

# Present status of adopted agricultural machinery in Sylhet region

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**Abstract:** Mechanized cultivation plays a significant role in food production of Bangladesh. Nowadays, the mechanization is increasing in such a manner which is very much able to acquire the food production requirement easily but the increasing population and decreasing rate of cultivable land daunting the food sufficiency in the future, which leads us to accomplish the study about finding out the current status of mechanization. A study was conducted in the Sylhet region as an undergraduate project work in the Department of Farm Power and Machinery, Sylhet Agricultural University, Sylhet. The objective was to determine the present status of the adopted agricultural machinery and make a comparison of the machinery used in different upazilas of Sylhet. The upazila agricultural office and the local farmers provided the data for the year of 2016-2017. On the basis of supplied data, it was found that the Osmaninagar upazila of Sylhet district has the most number of machinery as well as 3639 in number and the lowest, 997 pieces of machinery owned by Jaintapur upazila. On the cumulative measurement, Low lift pump (LLP) is used in the highest number, which is 9225, but seeder, bed planter and hand reaper are adopted in less than 5 in Sylhet district. Significant use of sprayer occurs in Sylhet upazila, which is 2306 in quantity. Among 13 combine harvesters, Golapganj and Zakiganj upazila use two in quantity respectively. The cultivable area of each upazila and the number of machinery indicate that Biswanath upazila belongs most machinery per square kilometer as 29.731 and the lowest is 6.358 per square kilometer in Gowainghat upazila. Among 13 upazilas, Sylhet, Biswanath, Fenchuganj, Biyanibazar have over 20 pieces of machinery per square kilometer, which is exactly 21.901, 29.731, 23.544, and 21.031 respectively. In this regard, developed machinery is required in this district to update the mechanization status. With a proper extension program and good promotion about this less available machinery, the superstition can be broken and the mechanization can be sustainable.

**Keywords:** mechanization, agricultural machinery, sustainable

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## 1 Introduction

Mechanization is an operative process through which improved agricultural activities and optimum crop production can be achieved. Currently, the mechanical inputs were used in different farming activities in Bangladesh like as pump, power tiller, subsoiler, weeder, sprayer, combine harvester and thresher for sustainable crop production. The cropping intensity and production of crops have recently been increased significantly due to the adoption of mechanized tillage, irrigation, and

spraying practices (Alam, 2000). According to BBS (2017), agriculture contributes a leading part for gaining the Gross Domestic Production (GDP) target which is 0.43% in 2016-17 in Bangladesh. Most of the people are involved in agriculture sector which employs 43.6% of total national employment (BBS, 2007; BBS, 2012) and on average 0.31 hectares owned by a small farm holder (Mottaleb et al., 2016). For the 160 million people, Bangladesh still can achieve self-sufficiency in food but it is getting harder day by day. Aus. was cultivated in 0.94 million hectares in 2016 which was 0.70 million hectares in 2015 (Majumder et al, 2016). However, yield and production could not be increased to the desired level due to the various bottlenecks in production. The challenges likely faced by the global farming tradition means mechanization of agriculture. Before the year of 2015,

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(Jabbar et al., 2011) the self-sufficiency of crops was more or less easily gained through the modern agricultural technologies but without further development of agricultural mechanization (Rijk, 1999), it may not be possible to ensure the food requirements for the increasing population. Sunamganj, Habiganj, Moulvibazar, and Sylhet play significant roles in crop production among the 64 districts of Bangladesh. Various types of agricultural machinery are used in this region for cultivating crops. Nonetheless, all machinery is not adequately adopted in this region (Matin et al., 2008). For this reason, production of yield per hectare is fluctuating over the cultivating season. Wohab (2012) reported the scenario of agricultural machinery in Bangladesh (Table 1).

**Table 1 The scenario of agricultural machinery in Bangladesh**

	Name of machinery	Quantity (unit)
Farm machinery	Power tiller	350,000
	Tractor	40,000
	Seeder	2,000
	Weeder	200,000
	Fertilizer applicator	8,500
	Sprayer	1,250,000
	Reaper	50
	Combine harvester	100
	Power thresher	200,000
	Maize sheller	2,000
Irrigation machinery	Winnower	200
	Low lift pump	140,000
	Deep tube well	31,300
	Shallow tube well	1,305,000

In 2000, almost 70% land preparations were finished by machine, which has now been raised to about 80%. However, bed makers, seeders, weeders, harvesters, and winnowers have limited the development (Ahmed and Matin, 2008). Almost 100% of maize and 80% of paddy and wheat is accomplished mechanically in threshing operation (Farouk et al, 2007). Efforts are being continued by the researchers to improve the machine performance.

In 2007-2008, the irrigated area coverage by different irrigation equipment was about 61% of the net cultivable area (8.29 million hectares). During the period, the associated mechanized equipment were 1.33 million which was 10.13% higher than those of the previous year. Though irrigation is done in a substantial area, the efficiency of irrigation schemes is very low (about

25%-40% for rice and 50%-55% for non- rice crops). About 80% of irrigation is done by groundwater and the remaining 20% is by surface water (BADC, 2008) and among the total irrigated area 90% of that is covered by minor irrigation (Mo, 2009). In Bangladesh, the mechanized irrigated area has developed from 0 to 4.62% in the period of 1960 to 2010 of the country (Islam, 2011), which means the succession of mechanization. Practicing of mechanization is considered in the Sylhet region which leads the crop production. This present study investigates to find out the proper insight of the mechanization status in Sylhet region. Additionally, attempt has also been made to understand the utilization pattern of agricultural machinery.

## 2 Materials and methods

Careful attention is very much important to select appropriate methods, procedures, and design for collecting valid data. The research necessitated the preparation of an interview schedule. The interview schedule was prepared according to the objectives of this research. This chapter deals with the methods and techniques for investigating mechanization status in Sylhet region.

### 2.1 Study area

The study was aimed to assess the status of adopted agricultural machinery in 13 upazilas namely Sylhet Sadar, Balaganj, Beanibazar, Biswanath, Companyganj, South Surma, Fenchuganj, Golapganj, Gowainghat, Jaintapur, Kanaighat, Osmaninagar and Jakiganj upazila of Sylhet district. The climate of Sylhet is humid subtropical with a predominantly hot and humid summer and relatively cool winter. The city is within the monsoon climate zone, with average highest temperature 23 degree Celsius and average lowest temperature 7 degree Celsius (Sylhet, Wikipedia). Majority of the people of this region are involved in agriculture farming and some of the farmers use machinery in the farming activities.

Generally, the plain land is covered by silt and clay soil and hilly area's soil surface become hard due to the sediment of sandstone. Resulting high amount of power is required for tilling purpose. In this case disc plow is most popular as attached implement instead of power tiller tine in the study area.

## 2.2 Field survey and interview

### 2.2.1 Questionnaire

A set of questionnaire was prepared for the farmers and upazila office. The questionnaires set of farmers has furnished 50 units for each upazila to collect information face to face interview. A semi-structured question was asked to the farmer to get a view of the number of the adopted machinery in the respected upazila.

### 2.2.2 Focus group

The focus group of this study was the agriculture-

related peoples in the selected areas. The farmers of these 13 upazilas were targeted to bring under the data collection process. To make sure the collected data was accurate, the collection was done by the farmer and the office because only office data might not be accurate.

## 2.3 Collection of data

The data was collected in numerical method to find out the present status of different types of agricultural machineries available in Sylhet region as shown in Table 2.

**Table 2 Adopted machinery available in different upazilas of Sylhet region**

	Reaper	Rice transplanter	Tractor	Power tiller	Power thresher	Foot pump	LLP	Spray machine	Combine harvester	Seeder	Hand reaper
Sylhet	18	1	12	269	356	25	560	2306	1	0	0
South Surma	6	1	2	386	200	11	600	385	0	0	0
Gowainghat	5	3	35	318	234	25	573	350	1	0	1
Balaganj	5	3	4	619	239	30	1131	384	1	0	0
Companyganj	20	1	26	202	168	33	368	510	1	0	0
Biswanath	9	1	4	251	140	38	1600	1166	1	0	0
Fenchuganj	2	1	10	255	155	28	400	490	1	1	0
Golapganj	9	3	10	750	266	48	875	661	2	0	1
Jaintapur	4	1	13	142	136	31	170	500	0	0	0
Kanighat	23	1	21	657	315	24	590	500	1	0	3
Jakiganj	3	2	15	398	75	22	235	339	2	0	0
Beanibazar	8	2	15	340	170	55	303	1778	0	1	0

## 2.4 Analysis of data

The data for the research was collected, compiled, tabulated and analyzed with respect to the objectives of the study. To find out the number of machinery per unit area and the comparison of utilization pattern of agricultural machinery was done by using Microsoft excel 2016 software.

## 3 Result and discussion

### 3.1 Scenario of agricultural machinery in the selected areas

The machinery availability in Sylhet region was unevenly distributed. In this chapter, the availability of machinery in different upazilas are shown graphically.

#### 3.1.1 Sylhet Sadar

Figure 1 shows that among all the machineries sprayers are maximum and rice transplanter are minimum. The result indicated that above 2000 farmers used the sprayer. The possible reason is that low price and availability in the local market has influenced the farmer. On the contrary, less consciousness, low production of agronomic crops depreciated Sylhet’s farmers in the least

use of combine harvester. Average LLP was used for pumping water in crops field due to high land and unavailability of surface water. Poor adaptability of rice transplanter was also observed with respect to soil conditions.

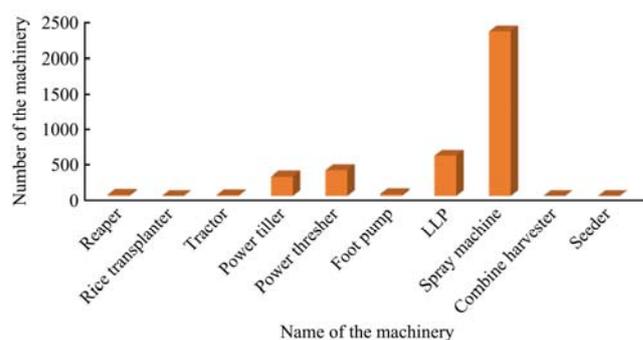


Figure 1 Number of machinery in Sylhet Sadar

#### 3.1.2 South Surma

LLP, power tiller and spray machine were abundantly presented in South Surma. Figure 2 represents that the highest number of LLP (600) was used. Rural electrifications and groundwater availability increased the use of LLP. Foot pump was also used at a significant level to boost up irrigation. However, foot pump covered a small command area in South Surma which is

time-consuming and laborious work. Harvesting and post-harvesting machinery was used at a low condition. This study also found that most of the machinery was used under subsidiary. It is clearly seen that power tiller, power thresher, and other costly machinery were present at an optimum level because of the good financial condition in South Surma.

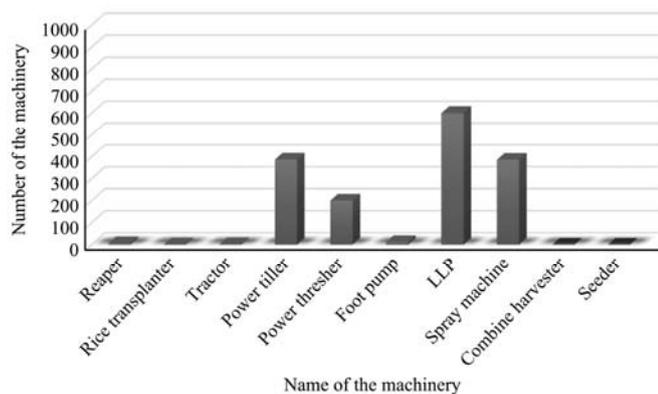


Figure 2 Number of machinery in South Surma

### 3.1.3 Gowainghat

Figure 3 shows that the sprayer was used at a significant level while rice transplanter and reaper was used at a less number. The investigation found that placing seed and seedlings was performed almost in a conventional way. About 54.5% of the total land was used in agriculture and 1,545 machines were used for cultivating 243 km<sup>2</sup> area (Table 3). This study also narrated that foot pump was used when LLP did not cover the hilly and yard crop for irrigation. Although reaper was used for harvesting crop but combined harvester was not familiar yet.

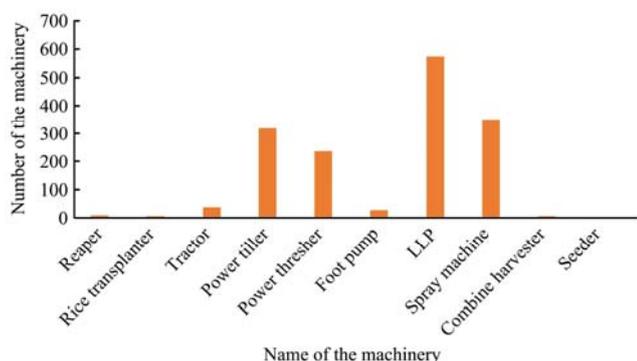


Figure 3 Number of machinery in Gowainghat

### 3.1.4 Balaganj

Hard soil surface had increased the adaptability of power tiller and LLP was mostly used from the last decades as a flood affected Sylhet district (Figure 4). Low cost, availability to the root farmers and high efficiency

has increased its use mostly. It was also found that disc and moldboard plow were used as associated implements for tilling operation at an adequate level. It is noticeable that rice transplanter and seeder is used considerably due to easy operation and high efficiency than traditional method.

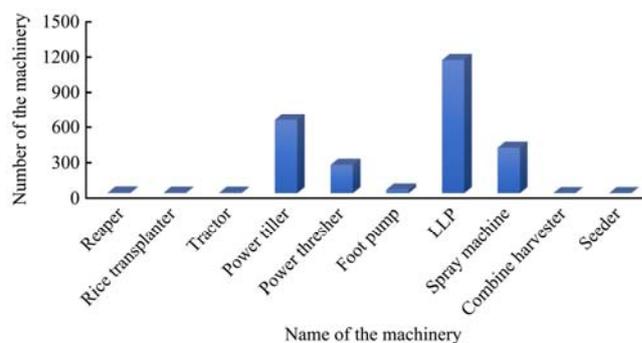


Figure 4 Number of machinery in Balaganj

### 3.1.5 Companyganj

Comprehensive use of the sprayer, LLP, power tiller and power thresher had increased the per unit area machinery use. Figure 5 shows that comparative appearance of machinery in Companyganj upazila. Practical and most effective use of power tiller revealed the mechanized tilling operation in this zone. This study found that all the sprayer was owned by farmers whereas power tiller and power thresher were provided under the project and government subsidiary. Fragmented land and lack of farmer's organization causes the inferiority used of the combine harvester in this area. Enhanced use of tractor was found as a result of framers' consciousness in case of transporting agricultural products to the consumer.

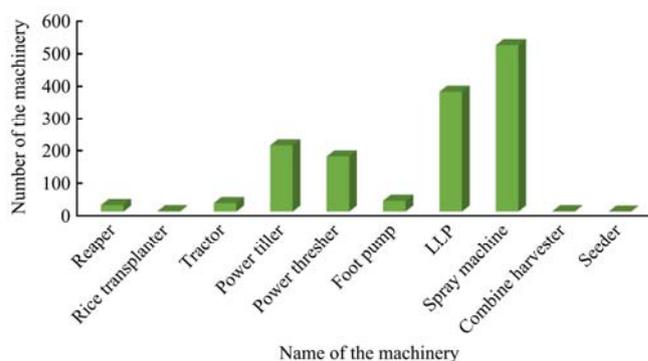


Figure 5 Number of machinery in Companyganj

### 3.1.6 Biswanath

Dominant of boro crop increased the use of LLP and sprayer. Figure 6 exhibits the number of available machinery in the respected area. Because of the lack of appellative steps and government supplementary, the use

of combine harvester became failed to turn into the advantage. Within total sprayer, 12% of it was utilized in Biswanath upazila.

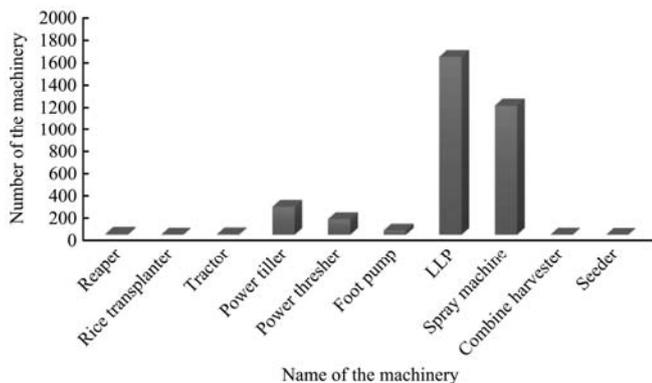


Figure 6 Number of machinery in Biswanath

### 3.1.7 Fenchuganj

Abundant use of sprayer and LLP was the result of low cost, easy operation and multiple uses of this machinery. Figure 7 represents that 490 sprayers, 400 LLPs, and 255 power tillers were used in this area. Livelihood income influences the farmer from buying more machines. Farming system of this area comprises 57 km<sup>2</sup> and 1352 machines used for total cultivation as shown in Figure 9. From the study it was observed that people’s eagerness in mechanization resulting significantly increased the used power tiller and power thresher.

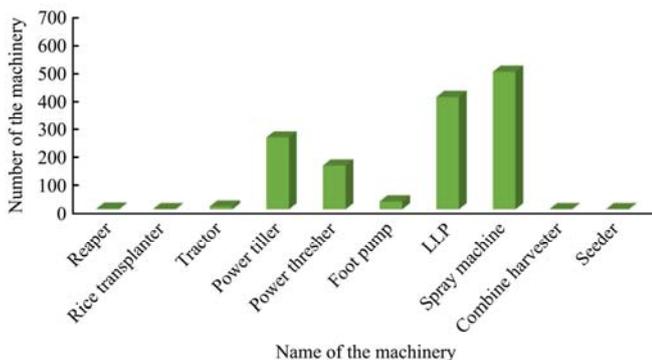


Figure 7 Number of machineries in Fenchuganj

### 3.1.8 Golapganj

It is noticeable that the maximum power tiller was used for cultivating land among all the upazilas as shown in Figure 8. Although LLP was used significantly, rice transplanter, reaper and combine harvester were used in a minimum range due to lack of insignificant abundance, high cost, and operational complexity.

### 3.1.9 Jaintapur

Availability of non-government organizations (NGOs) and government subsidiaries increased the use of the

tractor, spray machine and LLP at a maximum number (Figure 9). The result presents that among 142 power tillers from which six were provided from project and 136 were owned by personal deposits. In case of 290 sprayer were from various government project and 210 sprayers were owned.

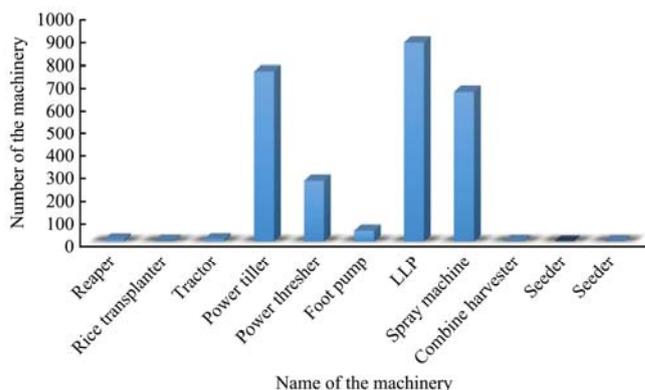


Figure 8 Number of machinery in Golapganj

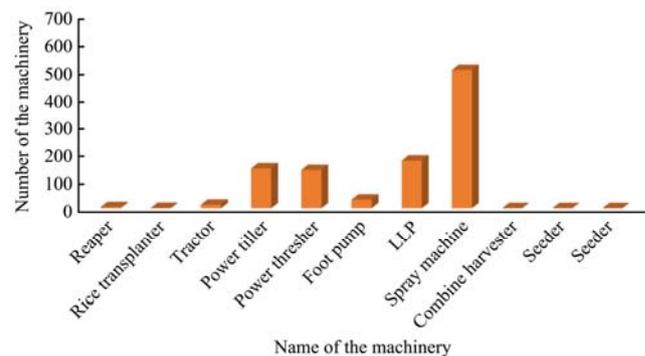


Figure 9 Number of machinery in Jaintapur

### 3.1.10 Kanaighat

Profuse use of power tiller occurred in this area which is 12% of total availability for the selected upazilas. Figure 10 shows that the foot pump and the tractor was used almost the same quantity. Adaptability of LLP greatly increased for high proficiency and availability to the locals.

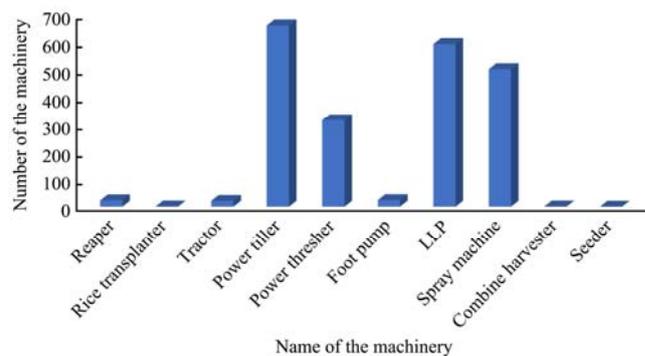


Figure 10 Number of machinery in Kanaighat

### 3.1.11 Jakiganj

In Jakiganj upazila, mostly used power tiller and

sprayer are in leading position. Figure 11 shows that the least used machinery was the reaper, rice transplanter, combine harvester and seeder compared with power tiller and sprayer. Power tiller was used significantly lower than that in Kanaighat and Jaintapur upazila.

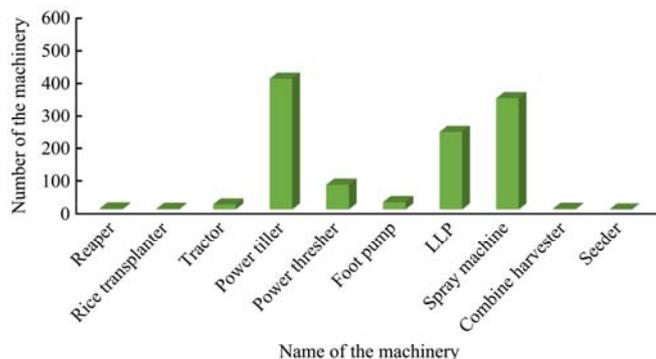


Figure 11 Number of machineries in Jakiganj

### 3.1.12 Beanibazar

The considerable number of sprayers were used due to the most of the cultivated land by horticultural crops although all other types of machinery are presented as shown in Figure 12. Interesting find is that from this study massive amount of non-cultivated and hilly area increased laggard persons which create a great effect on agricultural mechanization. From 253 km<sup>2</sup> total area only 127 km<sup>2</sup> of land are used in cultivation.

of LLP and power tiller were used in this area like as other study areas. Disc plow and moldboard plow implemented commonly on power tiller. LLP is used mostly because of irrigating a large amount of cultivated land. From the study, the farmer was given an opinion that power thresher and sprayer are used to get rid of from the laborious conventional threshing and spraying.

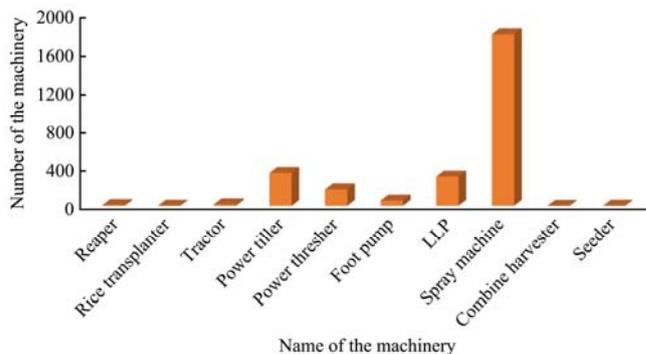


Figure 12 Number of machinery in Beanibazar

### 4.1.13 Osmaninagar

On the above discussion, the results found that plenty

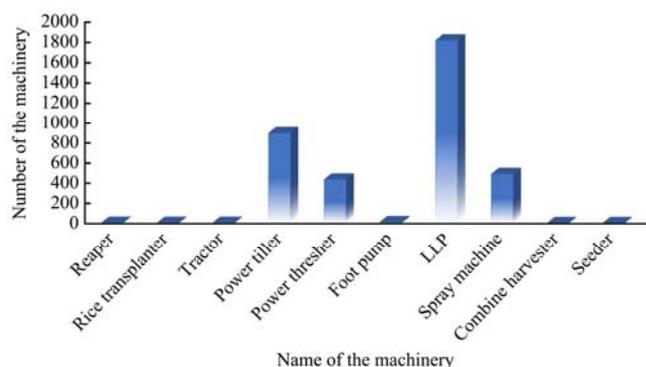


Figure 13 Number of machinery in Osmaninagar.

**Table 3 Different machinery exist per square kilometer**

Areas	Area (km <sup>2</sup> )	Reaper		Tractor		Power tiller		Power thresher		Foot pump		LLP		Spray machine		Combine harvester	
		No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>	No.	No. per km <sup>2</sup>
Sylhet	162	18	0.111	12	0.074	269	1.66	356	2.198	25	0.154	560	3.457	2306	14.235	1	0.006
South Surma	97	6	0.062	2	0.021	386	3.979	200	2.062	11	0.113	600	6.186	385	3.969	0	0
Guainghat	243	5	0.021	35	0.144	318	1.309	234	0.963	25	0.103	573	2.358	350	1.44	1	0.004
Balaganj	195	5	0.026	4	0.021	619	3.174	239	1.226	30	0.154	1131	5.8	384	1.969	1	0.005
Companygonj	140	20	0.143	26	0.186	202	1.443	168	1.2	33	0.236	368	2.629	510	3.643	1	0.007
Bishwnath	108	9	0.083	4	0.037	251	2.324	140	1.296	38	0.352	1600	14.815	1166	10.796	1	0.009
Fenchuganj	57	2	0.035	10	0.175	255	4.474	155	2.719	28	0.491	400	7.018	490	8.596	1	0.018
Golapganj	139	9	0.065	10	0.072	750	5.396	266	1.914	48	0.345	875	6.295	661	4.755	2	0.014
Jaintapur	130	4	0.031	13	0.1	142	1.092	136	1.046	31	0.238	170	1.308	500	3.846	0	0
Kanighat	206	23	0.112	21	0.102	657	3.189	315	1.529	24	0.117	590	2.864	500	2.427	1	0.005
Jakiganj	144	3	0.021	15	0.104	398	2.764	75	0.521	22	0.153	235	1.632	339	2.354	2	0.014
Beanibazar	127	8	0.063	15	0.118	340	2.677	170	1.339	55	0.433	303	2.386	1778	14	0	0
Osmaninagar	190	2	0.011	3	0.016	892	4.695	432	2.274	10	0.053	1812	9.537	486	2.558	0	0

### 3.2 Number of the machinery per unit area (km<sup>2</sup>)

Machinery per unit cultivated area refers to the number of machinery used in the study area. Table 3

shows that Osmani nagar was used for the highest number of modern machinery but tractor are existing 0.016 per square kilometer area whereas 0.175 in

Fenchuganj. In this study, we investigated that reaper and combine harvester were not familiar in the rural areas of Sylhet region. The result showed that six power tillers had existed in Golapganj whereas one standing Jaintapurper square kilometer of area. This investigation found that manual threshing system was still now covered in the Sylhet region instead of power thresher. It also found that 15 LLPs were present in Bishwnath on the contrary 10 LLPs exist in Osmaninagr to cover the per km<sup>2</sup> area. The analyzed results from the table noticed that advanced agricultural machinery per square kilometer area was not sufficient to fulfill the meaningful mechanization. Therefore, advanced agricultural machinery needs to be introduced in the agricultural sector for sustainable crops production.

#### 4 Conclusion

Based on this study, following findings were found that significant number 3,639 of machineries were used in Osmaninagar upazila which was three times higher than Jaintapur upazila. The results revealed that LLP was used the highest number 9,225 among all of the small and large machinery in the Sylhet region. Power tiller and power thresher for 5 483 and 2 889 respectively was taken second and third position followed by the LLP. In this study, we found that some modern machinery like seeder, bed planter, hand reaper and combined harvester were introduced in recent years, which resulted in less popularity. In this investigation, we remarked that a significant number of 2306 sprayers were used among all kinds of agricultural machinery in Sylhet region. The results showed that Biswanath upazila was ahead of all the 13 upazilas based on the present status of machinery with respect to 29 machineries per square kilometer area whereas Gowainghat, Companyganj, Jaintapur, and Jakiganj were far behind in the mechanization having less than 10 machineries. This study illustrated that the available machinery was not ample for sustainable agricultural mechanization. In this regard, government policymakers and the local machinery manufacturers should take a look at this non-mechanized upazilas to bring in the race of mechanization in agriculture. Therefore, the followings are the key recommendations which might be taken:

1) High yield and efficient farming depend on the adaptability and availability of machinery. Less use of machinery can cause the major deflection of GDP in agriculture. There is a need to evaluate the present status of mechanization with proper method.

2) More extension work and technical training program should be offered to the rural people.

3) There is a need for greater emphasis on research and development for adopting and accepting of machinery among the farmers.

4) Machinery prone area mapping should be prepared for future preparedness plans.

5) Production and distribution system should be improved.

6) Government should be taken initiative to give more subsidy in agricultural machinery sector.

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