

STUDY OF AGRICULTURAL MECHANIZATION AND ITS IMPACT ON RURAL ENVIRONMENT

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ABSTRACT

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The survey was conducted at author's own village "Charia Kalibari" in the Hatikumrul Union Parishad (No. 9) under Ullapara Upazila in Sirajganj District, Bangladesh during 2006 to know the status of agricultural mechanization and its impact on rural environment. Most of the farmers (80%) of the village said that fertility of soil was increased by agricultural mechanization. Farmers of the village seemed that layer of water was decreasing by deep tube well, as a result less water was being uptaking by wells and tube wells. Beneficiary earthworm and insects were destroyed by spraying pesticides. Animal draft power was decreasing with the increase of power tiller. As a result, cowdung is decreasing day by day. So, farmers used excessive chemical fertilizers instead of compost, which create toxicity in soil. Finally they stated that many peoples are being jobless which creates social problems. Eighty per cent farmers informed lack of spray machine for pesticides spray and high price of pesticides, and lack of fuel and high price of fuel for power tiller and power pump. Sixty per cent respondents claimed that lack of power tiller for tillage operation and lack of power pump for irrigation. Ninety per cent villagers told about improper supply of electricity.

Key words: Agricultural mechanization, soil fertility, rural environment

INTRODUCTION

Mechanization may be defined as the process of injecting power and machinery between man and materials in a production system. Mechanization as it relates to agriculture requires the study, manufacture, utilization, maintenance and repair of all tools, implements, machines, equipment and structures which will enable the farmer to raise the productivity of human labour economically. Esmay and Hall (1972) defined agricultural mechanization as the science application of mechanical aids for increased production, processing and storage of food with less drudgery and increased efficiency.

Farmer of Bangladesh generally used traditional plough for tillage operations in their field, but use of power tiller for land preparation has been increased in Bangladesh. In the early stage (1960) power tillers were imported by BADC and distributed to the farmers on experimental basis. It is estimated that nearly 1,50,000 power tillers are now operating in the country (Das, 1996). Until about the late 1950's, irrigation was basically through traditional method that included the use of swing baskets, don, hand tube wells and small gravity irrigation system, low lift pumps for irrigation were used from 1950. In 1968, the activities were expanded to include deep tube wells and shallow tube wells were used for irrigation form 1971 (BBS, 1989). To control the insects and pests the use of chemicals is now popular among the rural people. Mechanization of rice and wheat threshing is becoming popular recently. Mechanization may play a positive role and has negative impact on environment. So, the present study was undertaken to fulfill the following objectives:

- To asses the existing mechanization system in the village,
- To asses effect of agricultural mechanization on agricultural and social problem,
- To know the role of Government on agricultural mechanization and
- To find out the problems of agricultural mechanization

METHODOLOGY

The survey was conducted at own village "Charia Kalibari" in the Hatikumrul Union Parishad (No. 9) under Ullapara Upazila in Sirajganj District, Bangladesh of the author K. M. Khalequzzaman under guidance of Md. Abdul Karim during 2006. This survey was carried out for the fulfillments of a part of Foundation Training Course for NARS Scientists (Batch 13). At first questionnaire was developed and prepared. The questionnaires were used to record data from randomly selected 30 farmers of the village through interview. Information were recorded on population, number of household, literacy percent, number of education institution, occupation of rural people, agricultural production, health and nutritional status, social or NGO activities in the surveyed village. Other information was also recorded on agricultural mechanization on rural environment from the same respondents. The parameters were discussed as the surveyed village context as well as national context.

RESULTS AND DISCUSSION

1. Basic information of the village “Charia Kalibari”

The area of the village (Charia Kalibari) was three square meter and population were around 1900, where 975 male and 925 female. Total number of household was 370, literacy rate was 50% where 60% male and 40% female. There were one primary school and one Dakhil madrasha in the village. Main occupation of the people in this village was agriculture. Net income of the villagers ranged from Tk. 15,000 – 1,98,000 per year. Main crops were rice, mustard and potato, and vegetables were brinjal, bean, radish, cauliflower etc. Livestock were cow, goat and sheep, and poultry were hen and duck. Some villagers produced fish. Tube wells were main source of drinking water and 80% peoples used latrine. Communication with Upazila center/District are through road. Different NGO viz. BRAC, Grameen Bank, ASA etc. worked in the village.

2. Existing Mechanization System

a) Agricultural machinery presently being used on the farmers field in Bangladesh (Das, 1996)

Some of the agricultural machines, which are being used on the farmers’ field, are mentioned below:

- 1) Power tillers (imported and local)
- 2) Turbine, submersible pumps of different heads (local)
- 3) Centrifugal, suction-lift pumps of different capacities (local)
- 4) Treadle pumps, suction-lift reciprocating pumps (local)
- 5) Power pump, suction-lift reciprocating pumps (local)
- 6) Diaphragm pumps, suction-lift reciprocating pumps (local)
- 7) BARI sprinkler irrigation pump (local)
- 8) Agricultural sprayers (Hand sprayers, foot pump, power sprayer) (local)
- 9) Weeders (local)
- 10) Pedal thresher (local)
- 11) Power thresher (local)
- 12) Maize shellars (local)
- 13) Sugarcane crushers (local) and
- 14) Rice huller (mills and import)

b) Agricultural Machinery were used in the Village “Charia Kalibari”

Agricultural machineries were used in the village “Charia Kalibari” by the respondents are presented in Table 1. Table 1 showed that 80% farmers used power tiller and 20% farmers used animal draft for their land preparation. 80% land was covered by irrigation water of the village. 90% farmers used water of shallow tube wells and 10% used water of deep tube wells. 80% farmers sprayed by spray machine and 20% farmers by another way for their crops. 10% farmers used power tiller for threshing their cereal crops and 90% farmers threshed manually. Around 80% farmers used polythene with gunny bags and earthen pots for storing seeds of crops. Farmers did not use seeder, machine of intercultural operation and harvester.

Table 1. Agricultural machinery were used in the village “Charia Kalibari” by the respondents

Mode of action	Used equipments	No. of Farmers (%)	Farmers (%)
Land preparation	Power tiller	24	80
	Animal draft power	6	20
irrigation	Shallow tube well	27	90
	Deep tube well	3	10
Pesticides spray	Spray machine	24	80*
Threshing crop	Power tiller	3	10**
Seed storage	Polythene with gunny bag/ earthen pots	24	80***

Note: *20% farmers spray manually, **90 farmers threshed manually, ***20% farmers used doly etc.; 80% land was covered by irrigation water

3. Effect of Agricultural Mechanization on Agricultural and Social Environment

a) In National Context :

Mechanization process creates a great impact on socio-economic condition and environment of Bangladesh. Farm mechanization increases the farm productivity and judicious use of resources. But it is a controversial issue in a labour surplus densely populated country like Bangladesh. By vigorous mechanization many people may become jobless which create social problem.

Introduction of power tiller for tillage operation decreased the animal draft power of Bangladesh, which has indirect adverse effect on biomass fuel, and addition of organic matter in the soil. As a result, soil fertility may be affected. Deep plowing through Mechanization causes breaking of plow pan, which enhance the leaching loss

of nutrients, and reduces the water holding capacity of soil. Due to introduction of irrigation technology, dry land culture is transformed into wet-land culture that reduces the pasture land for cattle and affects the environment for micro flora and fauna. The use of surface water reduces the fishing ground and utilization of under ground water creates shortage of drinking water during dry season in some high land area (Das, 1996).

b) In the surveyed Village “Charia Kalibari” context :

Effects of Agricultural Mechanization on Environment according to the respondents are presented in Table 2. Some open questions were asked to the villager on the effect of mechanization on rural environment. Most of the farmers (80%) said that fertility of soil was increased by agricultural mechanization. Farmers of the village seemed that layer of water was decreasing by deep tube well, as a result less water was being uptaking by wells and tube wells. Beneficiary earthworm and insects were destroyed by spraying pesticides. Animal draft power was decreasing with the increase of power tiller. As a result, cowdung is decreasing day by day. So, farmers used excessive chemical fertilizers instead of compost, which create toxicity in soil. Finally they stated that many peoples were being jobless which created social problems.

Table 2. Effect of Agricultural Mechanization on Environment according to the respondents’ opinion of village “Charia Kalibari”

Effect of Mechanization	No. of respondents	% of respondents
Soil fertility increase	24	80
Water layer decrease by deep tube well	30	100
Destroy earthworm and beneficiary insects	24	80
Animal draft power decrease	24	80
Increase jobless problem	24	80

4. Role of Government on Agricultural Mechanization

a) In National Context :

Some of the measures already taken by the Government for successful implementation of a mechanization program in rural areas which are stated below:

- 1) **Research and development on Agricultural Mechanization:** Research and development related to Agricultural implements and post harvest processing equipment is primarily being done in the national research organizations BARI, BRRI, BJRI, BAU, BUET etc. also play an important in research and development of Agricultural Machinery.
- 2) **Testing and standardization of Agricultural Machinery:** The Government has established a national policy for testing of Agricultural Machineries. The Bangladesh Slandered and Testing Institute has the mandate to standardize Agricultural hand tools and equipments.
- 3) **Extension of Agricultural Machinery:** Extension and population of Agricultural Machinery among the farmers are done by the BADC and DAE. Government mass media like TV and Radio have programmes related to Agricultural Machinery extension (Hossain, 1988). Some big manufacturing companies do extension of their products.
- 4) **Subsidy on Agricultural Machinery:** The Government has the provision to give import subsidy for the purchase of Agricultural implements, equipment and machinery. But under the present privatization policy, these subsidies are gradually being withdrawn in order to eliminate them completely in future.
- 5) **Credit facilities:** The Bangladesh Krishi Bank and other nationalized commercial banks provide credit for the purchase of Agricultural Machinery to the farmers at concessional interest rates.

b) In the surveyed Village “Charia Kalibari” context :

Hundred percent farmers informed that they did not get any help from government about agricultural mechanization. They also did not get any training or machinery from Government.

5. Problems of Agricultural Mechanization

a) In National Context:

The following problems are occurred in agricultural mechanization

- 1) **Taxes and duties on imported machinery:** The lifting of imports bans together with the withdrawal of taxes and duties had made import of power tillers and pumps with engines so cheap that the local manufacturers are now out of production.

- 2) **High price of imported machinery:** Bangladesh imports many types of Agricultural Machinery. Prices of this machinery are very high. So, it is beyond capacity of purchase of poor farmers (Ahmed, 1984).
- 3) **Lack of applied research on agricultural mechanization:** Development of market for local products is very slow. The most urgent needs of the country are for problem oriented applied research and commercially oriented machinery design and development.
- 4) Premature release of machines for economical procedure leads to many, field problems and serious farmers' dissatisfaction.

b) In the surveyed Village “Charia Kalibari” context:

Problems of Agricultural Mechanization in rural area according to the respondents' opinion of village “Charia Kalibari” are presented in Table 3. Eighty per cent farmers informed lack of spray machine for pesticides spray and high price of pesticides, and lack of fuel and high price of fuel for power tiller and power pump. Sixty per cent respondents claimed that lack of power tiller for tillage operation and lack of power pump for irrigation. Ninety per cent villagers told about improper supply of electricity.

Table 3. Problems of Agricultural Mechanization in rural area according to the respondents' opinion of village “Charia Kalibari”

Problems	No. of farmers	% of farmers
Lack of spray machine for pesticides spray and high price of pesticides	24	80
Lack of fuel and high price of fuel for power tiller and power pump	24	80
Lack of power tiller for tillage operation	18	60
Lack of power pump for irrigation	18	60
Improper supply of electricity	27	90

Conclusion

The agricultural machinery was more or less used from around 1960. Now-a-days, many types of machinery have been developed. This machinery affects positive and negative impact on rural environment. Government did not help to the farmers of the village directly. The farmers have a lot of problems. So, the Government should supply all the facilities of agricultural machinery for higher crop production to the rural farmers.

Recommendations

- 1) Socio-economic problems, which are major constraints of farm mechanization, can be gradually minimized by increasing the level of education and informal creation of job opportunity by different activities.
- 2) There should be a clear policy statement on agricultural mechanization.
- 3) Continuance of subsidy to some extent in distribution of agricultural machinery.
- 4) To ensure loans at a concessional rates to manufacturers and consumers.
- 5) Identification of appropriate machinery for development in conjunction with farmers, planners and manufacturers.

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