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## Problems and prospects of agricultural diversification in shifting cultivation area of north east India: An empirical study

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**Abstract**

Tribal people have distinct problems and prospects on agricultural diversification based on demographic, socio-economic and geographical conditions. Diversification activities make greater contribution to generate cash incomes for poorer households and it is a key strategy by which people try to make ends meet and improve their well-being. The present paper intends to analyze the problems and prospects in diversification of agriculture in north east India. In case of agricultural diversification choice, vegetable cultivation (MS, 4.23), fruits orchard (MS, 4.19) and spice production (MS, 4.18) were identified by the respondents as top three strategies for livelihood diversification in shifting cultivation area and ranked I, II and III respectively. Among several impediments, the infrastructural constraints (GMS, 2.36) emerged as the most important constraint that hinders the different options of crop diversification. The paper discusses several issues that require attention on priority basis for accelerating the pace of agricultural diversification among Jhumias.

**Keywords:** Agricultural diversification, constraints, livelihood strategy, shifting cultivation

**Introduction**

The North East Region of India has often been visualized as the remote landlocked backward region of dynamic economy. Economic development of the North Eastern states depends primarily on achievements in the agricultural sector. The management of natural resources like land, water, forest resources for the economic development remains the major challenge for the region.

Shifting agriculture, locally known as '*Jhum*' in north eastern part of India is one of the main components of village agro-ecosystem<sup>[1]</sup>. The region occupies 83 per cent of the total shifting cultivation area in India<sup>[2]</sup>. Out of total schedule tribe households (16, 68,745) of six north eastern hill states namely; Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, about 23 per cent of them were practicing shifting cultivation<sup>[3]</sup>. The unique ecological entity and topographical diversities are the exclusive characteristics of the hill regions north east India. The distinctive socio-economic features, ethnicity, climatic variability and human activities, separate the hill ecosystem from the rest. The inaccessibility and fragility marginalized the hill economy and the community. These diverse typologies, having difficult terrain, inaccessible habitation, extreme vulnerability to natural calamity, poor infrastructures (socio-economic as well as physical) and distinctive gender dimensions, are the important features of the agri-horti-silvi pastoral economies. This implies that the hill regions demand a distinctive treatment that is different from the standard followed in the mainland plain areas<sup>[4]</sup>. The North East India, an important hill and mountain ecosystem, remained economically backward and bypassed area. The long legacy of developmental infirmity has been under debate in the socio-political circles from time to time<sup>[5]</sup>. The region has drawn sufficient policy attention of the mainstream policy circle, but the desired gain is awaited in perpetuity and economic as well as ecological degradation continued. Perhaps, on account of lack of proper understanding of the multiplicity of the problems of the region, policy strategies are not well placed and unable to reach out. Therefore, studies on North East region assume greater importance and relevance<sup>[6]</sup>. Tribal farmers mainly depend on their traditional knowledge and are constrained by inclement and inhospitable terrains. Shifting cultivation or terrace cultivation continued among the hill farmers. Their needs, aspirations and the customary practices of these hill people need to be documented in a comprehensive manner and separate action plan formulated. In the perspective of mainstreaming agricultural sector consider inclusion of tribal farmers, rather than excluding them from the category of farmers. This will enhance the participation of hill farmers in the developmental strategies.

The present paper has empirically examined the problems and prospects to agricultural diversification in shifting cultivation area of north east India.

### Materials and methods

The present study was conducted during 2016-17 in the six states of North Eastern Hill region of India, namely Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The selection of locale was based on the per cent of Scheduled Tribes to total population in the district and RD (Rural Development) blocks were purposively selected based on maximum area under *jhum*. From each blocks a cluster of (2-5) villages were randomly chosen for the selection of respondents (*Jhumias*). A total of 500 respondents were selected randomly from 52 villages of 14 RD blocks. A five-point Likert scale was used (1-strongly disagree, 2-rather disagree, 3-neutral, 4-rather agree, and 5-strongly agree) to measure the level of agreement with the expected agricultural diversification choice of the respondents whereas, constraints

were measured using three point scale (1-no constraint, 2-minor constraint, and 3-major constraint). The participatory tools and processes also applied for the study include multi-stakeholder consultations; key respondent interviews; transect walks, field observations, and focus group discussions with a variety of stakeholders in the study area for triangulation of data.

### Results and Discussion

#### Demographic characteristics of respondents

The farmers' decisions to diversify towards high-value crops are influenced by a number of household-specific factors and the surrounding socio-economic environment. Literature suggests experience, managerial skills, knowledge and information as the important factors in farmers' diversification decisions [7]. Table 1 summarizes the demographic characteristics of *jhumia* households such as age, education, household size etc.

**Table 1:** Socio-economic profile of the respondents n=500

Category	Frequency	Percentage
<b>Age</b>		
(i) Young (18 to 35 Yrs)	77	15.40
(ii) Middle (36 to 50 Yrs)	276	55.20
(iii) Old (Above 50)	147	29.40
<b>Educational status</b>		
(i) Illiterate	140	28.00
(ii) Primary	264	52.80
(iii) High school & above	96	19.20
<b>Family Size</b>		
(i) Small (<4)	41	8.20
(ii) Medium (4 to 8)	404	80.80
(iii) Large (>8)	55	11.00
<b>House Type</b>		
(i) Pucca	84	16.80
(ii) Kutcha	416	83.20
<b>Land Holding (Ha)</b>		
(i) Marginal (0.05 to < 1)	60	14.75
(ii) Small (1 to < 2)	204	39.75
(iii) Semi medium (2 to < 4)	200	36.75
(iv) Medium (4 to <10)	32	7.75
(v) Large (> 10)	4	1.00
<b>Monthly income (Rs.)</b>		
(i) Rs. < 3,715	46	9.20
(ii) Rs. 3,715 to 17,487	391	78.20
(iii) Rs. > 17,487	63	12.60
<b>Jhum Experience (Years)</b>		
(i) Less than 12	90	18.00
(ii) 12 to 36	305	61.00
(iii) More than 36	105	21.00
<b>Social Participation</b>		
(i) Self Help Group	167	33.40
(ii) Community based Organisation	53	10.60
(iv) Farmers club	68	13.60
(v) NGOs	13	2.60
(vi) No participation	199	39.80

Table 1 shows the profile of respondents from six north eastern hill states viz., Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. It was found that majority of the respondents selected under the study were from middle age group (55.20%) followed by old (29.40%) and young age (15.40%) group engaged in *jhum*. Educational status of the respondents reveals that maximum of them were educated up to primary level (52.80%) whereas; only 19.20 per cent had high school level education however, significant

proportion (28%) of respondents could not avail formal education (As per 2011 Census figures, literacy rate for STs in India was 59%). Highest majority (above 80%) of the respondents had medium family size and owned Kutcha house whereas, the all India percentage of the people owned Kutcha house was only 46.9% (Census, 2011). In case of land holding size, 39.75 per cent respondents had 1 to 2 hectare of land and 36.75 per cent had semi medium size land (3-4 ha.). Remaining 14.75, 7.75 and 1.00 per cent respondents had

marginal (0.05 to <1), medium (4 to <10) and large (>10) size land respectively. It was found that majority (78.20%) of the respondents had monthly income ranges from ₹3,715 to 17,487 while 12.60 and 9.20 per cent had income above ₹17,487 and below ₹3,715 respectively. Further, 61 per cent respondents had *jhum* experience ranges from 12-36 years whereas, 21 per cent respondents had more than 36 years of *jhum* experience. Only 12 per cent respondents reported *jhum* experience of less than 12 years. In view of the prevailing socio-economic status of *jhumias*, improvisation through agricultural diversification may be advocated as a sustainable strategy.

#### Access to mass media and cosmopolite source of information

Information is a basic and fundamentally important element in any development activity. Finding ways to harness it more effectively to assist those making decisions affecting the sustainability, productivity and profitability of their livelihoods is a priority concern<sup>[8]</sup>. In addition, the promotion of sustainable rural development strategies, including sound management of natural resources, is a central concern of agricultural information systems. Information can support sustainable livelihoods in a number of ways. The multiple uses for information correspond to the diverse needs of different users, their assets and their opportunities. Access to mass media and cosmopolite sources of information by the respondents is presented in Table 2.

**Table 2:** Access to mass media and cosmopolite sources of information by the respondents n=500

Media	Frequency	Percentage
Radio	225	45.00
Television	223	44.60
Print Media	77	15.40
Mobile Phone	439	87.80
Extension contact	29	5.8

Multiple sources accessed

Table 2 reveals the mass media exposure and access to cosmopolite sources of information by the respondents. It is clear from the Table that access to print media was poor however; about half of the respondents have access to radio and television. Surprisingly, 87.80 per cent of the respondents owned/use mobile phone. Extension agency contact was also found to be very low in the study area as a whole.

As reported by the TRAI, 2016, the total mobile phone users in north eastern states of Himalayan region of India was 4.1 million. A study conducted among the Garo tribal farmers (n=250) in the north-eastern Himalayan region of India found that mobile phones are owned by everybody, while 71 (34.63%) farmers are having featured phone and 134 (65.37%) farmers owned smart phone. Majority of them (65.37%) use their mobile phone for listening music followed by 62.92 per cent farmers use for watching videos and 21.46 per cent farmers use for listening to radio. The younger generations of Garo tribe are more technology savvy and inclined to the use of mobile phone for different purpose and even agricultural purpose as well. Hence, mobile based agro-advisories has real potential to come out as alternate extension system for dissemination farm information to the farming communities in the region, which will eventually result in increasing mobile use efficiency of the farmers in gathering farm information and ultimately help the farmers in the region to access right farm information at right time<sup>[9]</sup>.

Forest-based livelihoods strategies are conditioned by market remoteness and forest proximity. Remoteness also limits opportunities for alternative employment. Commercial trade of agriculture and forest products often requires long journeys to transport produces to markets, with high transactions costs in the form of transportation expenses, losses to perished product, official and unofficial tariffs, taxes and bribes, and uncertain demand and prices when they reach market<sup>10</sup>. As *jhum* cultivation are mainly performed in remote forest hence, it was imperative to study about market remoteness and forest proximity.

**Table 3:** Distribution of respondents based on Distance to Market and District headquarters n=500

Distance in KM	Frequency	Percentage
<b>Distance to market</b>		
Up to 10 Km	357	71.40
11-20 Km	91	18.20
21-30 Km	52	10.40
<b>Distance to District Head Quarter (DHQ)</b>		
Up to 20 Km	90	18.00
21-40 Km	174	34.80
41-60 Km	119	23.80
61-80 Km	87	17.40
Above 80 Km	27	5.40

In regard to distance from *jhum* land to market place the maximum (71.40%) respondents revealed that the distance to market (Table 3) was up to 10 Km followed by 18.20 per cent were situated up to 11-20 Km from market place. Only 10.40 per cent respondents reside at a distance of 21-30 Km from market place. In case of distance to District Headquarters (DHQ), 36.80 per cent respondents were 21-40 Km away from DHQ while 23.80 per cent respondents reside at a distance of 41-60 Km from DHQ. Only 18 per cent respondents reported the distance up to 20 Km from DHQ.

#### Problems in Agricultural Diversification

Agricultural diversification is an important mechanism for

economic growth. It depends, however, on there being opportunities for diversification and on farmers' responsiveness to those opportunities<sup>11</sup>. Changing consumer demand, changing demographics, changing marketing opportunities and diversifying from the monoculture of traditional staples can have important nutritional benefits of agricultural diversification for farmers in NEH region. However, *jhumias* are often not able to construct productive strategies to diversify their livelihood because of overwhelming odds. In order to secure people's livelihood, it is imperative to determine as to what exactly are the inhibiting factors so that necessary interventions may accordingly be made to create conducive climate.

**Table 4:** Constraints in Agricultural diversification n=500

Items	Grand Mean	Item Mean	Rank
Infrastructural Constraints	2.39		
Lack of market access		2.37	III
Lack of transport & subsidy for the products		2.55	I
Lack of value addition unit		2.28	V
Lack of proper road		2.48	II
Absence of small scale enterprises		2.30	IV
Resource constraints	2.24		
Insufficient natural resources (especially water scarcity during winter months)		2.25	II
Lack of individual property for capital building		2.34	I
Lack of individual ownership of land		2.14	IV
Lack of loan facility		2.24	III
Technological Constraints	2.36		
Lack of organic weed control method in <i>jhum</i> field		2.34	III
Lack of High Yielding Varieties for <i>jhum</i> land		2.39	I
Lack of access to extension service		2.35	II
Socio-economic constraints	2.23		
Inadequate experience in expected livelihood		2.18	II
Lack of role model entrepreneur in the vicinity		2.18	II
Unavailability of credit facility due to common property land resources		2.12	III
Lack of good market price for the produce		2.45	I

Table 4 reveals that among several impediments, poor infrastructural facility (GMS, 2.39) emerged as the most important constraint that hinders the different options of crop diversification. The technological constraints (GMS, 2.36) and resource constraints (GMS, 2.24) were other important impediments as perceived by the respondents towards diversification of livelihood of *jhumias* followed by socio-economic constraints (GMS, 2.23). Punitha *et al.* [12] reported that weed was one of the major problem faced by *jhum* farmers in the *jhum* field of Manipur. Huge labour cost, drudgery in removing weed manually, more weed growth after rainfall were the reason pointed by the *jhumias* as the problem in maintaining fruit orchard in *jhum* field. Hitherto, *jhum* farmers were practicing cultivation of crops without any external input like chemicals as they were completely against the method of controlling weed through chemical method. If any organic method of weed control method found suitable for those *jhum* areas, then it could be advocated to the *jhum* farmers through on farm trial and subsequently through front line demonstrations through respective KVK in each district. In North East India, where most of the populace comprises subsistence farmers largely depending on shifting agriculture,

technologies in agricultural development that are based on high external inputs, become inappropriate and inaccessible. Technologies, therefore, need to adapt to local conditions based on the principles of low external input for sustainable agriculture and should also be pro-nature, pro-poor and pro-women-oriented [13].

#### Prospects of Agricultural Diversification:

Shifting cultivation or slash and burn agriculture (locally called as *Jhum*) is the main form of agriculture in the hilly parts (locally called as *Tilla*) in the north-eastern region of India by the indigenous people. It is recognized that agricultural diversification helps achieve food security and improved human nutrition and increased rural employment; it can also impact favorably on soil fertility and pest incidence. Agricultural diversification involves movement of resources from low value commodity mix to high value commodity mix. It focuses mainly on horticulture, dairy, poultry and fisheries sector. The expected agricultural diversification strategies in shifting cultivation area as preferred by the respondents are presented in Table 5.

**Table 5:** Expected agricultural diversification strategies in shifting cultivation area n=500

Expected Agricultural Diversification Strategies	Mean	Rank
Agro forestry development (Tree bean, fodder, Subabul, Wild fruit crops, broom grass, guinea grass, mulberry, Multipurpose Trees etc.)	3.99	VI
Fruits orchard (Banana, Papaya, Citrus, Kiwi fruit, guava, pomegranate, pineapple, plum, amla etc.) development	4.19	II
Low cost bamboo poly house with high value cash crops(capsicum, king chilli)	3.96	VII
Integrated farming System	4.08	V
Integrated mushroom cultivation	3.25	XV
Integrated Apiary	3.27	XIV
Vegetables cultivation (Tomato, brinjal, chilli, cabbage, cauliflower, broccoli, leek, cucurbits, beans, pea, carrot, radish, leafy vegetables etc.) either sole or intercropping under fruit crops	4.23	I
Spice production (Turmeric, ginger, king chilli, etc.) either sole or intercropping under fruit crops	4.18	III
Introduction of Rabi crops under zero/minimum tillage (Rapeseed mustard, lentil etc.)	3.59	XI
Introduction of cover crops(e.g. Rice bean)	3.53	XII
Small scale primary processing unit (pickle jam/jelly, RTS beverage, squash, candy etc.)based on the produces from the <i>jhum</i> land	4.14	IV
Sericulture(if mulberry is included under agro-forestry)	3.34	XIII
Composting/Vermi-composting (using crop residues or leaf litter from agro-forestry component)	3.64	X
Live fence (e.g. perennial pigeon pea) for protection from wild animals as well as for additional income generation	3.80	VIII
Diversification through intercropping of pulse in Agro forestry system	3.68	IX

Table 5 reveals that vegetables cultivation (MS, 4.23), fruits orchard (MS, 4.19) and spice production (MS, 4.18) were identified by the respondents as a top three strategies for agricultural diversification in shifting cultivation area and ranked I, II and III respectively. Other strategies like small scale primary processing unit (pickle jam/jelly, Ready To Serve (RTS) beverage, squash, candy etc.) based on the produces from the *jhum* land (MS, 4.14), integrated farming system, agro forestry development (MS, 3.99) could be a viable option for agricultural diversification in shifting cultivation area as reported by the respondents. High value crops generally refer to non-staple agricultural crops such as vegetables, fruits, flowers, ornamentals, condiments and spices. Most of the high value agricultural crops are those known to have a higher net return per hectare of land than staples or other widely grown crops. Awareness among the respondents about this fact might have resulted in adoption of these crops for cultivation in *jhum* land towards diversification. Inclusion of agro forestry development (Tree bean, fodder, Subabul, Wild fruit crops, broom grass, guinea grass, mulberry, Multipurpose Trees etc.), low cost bamboo poly house with high value cash crops (capsicum, king chilli), live fence (e.g. perennial pigeon pea) for protection from wild animals as well as for additional income generation, diversification through intercropping of pulse in agro forestry system, composting/vermi-composting (using crop residues or leaf litter from agro-forestry component), introduction of rabi crops under zero/minimum tillage (Rapeseed mustard, lentil etc.), introduction of cover crops (e.g. Rice bean), sericulture (if mulberry is included under agro-forestry), integrated apiary and integrated mushroom cultivation may also have potential for livelihood diversification of *jhumias* as expressed by the respondents in descending order of preference. Government of India under Horticulture Mission for North East & Himalayan States (HMNEH) is promoting horticulture in a big way through a number of schemes and incentives<sup>[14]</sup>. Introduction of high yielding varieties, adoption of high density planting, canopy management, protected cultivation, training and capacity building, credit and subsidy would help diversification of shifting cultivation.

### Conclusion

The shifting cultivation areas of north east India is deprived of many developmental gains and remained bypassed despite a number of initiatives from time to time. This indicates that the policy planning strategies did not cater to the requirement of the region. Appropriate strategies are needed so that the rich and vast natural resources are exploited sustainably. This will help accelerate growth and make development more inclusive. Effective provision of production infrastructure in the line of Provision of Urban Amenities to Rural Areas (PURA) is essential to establish robust connectivity of rural community to market, and reverse the migration to urban areas. Possibilities of convergence of numerous developmental programs into an integrated and inclusive hill developmental scheme need more attention. In view of the geo-physical situation and vast potential in agriculture including forestry and horticulture, a complete input-output delivery package including improved seeds or saplings of fruit crops, fertilizers and pesticides, coupled with marketing facilities have to be organized.

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