum areas and homestead gardens. The FGD and in-depth interview identified 32 varieties of crops, vegetables and fruits cultivated by the Nyishi tribe in the study area. Most of the vegetables grown by them are mostly intended for household consumption, which have contributed to food and nutritional security at the local level. During conversations with the participants, they reported that due to lack of proper market accessibility they cultivated a limited range of crops for commercial purposes. Some women farmers usually sell their vegetables including some wild vegetables in the roadside areas. Similar studies related to tribal agriculture have reported that poor transportation, inadequate market infrastructure, high transportation costs and more dependence on intermediaries restricts the modernization of agriculture through commercialization (Tangjang & Sharma, 2018; Singh et al., 2023; Rao & Talom, 2026). However, they cultivate large cardamom and orange for complete commercial purpose. Studies have observed that large cardamom and orange cultivation significantly influence in promoting the process of commercialization in Arunachal Pradesh (Mody et al., 2012; Tangjang & Sharma, 2018; Singh et al., 2023). Furthermore, the cultivation and use of wild vegetables by them indicates their close association between indigenous agriculture practices, traditional food system and cultural rituals. Different studies have documented significant use of wild plants and herbs by the Nyishi and other tribes of Arunachal Pradesh including leafy vegetables and edible fruits (Gangwar & Ramakrishnan, 1990).

4.2 Community perspectives on jhum cultivation

Jhum cultivation plays crucial role in tribal agriculture of North-East India. Jhum cultivation is not merely a method of agriculture for the tribal people, but an integral way of their life. They are socially, economically and politically associated with juhm cultivation (Punitha et al., 2018). Though there is some transformation in the tribal agriculture; but majority of tribal people practice jhum cultivation not only to maintain food security, but also to preserve their indigenous identity and social structure (Bhuyan, 2019).

As most of the sample farmers are associated with jhum cultivation in the study area, therefore, from the focus group discussion, interviews, transect walk etc., the study tried to understand their views regarding their association with jhum cultivation.

The Village Head (age 69) stated,

> "We prefer jhum cultivation because it unites our society and different rituals are celebrated during jhum cultivation that brings good luck to us. As we are cultivating under community land, all the community persons are skilful in the indigenous methods of jhum cultivation."

This statement highlights the insightful aspects of jhum cultivation for the Nyishi community, showcasing how farming goes beyond just growing food-it is about community, culture, and shared experiences. This indicates that jhum is not just about planting different crops. It is about growing together as a community. The shared labour in different jhum activities creates a strong bond between people. It indicates their collective effort to make jhum not only an agriculture practice; but it is a way of life. The rituals celebrated during the process are crucial because they are woven into their cultural fabric. In aligning with these findings some other studies stated that the continuous practice of jhum cultivation not only to contribute to their agriculture but also it preserves their ritual practices, cultural identity and collective social rights (Ramaya, 2016; Punitha et al., 2018).

Another farmer (Age-62) said,

> "We are not shifting our agriculture from jhum cultivation to other form of agriculture because in commercial crops or cash crops it requires more capital and modern tools. We all work together to share our cost and live happily as family members."

This indicates that most of the farmers do not possess sufficient amount of capital to start the cultivation of profitable commercial crops or cash crops. To start the cultivation of commercial crops, it requires huge capital for clearing the hill, preparation of land, maintenance etc. For a single farmer the risk of cultivation of commercial crops will be high. He opined that in jhum cultivation the cost of cultivation can be shared among the community members. In contrast, jhum cultivation doesn't require the same level of investment in modern tools or machinery. The practice is community-based; people work together, sharing labour and resources. By doing so, the costs of farming are spread across the community, making it more affordable for everyone. Similar kind of study carried out by Paul et al., 2020 which covered 621 shifting cultivators, found that due to limited capital, market access, shared access to community resources etc., they are still practicing jhum cultivation. From the finding it can be concluded that the tribal farmers in the study area prefer community happiness over agriculture profit. Community agriculture provides social capital for them that generate economic efficiency in agriculture too.

Through this study, it was tried to explore the traditional criteria of selecting land for jhum cultivation and the factors that influence their decision on jhum land selection. One senior citizen (age 71) of the locality responded regarding the selection of area under jhum. He stated,

> "We first check the colour of the soil and select the crops accordingly for cultivation as per the colour of the soil. Additionally, we look into the geographical advantage of the site for living i.e., availability of water, distance to the road, important horticultural crops in that area, distance to the church, distance to the market."

This statement indicates that Nyishi people have traditional knowledge of quality of land which they use to examine the suitability of land for jhum cultivation. Traditionally, by observing the colour of the soil, they select the suitable land for jhum. Additionally, they select their jhum area in such a location where they can find easy accessibility of water, easy communication to the nearby areas or towns for market, short distance to the church etc. This finding of is supported by some similar studies. Gosai et al. (2011) found that Nyishi tribe classifies land on the basis of colour, texture, location, indigenous assessment etc.

One graduate participant (Age 36) said,

> "In recent days, we do not prefer more burning of forest for jhum cultivation and some of the community people shift their cultivation from jhum to permanent cultivation like large cardamom. So we are now aware about the quality of land that suits large cardamom cultivation from those who are cultivating cardamom."

This reflects that the young generation does not prefer to practice jhum cultivation. They are ecologically very concerned and they prefer settled cultivation. During the field visit, it was observed that most of the hills are covered with cardamom cultivation along with orange orchard. They find that large cardamom yield more profit to the farmers for a long period of

time. Now the people of the sample area show their interest in large cardamom cultivation, as a result of which some transformation from jhum to settled farming have been identified in the field. However, to maintain their tradition and for home consumption, they are still practicing jhum. This observation is aligned with the study carried out by Mody et al. (2012), which documented the large cardamom cultivation as an important commercial crop that contributes to socio-economic transformation among tribal farmers of Anjaw district of Arunachal Pradesh.

Thus, it can be summarized that the Nyishi tribe prefer jhum cultivation as it is related to their identity and unity of the community. However, a considerable shift from jhum to settled farming has also been observed in the sample area during the field survey.

4.3 Process of seeds preservation

This section examines the indigenous seeds preservation methods of Nyishi tribe. The details of focus group discussion regarding seeds preservation are explained below.

One Farmer (Age 59) told,

> "We have learnt about seed selection and preservation techniques from our forefathers. We basically select the best performing plants for seed selection and store it in bamboo tubes or woven bamboo baskets to offer ventilation while protecting seeds."

The Nyishi tribe has long used the traditional seed preservation techniques taught by their forefathers. At first, they select the plants that are in a healthy and matured stage. Once the best performing plants are identified, they use the seeds of those plants and store them in locally available bamboo tubes and baskets for further use. This seed preservation technique is one of the natural ways of providing ventilation to the seeds thereby protecting their shelf life. Evidence shows that other tribal communities of North-East India also demonstrate the importance of indigenous seed selection and storage practices. Atheequlla et al. (2026), in their study of indigenous seed storage among tribal communities in Mizoram, found that traditional storage system contributes to maintaining seed viability, preserving locally adapted crop varieties and transmitting agricultural knowledge across generations.

One Housewife/Farmer (Age 55) stated,

> "We use dried gourd and woven baskets made from locally found fibers to preserve seeds."

From the statement of the women farmer, it is clear that the Nyishi tribe uses locally available natural and renewable resources for seed storage. She opined that, the dried outer shell of the gourds and baskets woven out of bamboo are one of the most sustainable storage solutions. These help in protecting the seeds from pests and damage. It indicates the participation of women in tribal agriculture and involves in the process decision making. Similar studies have been identified in the literature that documented that indigenous community of North-East India, use bamboo-based storage structures and dried bottle-gourd shells for preserving seeds and grains (Zhimomi & Dutta, 2023; Gopala Swami & Wesley, 2020; Borah et al., 2023).

One Farmer (Age 65) stated,

> "We prefer local seeds because these are disease resistance, high yield, and adapts to local conditions well."

It reveals that the Nyishi tribe prefers to use local variety of seeds over the others for cultivation. This is a reflection of their strong preference and connection towards their native culture and knowledge. The local seeds are preferred because of their high yielding capacity. These seeds are not only disease resistant but also have quick adaptability to local conditions. Different studies have found genetic varieties of rice in the Eastern Himalayan range indicating their importance of crop improvement and productivity (Choudhury et al., 2013; Roy et al., 2016). Similar studies have found in the literature which stated that local varieties of vegetables have more adaptation and resistance to diseases and pests. Further, they opined that local varieties of seeds help to conserve agro-biodiversity, traditional knowledge and community food system (Babu et al, 2026; Roy et al., 2023).

Thus, these observations suggest that the Nyishi tribe has a strong preference towards traditional and natural storage solutions for seed preservation. This preference comes from the knowledge inherited by them from their forefathers. These seed preservation techniques are one of the natural ways of enhancing the shelf life of the seeds making them suitable for long term use.

4.4 Indigenous methods of post-harvest management

Indigenous Post-Harvest Management indicates traditional knowledge and practices used by the farmers to handle process, preserve and store agricultural produce after harvesting. Among the indigenous communities, various indigenous methods are developed through generations of agricultural experience and rely on locally available materials and resources. Research on tribal communities of North-East India has documented the traditional storage and indigenous pest management techniques for protecting harvested crops and maintaining households' food supply (Sinha, 2010; Zhimomi & Dutta, 2023).

One Farmer (Age 53) stated,

> "We first properly dry the harvested crops particularly grains like rice, maize, and millets. This prevents spoilage due to moisture"

This reflects the Nyishi tribe's indigenous practice on post-harvest management. He stated that, after harvesting, the crops, especially the grains like rice, maize and millets are properly sun dried to prevent their spoilage due to moisture. Similar studies conducted in the Northern Andhra Pradesh found that the tribal people usually sun-dry the finger millet and maize before storage and this process is considered as important components of traditional grain management (Gopala Swamy & Wesely, 2020).

One Housewife/Farmer (Age 55) further stated,

> "We use bamboo baskets, containers, and granaries for storage of our harvested crops which are versatile and durable for storage. I learnt to make bamboo baskets, containers and granaries from my father."

The respondent's account highlights that the Nyishi tribe people use storage solutions that are durable in nature. As stated by the respondent, the baskets, containers, and granaries used for storing the harvested crops are versatile and durable in nature. They have been using these storage solutions across generations and have inherited the techniques of making them from their forefathers.

So, the findings on the post-harvest management reveal that the Nyishi people have been using the indigenous methods of storing the crops during post-harvest stages. The crops are sun-dried and stored in baskets, containers, and granaries made out of local materials which makes it relatively durable and long lasting.

4.5 Traditional tools and techniques used by the Nyishi tribe in their agriculture practice

Traditional tools and technique plays a vital role in the agriculture system of the hill tribes of North-East India. These tools are not merely instruments of production; they also reflect the community's adaptation to steep terrain, forest based resources and the ecological condition of Eastern Himalaya (Dewagan et al., 2004; Gupta, 2005).

In the focus group discussion we have discussed indigenous tools which are used by the Nyishi people in their agriculture. From the discussions the study found that majority of the farmers use traditional tools and techniques in their jhum cultivation like for cutting and cleaning of the farming area traditional dao and axes are used, for digging and tilling simple digging sticks, hoes are used, different indigenous varieties of knives used for harvesting crops like rice, maize, and vegetables etc. The Nyishi tribes live on the steep and irregular slops of the hills where the traditional tools of agriculture are closely adapted to local ecological environmental conditions. Additionally, these tools are cost effective, easy to use particularly among the hill and tribal households (Langthasa et al., 2021). Some of the local names of the tools and their use are collected during the FGD which are listed in table 5.

Table 5: Traditional tools used by the Nyishi tribe in their agriculture practice

Sl. No	Name of the Tools	Local Name	Purpose
1	Sickle	Veekro	Used for clearing jhum field and harvesting
2	Spade	Fawrah	Used for digging the cultivable Land
3	Hoe	Khurpi	Shape soil and remove weed
4	Dibbler	Chei	Tool used for weeding
5	Bamboo Basket	Huch	Use to carry seeds during jhum
6	Weeding tools	Paie, Hoie	Weeding in the agriculture field
7	Harvesting Tools	Kech	Used for Harvesting
8	Winnowing Tools	Ophi	Clearing rice after harvesting
9	Transport Tools	Aging	Transport raw materials from one place to another
10	Sowing Tools	Lodap	A tools used for sowing paddy
11	Bamboo Basket	Chungchak	Use for carrying rice raw materials in the agriculture field by the women.
12	Bamboo mat	Uppiuh	Used for spreading out and sun-drying agricultural produce
13	Harvest tools	Riuchak/Chegnia	Used to cut Paddy

Source: Focus Group Discussion and Field Survey

From the table it has been found that almost all the tools which are used in agriculture by the Nyishi tribe are indigenous in nature. Most of the tools are local made through locally available resources like bamboo, wood etc. They have learnt the design and use of the tools from their forefather. However, due to development of road connectivity, extension of market, labour mobilizations etc., some modern tools and techniques have also been adopted by some of the farmers. Additionally, in the valley regions that attract large numbers of tourists, some showrooms sell the traditional tools as souvenir items at very high prices. These tools are environment-friendly and have less impact on soil erosion in the slopes of the hills. Similar studies have also been identified that the knowledge relating to the indigenous tools of agriculture and their use has largely been transmitted across generations (Dewangan et al., 2004). Similar evidence from North-East India shows that implements of indigenous tools such as hoes, sickles, and dibbling sticks are locally made, repeatedly modified and adapted to the specific requirements of jhum cultivation (Saikia & Bhaduri, 2018).

4.6 Association of agriculture with indigenous rituals and festivals of the Nyishi tribe

In the hill agriculture, rituals and festivals are closely associated with their indigenous agricultural practices. For the Nyishi people, agriculture is not merely a farming activity; it is closely associated with their social cultural and spiritual life of their community. Various kinds of rituals and festivals which are associated with the indigenous agriculture of the tribes reflect the belief that agricultural production depends not only on human labour, techniques and farming processes; but also on harmonious relationship with land, spirits and super natural forces (Gupta, 2005; Punitha et al., 2018). Therefore, this study focuses to identify the association of agriculture with indigenous rituals and festivals of the Nyishi tribe through focus group discussion and interviews with the farmers.

During focus group discussion, most of the farmers opined that their agriculture is closely associated with their religious beliefs, traditions, customs, rituals and festivals. Their selection of crops, methods of agriculture, sowing, harvesting etc., are

highly influenced by their religious traditions. In this context different information were collected from the statements of the participants and analysed accordingly.

One Farmer (age 53) expressed,

> "During clearing and planting of jhum we perform nyoing hingnam and rungho panam, during planting we perform rungho linam and aal-inyi linam. After some days of planting, we perform liyu upo tangnam. Through our rituals we pray the God of Land for better performance of our jhum cultivation."

This finding reveals that Nyishi people perform different rituals and festivals during their agriculture practice. Most of the rituals and festivals are community based, where the community comes together and celebrates as per the traditional customs and practices. These types of rituals and festivals unite the community and strengthen collective participation and cooperation in the agricultural activities. Such indigenous customs and festivals make agriculture economically and socially more sustainable. Various studies in the existing literature have reported similar observations which indicate that agricultural rituals and festivals help to maintain cultural continuity and strengthen community relationship (Gupta, 2005; Tada, 2016; Punitha et al., 2018).

A female member, age 47, who involve in agriculture stated that

> "We perform sangte-polu when the rice crop begins to appear to protect from pest attack. We also perform amji-danam and nyiti-anyang during harvesting"

These practices reflect that the Nyishi tribe believes in some special rituals that protect their crops from pest attack. During and after harvesting, they celebrate amji-danam and nyiti-anyang. Some of the rituals and festivals related to agricultural practices are presented in table 6.

Table 6: Rituals and Festivals associated with Agriculture among the Nyishi

Sl. No	Name of the Rituals & Festivals related to agriculture	Explanation
1	Nyokum Yullo	The Nyokum Yullo festival is celebrated in the month of February involves the invocation of various deities and the sacrifice of cattle as offerings to protect crops from insects, wild animals, and pest.
2	Longte-Yullo	The Longte-Yullo festival is one of the oldest festivals celebrated by the Nyishi tribe. It is held annually in April, marks the beginning of a new season and the commencement of sowing seeds. It emphasizes human wellness, fertility, and the invocation of benevolent sprits.
3	Lew Hunam	Before sowing seeds, women perform a ritual where they erect a shrine decorated with white fowl feathers and place ginger and rice husk in a Kukum leaf as offerings to agricultural deities.
4	Amjedinam	After the completion of the harvest, farmers organize a feast called Amjedinam. This feast can be organised by individually or jointly. On this occasion, villagers and their relatives are invited. Only newly harvested rice, wine and meat are served to the guests.
5	Nyoing Hingnam	Pray the God of Land (Gangte-Atu) after final choice of Jhum site. This ritual is organised during clearing jhum land.
6	Rungho Panam	Pray the God of Land (Gangte-Atu) after final choice of Jhum site. This ritual is organised at first day of clearing jhum land.
7	Rungho Linam	This ritual is organised at first day of planting in jhum land.

8	Aal-inyi Linam	Aal-inyi Linam is also performed on the same day of Rungho Linam.
9	Liyu upo Tangnam	It is primarily a household ritual performed for the benefit of the household and its crop of rice.
10	Sangte-Polu	It is an agriculture based ritual observed by the Nyishi community, traditionally around August, when the rice crop in the jhum fields begins to emerge. The ritual seeks to protect the growing rice from pests, diseases and other harmful influences, while promoting healthy crop growth and maturation.
11	Amji-Danam	Through this festival the early reaped rice is harvested and consumed by the Nyishi tribe as the stock of rice from the previous year has been exhausted.
12	Nyiti-Anyang	Rites of the new year celebration

Source: Focus Group Discussion and Field Survey

During the focus group discussion, issue of indigenous methods of maintaining soil fertility and protecting crops from pests were also discussed with the participants. It was reported that in the sample areas of Kurung Kumey all the farmers use manures, leaf compost etc. in their agricultural fields and use indigenous methods to protect their crops from probable pest attack. From the discussion, it has been found that the Nyishi farmers have good knowledge of ecology and selection of land as per the requirements of different crops. Basically, they classified their land into five types: (i) *Uttaola Ked* (Sandy Soil) (ii) *Kanla* (Dark Greyish Brown Soil) (iii) *Kannam* (Dark Soils) (iv) *Lengching* (Red Soil) (v) *Ponglung* (yellowish brown). In Uttaola Ked (Sandy Soil) they prefer to cultivate Maize, Millets and Paddy, in Kanla (Dark Greyish Brown Soil) they prefer to cultivate chilies, ginger, cucumber, cucurbits and white sesame, in Kannam (Dark Soils) they prefer to cultivate maize, leafy vegetables and millets, in Lengching (Red Soil) they prefer to cultivate beans, cotton, potatoes etc., in Ponglung (yellowish brown) they usually cultivate vegetables, paddy, maize, millets. These show that they have considerable knowledge in soil classification and crop selection. The Nyishi tribe, like many other indigenous communities in India, uses *neem* leaves or *neem* oil as a natural pesticide. Neem has properties that repel insects and pests and is often applied to the crops to protect them from being attacked by harmful insects. From the discussion, it has been found that the Nyishi people practice crop rotation as a traditional pest controls method. By planting different crops in different seasons or alternating them in the same plot of land, they seek to reduce the risk of pest infestations, as many pests tend to target specific crops. In some areas, the Nyishi farmers also cover certain vulnerable crops with woven mats or netting to protect them from birds, rodents and insects. Moreover, one of the participants stated that manures from livestock is the main source of soil fertility.

5. CONCLUSION AND POLICY IMPLICATIONS

The study shows that the indigenous agricultural practices among the Nyishi tribe in the hills of Kurung Kumey district of Arunachal Pradesh is not merely an agricultural activity; but it is an integral part of their ecological knowledge, livelihood systems, social relationship and their indigenous identity. The study ensures that jhum cultivation is significantly connected with community cooperation, traditional rituals, indigenous tools and techniques, local seeds preservation, soil assessment and post-harvest management. The identification of different varieties of crops, vegetables, fruits etc., shows the contribution of traditional farming and homestead gardens to household food security and nutritional security. The study also shows that indigenous agriculture among the Nyishi tribe is very dynamic rather than static. Although jhum cultivation is closely associated with their rituals and festivals; but some farm households are increasingly adopting settled cultivation, particularly large cardamom and orange cultivation. But, due to lack of sufficient agriculture infrastructures, connectivity, capital constraints etc., limit the wider commercialization of agriculture produce and the process of agriculture transformation in the study area. The ongoing practice of jhum cultivation among the Nyishi tribe indicates the enduring relationship between farming, food habit and indigenous identity. The findings suggest that agriculture transformation should not be understood simply as the replacement of traditional practices by some modern methods of agriculture, but evolving process in which economic goals interact with indigenous knowledge and cultural continuity.

5.1 Policy Implications

Agricultural policy of the government should aim to preserve the uniqueness of the indigenous agricultural practices of among the Nyishi tribe, including traditional tools, seed selection, seed preservation, pest management, soil assessment, rituals etc. Agriculture extension services should promote context specific and environmentally appropriate improvements rather than the abandonment of jhum cultivation. Some indigenous activities such as soil management, agroforestry, indigenous seeds, locally adapted crops, and improved tools suited to hill terrain should be given greater attention. To strengthen the commercial viability of large cardamom, orange and locally grown vegetables priority should be given to improve market connectivity, affordable credit, storage facility, transportation and reliable market information. Women farmers involved in cultivating and selling wild vegetables should receive targeted support through proper market infrastructure. Agricultural development programmes in the hills should involve village institutions, women, elders and younger farmers in decision-making process. Such inclusive approaches in the study area would help in diversifying livelihoods, protecting the tribe-specific ecological knowledge, cultural traditions and community relations that underpin indigenous agriculture.

ACKNOWLEDGEMENT

The authors acknowledge the Indian Council of Social Science Research (ICSSR), New Delhi, for providing financial support for the research project entitled "Sustainable Agriculture Practices among the Tribes of Northeastern Region." The present paper is one of the outcomes of that project. The authors also express their sincere gratitude to all the participants of the focus group discussion, in-depth interviews, and informal interactions for sharing their valuable knowledge, experiences, and insights into the indigenous agricultural practices of the Nyishi community.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

REFERENCES

[1] Aker, J. C. (2011). Dial "A" for agriculture: A review of information and communication technologies for agricultural extension in developing countries. Agricultural Economics, 42(6), 631–647. https://doi.org/10.1111/j.1574-0862.2011.00545.x

[2] Atheequlla, G. A., Varte, Z., Lalrinfela, T., Mukherjee, A., Shubha, K., Balakrishna, B., Ramya, H. R., Kumar, H. V. H., Raju, R., Kumar, R. S., Das, L., Rakshit, S., & Roy, P. (2026). Conceptualizing indigenous seed storage as a climate-resilient food system infrastructure: Evidence from tribal community-based maize conservation in Eastern Himalaya. Frontiers in Sustainable Food Systems, 10, Article 1850667. https://doi.org/10.3389/fsufs.2026.1850667

[3] Babu, R.R., Suresh, S.P.G., Gowda, D.C.M. et al. The status and challenges of managing vegetable genetic resources in Northeast India. Discov. Plants, 3, 190 (2026). https://doi.org/10.1007/s44372-026-00652-7

[4] Bhuyan, R. (2019). Review note on shifting cultivation in Northeast India amidst changing perceptions. Dhaulagiri Journal of Sociology and Anthropology, 13, 90–95. https://doi.org/10.3126/dsaj.v13i0.24252

[5] Bisht, P., Joshi, N. C., & Pandey, S. (2021). Ethnobotanical study on plant species used by the Nyishi tribe of Arunachal Pradesh, India. Journal of Traditional and Folk Practices, 9(1–2). https://doi.org/10.25173/jtfp.5

[6] Borah, N., Bey, B. S., & Deka, N. (2023). Indigenous technical knowledge (ITK) used in agriculture by selected ethnic communities of Assam. Indian Journal of Traditional Knowledge, 22(2), 264–272. https://doi.org/10.56042/ijtk.v22i2.46568

[7] Bose, P. (2019). Oil palm plantations vs. shifting cultivation for indigenous peoples: Analyzing Mizoram's New Land Use Policy. Land Use Policy, 81, 115–123. https://doi.org/10.1016/j.landusepol.2018.10.022

[8] Chakravorty, J., Ghosh, S., & Meyer-Rochow, V. B. (2011). Practices of entomophagy and entomotherapy by members of the Nyishi and Galo tribes, two ethnic groups of the state of Arunachal Pradesh (North-East India). Journal of Ethnobiology and Ethnomedicine, 7, Article 5. https://doi.org/10.1186/1746-4269-7-5

[9] Choudhury, B., Khan, M. L., & Dayanandan, S. (2013). Genetic structure and diversity of indigenous rice (Oryza sativa) varieties in the Eastern Himalayan region of Northeast India. SpringerPlus, 2, Article 228. https://doi.org/10.1186/2193-1801-2-228

[10] Das, K., & Das, D. (2020). Technical efficiency in small tea gardens of Assam. Review of Development and Change, 25(1), 112–130. https://doi.org/10.1177/0972266120916318

[11] Deb, S., Lynrah, M. M., & Tiwari, B. K. (2013). Technological innovations in shifting agricultural practices by three tribal farming communities of Meghalaya, northeast India. Tropical Ecology, 54(2), 133–148.
[12] Dewangan, K. N., Prasanna Kumar, G. V., & Dutta, R. K. (2004). Scope of mechanisation in Arunachal Pradesh—Part I: Traditional hand tools of shifting cultivation. Agricultural Engineering Today, 28(3–4), 60–67.
[13] Evenson, R. E., & Gollin, D. (Eds.). (2003). Crop variety improvement and its effect on productivity: The impact of international agricultural research. CABI Publishing.
[14] Gangwar, A. K., & Ramakrishnan, P. S. (1990). Ethnobiological notes on some tribes of Arunachal Pradesh, Northeastern India. Economic Botany, 44(1), 94–105.
[15] Gopala Swamy, S. V. S., & Wesley, B. J. (2020). Traditional knowledge of post-harvest crop handling by tribal farmers of northern Andhra Pradesh. Indian Journal of Ecology, 47(2), 383–389.
[16] Gosai, K., Arunachalam, A., Dutta, B. K., & Prasanna Kumar, G. V. (2011). Indigenous knowledge of soil fertility management in the humid tropics of Arunachal Pradesh. Indian Journal of Traditional Knowledge, 10(3), 508–511.
[17] Gupta, V. (2005). Jhum cultivation practices of the Bangnis (Nishis) of Arunachal Pradesh. Indian Journal of Traditional Knowledge, 4(1), 47–56.
[18] Hazell, P. B. R. (2009). The Asian Green Revolution (IFPRI Discussion Paper 00911). International Food Policy Research Institute. https://hdl.handle.net/10568/161978
[19] Merriott, D. (2016). Factors associated with the farmer suicide crisis in India. Journal of Epidemiology and Global Health, 6(4), 217–227. https://doi.org/10.1016/j.jegh.2016.03.003
[20] Ministry of Agriculture & Farmers Welfare. (2018, December 18). National Mission for Sustainable Agriculture. Press Information Bureau, Government of India. https://www.pib.gov.in/newsite/PrintRelease.aspx?lang=2&reg=3&relid=186559
[21] Mody, P., Kri, S., Singh, H. V., & Taggu, A. (2012). Cultivation of large cardamom in Anjaw district of Arunachal Pradesh: Commercialization and general profile of cultivators. South Asian Journal of Marketing & Management Research, 2(12), 1–11.
[22] Mohanty, B. B. (2005). 'We are like the living dead': Farmer suicides in Maharashtra, Western India. The Journal of Peasant Studies, 32(2), 243–276. https://doi.org/10.1080/03066150500094485
[23] Nair, S. R. (2021). Agrarian suicides in India: Myth and reality. Development Policy Review, 39(1), 3–21. https://doi.org/10.1111/dpr.12482
[24] Nanu, T., & Nimasow, G. (2024). Ethnomedicinal plants on home gardens of the Nyishi tribe of Papum Pare District of Arunachal Pradesh, India. International Journal of Ecology and Environmental Sciences, 50(5), 793–798. https://doi.org/10.55863/ijees.2024.0224
[25] Office of the Registrar General & Census Commissioner, India. (2011). A-11 Appendix: District-wise Scheduled Tribe population, Arunachal Pradesh. Census of India 2011. https://censusindia.gov.in/nada/index.php/catalog/43011
[26] Pangging, G., Nabam, A., & Sharma, M. (2025). Documentation of prevailing agroforestry systems and socio-economic conditions of agroforestry farmers of Nyishi tribe: A case study of Papumpare district in Arunachal Pradesh, India. Indian Journal of Agroforestry, 27(1), 75–94.
[27] Paul, S., Das, T. K., Pharung, R., Ray, S., Mridha, N., Kalita, N., Ralte, V., Borthakur, S., Burman, R. R., Tripathi, A. K., & Singh, A. K. (2020). Development of an indicator based composite measure to assess livelihood sustainability of shifting cultivation dependent ethnic minorities in the disadvantageous Northeastern region of India. *Ecological Indicators, 110*, Article 105934. DOI: 10.1016/j.ecolind.2019.105934
[28] Pingali, P. L. (2012). Green revolution: Impacts, limits, and the path ahead. Proceedings of the National Academy of Sciences, 109(31), 12302–12308. https://doi.org/10.1073/pnas.0912953109
[29] Punitha, P., Ansari, M. A., Pandey, D. K., Ram, D., Datt, S., Sharma, P. K., Aheibam, M., Jyothi, S. S. P., & Prakash, N. (2018). Shifting cultivation in North East India: Social dimension, cross cultural reflection and strategies for improvement. The Indian Journal of Agricultural Sciences, 88(6), 811–819. https://doi.org/10.56093/ijas.v88i6.80497
[30] Rao, C. S., & Talom, M. (2026). Orange cultivation in 'Dambuk' region of Arunachal Pradesh, India: Production conditions and marketing challenges. Asian Journal of Agricultural Extension, Economics & Sociology, 44(4), 1–11. https://doi.org/10.9734/ajaees/2026/v44i42906 Asian Journal of Agricultural Extension

[31] Roy, S., Marndi, B. C., Mawkhlieng, B., Banerjee, A., Yadav, R. M., Misra, A. K., & Bansal, K. C. (2016). Genetic diversity and structure in hill rice (Oryza sativa L.) landraces from the North-Eastern Himalayas of India. BMC Genetics, 17, Article 107. https://doi.org/10.1186/s12863-016-0414-1

[32] Roy, S., Sarma, A., Paul, S., Jha, D. K., & Tayung, K. (2023). Plant growth-promoting traits and activation of defense enzymes in traditional rice variety by fungal endophytes isolated from seeds of indigenous rice cultivars of Northeast India. South African Journal of Botany, 160, 483–492. https://doi.org/10.1016/j.sajb.2023.07.041

[33] Saikia, A., & Bhaduri, S. (2018). Institutional design and occupational 'opportunity': The case of shifting cultivators in Nagaland, northeast India. In M. Cairns (Ed.), Shifting cultivation policies: Balancing environmental and social sustainability. CABI. CSSP JNU

[34] Sati, V. P., & Vangchhia, L. (2017). Prospects of oil palm plantation in Mizoram, India. Indian Journal of Hill Farming, 30(1), 139–143. https://epubs.icar.org.in/index.php/IJHF/article/view/73320

[35] Shimrah, T., Rao, K. S., & Saxena, K. G. (2015). The shifting agricultural system (jhum) and strategies for sustainable agroecosystems in Northeast India. Agroecology and Sustainable Food Systems, 39(10), 1154–1171. https://doi.org/10.1080/21683565.2015.1089350

[36] Singh, S. P., Singh, N. U., Sasmal, D., Naveen, K., & Gogoi, K. C. (2023). Economics of marketing pattern of large cardamom: A study in Anjaw district of Arunachal Pradesh. Indian Journal of Hill Farming, 36(2), 105–111.

[37] Sinha, B. (2010). An appraisal of the traditional post-harvest pest management methods in Northeast Indian uplands. Indian Journal of Traditional Knowledge, 9(3), 536–543.

[38] Tada, B. (2016). The socio-economic life of the Nyishis' of Arunachal Pradesh. Dera Natung Government College Research Journal, 1(1), 23–32. https://doi.org/10.56405/dngcrj.2016.01.01.03

[39] Tangjang, A., & Sharma, A. (2018). Problem faced by the large cardamom growers during production and marketing: A case study of Tirap district of Arunachal Pradesh, India. International Journal of Current Microbiology and Applied Sciences, 7(5), 2561–2573. https://doi.org/10.20546/ijcmas.2018.705.295

[40] Zhimomi, L. K., & Dutta, P. (2023). Indigenous agricultural storage and pest management of Northeast India. Indian Journal of Hill Farming, 36(1), 274–278. https://doi.org/10.56678/iahf-2023.36.01.36