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## Farm size categories and agricultural implements used for farming: a case study in Baghaichari Mukh village, Chittagong hill tracts, Bangladesh

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**Abstract:** The paper aims to report the types, sources and functions of the existing agricultural implements of indigenous Chakma people, who live in the Chittagong Hill Tracts of southeast Bangladesh. The major farming system in Chittagong Hill Tracts is still traditional. Subsistence farming of small farmers is most prevalent where farming is carried out in a traditional way using with hand-made agricultural implements from wood and bamboo. Also a great deal of human labor and animal-draught power is required for land preparation, sowing, transplanting, harvesting and processing. Recently, modern implements (e.g. power tiller) as well as locally existing agricultural implements began to be used for rice cropping system in the village. However, farmers' practices and management are still kept as traditional ways that they are taught from their ancestors in the village. Some farmers prefer using draft power more than the power tillers, because they thought draft power can till the land deeper. According to the interview with a few farmers, deep tillage can control weed seeds which enables high yield, whereas the tillage with power tiller is not good for the yield. Some farmers said that the power tiller is very useful in the rainy season for preparing puddle soil. Farmer opines that power tiller is required less time in order to till the land though some farmers prefer modern implements.

**Key words:** Chittagong Hill Tracts, farm size categories, existing agricultural implements and modern implements.

### Introduction

Chittagong Hill Tracts (CHT), cover an area of 13,295 km<sup>2</sup> is situated southern part of Bangladesh, bordering the Rakhine and Chin States of Myanmar and Tripura and Mizoram States in India (Background of Chittagong Hill Tracts, 2002). It is the land to nearby twelve indigenous groups, who do not exactly share a common language among themselves, but who are so far part from majority Bengali population in terms of indigenous background, religious and socio-cultural practices. These indigenous peoples are called *jhumma* that include the people who cultivate *jhum* (swidden cultivation). *Jhum chas* (swidden cultivation) is practiced by the indigenous communities of the Chittagong Hill Tracts regions since time immemorial. The major farming system in Chittagong Hill Tracts is still traditional. Subsistence farming of small holder farmers is most prevalent where farming is carried out in a traditional way using with old and indigenous farming implements and little inputs. This involves a great deal of human labor and animal-draught power for land preparation, sowing, transplanting, harvesting and processing. The use of animal-drawn implements of today is a crucial in realizing the current socio-economic condition of Chittagong Hill Tracts. Improvement of agricultural implements is a prerequisite and important for any improvement of agriculture as a whole. However, research on locally existing agricultural technologies in Japanese ZAICHI NO GUUTSU (Ando, 2011) has been so far considered a neglect subject and detail and comprehensive study is still lacking in Chittagong Hill Tracts. Besides, there have been few research efforts to encourage the use of appropriate farm implements which has a great potential increase the national production. Therefore, the study aims to identify the types, sources and functions of the existing agricultural implements in the study area.

### Materials and Methods

This study was carried out in Baghaichari mukh village Under 51 No Dighinala Union of Dighinala Upazila of Khagrachari district. The village is located about 30 km away from the district headquarters. The field surveys were carried out in 2005. The village stretches 500 m from south to north and 3 km from east to west. The Mayani

River flows through the western part of the village. One concrete road runs from north to south. The reserved forest is located in eastern part of the village. There were 247 households in the study village and were interviewed by questionnaire. In addition, interviews using a semi-structured questionnaire and field observations were also conducted. Three distinct cropping seasons existed in this area. The summer season was in March and April and it is characterized by high temperatures and humidity with occasional thunderstorms and cyclones. The rainy season started in May and ended in October, while winter started in November and ended in February (Soil Resource Development Institute, 2002). Based on long-term records (1961-1990) obtain from the Rangamati Weather Station, rains began in February, gradually increased until July, and then decreased. Ninety percent of the rainfalls occurred during the rainy season from May to October. The highest (627 mm) and lowest (4 mm) amounts of rainfall occurred in the months of July and January, respectively. Maximum 33°C and minimum 20°C temperatures were recorded in April and January (BBS, 2001).

### Results and Discussion

**Farming practices and agricultural implements uses in the study village:** Farming practices in Baghaichari mukh village include cultivation techniques, and farming implements.

**Seed germination:** At first, about 1 Ari (1 Ari= 10kg) of seeds are placed in a bag (locally call such as *bosta*, *karang*, *leye*, or *maralla*) and soaked in water for one day. Then the seeds are placed in another bag, covered with banana or teak leaves for 10-12 hours and kept in the house. The seeds are then soaked in water for a while, covered with any green leaves (again, teak or banana), until the seeds are germinated. Within 22-24 hours the seeds begin sprouting.

**Preparation of seed bed:** The seed bed is prepared in the different land types, but mostly it was practiced in the homestead areas and near the rice fields (Fig. 1a).

**Ploughing:** This is usually done by with a plough and a team of two bullocks (Fig. 1b). Most farmers prefer tillage with a *naol* (a traditional plough) for its deep tillage, but

some preferred a power tiller. Most still preferred the *naol* for its deep tillage. According to the farmers, deep tillage controlled weed seeds and yield was increased, whereas the tillage with power tiller was not good for the yield.



**Fig. 1.** (a) Seedbed, (b) Ploughing the paddy plot by using bullock

The farmers also revealed that the power tiller is very useful in the rainy season for preparing puddle soil for transplanting aman. Though most farmers still preferred the traditional plow, the fact that power tilling required less time impressed many enough to use it. In the study area, farmers plowed 3 to 4 times with the traditional plow, or 2 times by power tiller (although they still used the traditional plow to plow once for the final land preparation). The plowing time is very early in the morning (from 5 to 10 a.m.). This is completely different from other plain areas. If a farmer rented a pair of bullocks, he would pay 50 Taka for 5-6 hours each day. A farmer using a power tiller would pay 200 Taka to plow 40 decimal of land.

**Harrow:** The farmers level the paddy field with a leveler (locally called *shapta*), which is pulled by two bullocks while the farmers sat on the level (Fig. 2a).

After one plowing is completed; one leveling is needed for pressing the soil tightly. Three repetitions of plowing and leveling are necessary for good land preparation. This implement is used for leveling of cultivated land and also to break clods. It is made of three pieces of split bamboos or wood.

**Transplanting:** Transplantation is done manually (Fig. 2b). Regarding irrigation facilities, farmers make a small reservoir to collect water in a small piece of land. Villagers usually followed a local custom of having fixed days for transplanting and harvesting. There is a proverb which says, '*shom shokkure lagai dhan, bode breshode ghorat an*'. This means that one should plant rice on Monday and Friday, and harvest on Wednesday and Thursday.



**Fig. 2.** (a) Farmer leveling the paddy plot by the ladder, (b) Transplanting of rice seedling

**Weeding:** Weeding is usually carried out manually 15-20 days after transplanting (Fig. 3). Family labor is mainly used but sometimes-hired labor is needed. The fertilizers

commonly used are Urea, T.S.P (Triple super phosphate) and M.P. (Murate of potash). However, the amount of fertilizer application is limited to a rate of about 10kg in each plot because of its high cost.



**Fig. 3.** Weeding done by male and female

**Pesticide:** The commercial names of pesticides widely used in the village are Ripcord, Furadan and Basudin. Farmer locally makes implement for pesticide sprayer (Fig. 4).



**Fig. 4.** Locally made implement for pesticide sprayer

Farmers also used an indigenous method especially for rice bugs. When a side of a plot became dry while the other sides of the plot remained wet, the *chunapada rug* (meaning to look like calcium chloride) attacked the plot and the rice leaves become whitish and the plants became weak. Farmers put some branches of *kuruk* around the affected plot (Fig. 5). Farmers believed that the rice bugs cannot be eradicated by pesticides or insecticides and that '*kuruk*' (a wild shrub) branches can make the rice bug run away from the field. When rice hispa attacks at the milking stage, farmers place some shrimp paste or fish paste wrapper on the top of sticks. The rice hispa comes to the stick instead of attacking the rice. In the mean time, filling of paddy grain are completed and infestation of rice hispa can be avoided.



**Fig. 5.** (a) To control rice bugs, farmers placed 'Kuruk' tree branches into the paddy plot, (b) Insect control using these 'Kuruk' tree branches

**Harvesting and seed production:** Before harvesting the crop, the farmers pray to God to give them more rice. This is locally called *To Do Fung*. Farmers harvested the rice by hand using sickles, and the rice plants would generally be cut around the middle portion (Fig. 6a). The bottom part is left to decompose to fertilize the next crop. Another advantage of cutting at the middle is that they can be carried easily by making bundles (Fig. 6b and 6c).



**Fig. 6.** (a) Paddy harvesting by using sickle (b & c) Farmers carry bundle of paddy.

The bundles are carried to the homestead and arranged in a circle on a threshing floor to be trampled by bullocks. The bullocks are driven side by side over the circle of rice in a counter clockwise direction (Fig. 7a). After several rounds, the bundles are piled up again and trampled in the same way. 3-4 cows are needed to thresh the large amount of rice. In the case of small amounts of rice, farmers thresh them by treading over them. It takes at least 2-3 days to thresh the rice from a 40 dec. farm. Working hours are at least 3 hour per day per day. Then the straw is removed and the rice grains were collected. They are cleaned by winnowing or *kula* (Fig. 7b), and sun dried for 2-3 days. After drying, the seeds are stored either in *gola* or *chidira* (a storage house made of bamboo). Seeds were carried in a small basket made of woven bamboo (Fig. 7c).



**Fig. 7.** (a) Farmers trampled paddies by bullock, (b) To removing the unfilled grains and dust by using (*Kula*), and (c) Bamboo made basket

**Sickle:** Sickle is locally called ‘charey’. It is a man and women operated implement for paddy harvesting. Materials of construction are locally available and made by locally blacksmith.

**Jhum Cultivation Implements:** *Jhum* was a type of cultivation practice particularly followed in the Chittagong Hill Tracts. Instead of cultivation the entire region, holes at different distance were dug in the soil and seed placed therein. The following implements we generally used in Chittagong Hill Tracts.

**Tagol:** It was used for cleaning of the *jhum* cultivation area by cutting shrubs and herbs and twig of trees (Fig. 8). It was also used for digging holes for sowing seeds. The length of the blade was 25 cm and handle is 25 cm. It is made by the village blacksmith and costs Tk 80 at the market. It was perhaps the most extensively used implement in *jhum* cultivation from start to the end.



**Fig. 8.** Tagol

**Kurum:** Seeds were carried in small basket (Kurum) made of woven bamboo (*Agocha bash*). It was 25cm long and 20cm in diameters at the mouth. It was carried at the back of the user and hold tight at the komor with a rope fitted with the kurum (Fig. 9.). It was made by the village artisans and costs Tk 50 at the market.



**Fig. 9.** Kurum

#### Possession of number of agricultural implements classified by farm size categories in the study village

It is found that the number of agricultural implements are being utilized by the farm size categories has been varied. Table 1 shows that most of the agricultural implements are possessed by small farmers including the plough 62%, yoke 60%, ladder 61%, spade 65%, and sickle 91% but they do not possess modern implements. Among the modern implements like power tiller most of them are possessed by large farmers (66%). It is also found that landless farmers, which are very few in number as they are usually involved in off farm activities, have only a spade and sickle. But medium farmers possess all types of implements. More farmers from medium farm size categories possessed the various items of agricultural implements compared with other farm size categories. There are three power tillers in the village almost all of which are possessed by the medium and large farm size households. The owners rent their power tiller to other farmers in the peak season of land preparation time. From the above result it is also being shown that the number of farming implements has a relation with land tenure systems. The small and medium farmers are involved in rent-in system and they have to have more implements on the contrary the large farmers are involved the rent-out system and comparatively are less possessed. According to the interviewed with farmers that deep tillage controls

weed seeds and yield is increased, whereas the tillage with power tiller is not good for the yield. The farmers are also revealed that the power tiller is very useful in the rainy season for preparing puddle soil for Transplanting Aman

seasons. Some farmers are opined that power tiller required less time in order to tilt the land. Existing agricultural implements are constituted important assets of the farmers in the study area.

**Table 1.** Possession of number of agricultural implements classified by farm size categories in the study village

Farm size categories in ha	Number of Households	Number of implements						
		Different farming implements					Modern implements	
		Plough	Yoke	Ladder	Spade	Sickle	Tube well	Power Tiller
Land less	12 (4.9)	0 (0.0)	0 (0.0)	0 (0.0)	5 (1.8)	9 (0.4)	0 (0.0)	0 (0.0)
Small <1.0	163 (65.9)	139 (62.0)	130 (60.0)	133 (61.0)	178 (65.9)	2240 (91.0)	2 (33.3)	0 (0.0)
Medium 1.0-3.0	61 (24.7)	64 (28.6)	61 (29.0)	62 (29.0)	72 (26.7)	176 (7.1)	2 (33.3)	1 (33.3)
Large >3.0	11 (4.5)	21 (9.4)	23 (11.0)	21 (10.0)	20 (7.4)	37 (1.5)	2 (33.3)	2 (66.7)
Total	247	224	214	216	275	2462	6	3

Source: Survey in 2005, Note: Figures in parentheses indicate percentages

### Existing agricultural implements own made & purchased by farmers of different farm size categories in the study village

In this study, the most important existing agricultural implements are found such as plough, ladder, yoke, sickle, spade, tube well and power tiller. Some implements are mainly own made by farmers and some are bought from local markets. BARC (1982) also listed such implements which were identified in this study. Most implements are imported from outside village or India is mainly brought throughout unofficial lines, it is meant by farmers themselves under their own expenses and management. The modern agriculture implements such as power tiller and water pumps are introduced into the village; power tillers are introduced 5-6 years ago by the large farmer. However, at that time, some modern implements already existed such as small water pumps. Recently, both modern and local implements are used in the village. However, from viewpoints of the farmers' practices and management are still kept as traditional ways that they are taught from their ancestors in the village. It is cleared that the existing agricultural implements have developed based on the physical conditions of a locality such as land use and soil type, particularly soil structure, depth of plough pan, nature of crop grown and also the socio-economic condition of the farmers. These existing agricultural implements have direct impact on the existing farming systems of the study village.

### Conclusion

Recently, both modern and local farming implements are used in the village. However, from viewpoints of the farmers' practices and management are still kept as traditional ways that they are taught from their ancestors in the village. Some farmers are preferred using draft power more than the power tillers because, they thought that it can be tilt the land deeper. According to the interview with farmers that deep tillage controls weed seeds and yield is increased, whereas the tillage with power tiller is not good for the yield. The farmers are also revealed that the power tiller is very useful in the rainy season for preparing puddle soil for Transplanting Aman seasons. Some

farmers are opined that power tiller is required less time in order to tilt the land. It is cleared that the existing agriculture implements are developed based on the physical conditions of a locality such as land and soil type, particularly soil structure, depth of plough pan, nature of crop grown and also the socio-economic condition of the farmers.

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