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Short communication

Horticulture based farming system as an alternative to *Jhum* in North East India: *Jhumias'* perspectives

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ABSTRACT

The purpose of this study was to identify the appropriate technological interventions to manage *jhum* land and forest fallow based on *jhumia's* preference and to analyze the problems as perceived by them. 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 were ranked I, II and III respectively. Among several impediments, the infrastructural constraints (GMS, 2.36) emerged as the most important barrier that hinders the different options of crop diversification followed by *jhum* specific technologies. The paper discusses several issues that require attention on priority basis for accelerating the pace of agricultural diversification among *jhumias*.

Key words: Cash crop, farming system, *Jhum,* livelihood diversification, North East India.

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. The region accounts for 83 per cent of the total shifting cultivation area in India (NRSC, 4). Out of total schedule tribe households (16, 68,745) of six North Eastern Hill (NEH) states namely; Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura, about 23 per cent of them were practicing shifting cultivation (NEC, 3). *Jhum* is a primitive practice of cultivation in NEH region and other tribal areas of India, and people involved in such cultivation are known as *jhumia*.

The practice involves first clearing of vegetation/ forest cover, drying, burning it before onset of monsoon, and growing crops on it. After harvest, this land is left fallow and vegetative regeneration is allowed on it till the land becomes reusable. Although *jhum* cultivation is destructive for environment and non-remunerative for the cultivators; the vast majority of rural and semi-urban households have to resort to this primitive cultivation practice (Singh *et al.,* 6). The shifting cultivation became unsustainable today primarily due to the increase in population that led to rise in food demand. *Jhuming* cycle in the same land, which extended to 20–30 years in earlier days, has now been reduced to 3–6 years (Borthakur, 2). Land degradation in the region is 36.64 per cent of the total geographical area, which is almost double the national average of 20.17 per cent (Anonymous, 1).

To mitigate the problems associated with *jhum* and their management, scientific establishments has put forth number of alternatives including conversion of *jhum* area to settled agriculture through terrace construction or establishing plantations and orchards, agro forestry, sericulture, integrated mushroom cultivation, integrated apiary etc. The identification, prioritization and diffusion of environmentally sound technologies for mitigation and adaptation to problems associated with *jhum* can be a powerful solution for simultaneously addressing problems and advancing development. If the process of technology development, diffusion and transfer is designed and implemented effectively, it will generate significant opportunities to address the problems of *jhum* and promote sustainable, innovation-based growth. As such, choices we make on technology selection and investments will have profound and long-term impacts on our societies (UNDP, 8). The present study is an effort to empirically examine and document the *jhumias'* choice over a basket of technologies and potential barriers in adoption of these technologies to manage *jhum* land.

The present study was conducted during 2016-17 in six states of North Eastern Hill (NEH) region of India, namely Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. The selection of locale was based on the proportion of Scheduled Tribes to total population in the district.

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RD (Rural Development) blocks were purposively selected based on maximum area under *jhum*. From each block 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, barriers were measured using three point scale (1-no barrier, 2-minor barrier, and 3-major barrier). The participatory tools and processes also applied for the study include multi-stakeholder consultations; key respondent interviews; transact walks, field observations, and focus group discussions with a variety of stakeholders in the study area for triangulation of responses.

The expected horticulture diversification choices in shifting cultivation area as preferred by the respondents are presented in Table 1.

Table 1 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 choices 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. Other alternatives also have potential for livelihood diversification of *jhumias* as expressed by the respondents in descending order of preference. Thimmappa and Mahesh (7) reported that among the different farming systems the horticulture-based farming system registered maximum annual net return per hectare and this system generated 111 man-days which was very close to shifting cultivation (133 man-days) in Meghalaya.

Agricultural diversification is an important driver of economic growth. It depends, however, on there being opportunities for diversification and on farmers' responsiveness to those opportunities. During survey (Fig. 1) it was found that a number of *Jhumias* have already started cultivation of cash crops on *jhum* land with assistance under horticultural development schemes of Central and State Governments. Changing consumer demand, demographics, marketing opportunities and diversifying from the monoculture

Table 1. *Jhum* management choice preferred by the respondents.

n=500

Jhum management choice	Mean	Rank
Vegetables cultivation (Tomato, brinjal, chili, cabbage, cauliflower, broccoli, leek, cucurbits, beans, pea, carrot, radish, leafy vegetables etc.) either sole or intercropping under fruit crops	4.23	I
Fruits orchard (Banana, papaya, citrus, kiwi fruit, guava, pomegranate, pineapple, plum, amla etc.) development	4.19	II
Spice production (Turmeric, ginger, king chili, etc.) either sole or intercropping under fruit crops	4.18	III
Small scale primary processing unit (pickle jam/jelly, RTS beverage, squash, candy etc.) based on the produces from the *jhum* land	4.14	IV
Integrated farming System	4.08	V
Agro forestry development (Tree bean, fodder, subabul, wild fruit crops, broom grass, guinea grass, mulberry, multipurpose tree etc.)	3.99	VI
Low cost bamboo poly house with high value cash crops(capsicum and king chili)	3.96	VII
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
Composting/Vermi-composting (using crop residues or leaf litter from agro-forestry component)	3.64	X
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
Sericulture(if mulberry is included under agro-forestry)	3.34	XIII
Integrated apiary	3.27	XIV
Integrated mushroom cultivation	3.25	XV

Fig. 1. a. Orange fruit orchard on *Jhum* land in Upper Subansiri, Arunachal Pradesh, b. & c. Mono-cropping of strawberry and cabbage in *Jhum* land of Siaha, Mizoram, d. Solo cropping of pineapple in *Jhum* land of West Garo Hills, Meghalaya.

of traditional staples can have important nutritional benefits of agricultural diversification for farmers in NEH region. However, *jhumias* are often not able to diversify their livelihood because of overwhelming odds. In order to secure people's livelihood, it is imperative to determine what exactly the inhibiting factors are so that necessary interventions are made.

Table 2 reveals that among several impediments, poor infrastructural facility (GMS, 2.39) emerged as the most important barrier that hinders the different options of crop diversification. The technological barriers (GMS, 2.36) and resource barriers (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*. (5) 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 averse to herbicide application. Alternative methods of weed management may be promoted through Krishi Vigyan Kendras. It is argued that low external input for sustainable agriculture practices are promoted.

A clear picture emerges that indigenous shifting cultivators prefer horticulture based farming system among various alternatives to manage *jhum* in NEH region. The extension agencies of the region involved in technology transfer of *jhum* management should focus on promoting fruit, vegetable and spices cultivation and promote intensification allowing the adoption of better and longer fallow management cycles. Improving the value of the fallow or a shift towards settled cultivation, horticulture has provided the much needed capital with which

Table 2. Barriers to technology adoption for diversification.

n=500

Items	Grand Mean Score (GMS)	Rank
Infrastructural barriers	2.39	I
Resource barriers	2.24	III
Technological barriers	2.36	II
Socio-economic barriers	2.23	IV

further intensification of lands has been undertaken in many cases of the NEH region. Niche and high value crops such as cabbage, cauliflower and tomato have emerged as favourite in many shifting cultivation areas. This may get further impetus because of higher allocations for Horticulture Mission for North East and Himalayan States.

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