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Rice-based cropping system of different ethnic groups across the Brahmaputra floodplain in Assam, India

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Abstract: In Assam, various ethnic groups have traditionally engaged in agriculture, especially rice cultivation in the Brahmaputra floodplain. It is important for agricultural development to understand how these people technologically adapt to the low-lying floodplain environment and how much variations are there among cropping technology of different ethnic groups. This study revealed the regional differences of rice-based cropping system among the different ethnic groups living in the Brahmaputra floodplain through a comprehensive field work in 32 villages. The results show that the present rice-based cropping system has little relation with ethnic background, but it is based on local ecological condition. Both traditional and modern technology shows some regional pattern within the Brahmaputra floodplain, which may be caused by interaction of both indigenous people and immigrant people.

Key words: Rice cultivation, cropping technology, ethnic groups, Brahmaputra floodplain, Assam

Introduction

In Assam of Northeast India, rice is traditionally grown in the low-lying floodplain formed by the mighty Brahmaputra coming down from the Himalayas. Till today, most of the population in Assam has been engaging in rice cultivation, and the considerable portion of the state economy (about 45% of Net State Domestic Products) depends on agricultural sector (Daimari, 2008). The rice cultivation in Assam, however, still using various kinds of traditional technologies and the productivity is much lower than the national average (1576 kg/ha in Assam and 2130kg/ha in All India in 2009/10 from Gov. of India 2011). Moreover, influence of natural hazards such as floods and droughts is not negligible. Modernization of agricultural sector including rice cultivation is the urgent task of the state government.

Many researchers studied problems of rice cultivation in Assam for agricultural development (e.g. Das, 1985; Bhagabati and Das, 1992; Singh, 2006). However, the methodological problem is that most of them are using district-level statistical data. These studies often focus on output of rice cultivation such as yield or economic value per area, and hardly consider the cropping technology which peasant farmers are using in their paddy fields. The information on existing cropping technology is fundamental for agricultural development, but it is not studied much in Assam. Moreover, northeast India including Assam is the home of different ethnic groups such as Aryans, Tibet-Burma, Tai group. It is also important to know how these people with different cultural background have historically developed the rice-based cropping system in the Brahmaputra floodplain.

This study reveals the rice-based cropping systems of different ethnic groups living in the Brahmaputra floodplain through extensive village survey, and discusses the regional differences and ongoing changes of the system.

Materials and Methods

Field work was carried out at 32 villages in 12 districts in the Brahmaputra floodplain in Assam during September to December 2011 (Fig. 1). The dominant group is Hindu Assamese (Aryans) in 12 study villages, Ahom (Tai group) in 5 villages, Bodo, Kachari, Mishng, Rabha, Mutok (Tibet-Burma group) in 2 villages each, Muslim Assamese, Ex-Tea garden tribe, Koch (Aryans), Karbi, Deori (Tibet-Burma group) in 1 village each. The average distance of study villages from nearest town is about 10

km (Max. 25 km, Min. 2 km). They are located in different ecological zones of piedmont plain, alluvial plain and floodplain.

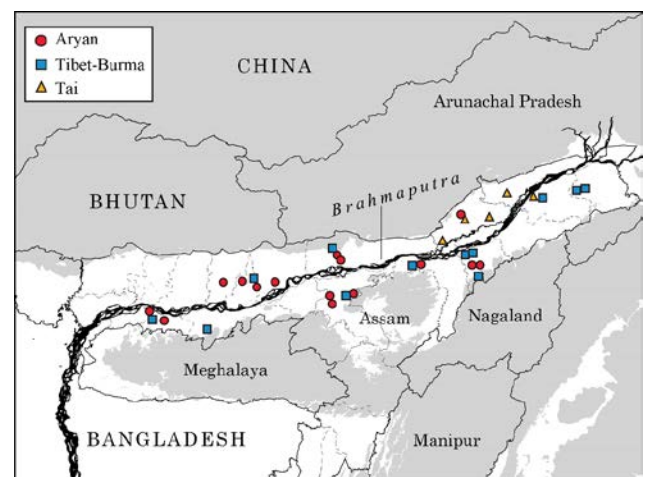


Fig. 1. The Brahmaputra floodplain and the study villages (Note: Altitude above 300 m is gray shaded.)

Primary data were collected in the study villages through questionnaire survey from male farmers in local language (Assamese language). The questionnaires include questions on village information (approximate household number, ethnicity, foundation year etc.), cropping pattern (both present and before), cultivation practices (transplanting, weeding, harvesting, threshing etc.), rice variety (local variety, modern variety etc.), agricultural implements (both traditional and modern), paddy field condition (location, soil quality etc.).

Results

It is well known that there are three kinds of traditional rice group in Assam grown in different season and ecological condition; *Ahu*, *Bao*, *Sali*. *Ahu* is the broadcast rice grown from February to June in higher paddy fields. *Bao* is also broadcast rice but grown from February to November in lower fields. *Sali* is the transplant rice grown from June to November. These rice correspond to *Aus*, broadcast *Aman* and transplant *Aman* in Bangladesh. In all study villages, regardless of ethnicity, any of these rice are grown (Fig. 2a). Among three rice, transplant rice *Sali* is

cultivated in all villages, but *Ahu* and *Bao* are cultivated only in some villages.



Fig. 2. Cropping pattern of the study villages (a) present, (b) before. (Source: Author's fieldwork)

The variation of cropping pattern is attributed to rather ecological and economic condition than ethnic background. When compared to former cropping pattern, nowadays *Ahu* and *Bao* rice was abandoned in some villages (Fig. 2b). Farmers insist rainfall decrease and low yield are the main reasons of this change. They could not continue broadcast rice due to rainfall decrease, and some farmers started to cultivate the same variety as transplant rice. After stopping rice cultivation, some farmers started wage labour and others converted their paddy fields in higher land into private tea garden to earn stable and more profit. Only in the western and central part of the state, *Boro* rice, which is grown from December to May in dry season, was introduced with irrigation facilities.

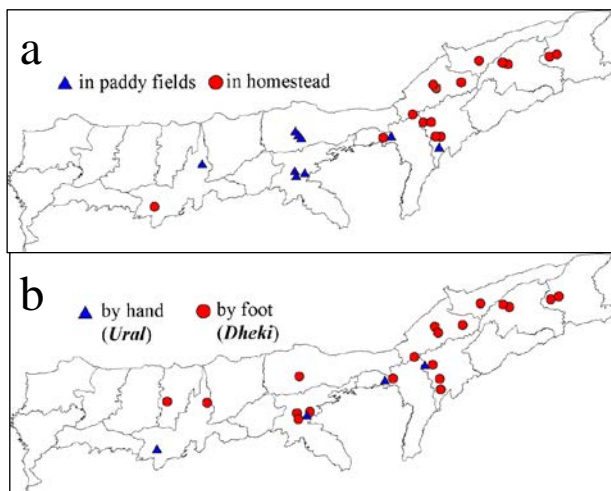


Fig. 3. Cultivation practices in the study villages (a) seedbed, (b) milling. (Source: Author's fieldwork)

There is not much difference in cultivation practices among study villages. It was found that broadcasting season of *Ahu* and *Bao* rice or transplanting season and harvesting season of *Sali* rice is almost same in all villages. However, minor differences can be seen in seedbed

preparing, weeding, threshing and milling. In the villages of eastern (western) Assam, they prepare seedbed in their homestead (paddy fields) (Fig. 3a). In threshing, some ethnic groups like *Mishing* use their foot for threshing rice while others use cows or tractors (no figure). In milling rice, people of *Mishing*, *Karbi* and *Rabha* use wooden mortar by hand (*Ural*), while others use wooden mortar by foot (*Dheki*) (Fig. 3b and Fig. 4).



Fig. 4. Traditional wooden mortars. (a) *Ural*, (b) *Dheki*. (Source: Author's fieldwork)

There can be seen the specific regional difference of plough (*Nangal*) type (Fig. 5). In the Brahmaputra floodplain, traditional plough is still used for land preparation along with harrow (*Moi*), both implements are pulled by two bullocks. Different kinds of plough are used together for different purpose. In many villages, wooden plough (*Kathor Nangal*) and iron plough (*Rohar Nangal*) are used (type I in Fig. 5 and Fig. 6). In the western part, iron plough is not used but two kinds of wooden plough (*Soja Nangal*, *Buta Nangal*) are used (type II). In the eastern part, they also use two kinds of wooden plough, one of which bottom has a longer shape (*Fanforiya Nangal*) (type III). In two villages of the eastern most district, they only use *Fanforiya Nangal* (type IV). This difference of plough type does not seem to be related with ethnicity.

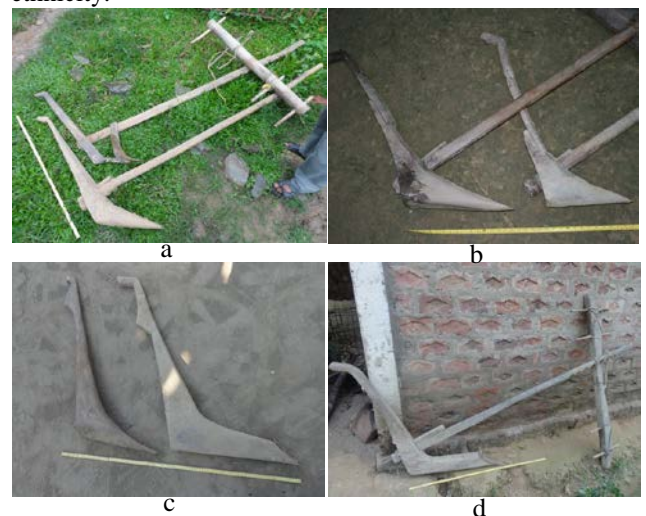


Fig. 5. Different type of ploughs. (a) *Kathor Nangal* (bottom) and *Rohal Nangal* (top), (b) *Soja Nangal* (right) and *Boja Nangal* (left), (c) *Fanforiya Nangal* (right) and *Kathor Nangal* (left), and (d) *Fanforiya Nangal*. (Photos of I, III, IV are taken by author, Photo II by Nityananda Deka)

There are so many local rice varieties in Assam, but nowadays many farmers grow High Yielding Varieties (HYVs) as it has higher productivity than local variety. HYV is grown in all study villages, but its popularity is higher in the western Assam (Fig. 7a). In the eastern Assam, local variety is still popular mainly for its taste. Among local varieties, glutinous rice or sticky rice locally called *Bora Chaul* is the special variety for local people as the rice cake (*Pitha*) or daily light meal (*Jolpan*) is made from this variety. This variety was found in almost all study villages, but the local name is different in some villages especially in the western Assam (Fig. 7b).

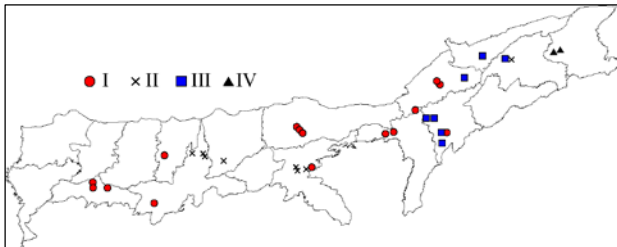


Fig. 6. Plough type of the study villages. I, II, III, IV are given in text. (Source: Author's fieldwork)

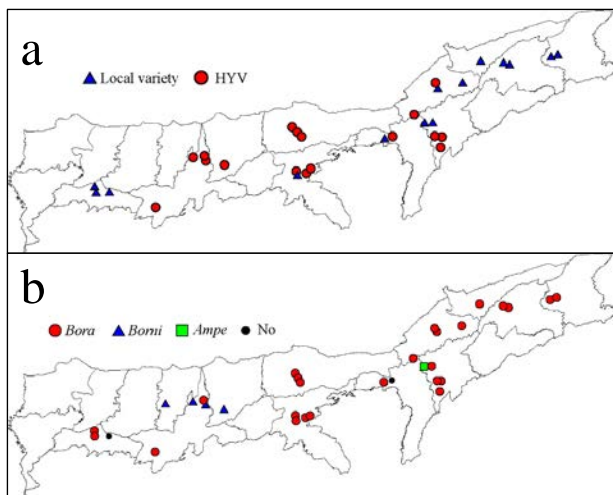


Fig. 7. Rice variety of the study villages (a) most popular variety, (b) name of the glutinous variety. (Source: Author's fieldwork)

Finally, introduction of modern inputs for rice cultivation was investigated. Cultivating machinery such as power tiller or tractor is introduced into almost all villages. These machineries are used for land preparation along with bullocks. Chemical fertilizer is also used in many villages along with traditional cow dung but it is not used in some villages in eastern Assam (Fig. 8a). Irrigation facilities such as power pump and tube well are used in the villages in the western and central Assam, but not in the eastern Assam (Fig. 8b). These modern inputs were brought to study villages after the 1990s. Introduction of these modern inputs are gradually carried on in all ethnic community.

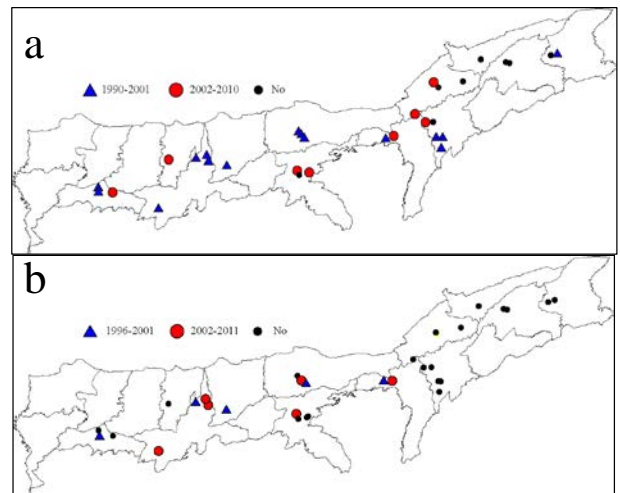


Fig. 8. Introduction of modern inputs in the study villages (a) chemical fertilizer, (b) irrigation facility. (Source: Author's fieldwork)

Discussion

From the above results, it can be said that rice cropping technology in the Brahmaputra floodplain is rather uniform among the different ethnic community, though a few of cultivation practices are different by ethnic community. However, It should be noted that there are some regional patterns among the distribution of traditional technology. Especially, the plough type is clearly different between eastern and western part of the state. As for modern technologies, most of these technologies were introduced during the 1990s and 2000s, but they can be found more in the villages of the western Assam. Why these regional patterns are seen among the cropping technologies?

Local farmers explained that interaction with farmers from other villages had enabled transfer of new technologies. One farmer from Ex-Tea garden tribe community said they spoke their own language and kept unique culture in the village. They had little experience to interact with people from other community before, but nowadays they accept general Assamese culture such as food habit and festivals to a large extent. They have many opportunities to learn cropping technology from other village, and this is one explanation why differences of traditional technology become small over the ages in the neighboring region. The assimilation between different communities was also reported in the previous study (Nath, 2003), but its effect on technology diffusion should be studied more.

There are also answers of why modern technologies are introduced more in the western part of the state. One farmer from Assamese community in Nagaon District (central part of Assam) said Muslim immigrants came to sharecrop in his village because the immigrants owned only a small size of paddy fields. They started to grow *Boro* rice in the tenanted land, and the indigenous villagers could learn the *Boro* rice cultivation from them. Another farmer from Assamese community in Goalpara District (western part of Assam) also had interaction with Muslim immigrants in his village. The immigrants started to use chemical fertilizer which accelerated the growth of rice. After harvesting rice in the earlier season, they kept cows

in the paddy fields. Then the indigenous Assamese farmers too had to use chemical fertilizers, otherwise stray cows could come to eat the un-harvested rice in their paddy fields. In these ways, modern technologies have been gradually introduced in the central and western part of the state where many Muslim immigrants live among indigenous Assamese community.

Apart from the villagers' interaction with different community, agricultural office in the nearest town also plays the important role for extending modern inputs. Introduction of modern inputs largely depends on the availability of schemes from agricultural office. One Assamese farmer said they started *Boro* rice cultivation because the government provided them with rice seed as a demonstration. On the other hand, another Assamese farmer complained that the government does not provide any irrigation equipments, which could enable *Ahu* rice cultivation in his uncultivated land. However, only the distance from nearest town cannot explain the availability of government scheme in each study village, and more research will be required on how the villagers bring new technology from the office.

Conclusion

The present rice-based cropping system in the Brahmaputra floodplain shows little differences among the ethnic communities, but some regional characteristics are seen in the use of both traditional and modern technologies. Interaction with indigenous people and immigrant people from different ethnic community may be related with the technology diffusion. Therefore, historical interaction of different ethnic community should be studied for

understanding the present rice-based cropping system and future agricultural development in the state.

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